

Woody plants
introduced from
North America

by

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Introduction

The present teaching material covers woody species introduced from North America. The discovery of America in 1492 marked the beginning of colonising, exploring and exploiting the continent that had been completely unknown to Europe. It is a milestone of such significance not only in botany, but also in horticulture, forestry and other practical fields focused on plant life that all the plants introduced into Europe after 1500 are termed neophytes.

While the North American continent has climate on large expanses that is similar to that of Europe to a degree sufficient enough for a large number of plants to be ready to accept Europe as their new native country, the vegetation of North America is significantly more diverse than that of Europe, which has been decimated by recurring ice ages. In North America, plants were much more likely to survive such periods, since the ground configuration (the main mountains oriented from north to south) was allowing the plant life to steadily retreat to the south and return to the north.

North America is native to many species that are now grown on different continents and thrive even in Central Europe, hence in this country. The black locust was introduced to virtually all continents (except Antarctica), where it often became a permanent part of communities or even a major species within those newly emerging. As an ornamental tree, the Colorado spruce (called also "silver spruce" in Czech) is in fact grown all over the globe with the exception of the tropics and Antarctica. Multitudes of other woody species are planted as ornamental trees in parks and gardens. Spruce, pine and fir trees, as well as Douglas firs, cypresses and giant cedars are grown in large numbers not only in parks, but also in forest stands. Forest management in many countries is dependent on the plantations of introduced woody plants; thus, although the Czech Republic still has enough stands of native woody species, it is also here where the Douglas fir, grand fir, eastern black walnut and northern red oak as well as the other group members are cultivated for the woodworking industry as promising species.

Other woody species were imported to Europe and tested as a source of raw materials for pharmaceutical or cosmetic industry (the witch hazel, the sweet gum) or serve for fruit production (serviceberries, the black chokeberry, hawthorns, cranberries or the blue huckleberry). Some woody plants were or still are promising as a source of various materials (the staghorn sumac - tannins, the osage orange - antioxidants).

Of course, introducing woody species involves drawbacks. Sometimes imported species got out of control and began quickly spread in the new settings; they can potentially damage the native communities. Some of them can cause allergies, are poisonous, etc.

While cultivated only as ornamental plants in this country, many of the species possess a far greater importance in their native regions, whether being utilised as forestry woody species for timber or for planting, amelioration and reclamation in the great outdoors (the black cherry, the white ash, the osage orange).

And even if not having any practical use, a number of the species were inevitable for indigenous cultures, whether as a source of food and medicinal substances, or as technology plants or sacred and symbolic species (the staghorn sumac, the red osier dogwood, the American sweet gum, the common snowberry, the pencil cedar, etc.

However, even if the trees were just beautiful, they are worth to become familiar with.

General information

The textbook has several parts. The main part consists of chapters dedicated to particular species of woody plants. They are sorted alphabetically by scientific name. Each chapter provides a species' scientific name and common name, synonyms, vernacular names in other languages where appropriate, a species description and distribution, ecology or conditions of cultivation, where applicable, the importance and use of the species and its variability. The nomenclature was used by Koblížek 2006 or Horáček 2007 (namely the lower taxa and cultivars). Any data not included in these sources were supplied by biolib.cz and databaze.dendrologie.cz. Conifers were compiled by Doc Ing Luboš Úradníček, CSc, while deciduous species were prepared by Ing Soňa Tichá, PhD.

Complementing the main part is the chapter dedicated to major Czech botanists and travellers - Thaddeus Haenke and Benedikt Roezl, who take credit for much more than just contributing to the discovery of new plant species in the New World. This chapter was compiled mainly using Internet resources. (Note: references are given for each chapter.)

List of acronyms and abbreviations

AGM - Award of Garden Merit; refers to quality branding awarded to garden plants by the UK Royal Horticultural Society.

IPNI - International Plant Names Index

AMSL - Above mean sea level

NP - National park

NL - Northern latitude

The story of Thaddaeus Haenke, the "hunter of lilies"

Thaddaeus Peregrinus Xaverius Haenke was a Czech traveller, naturalist, botanist, physician and ethnographer. Called "hunter of lilies" or "Czech Humboldt", he entered the history through several accomplishments, which essentially involved travelling and botany, but generally reached far beyond the fields. He launched the first Montgolfière-style hot air balloon in what is now the Czech Republic; he was the first Czech to arrive in Alaska (1791), New Guinea (1792), New Zealand (1793), Australia (1793), Tahiti (1793), and Cuzco (1794); he was the first to conquer Chimborazo, the highest mountain in Ecuador (1804) and to recognise Chilean saltpeter to be an excellent fertiliser. Notable are his ethnographic findings as regards Native South Americans, thousands of museum specimens of botanical and ethnographic importance that Haenke collected and sent to Europe, or a number of botanical discoveries that are now lost somehow to the memory of the public.

Youth

Thaddaeus Haenke was born in Chřibská, North Bohemia (then Kreibitz in German) on 6 December 1761 as the seventh of the twelve descendants of Elijah Haenke, a lawyer, farmer, local lay magistrate and a well-respected person. Haenke's older sister Anna Maria married in 1775 Jan Kaspar Bienert, a merchant with glass operating in Cadiz and later in Cartagena, thus creating a very close family relationship with the territory of Spanish language.

Small Thaddaeus lived for several years with his uncle - a pastor based in the village of Robeč by Česká Lípa. In addition to teaching him Latin and paid him music lessons at Professor Schubert in the town of Varnsdorf, his uncle Eschler was essential for the insightful, talented and diligent young man to be able to attend studies in that he sent Thaddaeus to the Jesuits in Prague. In the beginning, young Haenke was a singer and player of bassoon and trumpet in church; since however his musical career was soon terminated by pneumonia, he devoted to studies of mathematics, astronomy, physics, philosophy, medicine and botany at Prague university.

In 1784, he attracted the attention when he constructed a hot-air balloon following the French Montgolfière style and made successful experiments with unmanned flights. He also became the assistant to his teacher Mikan, the Director of the Prague Botanical Garden. He made several botanical trips and surveys in Bohemia focusing on the administrative regions of Rakovník and Beroun. Perhaps the most important expedition was that taken by foot and by cart from Prague to the foothills of the Krkonoše Mountains and to Lučiny, the mountain tops of Černá Hora, Studniční hora and Sněžka, the River Elbe valley, and back to Prague. This journey produced one of this country's first botanical inventories.

Still in the 1780s, Haenke left for Vienna, where he continued his studies at professors Jacquin (botany) and Maximilian Stoll (medicine), soon becoming the former's assistant at the university. Haenke brought so many findings from his scientific expedition to the Alps that he was admitted as a member of the Royal Czech Society of Sciences in 1789.

Travelling around the globe

Thaddaeus Haenke wanted to participate in the expedition led by Captain Billings, for which the cost was paid by Russian Empress Catherine II. Since however Billings eventually did not take any scientist, Haenke decided to attend another such event. Thanks to his excellent knowledge and skills, he was invited, upon the intercession of Ignatius von Born - an important scholar, to participate in a scientific expedition to the western hemisphere. It was organised under the auspices of the Spanish King Charles IV Bourbon. Thaddaeus Haenke received a permission to participate in the operation from Emperor Joseph II only upon the condition of returning to the homeland; this however never happened.

The corvettes of Descubierta and Atrevida led by Alessandro Malaspina di Mulazzo, an Italian captain in the Spanish service, were to sail away from Cadiz in 1789. Although Malaspina with his expedition fleet unfortunately went away before Haenke handled all the paperwork in Vienna and arrived at the Spanish port, the strong-minded and determined expedition naturalist did not give in and, assisted by a fellow, made his way onto a merchant ship bound for South America. Despite its poetic name, "Our Lady of Good Roads", the ship wrecked off the coast of Uruguay, Haenke being amongst the very few that saved themselves. The waves of the ocean retained all his personal belongings and scientific equipment; the credentials from the Spanish King Charles IV and a copy of Linné's *Genera Plantarum* were all that the traveller salvaged. A boat took him to Montevideo to learn that the Malaspina's expedition had sailed to the west coast of South America. Even that, however, did not make Haenke to return or give up. He set off on a risky and a highly challenging trip across the continent and the Andes, which took place largely by foot, to catch up with the expedition in Santiago on 2 April 1792, it just returning from the Falkland Islands. Another part of the discovery trip led to the upper stretch of the River Amazon to explore possible river navigability. Afterwards, both of the two ships moved along the west coast of America to the north as far as Alaska and back. Haenke was carrying out

scientific research and collecting plants and minerals throughout the journey (in Alaska, California, Mexico, Panama, Ecuador, etc.) to send everything to Spain.

A similar manner was applied to the following trip through the Pacific. Once the expedition explored the island of Guam, the Mariana Islands, the Philippines, a part of Australia and New Zealand as well as the Tonga archipelago and the Tahiti Island, it returned to South America in 1794.

Due to scorbute, but mainly because of a fall and arrest of Malaspina (accused of disloyalty in Spain as a result of conspiracy), Haenke stayed for good in Latin America, and continued taking natural history research trips to the interior of South America. In the Peruvian city of Callao, he asked for consent to a large inland tour. Spending several months in what is today Peru, he described a multitude of still undiscovered plant species.

Two years later, he finally settled in Cochabamba (then Oropesa), Bolivia, where he set up his medical practice and bought a small farm house with a garden in which he grew not only medicinal plants, but also other interesting plants brought from his trips. He also launched a silkworm culture to produce silk.

When examining the navigability of the River Marañón and its tributaries in 1801, Haenke discovered a then unknown water-lily plant with giant leaves and beautiful large flowers on the River Mamoré, which he also described for the first time. Another finding of this giant aquatic plant came only twenty years later - found by Frenchman Bonpland in the River Amazon Basin, it was followed after eight more years when d'Orbigny discovered the third specimen, this time on the River Paraná. Only the third piece of the plant known for 28 years was first scientifically described in a valid manner and named *Victoria regia* (later *Victoria amazonica*) in honour of Queen Victoria; the description and naming however happened only after Haenke's death. More recently, the plant was found to be actually two different species - *Victoria regia* growing in the River Amazon Basin, and the Santa Cruz water lily (*Victoria cruziana*) occurring in the River Paraná Basin, of which the former reaches slightly larger dimensions, it making the plant the world's largest water lily. Its leaves can grow to a diameter of up to 2 metres. Stiffened with a hard venation on the underside, they can carry a three-year child on the water surface (reportedly, even as much as 50 kg). *Victoria regia* arrived in Europe as late as 1849 via the Royal Botanic Gardens, Kew, England. Three years later, one such plant came into flower in the chateaux garden of Děčín, Czech Republic, which occurred for the first time in Europe. This plant sparked in Europe an enormous attraction in and a fashion of building *Victoria* greenhouses. Even today, the plant is amidst the most popular species in botanical gardens across the world.

Haenke also discovered or described a host of other plants; since most of them, however, became somewhat rusty, his name is associated mostly with just *Victoria* plants or in the best case with the world's largest bromelia, *Puya raimondii*.

While staying in South America, Haenke kept in touch with leading botanists and other scientists in Europe, sending them minerals, plants, seeds, indigenous cultures' artefacts and scientific studies on the natural world and on the life of natives. In 1804, he made a trip to the Andes where measuring mountain ridges. On that occasion, he stepped, as the first-ever human, on the highest mountain in Ecuador, Chimborazo (6.310 m). Haenke surveyed the silver mines in Potosí as well as numerous hot springs and headwaters in the region, and found a Chilean saltpeter, recommending the material as an excellent fertiliser. He gathered numerous ethnographic findings about the different native tribes. His documents on Native South Americans, including sketches of clothing, armament, tools and objects or vocabularies containing basic words of different tribes are available in the Madrid museum to this day.

Haenke's days of old age

In 1806-1809, Haenke was active as a Spanish government commissioner for the native tribe of Chiriguano to make the indigenous people familiar with the principles of Christianity. He began to sympathise with the patriots who fought for the freedom of individual Spanish colonies to eventually begin to help them. Examples included training how to produce gunpowder from sulphur and saltpeter, for which Haenke was arrested. His health was however so bad that he was released from the prison. He was recovering at home in Buxacaxey, where he soon died on 31 October 1817 under not yet clear circumstances. According to the official report of the Spanish colonial authorities, a maid mistakenly administered him a poison instead of medicine in his illness, the use of which resulted in convulsions and then death. Many do not believe this explanation, assuming he was poisoned deliberately. This version says that the maid deliberately administered Haenke his favourite corn cake with orange marmalade, which was poisoned.

Thaddaeus Haenke was buried in Cochabamba, where his house still stands and one of the main streets bears his name (Avenida Tadeo Haenke). Haenke's portrait hangs at Casa de la Cultura among those of the most important citizens.

Work of Thaddaeus Haenke

In Bolivia, Haenke was proposing the cultivation of appropriate crops; he also founded a botanical garden (the first-ever such facility in Latin America), produced a frequently used paper on the navigability of the rivers in the South American interior and is rightly considered one of the founders of natural history of Bolivia by Bolivian historiographers today, as well as respected as a person who very significantly influenced the country's economy. To this day, Haenke's name is expressed in Cochabamba with due pride. Haenke's descendants still live in this Bolivian town - at least the fifth generation of the Haenke family founded in the late 18th century by Don Tadeo, a native from Chřibská, North Bohemia.

Most of his valuable documents are kept today at the Royal Botanic Garden of Madrid; some are also stored at the Museum of Literature, Prague. As however regards the materials that Haenke wanted to pick up in person after his return eventually settled at the Náprstek Museum and the National Museum in Prague after a journey that was almost as impressive as that of Haenke's alone. The seven crates with natural products that Haenke sent in 1794 dwelled in the ports of Cadiz and later Hamburg until 1821. This whole estate was offered in 1819 to the Czech Patriotic Museum in Prague (today National Museum) for a very low price of 655 gold. Due to concerns that the material had been destroyed over the 25 years of storage in moist ports, the purchase underwent a total of three discussions. It was decided to transfer the cases to the town of Nový Bor, where they were inspected by Professor Tausch who concluded that the condition of the material (mainly plants) is much better than expected. After this testimonial, the Patriotic Museum bought the collection that was encompassing 15,000 plant specimens of 4,000 species. The collection was scientifically processed under the supervision of Count Kašpar of Sternberg and new or rare species were published in the works entitled *Reliquiae Haenkeanae, seu, Descriptiones et icones plantarum: quas in America meridionali et boreali, in insulis Philippinis et Marianis collegit Thaddaeus Haenke* (1825-1835). Invitation to participate in the work was extended to numerous domestic and foreign botany specialists, with Karel Bořivoj Presl being appointed an editor-in-chief. Seven notebooks listed more than 700 new, not yet described species of plants. Thaddaeus Haenke's herbarium items are amidst the most valuable collections of the botanical department at the National Museum in Prague.

The indigenous people items, such as angling rods, hats, baskets, models of boats etc. are stored at Náprstek Museum.

Thaddaeus Haenke's name is used in botanical literature in the form of HAENKE". In IPNI, his name is given in 74 entries, the examples include: *Begonia anemonoides* Haenke, *Campanula pusilla* Haenke, *Dianthus glacialis* Haenke, *Gentiana frigida* Haenke, *Gentiana prostrata* Haenke, *Pinus pumilio* Haenke (today a synonymum) or *Poa badensis* Haenke.

Haenke's name is contained in names of 240 taxa, such as

Alpinia haenkei C. Presl

Berberis haenkeana Presl ex Schult. f.

Bromus haenkeanus (J. Presl) Kunth

Carex haenkeana C. Presl

Ceratochloa haenkeana J. Presl

Hymenoxys haenkeana DC.

Lobelia haenkeana A. DC.

Loranthus haenkeanus Presl ex Schult. f.

Pteris haenkeana C. Presl

Salvia haenkei Benth.

Waltheria haenkeana D. Dietr.

and others.

Named after Thaddaeus Haenke in addition to plants was the Haenke Island, Alaska.

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The story of Benedikt Roezl, the "orchid hunter"

Benedikt Roezl was a Czech traveller, gardener, and plant collector. He is perhaps the most renowned collector of exotic plants, particularly orchids, of his time. Many of these were described and named by Roezl himself or described by other botany specialists according to specimens sourced by Roezl and named after him. It is perhaps worth remembering that Benedikt Roezl did not have adequate formal education - he attended only a primary school - and that he achieved his knowledge only through his long hard work and constant self-education.

Young age

Benedikt was born on 13 September 1824 in Horoměřice near Prague, in the family of gardener Vincent Roezl who taught the young boy the gardening craft from the childhood. In 1836, Benedikt left for the town of Děčín to start his apprenticeship in the gardens of Count F. A. Thun, in which Franz Josst, the then most respected grower of exotic plants in this country, became involved as teacher. Under his leadership, Benedikt Roezl learned for three years how to cultivate and take care of numerous foreign species, of which however orchids fascinated the young man the most, attracting his favour throughout his life.

After completing his apprenticeship in 1840, Benedikt worked in several gardens in various parts of Europe until 1846 when he was admitted as a gardener at a commercial gardening centre of Louis Van Houtte in Ghent, Belgium. Here, with his knowledge and diligence, Benedikt soon became a head gardener for tropical greenhouses and later on, when Van Houtte's gardening business became a state institute, he was appointed a senior gardener. This however did not satisfy the young man whose desire was to see America, the native homeland of the plants that he knew and admired.

First stay in America (1854-1872)

In March 1854, Benedikt Roezl sailed from the Dutch port of Vlissingen to New Orleans, taking market plants with him from Europe to America, such as rhododendrons, geraniums, fuchsias and camellias. They were to help him to set up a gardening business, the earnings from which were intended to pay for his botanical collections. In New Orleans, he sold a part of the imported plants and encouraged to visit Mexico

which he accomplished in May 1855, when he first stepped on Mexican land in Veracruz to head for Mexico City. On his way, he made a stop in Cordoba. In the neighbourhood of this town, at the foot of the volcano of Pico de Orizaba, Benedikt acquired his first collections of plants that he sent to the Louis Van Houtte's gardening centre in Ghent. The shipment contained nearly a thousand of seeds of woody species, heathers and orchids.

Ciudad de México - the Mexican Capital - was reached by Benedikt in 16 June 1855; robbed, but unhurt, he bought an inn with a garden on the outskirts of the town along with his boyfriend Louis Chabé. He was periodically undertaking plant-collecting expeditions in the surrounding area. In the late 1858, he left *Ciudad de México* along with Louis Chabé to settle in a newly established small village of Santa Borgia where they set up another inn and gardening centre. Roezl had him sent European varieties of apple and pear trees from Europe, becoming engaged in growing the plants under local circumstances. In the dry season, he undertook expeditions to the mounts of Popocatepetl, Iztaccíhuatl and Nevado de Toluca where he was collecting plants at an elevation of 4,000 metres and at six degrees below zero. In 1859, he undertook a plant-collector's trip of five months, gradually visiting five Mexican states. On his way, he was captured by rebels several times and robbed. After completing the journey, Benedikt sent from Mexico, among others, 30,000 specimens of the orchid *Odontoglossum rossii* Lindl.

After he left the village of Santa Borgia in 1860, Roezl bought land near the village of Santecomapan. Here he continued to cultivate European varieties of apple and pear trees while collecting plants in the area. His activities also involved experimenting with growing the ramie. After the successful cultivation and processing this fibre crop, he left to sail to New Orleans to put his results on display.

In January 1868, Roezl travelled to Havana, Cuba, to present the ramie processing on a machine of his own design. As he did so, there was an accident when the machine crushed his left hand, so the hand had to be amputated. Benedikt remained in Cuba for additional four weeks of recovery before returning to Santecomapan. Here he handed over his operations and gardening centre to his relatives who arrived from Bohemia upon invitation. Benedikt returned to Cuba, restricting his activities only to collecting plants which initially took place near the River Magdalena, Colombia, the collections being sent to Europe once per month. A total of 10,000 orchids were gathered over four months, of which 3,000 specimens involved *Odontoglossum* orchids. In addition, 500 diverse species of plants were entered into the collection. During the rainy season, Benedikt left Columbia to collect the seeds of coniferous trees in California. Afterwards, he visited Vancouver Island and British Columbia and then returned to San Francisco. He went through southern California as far as the Mexican border. Although his ship wrecked on the way back, Roezl saved and re-arrived in San Francisco.

After recovering from the shipwrecking he returned to Colombia, to the city of Buenaventura. At that time, he signed his first and at the same time last contract binding him to collect plants at a specified location and for a particular company - Linden gardening centre in Brussels and Ghent. Half a year later, he took his collections on 80 mules from the mountains to the River Magdalena, then by boat to Barranquilla and from there they were sent to Europe.

The early 1872 met him staying in Peru. Initially, he collected plants on the west coast, from where he went into the Cordilleras to spend four weeks on the eastern side of the Andes. After the trips around Peru, Roezl went to Colombia to continue to Europe via Panama. He entered the European mainland on 1 May 1872, bringing with him his biggest catch from his trips - a rare orchid *Cypripedium palmifolium* Lindl., and new species of orchids that were later named after him in his honour: *Cypripedium roezlii* Regel, *Masdevallia roezlii* Rchb. f. and *Odontoglossum roezlii* Rchb. f.

Second stay in America (1872-1874)

In America - New York, Benedikt Roezl arrived along with his sixteen-year-old nephew František Klaboch on 3 August 1872. From New York, they left for Denver after a month. Taking several days, the collecting activities around the town yielded six crates of the small soapweed, *Yucca angustifolia* Pursh, and thousand bulbs of *Calochortus* plants. The travellers, however, were robbed of all the cash in the local pub. After the theft, Roezl and Klaboch left for New Mexico to collect plants to turn back to Denver fourteen days after and hear the outcome of the investigations. Since it was negative, Roezl had to borrow money to go to California by the Pacific Railroad, taking trips into the neighbourhood with Klaboch at each stop.

In October 1872, they left Acapulco, Mexico, heading for Sierra Madre to collect 2,000 specimens of the orchids *Odontoglossum citrosimum* var. *rosellum* Lem, *Odontoglossum nebulosum* Lindl. and *Odontoglossum pulchellum* Bateman ex Lindl. Another orchid, *Oncidium tigrinum* Lindl., made them to climb up to about 3,000 metres above sea level. Searching for the orchid *Cattleya mossiae* Hook. led them in February 1873 into the surroundings of Caracas, Venezuela. Their search for an orchid called *Flor de mayo* by the natives met with success - they managed to fill eight crates.

Still in Venezuela in February 1873, they moved to Mexico. Worth mentioning amongst the plants collected locally are the four large specimens of the cactus *Echinocactus visnaga* Hook sent to London. The largest of these was one metre tall and weighed 5 quintals.

Subsequently, in March 1873, Roezl made a stop at his closest relatives in Santecomapan to leave there his nephew František. On the next journey, Roezl was accompanied by another of his nephews, František's brother Eduard Klaboch, who had arrived in Santecomapan from Vienna in 1871 and joined Benedikt to head for Peru. In August 1873, they took the railway from Lima to go up to the elevation of 5,000 metres and bring 10,000 orchid tubers when coming back. Another of their journeys led to the Lake Titicaca, Bolivia, to La Paz and from there to the Andean foothills of Yungas via the Illimani Mountain. This journey too yielded a host of plants delivered, especially orchids. Encouraged by previous collections, they once again entered the mountains to discover a new orchid in Ecuador at an elevation of 6,000 metres when climbing Mount Chimborazo. Named *Pescatori roezlii* Rchb. f., it marked the end of the second Roezl's American stay drawing near. Leaving the nephews Eduard and František in America, Benedikt sailed to London in April 1874, his cargo containing, among others, the orchids *Pescatoria dayana* Rchb. f., *Masdevallia chimaera* Rchb. f. and *Odontoglossum roezlii* Rchb. f.

Third American stay (1874-1875)

On his way to New York, where he arrived on 15 July 1874, and onwards as he travelled America, another of his nephews, Bohumil Houda, became Benedikt Roezl's companion. To circumvent the law, Roezl registered Bohumil, then sixteen years old, as his own son of twenty four. From New York, they went to the Niagara Falls to make a short stop of two days. Then they continued to Denver via railway, where they arrived on 2 August 1874 to gather seeds around the town. Several days after, the activity yielded 125 kg of conifer seeds, 25 kg of seeds of the small soapweed, *Yucca angustifolia* Pursh, and 10 kg of seeds of the bush morning glory, *Ipomoea leptophylla* Torr.

From Denver they left by train towards San Francisco. While on the way, they were making stops at some stations to undertake collection trips in the surrounding. In doing so, they collected a total of 2,000 bulbs of *Lilium washingtonianum* Kellogg, 150 kg of seeds of *Pinus lambertiana* Douglas and several crates of *Lilium puberulum* Torr. ex Duch.

Upon arrival in Mexico in December 1874, Roezl's plan was to undertake trip to collect plants in the immediate vicinity of the volcano of Colima. Several attempts to climb the volcano failed due to the hard-to-penetrate terrain and the attack of cold fever. Yet their collections counted 100,000 orchids, which included 22,000 specimens of *Odontoglossum cervantesii* La Llave & Lex. The attempt to reach the top of the Colima Volcano was repeated in April 1875, which this time occurred from a different direction. The first try failed but Roezl did not give up and tried to climb the volcano once again after a couple of days, this time

successfully. Despite the mountain restoring its volcanic activity, they climbed to an elevation of 4,000 metres. Plant collection results, however, did not meet the collector's idea with only finding *Dahlia imperialis* Roezl ex Ortgies becoming the reward for the effort.

In April 1875, Roezl was dwelling in San Francisco to recover from the hardships of travelling and to leave the town for Europe after four weeks.

Days of old age

After returning from America in 1875, Benedikt Roezl was travelling across Europe. This included a stop at the flower exhibition in Cologne, where *Begonia froebelii* A. DC. which he had discovered was honoured with the first prize.

In October 1876, Roezl permanently settled in Prague - first in the quarter of Žižkov, then in Karlín. Slowly he was getting used to the native setting. Initially, he was organising trips and plant collection activities in America for his nephews - Klaboch brothers and Bohumil Houda, their customers including not only major horticultural enterprises in Europe and America, but also the imperial gardens of Schönbrunn, the Rothschild's garden in Vienna and greenhouses of Sychrov Chateau.

The 1st International Gardening Fair held in St. Petersburg in 1879 witnessed Roezl receiving the Medal of Merit in Horticulture. In January 1880, forty gardening professionals founded the Guild of Artistic Horticulture Flora with Benedikt Roezl being elected the president. He also became a member of the Provincial Fruiterer Association and the Society for the Cultivation of Horticulture in Bohemia.

On 1 March 1883, the first issue of the Flora magazine was on, Benedikt Roezl being its publisher and its first two volumes containing a serial of Roezl's travelogue memories.

Credits and honours that Benedikt Roezl received continued in December 1884 at the botanical-horticultural exhibition in St. Petersburg. In addition to serving as a judge, Roezl was awarded the Order of St. Stanislaus by the Russian Tsar for which the botanical specialist received congratulations from his friends and business partners from both Europe and America. The series of tributes continued in Bohemia when Roezl returned from St. Petersburg and involved a grand dinner held by the Flora Guild at which Roezl received a laurel wreath with a tricolour ribbon. Ceremonial speeches were given by František Josef Thomayer - a prominent landscape architect, and Martin Fulín, a horticulture writer.

Benedikt Roezl died on 14 October 1885 in Prague when sixty one years old. The funeral ceremony was held on 16 October in the Church of St. Wenceslas, Smíchov, Prague. A day later, the coffin was placed in the tomb of Roezl's father Vincent in a graveyard in Panenský Týnec near the town of Louny.

Linked to the story of Benedikt Roezl is also that depicting the erection of his monument in Prague. As the 19th century neared its end, Czech natural scientists resolved to build a statue in Prague to honour Jan Svatopluk Presl, a botanist and awakener, seeking assistance in promoting this idea from a Prague daily newspaper. As a result of an error made by the author of the article, readers were told that there would be a monument built of Josef Ressler, the inventor of the screw-propeller. And, that was not the end: there was another confusion in searching for a good site with the city officials deciding to place the monument at the square of Karlovo náměstí which this time involved a monument dedicated to Benedikt Roezl. Meanwhile, a memorial was made and funded by both domestic and foreign horticulturists and friends - depicting Benedikt Roezl, its author was a young sculptor Augustin Zoula. The work still decorates the Prague square, the inscription on it translating as:

"Devoted to Benedikt Roezl, the famous botanist and traveller, by his admirers"

The standard form of the scientist's name used in botanical literature reads as ROEZL. IPNI is listing the traveller in 289 records. Roezl is the author of description for a number of plants from not only the orchid family, but also members of pine trees, bromeliads and species of *Agavaceae* and *Cactaceae* families, etc.

Roezl's name can be found in nearly one hundred and thirty species of plants, the examples to mention being as follows:

Roezliella Schltr. genus (today it stands as a synonym for *Sigmatostalix* Rchb. f.)

Amaryllis roezlii Regel

Brahea roezlii D'Ancona

Cattleya roezlii Rchb. f.

Cereus roezlii J. N. Haage

Furcraea roezlii André

Guzmania roezlii Mez

Lilium roezlii Regel
Masdevallia roezlii Rchb. f.
Pinus roezlii Carriere
Pescatoria roezlii Rchb. f.
Selenipedium roezlii Rchb. f.
Sobralia roezlii Rchb. f.
Yucca roezlii hort. ex Baker
Zamia roezlii Regel

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***Abies balsamea* (L.) Mill. - Balsam Fir**

Pinaceae

Other names: Canadian Fir, Blister Fir

Czech: Jedle balzámová

Description

A lesser-bodied tree, reaching the height of 15-25 (35) m and trunk diameter up to 1 m; in higher elevations, it often develops a shrub form. Maximum life span is 200 years. Erect trunk, the crown is conical, of medium width. Needles are of dull blue-green on the upper side with visible bands of stomata at the needle end; distinctive bands of stomata are on the underside as well. Needles are 15-25 mm long, salient on the upper side of the branches, distichous on the underside. Buds are small, ovoid, strongly resinous, green to red. Twigs are greyish-green, pubescent. Cones are 5-7 cm long, cylindrical, blunt ended, purplish-brown; bract scales not protruding. The root system is well developed almost along the surface; uprooting occurs frequently on wet or shallow soils.

Distribution and ecology

The balsam fir has a wide range in the northern and eastern parts of North America which in Canada is from Labrador and Newfoundland in the east as far as southern Alberta in the west, while in the USA it is found around the Great Lakes, from Minnesota in the west to Virginia in the southeast. It occurs from the sea level to the elevation of 1,900 m; Mount Washington in the White Mountains being the highest area. Often forming pure stands, it however usually grows in boreal forests with *Picea glauca* and *P. mariana*, while more to the south it is with *Pinus strobus* and *Tsuga canadensis*. It has the largest distribution area of North American firs. Introduced to Europe in 1698; in Bohemia it occurred in 1835 (Prague). Juvenile plants tolerate strong shading, while in the adult age the light requirements are rising. Prefers rather moist soils, often grows on waterlogged soils, requires sufficient precipitation and sustained high relative humidity. Found most often on rather poor, acidic soils and peat bogs, but grows on sands or crystalline, less frequently on nutrient soils. Grows best at lower elevations on rather deep soils. Although frost-resistant to a sufficient degree, it does not favour a continental climate. Can withstand flue gases to a moderate extent.

Practical importance

In its native area of distribution, balsam firs are used chiefly for the production of pulp, wood finds its application in building construction, e.g. doors, frames, packaging material etc. The resin is used for producing the so-called Canadian balsam, a commodity used in optics and pharmacy. Fine branches were once used as padding for pillows. Notable is its use as Christmas tree. Cultivation is rare in this country - it is rather a species for collections. No importance for forest management due to it being heavily damaged or even destroyed by game. A quite slow-growing woody species, able to adapt extremely well to the given conditions, it still does not suffer from rather serious pests in this country. Not an invasive species - no natural regeneration occurs. Only a decorative tree; noteworthy with its scent of resin.

Note

Out of more than 10,000 individuals planted in the territory of the Training Forest Enterprise Masaryk Forest Křtiny in 1920s-1930s, a single tree preserved until 1980 - all of the remaining trees were destroyed by game.

***Abies concolor* (Gord.) Engelm. - White Fir**

Pinaceae

Other name: Colorado Fir

Czech: Jedle ojíňená, stejnobarvá

Description

Medium-sized to stately tree, 45-50 m high in stands, a trunk diameter of up to 1.5 m, life span of 200-300 years. The maximum dimensions - the height: 60 m, trunk diameter: 2 m, life span: 500 years. The trunk is usually erect and slender; conical crown. Long, soft, sickle-shaped needles. Needle length: 25-60 mm, needle width: typically 2-2.5 mm. Needles similarly coloured on both sides, from light green to silvery blue, dull. Buds are oblong-ovoid, 3-5 mm long, up to 3 mm wide, coloured yellow to brownish-yellow, and resinous. Annual shoots are yellow-green to grey-green, glabrous or sparsely hairy. Blooms in April. Cones are about 7-13 cm long, 3.5-5 cm wide, without salient bract scales. The species propagates from year 40 irregularly in the range of 3-5 years. Germination is around 50%. The root system undergoes versatile development and the woody plant is very well anchored in the soil. Breakage occurs under the gust of wind or snow rather than uprooting.

Distribution and ecology

A North American species with a range in the southwest and west of the United States. Isolated sites are also in Mexico. Inland and seaside parts of the range are necessary to discern. In the interior, the white fir occurs in the main mountain groups of the Rocky Mountains of Colorado, Utah, Arizona and New Mexico, while the oceanic distribution extends in California in Sierra Nevada and in the Coast Range to Southern Oregon. In terms of elevation, the distribution is extremely extensive depending on the climate and ranges from 500 m in the northwest to 3,200 m in the southeast. The white fir tolerates shading, thus it often occurs in the lower layers of stands. Trunk sheds branches poorly. Rather small specimens can keep being dwarf in the shadow for long decades. However, it can also grow well in full sunlight. Not very water-demanding species; especially in the southeast portion of the range it thrives in dry, hot areas, exposed to full sunlight. It occurs on a wide variety of substrates. Introduced to Europe in 1873, or maybe even in 1851 according to some data. Gives the best results on drained volcanic soils if moisture supply is at least somewhat favourable. Tolerates considerable climatic extremes. Belongs to the firs with the best tolerance to the urban environment. Has many pests from both animal and plant kingdoms; losses by browsing can be particularly considerable.

Practical importance

An associated species, the white fir has a marginal importance in terms of forestry. Elsewhere in the world, it found its application as an ornamental tree, particularly the form with blue-silver needles. If used, distinguishing between the coastal and the continental variety is necessary, similarly as with the Douglas fir, due to the better growth and the quality of the coastal variety.

Variability and cultivars

var. *lowiana* (A.Murr.) Lemm - Californian white fir [(syn.: *A. lowiana* (Gord.) A. Murr.)] - The needles are straight, length 40-80 mm, with more prominent whitish bands of stomata from the underside. It naturally occurs in the Coast Range on the borders of California and Oregon. A fast growing tree, it is good for use in forest stands, but requires more precipitation and wetter soils than the type *A. concolor*. Maximum dimensions - height: 60 m, trunk diameter: 2 m, lifespan: 500 years.

***Abies grandis* (Douglas) Lindl. - Grand Fir**

Pinaceae

Other names: Giant Fir, Lowland White Fir, Great Silver Fir, Western White Fir, Vancouver Fir, Oregon Fir

Czech: Jedle obrovská

Description

A massive-growth tree reaching a height around 70 (90) metres and a trunk diameter of over 1.5 metres. The species does not reach any greater life span; max. 200 to 250 years are standard values. The trunk is erect and slender; the crown is regular, multiple-tiered, usually conical. Needles are flat, shiny dark green on the upper side, with two white bands of stomata on the underside, 30-60 mm long, distinctively distichous, different lengths side by side, smell like citrus when rubbed. Buds are small, ovate, resinous, often purplish. Twigs are olive green, shiny, glabrous (strong end annual shoots are pale hairy, needles mostly cover the twig from above). Cones 5-10 x 4 cm, cylindrical, acuminate, fresh-green, bract scales not protruding. The species starts to propagate as early as year 20. The root system is well developed into the depth and anchors the woody plant in the soil very well.

Distribution and ecology

The species is native to the western portion of North America, particularly widespread in the Pacific part of the continent. The seaside part of the range covers the Cascade Range and the Coast Range from the southwest of Canada through Washington and Oregon to northern California. The inland portion of the range extends over different mountain ranges of the Rocky Mountains from Canada to Idaho. In the northern portions of these two sub-areas, the species grows from the sea level to an elevation of about 600 m, while in the southern parts it extends into the mountains, sometimes to the forest boundary; 2,200 m is the maximum. Introduction to Europe occurred in 1831, to Bohemia in 1839 (Sychrov Chateau). The species tolerates shading and lasts long in the second tier. It requires sufficient precipitation and soil moisture; in places with persistent high relative humidity it grows even on rather dry surfaces. Geological bedrock of sites is very diverse; the tree occurs on basalts and andesites, weathered lava and tuffs, on various crystalline rocks, on sediments and even on limestones. Grows best on rather deep drained alluvial valleys. It is resistant to frost. Can withstand flue gases to a moderate extent.

Practical importance

In the area of its native range the grand fir is ranked amongst the many of farmed woody species. In this country, it is sometimes cultivated as a decorative tree. From the 1960s onwards, it began to be introduced into forest stands in Europe. A very fast-growing woody species, it can reach the height over 40 m as early as year 50. In this regard, it exceeds other conifers and equals the Douglas fir. In this country, no rather serious pests have been observed, but on rather rich sites it is often damaged by the *Armillaria* fungi. Regenerates naturally, but is not of invasive nature. The soft, light-colour wood is an important source of fibre; it is also used for lightweight structures and packaging materials. Provides invaluable ornamental twigs and is used for Christmas trees.

***Abies lasiocarpa* (Hook) Nutt. - Subalpine Fir**

Pinaceae

Other names: Alpine Fir, Downy-cone Fir, Oregon balsam Fir

Czech: Jedle subalpinská

Description

A lesser-size tree, reaching the height of 15-30 (45) m and a trunk diameter up to 1 m. Max. life span: 400 years. The trunk is erect; the crown is considerably narrow and acuminate at the top. Needles are of dull blue-green upper side with distinctive bands of stomata, with visible stomata on the underside as well; they are 18-40 mm long, projecting crossways from the twigs and directed forwards from above. Buds are small, ovate, resinous, brown. Twigs are greyish-green, pubescent. Cones are 5-10 cm long, cylindrical, blunt-ended, purplish-brown, bract scales do not protrude. The root system is richly developed nearly along the surface and anchors the woody plant in the soil very well. Often producing noticeable multi-stemmed forms at higher elevations.

Distribution and ecology

The typical species known as *Abies lasiocarpa* var. *lasiocarpa* is native to western North America and distributed mainly in the Pacific part of the continent. The seaside part of the range covers the Cascade Range and the Coast Range from northern California through British Columbia in Canada to Yukon, Alaska while the interior part extends over several mountain ranges of the Rocky Mountains from Canada to Idaho (USA). *Abies lasiocarpa* var. *arizonica* (with more silvery needles and cork bark) in turn grows in the Rocky Mountains (Colorado) to New Mexico and Arizona. Rather high elevations are typical of the subalpine fir. In Alaska, however, it is found from the sea level to an elevation of about 1,200 m. More southwards, its sites move up into the mountains, such as in Olympic National Park where it reaches to locations at 1,800 m above sea level. In the southern-most part of the range, it extends up to 3,600 m, often forming a forest boundary. The subalpine fir was introduced to Europe in 1863, which in Bohemia took place in 1865 (Hluboká Chateau). The species tolerates shading when juvenile, but later it is rather light demanding. It requires sufficient precipitation and soil moisture; at sites with persistent high relative humidity it grows on drier substrates as well. Geological bedrock of sites is very diverse; the tree occurs on nutrient substrates and various crystalline rocks, weathered lava and tuffs, usually on acidic soils, but even on limestones. It grows best at moderate elevations on deep soils, often occupying litosols as well. A frost-resisting species, it can withstand flue gases to a moderate extent.

Practical importance

Since the subalpine fir is among the smallest fir trees in its native range, it is almost not exploited as an economic woody plant in the southern portion of the area; it is however one of such species in Alaska. In this territory, its wood finds application in building construction, to produce doors, frames, packaging materials and boxes, and as a source of fibre. Of particular importance is the protective planting, stabilising slopes, anti-avalanche planting etc.

In this country, the species is cultivated as a decorative tree, which mostly applies to the *arizonica* variety. A very slow-growing species, it can adapt to the conditions very well and is advisable for use as a mobile form of greenery. It has not been suffering from rather serious pests in this country and natural regeneration almost has not been observed. It is rather enriching collections.

***Abies procera* Rehd. - Noble Fir**

Pinaceae

Syn.: *Abies nobilis* (Dougl.) Lindl.

Other names: Bracted Fir, Silver Fir, Feather-cone Fir

Czech: Jedle vznešená

Description

A tree of large dimensions. The stands normally tend to contain trees with a trunk diameter of 120 cm, a height of around 60 m, and the age of 300-400 years. The largest measured specimens are up to 90 m tall with a trunk diameter of 220 cm. Reaches the longest life span of all firs: 600 to 700 years. The trunk is erect and full-timbered, with a thin bark until the old age. The crown is cylindrical. The closely spaced needles are of silvery colour (blue-green), flatly spread and curved backwards, with a length of 20-35 mm, covering the twig from above. Buds are ovoid, resinous. Annual shoots are reddish-brown, downy. Cones are very noticeable, 12-25 (27) cm long, with salient, back-curved, narrow bract scales. Propagation starts on year 50; in this country, it produces a large number of empty seeds. The root system is fasciculate, developed rather in terms of area; it lacks the tap root, thus uprooting may occur at exposed sites. The trunk sheds branches very well in the stand and remains smooth, without knags.

Distribution and ecology

It is a North American woody species with the range in the western United States (Washington, Oregon, and northern California). Found most often on the western slopes of the Cascade Range and in the high zones of the Coast Range from 500 (min. 200 m) to 2,000 m (max. 2,500 m). Imported into Europe after 1825 (1830), in this country since 1865 (Hluboká). The noble fir is a light-demanding tree, thus it occupies with its crowns the top layer of stands while thriving very poorly in the lower storeys. It requires plenty of precipitation and sufficient soil moisture. It grows on a variety of bedrocks; volcanic materials and sediments prevail. A woody plant of the oceanic climate, it withstands even tougher winter when there is enough snow. Has little pests compared with other firs. With its soft needles and thin bark, the tree has a low resistance to browsing so is very often damaged by game.

Practical importance

In its native range, the noble fir is a species of high economic value, but still very little represented. Unlike the competing woody species of the same height category, it has a much greater volume of wood mass. A rather intense forestry use not yet occurred in this country. In addition to finding its application as a nice decorative woody plant in extensive parks, it is grown on plantations as a Christmas tree and becomes increasingly popular.

Variability and cultivars

'Glauca' - Silvery-blue needles. Recognised since 1894.

***Acer circinatum* Pursh. - Vine Maple**

Aceraceae/Sapindaceae

Czech: Javor okrouhlolistý

Description

A patulous deciduous shrub to a multiple-trunk tree, 6-12 m tall, with a smooth outer bark. Opposite leaves with palmate venation, seven- to nine-lobate, 6-12 cm wide, lobes 1-2 times sharply serrated, deep cut to about one-third of the leaf blade, pubescent on the underside only in the young age; turn red in autumn. Leaf scars of narrow sickle shape, connected with a V-shaped line. Annual shoots greenish, glabrous, often glaucous. Buds are ovoid, covered with multiple scales. Whitish flowers with a purple calyx and a glandular disc grow in pendent panicles. Blooms in April-May. The fruit is a double samara, with individual achenes being up to 4 cm long, divaricate.

Distribution and ecology

The species' range is western North America from British Columbia to northern California along the Pacific Coast, within a strip of about 300 km wide, from sea level to the elevation of 1,500 m. Grows in coastal thickets, on clearings and as undergrowth of moist forests with *Pseudotsuga menziesii* and *Abies grandis*, on nutrient soils rich in nitrogen. It favours a rather cold oceanic climate. After cutting, it regenerates on the stump very well. Introduced to Europe in 1826, to the territory of the today's Czech Republic in 1880 (Sychrov Chateau). Tolerates open, sunny locations as well.

Practical importance

The vine maple is an ornamental woody species favoured in the west of North America, valued for its autumn leaf colour and attracting with the bark colour. It forms a welcome alternative to *Acer japonicum*.

In this country, it is a less-often grown ornamental tree of a rather small size, decorative through its leaf. Does not grow wild.

The wood is hard, heavy and durable, but grows only small proportions. It is used to craft handles, small boxes, wooden parts of baskets, etc. Indigenous cultures used the wood for making snowshoe frames, parts of cradles, and perhaps even for the production of bows. Fresh wood will not burn and was used for hanging kettles over the fire. Charcoal mixed with oil was used for preparing black colour.

Annual shoots were applied in basket braiding, with thicker branches serving as frames. Leaves were good for wrapping fruits and vegetables for winter storage.

Sap was sourced from trunks in early spring. The sap has however less sugar than that of other species of maple.

Charcoal was used in traditional medicine; mixed with water and brown sugar, it served to treat dysentery and poliomyelitis.

Variability and cultivars

var. *fulvum* J. Henry - yellow flowers

'Glen Del' - The habit narrow and erect, slower growth; 5-7-lobate leaves, 4-5 cm wide, lobed to the centre, the middle lobe is much longer than the others; red petioles; light green blades, sometimes possessing creamy margins. Originating from the USA, before 1984

'Little Gem' - A shrub up to 1 m tall, very densely branched, globose; thick leaves of the same shape as the original species, but much smaller, 1-3 cm in diameter, less lobed - only to the quarter of the blade, light green in colour, turn orange, crimson and red in the autumn; discovered as a witch's broom in Vancouver, British Columbia.

'Pacific Fire' - A multiple-trunk tree, shoots first purple and orange, the bark then grenadine; light green leaves turning gold in the autumn; a very attractive tree in winter because of the colour of branches and shoots.

Note

The leaves formed a model for the symbol of marking a U.S. Army's major and Lt. colonel.

***Acer pensylvanicum* L. - Striped Maple**

Aceraceae/Sapindaceae

Syn.: *A. striatum* Lam.

Other names: Moose Maple, Moosewood

Czech: Javor pensylvánský

Description

A stately deciduous shrub or a tree, 8-12 m tall, with a globose to a sub-globose crown, with pendant branches when adult. Green-striped bark of the trunk and the branches. Opposite leaves with palmate venation, circular in outline, trilobate in the upper part of the blade, 12-18 cm long, corrugated on the upper side, the underside is ferruginous and hairy, which later on is found only in the axils of veins, petioles 2-10 cm long, pink. Leaf scars of narrow sickle shape, linked with a V-shaped line. Annual shoots are green, glabrous, non-glaucous, lactescent; dark red buds, covered with two scales. Yellowish flowers are arranged in pendant 10-15 cm long and glabrous racemes. Blooms after foliage, in May and June. The fruit is a double samara, with individual achenes being about 2 cm long, the wings sickle-curved, forming an obtuse angle.

Distribution and ecology

The striped maple is native to the northeast of North America, from Nova Scotia to the Appalachian Mountains (northern Georgia), where it grows from the lowlands to the mountains (to an elevation of about 1,000 m) in the undergrowth of wet, cool forests, on slopes, on nutrient, moist soils, often in large quantities. Introduced to Europe in 1755; in Bohemia, it took place in 1865 (Hluboká Chateau). It is one of the most shade-tolerant maples and a typical species of shelterwood. It is capable of both blooming and propagating in the shade. It favours deep loose soils, and a rather moist, acidic site; on calcareous soils it may suffer from chlorosis of leaves. A frost-resistant species, but may develop frost cracks on the trunk and branches when planted at a site with full sunlight in the early spring.

Practical importance

In its native range, where it occurs in the undergrowth of forests, this maple is not used by forestry and is rather considered an unwanted species, because it prevents other species from regeneration.

At present, it occurs not very often in this country; it is found in parks as a tree decorative through its leaves, fruits and the distinctively striped outer bark it features in winter. It does not grow wild.

The wood is of not very good quality and soft. The tree will not reach any larger dimensions and the wood is not commercially used. Serves as fuel in some areas.

As with other maples, the leaves were once used for packaging fruits and vegetables for winter storage.

In traditional medicine, the inner bark was used to treat cough, cold, kidney infection and gonorrhoea. Externally, a decoction was used for washing swelling of the limbs and for baths in paralysis. Tea made from twigs was mitigating or, vice versa, inducing vomiting depending on the dosage.

Variability and cultivars

'Albo-variegatum' - An erect to tree-shaped shrub, crown elongate-ovoid to cylindrical, rounded; leaves of whitish colour.

'Aureo-marginatum' - Colourful yellow leaves.

***Acer saccharinum* L. - Silver Maple**

Aceraceae/Sapindaceae

Syn.: *A. dasycarpum* Ehrh.

Other names: Creek Maple, Silverleaf Maple, Soft Maple, Swamp Maple, Water Maple, White Maple

Czech: Javor stříbrný

Description

A deciduous tree species, 20-30 (40) m tall, with a patulous crown and dark outer bark - peeling off in long, lengthwise strips later in life. Opposite leaves with palmate venation, deeply five to seven-lobate, 6-14 cm wide, with irregularly sharply 2x serrated, long acuminate lobes, pale green, smooth on the upper side and silvery white on the underside (a waxy coating); in autumn, the upperside is yellow to red, while the underside is silvery white. Leaf scars narrowly sickle-shaped, not touching each other, but connected with a V-shaped line. Annual shoots are reddish-brown, glabrous; buds are ovoid, covered with multiple scales; the lateral buds are differentiated as leaf and flower (rounder) buds. The flowers are apetalous, green-yellow, in small clusters. Blooms in March, sometimes in February, before foliation. The fruit is a double samara, maturing in June. The individual achenes are 4.0 to 7.5 cm long; wings enclose a right angle approximately. Seedlings germinate hypogeically.

Distribution and ecology

The silver maple is a woody plant of eastern North America - from Maine and Quebec to Georgia, in the west to Minnesota, Kansas and Oklahoma. It mostly grows on moist to mudified soils. It does not tend to be part of forest stands. Introduced in 1725 to Europe and in 1835 to the territory of this country (Prague - the park of Královská obora). It is a fast-growing, short-lived, shade-tolerant woody species, resistant to frost and quite resistant to immissions and dust level. In soils high in calcium, it may suffer from chlorosis; is sensitive to salinity. Not suitable for compacted surfaces. If planted, it grows well even on drier sites. In the wild, its life span can reach up to 130 years, but barely 80 years if planted in an urban area.

Practical importance

For the nice foliage and high growth rate the silver maple is distinguished as a park tree; unfortunately, it is often damaged by wind. In this country, planting is common in parks and tree avenues throughout the territory and is most frequent in Central/Eastern Bohemia and Northern Moravia. Growing wild occurs rarely (Mělník - the port).

The wood is lightweight, fragile, of lesser quality than that of the domestic maple species and is used for the production of plywood, crates, furniture, floors, and fibre. Annual shoots are used in basket production. The inner bark is used for preparing brown dye, while twigs are source of black dye. Black to dark blue dye is produced from a mixture with lead sulphate and is usable as ink. The bark mixed with that of hemlock and oak is used for removing rust from iron and preparing an anti-rust paint. Leaves were formerly used for wrapping fruits and vegetables for winter storage.

This species too is used for extracting sap although it has less sugar and is of lesser quality than the sap of sugar maples. Other parts, i.e. inner bark, seeds, seedlings, were used in the kitchen in the same way as parts of the red maple (*A. rubrum*).

In traditional medicine, the bark was used internally to treat cough, cramps, dysentery and gynaecological problems, while external use was good for washing sore eyes and old ulcers.

Variability and cultivars

Dozens of cultivars are known. e.g.

'Born's Gracious' - Height up to 20 m, leaves partite almost to the base with narrow, coarsely serrate lobes. A significantly winter-proof tree. Cultivated in 1959, Rosenheim.

'Elegant' - Ascending branches, small leaves, lobate only in the upper half. Cultivated since 1969.

'Pyramidale' - Broadly columnar, brittle branches, leaves coarsely serrate, often bowl-curved, with a curved-up margin, grey on the underside, yellow in autumn. Cultivated since 1885.

'Wieri' - Up to 20 m tall, long-pendant branches, leaves distinctively silvery on the underside, with very long and narrow lobes. Cultivated since 1873.

***Acer saccharum* Marsh. - Sugar Maple**

Aceraceae/Sapindaceae

Syn.: *A. barbatum* Michx., *A. saccharophorum* K. Koch

Other name: Rock Maple

Czech: Javor cukrový, cukrodárný

Description

A deciduous tree, 20-25 (40) m tall; crown patulous, globose-ovoid; outer bark coarse, furrowed, tabularly peeling. Leaves opposite with palmate venation, three to five-lobate, sometimes seven-lobate; 8-14 cm broad, sharply acute lobes, but not extended into a filiform tip, coarsely serrate along the perimeter, petiole and leaf margin ciliate, pale green, glabrous on the upperside, cinereous on the underside, petiole not lactescent when torn, autumn colour: yellow to red. Annual shoots are green, later reddish, glabrous; buds are slender, spindle-shaped. Green-yellow flowers are arranged in few-flowered, almost sessile corymbs, on pendant, pubescent, 2-7 cm long peduncles. Blooms in April, before the foliation. The fruit is a double samara, individual achenes are 2.5 to 4 cm long, wings enclose an acute angle.

Distribution and ecology

The species is native to eastern North America from Nova Scotia to Minnesota, in the south to Georgia and Texas, where it grows in forests from lowlands to the mountains (1,600 AMSL), often as the main stand-forming woody plant. Prefers a rather cool climate. Introduced in 1753 to Europe, and in 1885 to Bohemia (Prague - the park of Královská obora). A rather slow-growing, shade-tolerant species, quite frost-resistant; prefers deep, drained, but sufficiently moist soils, will not tolerate flooded land. Quite sensitive to salting roads and not tolerating flue gases, it is not suited for street planting. Tends to be damaged by winds.

Practical importance

In the USA, the sugar maple is used in forestry, is an economically important tree and provides one of the most valuable hardwoods. In addition, it is commercially grown as a source of maple sugar.

In this country, the species is cultivated as a tree for parks or collections. It does not grow wild.

The wood is fine-grained, solid, hard, heavy, highly glossy. It is used for making furniture, sports utensils, ships, musical instruments. Valued for the manufacture of wooden flooring as well as a fuel - the ash is rich in minerals and gives large quantities of potash.

Leaves were formerly used for wrapping fruits and vegetables for winter storage. It is the most popular maple for the extraction of sap to produce maple syrup. The sap is extracted in March and contains 2-6% sugar. One tree can provide 40-100 l of sap, while 30-40 l of sap is sufficient for making about 1 litre of syrup. Other parts, i.e. inner bark, seeds, seedlings, were used in cuisine in the same way as parts of the red maple (*A. rubrum*).

In traditional medicine, the tea made from the inner bark was used as a blood tonic, a diuretic and an expectorant. Drops made from the bark were used for treating blindness, the sap was applied in treatments of sore eyes, and syrup was part of medications to treat cough, while serving as a liver and kidney tonic.

Variability and cultivars

ssp. *grandidentatum* (Nutt. ex Torr. et Gray) Desmarais - A small tree, up to 12 m in height, or just a shrub form; leaves 3-5 lobate, 5-11 cm wide; leaf lobes acute or blunt, entire with a lobate margin, bluish on the underside, softly hairy, red in autumn. North America: the Rocky Mountains, Utah to New Mexico. Known since 1894.

ssp. *nigrum* (Michx.) Desmarais - (syn.: *A. nigrum* Thunb., *A. nigrum* Michx. f.) - A tree to 40 metres with a blackish, deeply furrowed outer bark; leaves mostly 3-lobed, 9-15 cm wide, pendant downwards, hairy on the underside, yellow in autumn, wings of achenes enclose an obtuse angle. Eastern and central North America.

ssp. *ozarkense* AE Murray - A lesser and more thickset tree up to 12 m in height, or reduced to a shrub form; leaves five-lobed, abaxially grey-green, with curved lobes. Arkansas and Missouri.

A very variable species with dozens of cultivars grown.

ssp. *skutchii* AE Murray - A tree 15-30 m tall, the trunk often up to 75 cm in diameter, twigs glabrous; long-petiolate leaves, palmately three to five-lobed, 12-16 cm long and 14-20 cm wide, abaxially usually grey-green and hairy tomentose on the veins, the base deeply or shallowly cordate, the lobes triangular-ovate or broadly ovate and acuminate, glabrous from the upper side, paler and often cinereous on the underside, villose-tomentose on the nerves, otherwise sparsely hairy or glabrous; the inflorescence is a corymb, pedicels up to 3 cm long; fruits 2.5 to 4.5 cm long, the seed part 1 cm long, non-flattly, almost smooth. Guatemala, an endemic species.

Note

Acer saccharum is the official tree of the U.S. states of New York, Vermont, West Virginia and Wisconsin.

***Aesculus octandra* Marsh. - Yellow Buckeye**

Hippocastanaceae/Sapindaceae

Syn.: *Ae. flava* Soland., *Ae. flava* Ait., *Ae. lutea* Wangenh., *Pavia lutea* Poir.

Other names: Common Buckeye, Buckeye Sweet

Czech: Jírovec žlutý, pavie žlutá

Description

A deciduous tree 15-25 m tall, with a narrow crown and flaky-peeling outer bark. The leaves are opposite, palmately compound, pentamerous, long-petiolate; leaflets 10-15 cm long, oblong-obovate to narrowly elliptic, petiolulate, pubescent on the underside in the young age, later almost glabrous. Annual shoots strong, grey-yellow to brownish, glabrous; buds brown-red, slightly glutinous. Flowers grow in erect panicles 10-15 cm long; are symmetrical, yellow; calyces and stems glandular and hairy, stamens not protruding. Blooms in May and June. Capsules globose, 5-6 cm in diameter, smooth.

Distribution and ecology

The species is native to south-eastern North America, from Pennsylvania to Georgia and Illinois. In this area, it grows on slopes and in the valleys of sub-montane and montane forests on moist soils. It often grows together with the sugar maple (*Acer saccharum*). Introduced in 1765 to Europe, and in 1835 to Bohemia (Prague - the park of Královská obora). Grows well on deep, rather moist soils. A frost-resistant plant.

Practical importance

The yellow buckeye is a decorative tree with pendant branches, but not very distinctive when it comes to the colour of flowers.

Not infested by the horse-chestnut leaf miner. In the UK, the species was awarded by listing under the AGM.

In this country, the tree was formerly grown more frequently; today it is rather seldom planted in parks, botanical gardens and arboretums. Does not grow wild.

The wood is very soft, lightweight, fine-grained, difficult to split. In the natural range, the wood is used for producing furniture or decorative items; it was formerly used, for instance, to manufacture prosthetic devices (such as artificial limbs), and to produce cellulose. The fruits contain saponins; when crushed, they can be used as soap or detergent. The seeds and young shoots of this species are considered toxic to animals. Reportedly, the seeds are as sweet as the sweet chestnut fruits, yet they contain saponins and need to be processed before using in a way similar to the seeds of other chestnut trees. The flowers contain sweet nectar that can be sucked in the similar manner as with the dead-nettle nectar.

Variability and cultivars

f. *vestita* (Sarg.) Fernand - Annual shoots and the underside of the blade densely hairy. Ohio, Kentucky. Known since 1893.

f. *virginica* (Sarg.) Fernand - Flowers red, pink to yellow. West Virginia.

***Aesculus parviflora* Walt. - Bottlebrush Buckeye**

Hippocastanaceae/Sapindaceae

Syn.: *Ae. macrostachya* Michx., *Pavia alba* Poir.

Other names: Dwarf Buckeye, Dwarf Horse Chestnut

Czech: Jírovec drobnokvětý, pavie drobnokvětá, bílá

Description

Deciduous, spreading and patulous shrub, 2-4 m tall, of a loaf shape, heavily propagates by means of root suckers. The leaves are opposite, palmately compound, pentamerous to heptamerous, long-petiolate; leaflets oblong, 8-16 (20) cm long, sharply acuminate, serrate, with rather long petiolules (8-10 mm), dark green and glabrous on the upper side; grey-green, densely and shortly hairy on the underside; pale yellow in autumn. Annual shoots are grey, hairy, glabrescent, with large clypeiform leaf scars; buds conical, non-glutinous. Flowers grow in rich, terminal, erect panicles 20-35 cm long, are symmetrical, white, only about 1.5 cm long, with distinctively long stamens (3-4 cm). The tree flowers from July to August. Capsules obovate, 2-3 cm long, smooth; chestnuts small, with a little scar.

Distribution and ecology

The bottlebrush buckeye is native to south-eastern North America from South Carolina to Florida via Alabama, where it grows in rich woods, on the cliffs, but mostly on the banks of watercourses, on sandy soils. It is a woody species of the shrub layer of hard-wood floodplains. Introduced in 1785 to Europe, and in 1835 to Bohemia (Prague - the park of Královská obora). It tolerates both full sunlight and half-shady and shady zones. Grows well on freshly wet but deep drained soils, and is frost resistant.

Practical importance

A species suitable for parks and rather large gardens, relatively a late flowering tree. It is a convenient woody plant to cover large areas of land. Although native to the eastern portion of North America, it never became a very preferred garden woody species. By contrast, it gained AGM in the U.K.

In this country, it is quite often planted in parks as an ornamental, preferably solitary shrub that stands out within rather extensive lawn areas. It does not grow wild.

The wood is easy to process and is used for the production of water troughs, crates, tea boxes, ornamental items, etc.

In traditional medicine, the plant was used for treating colic, constipation, whooping cough and rheumatism.

The level of toxicity and the possible use of e.g. seeds are assumed to be identical as those for *Ae. pavia*.

Variability and cultivars

f. *serotina* Rehd. - The underside of leaves slightly hairy to glabrous, blue-green; flowers 2-3 weeks later than typ. Alabama.

f. *serotina* 'Rogers' - blooms later than f. *serotina* and much later than the type; the inflorescence is much longer than that of typ.

A seedling produced by selection.

***Aesculus pavia* L. - Red Buckeye**

Hippocastanaceae/Sapindaceae

Syn.: *Pavia rubra* Poir.

Other name: Firecracker Plant

Czech: Jírovec pavie, pavie červená

Description

A deciduous shrub to a small-sized tree, 4-6 (15) m tall, with pendant branches when adult. Leaves opposite, palmately compound, pentamerous, long-petiolate. Leaflets oblong, 8-15 cm long, serrated, shortly petiolulate, deep-green, glabrous on the upper side, lighter on the underside, hairy on the veins. Annual shoots are glabrous, rather thick, with wide pith; buds non-glutinous. Flowers in rich, erect panicles 10-16 cm long; are symmetrical, vividly red. Capsules globose, 3-5 cm in diameter, smooth or with tiny bosses, spineless in all cases, light brown; chestnuts dark brown with a small whitish scar.

Distribution and ecology

The species is native to southeast North America, in the north from Illinois to Virginia, to the south from Texas to Florida where it grows in coastal forests and bushes. Introduced in 1711 to Europe, and in 1835 to Bohemia (Prague - the park of Královská obora). Grows best on deep, freshly moist soils. A quite frost-resistant tree.

Practical importance

The species is a favoured ornamental plant, sometimes grafted onto the common horse chestnut.

Cultivated as an ornamental tree in this country, although its hybrid, the red horse chestnut (*Aesculus* × *carnea*) is more frequent, does not grow wild here at present, while in some countries it is classified as an invasive species.

The flowers are attractive to bees and hummingbirds. The fruits are rich in saponins; when crushed, they can be used as soap or detergent. The oil contained in the fruits was formerly used for making soap.

Natives used the seeds cooked in cuisine, probably only in times of meagreness. When that happened, saponins were removed by roasting with subsequent leaching the seeds in running water and additional boiling and leaching.

In traditional medicine, the bark was used as a remedy for toothache and as a hypnotic agent, while administering poultices made of seeds for the treatment of tumours and as an ointment on wounds.

Variability and cultivars

var. *pavia* - Leaves glossy from the upper side, whitish tomentose on the underside; flowers red to yellow with a touch of red. Southeast North America: eastern half of Texas

var. *discolor* (Pursh) Torr. et Gray - Annual shoots finely hairy, leaves whitish tomentose on the underside, yellow flowers with a touch of red. Southeast USA. Known since 1812.

Note

Aesculus pavia is a parental species of *Aesculus* × *carnea* (*Aesculus pavia* × *hippocastanum*) as well as the hybrid *Aesculus* × *hybrida* (*Aesculus pavia* × *flava*) found even in the wild.

Aesculus x carnea Hayne - Red Horse Chestnut**Hippocastanaceae/Sapindaceae**Syn.: *A. hippocastanum* x *pavia*, *A. rubicunda* Loisel., *Pavia carnea* (Hayne) Spach

Czech: Jírovec pleťový

Description

A deciduous tree, 10-15 (20) m tall, with a broad crown. The leaves are opposite, palmately compound, usually pentamerous, long-petiolate; leaflets 8-15 cm long, dark green. Annual shoots are strong, grey-yellow to brownish, glabrous, with a wide pith and clypeiform large leaf scars; buds brown-red, slightly glutinous. Symmetrical flowers, dark pink to red; petals on the rims glandular and hairy; flowers in rich, erect, 15-20 cm long panicles. Blooms in May and June. Capsules globose, 3-4 cm in diameter, very sparsely spiny.

Distribution and ecology

This hybrid was produced around 1818, probably in Germany; first imported to Bohemia in 1835 (Prague, the park of Královská obora). Grown in this country more often than *Aesculus pavia*. Suitable for cultivation are deep, freshly moist, drained soils. A frost-tolerant species, it resists to the horse-chestnut leaf miner (*Cameraria ohridella*) better than the common horse chestnut (*Aesculus hippocastanum*) - a species native to Europe. Although of hybrid origin, it is normally cultivated from seeds.

Practical importance

An unusually decorative tree, it is quite often grown in this country. Blooms about a week later than *A. hippocastanum*. Due to its resistance to the horse-chestnut leaf miner it is a good alternative for the common horse chestnut in street alleys and parks. The level of toxicity and the possible use of e.g. seeds can be assumed to be identical as those for *Ae. pavia*.

Variability and cultivars

'Briotii' - leaves glossy dark green, flowers shiny dark red, inflorescences up to 35 cm long. Produced in Trianon, 1757, through selection.

'Marginata' - Leaves (creamy-) yellow lined; the centre of the blade is light/dark green; flowers pink to light red.

Amelanchier alnifolia* (Nutt.) Nutt. - Saskatoon*Rosaceae/Malaceae**Syn.: *Aronia alnifolia* Nutt.

Other names: Pacific Serviceberry, Western Serviceberry, Alder-leaf Shadbush, Dwarf Shadbush, Chuckley Pear, Western Juneberry

Czech: Muchovník olšolistý

Description

Erect, thornless, deciduous shrub and/or small tree, 2-4 (10) m tall. Leaves alternate, simple, elliptic to circular, 3-5 cm long, in the upper half coarsely dentate (2-5 teeth per cm), green to blue-green, glabrous. Annual shoots are tomentose in the young age, soon glabrous, red-brown; buds fusiform, acute, dark wine-red. Inflorescence racemate, 3-5 (5.5) cm long with 7-11 flowers, erect, dense and compact. Flowers pentamerous, white, pear flower scented; petals 0.6 to 1.0 cm long. Blooms in May. Pome globose, 1-1.5 cm in diameter, with a persistent calyx, without lenticels, purplish-black, glaucous, edible, sweet and juicy, ripe in June and July. They contain 4-10 seeds.

Distribution and ecology

Distributed in the northwest North America, from Alaska through western Canada to Saskatchewan and northwest USA (Montana, Idaho, Washington), the tree grows in coastal thickets, on meadows and in forests, where it is a common shelterwood species; occurs even on rocky and dry soils, at elevations from sea level to 3,400 m. It was introduced to Europe in 1918, and to Bohemia in 1927 (Průhonice). Unlike other American serviceberry species, it grows on dry soils as well. It is a totally frost-resistant, sun-loving species, but tolerates partial shading.

Practical importance

In the USA, the saskatoon was used for protective anti-erosion planting. At present, it is cultivated for its delicious fruits and is a trendy fruit particularly in Canada. The tree is valued for its early period of berries, autogamy and resistance to frost (it supposedly withstands as low as -40 °C, with flowers tolerating spring frosts very well).

Occasionally grown in this country. The occurrence of a grown-wild individual was observed in Český Krumlov, which rather was a remnant of a culture.

The fruits are high in iron and manganese, and especially vitamin B2 (riboflavin). They are consumed fresh and/or dried, used in cuisine as pie filler and as a source for making jams and compotes, plus they are pressed to make juices and wine. Indigenous cultures used the dried fruit as an important part of Pemmican (a mixture of dried meat, fat and various dried fruits).

Dried fruits were also added into medicines, particularly mixtures used against lack of appetite in children. Fresh/dried leaves or even the inner bark of the shrub was used for brewing tea used as a refreshing drink, reminiscent of green tea

Variability and cultivars

var. *alnifolia* - Petals 0.7 to 1.3 cm long; inflorescence pubescent.

var. *pumila* (Nutt.) A. Nelson - Petals 0.7 to 1.3 cm long; inflorescence glabrous.

Note

When planted as a fruit woody plant, it can bear fruit over more than 30 years.

***Amelanchier lamarckii* F. G. Schroeder - Snowy Mespilus**

Rosaceae/Malaceae

Syn.: *A. botryapium* (L. fil.) DC., *A. canadensis* K. Koch non (L.) Medic.

Other names: Juneberry, Snowy Mespil, Apple Serviceberry

Czech: Muchovník Lamarckův

Description

Patulous stately deciduous thornless shrub/tree, height 10-12 m. Leaves alternate, simple, oblong to elliptic, 4-8 cm long, brown-red when unfolding, orange in autumn, at the base rounded to heart-shaped, silk-hairy, soon glabrous, finely serrated. Petioles hairy. Annual shoots are silk hairy. Flowers pentamerous, white, 8-10 in erect to horizontal racemes 4-8 cm long, petals 1-1.4 cm long. Blooms in April. The fruit is a small purplish-black pome of sweet, apple flavour, with a persistent calyx with erect calyx lobes, with 4-10 seeds, without lenticels.

Distribution and ecology

A species grown in North America - Eastern Canada: not unknown in the wild. To Europe, it was introduced perhaps as early as 1623, coming to Bohemia probably as late as 1927 (Průhonice). An unpretentious, fully frost resistant tree, it thrives at sunlit sites, but tolerates even a partial shade. Grows best on moist, well-drained, acidic to neutral soils, is calciphobic. It is a self-fertile species.

Practical importance

The snowy maspilus is a decorative plant with its flowers and leaves, particularly with autumn colouring. Advisable for planting in urban areas, openly composed and maintenance-free natural gardens - as a solitary tree, but also for hedges and living walls. In Western Europe it is often grown as an ornamental or fruit woody plant. In roughly the second half 19th century, it was introduced to France from which it was spreading further; today it is naturalised in many countries of Europe (e.g. northwest Germany and the Netherlands).

It was granted AGM in the U.K.

Grown in this country as well, gone-wild specimens were observed around Nové Hradky and in park in Průhonice.

Fruits are rich in iron and copper, are delicious in the raw state and suitable for further processing. They are often used for making jams, jellies and as filler for cakes. They are much sought food for birds.

Variability and cultivars

'Forest Prince' - Up to 7.5 m high

'Majestic' - Leaves dark green, bright-red in autumn, large inflorescence.

Note

Considered to be a stable, naturally developed hybrid resulting from the crossing between *A. laevis* and either *A. canadensis* or *A. arborea*. Therefore, *A. x lamarckii* F. G. Schroeder should be the correct name.

***Amelanchier spicata* (Lam.) K.Koch - Thicket Shadbush**

Rosaceae/Malaceae

Other names: Low Juneberry, Dwarf Serviceberry, Low Serviceberry, Pigeon Berry

Czech: Muchovník klasnatý

Description

A deciduous thornless shrub 1-2 (4) m tall, creates abundant root shoots. Leaves alternate, simple, ovate to broadly elliptic, 2.5-5 cm long, whitish tomentose in the young age, later glabrous, the upper two thirds finely serrated (5-8 teeth per cm), the teeth terminated with an aristate tip. Flowers pentamerous, white to pinkish, 4-10 in dense, erect racemes 2-4 cm long, petals 0.4-1 cm long. Blooms in April. Pomes purplish-black, with persistent calyx, with 4-10 seeds, without lenticels, glaucous, 0.6 to 0.8 cm in diameter, juicy, edible.

Distribution and ecology

The thicket shadbush occurs in the northeast of North America: from Ontario to Michigan, Iowa, Pennsylvania and North Carolina, where it grows on riverbanks, on dunes and in the woods. Introduced to Europe around 1800, it is a completely unpretentious and frost-resistant tree found on sandy to heavy clay, acid to neutral soils; moist to wet soils suit the species. It tolerates partial shade.

Practical importance

Currently the most frequently grown and wild-growing species in this country. Cultivated as an ornamental tree, usually as a solitary plant, it is increasingly regarded as a fruit tree as well.

Fruits are high in iron and copper and are eaten raw or processed in cuisine. They are a favourite food for birds that often completely harvest the fruits before full ripeness.

***Amorpha fruticosa* L. - Desert False Indigo**

Fabaceae

Other names: False Indigo Bush, Bastard Indigobush

Czech: Netvařec křovitý

Description

Erect deciduous shrub 1-3 m tall, with smooth, black-grey to brown-grey outer bark, forming root shoots. Leaves alternate, pinnate, 5-12-jugate, 12-30 cm long; leaflets entire, oblong, ovate to elliptic, 2-4 cm long, on the top blunt to slightly notched, dark green to cinereous, with yellowish translucent dotted glands, the underside hairy only in the young age, shortly petiolulate. Stipules narrowly lanceolate, 4-5 mm long, deciduous. Annual shoots grey, shallowly canaliculate; buds serially by two over each other. The flowers are arranged by 50-70 in narrow racemes 7-20 cm long, are of blue-violet colour, tiny, the crown is composed of nothing but a shield, with wings and the carina almost absent, so conspicuous yellow-orange anthers stand out. Blooms from June to July. The fruit is a very small, indehiscent pod with 1-2 seeds, brown, glabrous, 0.7 to 0.9 centimetres long, bent.

Distribution and ecology

The species is native to the extensive territory of central and eastern parts of North America as far as almost the west coast, in the south to Mexico; it grows on hills as well as in swamps and on river banks. Cultivation has spread the species to the north and west of North America, where it occurs gone wild, sometimes seen as a pest plant (Washington). Introduced to Europe in 1724 (England); in Bohemia, it took place in 1865 (Hluboká Chateau) or even earlier according to some sources (Sychrov, 1852). Tolerates dry and sandy soils, a heliophilous species - it reproduces vegetatively when shaded. A frost resistant plant, it very well tolerate salinisation of soils and flue gases. Relatively resistant to winds. Enriches the soil with nitrogen like other legumes. It has an extensive and solid root system; overgrown seedlings are difficult to transplant.

Practical importance

This plant was used in forestry and protective plantings, which in addition to the USA occurred e.g. in Italy, Japan and other countries, especially as part of erosion control strips. Gone-wild species in many countries, often invasive.

In this country it is sometimes cultivated in parks, gardens and streets as an ornamental shrub, while in warmer areas it was planted on sunny slopes to compact soil and in marginal rows of windbreaks (the River Elbe Basin, South Moravia). It may also play an important role in beekeeping. Used also for planting along motorways, including the middle lane between the barriers. Currently, it is classified as invasive species.

The resin contains substances with insecticidal effects. The cut branches were used as bedding for cattle. Used by the first settlers in North America as a source of blue dye, a substitute for true indigo, of which it however contains a very small amount.

Crushed berries are reportedly used as seasoning.

Leaves and fruits contain toxic isoflavone rotenoids - tefrosin, toxicarol, rotenone and amorphigenin, plus there is the presence of amorinin (chromenoflavanon).

Variability and cultivars

var. *angustifolia* Pursh - Leaves with 9-27 oblong-oval leaflets, acute on both sides, 2-4 cm long; height 1.5-5 m; brown-violet flowers in racemes 5-20 cm long; pods 6-7 mm long. USA: Iowa and Montana.

var. *emarginata* - Leaflets broader than these of the type; at the top notched or blunt.

var. *tennesseensis* (Shuttlew. ex Kunze) EJ Palmer - Up to 6 m tall, very hairy; leaflets somewhat longer, calyx lobes more obtuse; pods longer. Southeast USA.

Note

The *Amorpha* genus includes fifteen species found in North America to Mexico and including herbs, semi-shrubs to shrubs.

***Aristolochia durior* Hill. - Common Pipevine**

Aristolochiaceae

Syn.: *Aristolochia macrophylla* Lam., *A. sipho* L'Hér

Czech: Podražec velkolistý

Description

Twining creeper 5-10 (20) m tall, with brown-grey outer bark; wood, bark and roots are aromatic, give a strong pepper flavour when broken. Leaves alternate, heart-shaped, 10-30 (50) cm long, dark green on the upper side, lighter and pubescent in the young age on the underside. Petiole from 3 to 7 cm long. Annual shoots and young branches glabrous. Flowers symmetrical, gambosepalous, pipe-shaped, 1-2 in the axils of leaves; the floral envelope pipe-curved, yellow-green, ended with three purple-brown calyx lobes. Insects may become locked in the flower for some time when pollinating. Blooms from June to August. The fruit is 6-8 cm long, cylindrical capsule opening along six valves; seeds numerous, flattened.

Distribution and ecology

The common pipevine is native to eastern North America, in south-eastern Canada over the northeast USA (Pennsylvania, West Virginia) to northern Georgia, where it occurs in forests and rocky sites at the elevation of 50 to 1,300 m. Introduced in 1783 to Europe (England), and in 1835 to Bohemia (Prague - the park of Královská obora). Moist, rich soils suit this frost resistant species.

Practical importance

The species is grown in many regions of the world such as a creeper plant decorative through its leaves, with very special flowers. Advisable for use as a woody plant to cover walls, fences, arcades, etc., it needs to be supported by a tree or structure around which it can entwine.

In this country, it is grown in relatively warmer regions, rather as part of collections of woody species and in botanical gardens; it also grows wild occasionally in such locations (e.g. the Křtiny arboretum).

Indigenous cultures used the roots in traditional medicine, with the decoction used for baths and treatment of lower limb oedema.

Note

The *Aristolochia* genus encompasses about three-hundred fifty species of herbs / woody plants, of which the majority grows in the tropics and subtropics of both hemispheres, less frequently in the temperate zone. Some of the species have been and are used in traditional medicine (e.g., ancient Greek, Chinese); they are however toxic - containing aristolochic acid and other substances with e.g. carcinogenic effects.

***Aronia melanocarpa* (Michx.) Elliott - Chokeberry**

Rosaceae/Malaceae

Syn.: *A. nigra* Dipp., *Sorbus melanocarpa* (L.) Heynh., *Photinia melanocarpa* (Michx.) Robertson et Phipps

Other names: Black Chokeberry, Aronia Berry

Czech: Temnoplodec černoplodý, (černý jeřáb)

Description

A stoloniferous, thornless, deciduous shrub 1.5-3 m tall, often as a tree grafted onto *Sorbus aucuparia*. Leaves alternate, simple, elliptic to obovate, 2-6 cm long, crenate-serrate, glabrous, with arcuate-curved lateral veins, with black glands on the middle vein on the upper side. Turn reddish-brown in autumn. Annual shoots are glabrous. Flowers pentamerous, white, about 1.5 cm in diameter, in glabrous corymbs. Blooms in May. Glossy black, globose pomes, 0.6-0.8 cm in diameter, have a persistent calyx, are bitter-sweet, fugacious.

Distribution and ecology

A plant native to eastern North America where it is chiefly found at waterlogged and marshy sites. Introduced around 1700 to Europe, and in 1835 to Bohemia (Prague - the park of Královská obora). Totally low demand as to the soil, it can grow on rather light, dry soils and soils at marshy sites. It is however not suitable for planting on compacted surfaces. Tolerates shade, but the best production is achieved when planted at a sunny site. A totally frost and drought resistant, not prone to exhalants, does not suffer from diseases and pests.

Practical importance

The species is now widespread in northern Europe, in Germany, Poland, Belarus and Russia, where it is grown in plantations as a fruit woody plant.

In this country, it is planted rather rarely as an ornamental shrub, showy in autumn with its orange-red colouring of leaves. Grows wild only sporadically.

Fruits find a very wide application. They are not consumed raw due to the astringent taste, but are converted into jams, syrups, juices, wine, added into ice creams, jelly, yoghurts, sauces and even beers. Dried are used as part of fruit tea mixtures.

They are high in bioflavonoids, vitamins PP, B2 and B9, carotenes, pectic substances and rutin. They contain a large quantity of iron and important microelements: iodine, boron, fluorine, copper, manganese, cobalt, molybdenum and others.

In traditional medicine, a decoction of the fruit was used to treat colds.

Variability and cultivars

var. *elata* Rehd. - More vigorous growth, up to 3 m tall; leaves oblong-obovate, acute; larger flowers and fruits.

var. *grandifolia* (Lindl.) C. K. Schneid. - Height up to 2.5 m; leaves obovate to widely obovate; larger flowers and fruits.

'Autumn Magic' - Height 1.5 to 2.1 metres, more compact than the base species; leaves dark green, waxy, red and purple tints in autumn; flowers white.

'Nero' - A fruit variety; naturally found as a shrub reaching a height of 2.5-3 m; annual shoots dark grey-brown; leaves coriaceous, shiny, glabrous, dark green; inflorescence composed of 20-30 flowers; fruits are 15-17 mm in diameter, almost black, glaucous.

Note

The *Aronia* genus includes three species that are quite similar to each other and spread naturally only in North America.

***Betula lenta* L. - Black Birch**

Betulaceae

Syn.: *B. carpinifolia* Ehrh.

Other names: Cherry Birch, Mahogany Birch, Spice Birch

Czech: Bříza tuhá, habrolistá

Description

Deciduous tree 12-15 (20) m tall, with brown-red, non-peeling bark which turns into a fissured, blackish outer bark peeling off in thin flakes. Leaves and annual shoots are strongly aromatic. Leaves alternate, spirally arranged, oblong-ovate, 6-12 cm long, with 9-12 pairs of veins, 2x sharply serrated, with a distinctively elongated tip and rounded base, silk-hairy on the veins on the underside, yellow in autumn. Petiole 1-2 cm long. Annual shoots are purple-brown, slightly pubescent in the young age, the pith in the twigs triangular to two-edged. Flowers arranged in pendant catkins. Male catkins found at the ends of annual shoots, hibernate; female catkins hidden in the buds on brachyblasts through the winter. The infructescence involves disintegrating, 2-3 cm long erect cones up to 1.5 cm in diameter, composed of thin, three-lobed papery bracts and small samaras. Bract scales are glabrous with lobes nearly of the same length.

Distribution and ecology

A tree native to eastern North America south of the Great Lakes (from southern Maine) to northern Georgia, where found on moist slopes on drained soils as well as on the rocks. Occurs from the sea level to about 1,400 m AMSL. Introduced to Europe in 1759, to Bohemia in 1890 (Průhonice), but perhaps as early as 1880 (Sychrov). Like any birch, it requires a sunlit location, preferably an open area; grows best on deep, moist soils. A frost-resistant species, can withstand emissions. Life span in its homeland is 100 years, can reach a maximum of 150 years.

Practical importance

In the USA, this birch is a commercially used species. It experimentally planted in Germany for forestry use.

In this country, it is occasionally seen cultivated in parks as an ornamental tree decorative through its leaf and a beautiful, showy outer bark. More suitable for rather warm sites than *Betula papyrifera*. It does not grow wild.

The wood is fine-grained, hard and heavy. Processed in the USA along with the wood of *Betula alleghaniensis* - a more common species, the species is used for producing furniture, floors, tools and other articles, plus it finds application in the production of pulp and paper. It also serves as an excellent fuel.

The bark was formerly used for the manufacture of canoes, baskets and containers. Later it served for commercial sourcing of salicylic acid methyl ester that in the USA is used as flavouring agent for candies and chewing gums and as an ingredient in shampoos; today, the substance is produced synthetically.

In cuisine, this birch species had the same traditional uses as the birch papyrus. In addition, the essential oils were used for flavouring foodstuffs.

In traditional medicine, the bark was used as an anthelmintic, diuretic, stimulant, in the treatment of fever, abdominal pain, dysentery, gynaecological and pulmonary diseases. In modern healing methods, the use in the treatment of infections of urinary tract and kidney stones or rheumatism is promising.

Variability and cultivars

'Laciniata' - The leaves are much more incised. Found in 1902 near New Boston, New Hampshire, USA.

***Betula papyrifera* Marshall - Paper Birch**

Betulaceae

Syn.: *B. latifolia* Tausch, *B. papyracea* Ait.

Other names: White Birch, Canoe Birch

Czech: Břıza papírovitá

Description

A deciduous tree 20-30 m tall, often a multiple-trunk form, with smooth, white bark peeling in wide papery strips. Wood hard, diffuse-porous, whitish to pinkish. The root system widely spreading. Leaves alternate, spirally arranged, broadly ovate to deltoid-ovate, 4-8 (10) cm long, broadly cuneate to rounded, non-distinctively 2x serrated, with 6-8 (9) pairs of veins, venation mostly pubescent. Leaves turn golden yellow in autumn. Petiole 2-4 cm long. Annual shoots are purple-brown, diffuse-glandous, slightly pubescent in the young age, the pith in the twigs triangular to two-edged. Yellow-green flowers in pendant catkins bloom in April. Male catkins found at the ends of annual shoots, hibernant; female catkins hidden in the buds on brachyblasts through the winter. The infructescence involves disintegrating cylindrical, 3-5 cm long cones composed of thin, three-lobed papery bracts and small samaras. Cones yellow-green, stronger and bigger than in *Betula pendula*. Fruit scales are pubescent and possess a median lobe longer than the lateral lobes.

Distribution and ecology

The species is native to north-eastern and central North America, from Alaska to the East Coast and Greenland. Typical sites are cold, wet forests, edges of water reservoirs and watercourses, swamps. Introduced to Europe in 1750; in Bohemia, it took place in 1865 (Hluboká Chateau). It is a heliophilous, frost-resistant species; rather nutrient, moist, but well-drained soils suit the plant. It is a typical pioneer woody species, colonising areas left after fires and logging activities. Sensitive to salinity. Becomes dry at shady or dry sites - not suitable for planting in streets or compacted areas. Incapable of growing together with walnuts - juglones are significantly toxic for this plant.

Practical importance

In the USA and Greenland, this birch is used by forestry - as a preparatory woody species as well as for erosion control planting due to the extensive root system. In some US states, *Betula papyrifera* is considered vulnerable to endangered species.

In this country, it is the most commonly grown exotic species of birch. Advisable for open areas and sunlit sites. Promising is also the use for the reclamation of wet sites. It does not grow wild.

The wood is strong, hard and lightweight, fine-grained and flexible. It is used for flooring, furniture, veneers, cellulose. Of note is the fact that the wood is also used for producing popsicles, as well as a fuel, burning even fresh, but producing large quantities of soot and tar.

The bark was formerly used for the manufacture of canoes, traditional containers, boxes (wiigwaasi-makaks) and roofing and was a source for making glasses against snow blindness. It is considered one of the best materials suitable for making fire, burns even when completely wet. While the thin outer bark can be used as a substitute for paper, the inner bark was a source for preparing brown or even red dye. In the wild, the bark of this birch is an important winter diet for the moose and the white-tailed deer. A decoction of the leaves is used as an anti-dandruff shampoo.

The inner bark of the birch was used in bad times as food, eaten either raw or served to thicken soups and as a flour additive to make bread. The sap is a source of a syrup when boiled, and was also used for the production of vinegar or beer. Very young leaves, shoots and catkins were eaten raw or boiled, young leaves and root bark was used to prepare tea.

In traditional medicine, papery birch was a widely used plant, serving chiefly to treat skin problems, rashes, ulcers and burns. It was also used for making splints for a broken limb. Internally, the decoction of the bark was used to treat dysentery, while that of wood served as a perspiratory agent and to increase milk production in lactating women. Although the modern medicine does not employ such uses of the species, treatment of urinary tract infections, kidney stones and rheumatism seems to be perspective.

Pollen is a relatively strong allergen.

Variability and cultivars

Variability in the native range and in culture is considerable, particularly as regards leaves and fruits. A number of variations are assessed even as separate species.

var. *commutata* (Regel) Fernald - A tree tall up to 40 m, outer bark reddish-brown to orange, sometimes whitish-orange; annual shoots yellow-brown, verrucose and pubescent; leaves acute to long-acuminate, on young plants up to 12 cm long, 2x serrated, mostly deeply cordate at the base, quite thin; fertile cones 3-4 cm long, bract scales ciliate on the margin. USA.

var. *commutata* 'Grandis' - Large trees with larger heart-shaped, 2x serrated leaves. Selected in the Netherlands before 1973.

var. *cordifolia* (Regel) Fernald - A shrubby-tree type with a larger number of trunks, branched from the ground; bark white to dark brown, thinly peeling off; leaves (broadly to narrowly) ovate or triangular-ovate, (3) 6-14 cm long, veins long hairy on the underside. Labrador to Minnesota.

var. *humilis* (Regel) Fernald & Raup - A tree 8-10 (25) m tall, outer bark dull-white to reddish-brown; annual shoots glabrous, but densely resinous glandular; leaves triangularly to rhombic-ovate, acute to long-acuminate, thin, 3-8 cm long, dark green on the upper side, light green on the underside, coarsely serrated, with 4-5 pairs of veins, the base rounded to broadly cuneate, glutinous in the young age; fertile cones about 3 cm long, on a 2-cm long stem, bract scales ciliate only on the upper margin. Northwest USA to Alaska.

var. *kenaica* (W. H. Evans) A. Henry - A small tree 7-12 m tall, the bark white with orange and brown stripes, annual shoots softly hairy; leaves ovate to almost deltoid, 3-5 (7.5) cm long, acute to shortly acuminate, dull green on the upper side, yellow-green on the underside, the margin coarsely 2x serrate to dentate, the base rounded to broadly cuneate, with (2) 5-6 pairs of veins, petioles yellow; fertile cones 2.5 cm long, fruit wings as broad as the seed locule or slightly narrower. Alaska, Yukon.

var. *subcordata* (Rydb.) Sarg. - A rather small tree 6-10 m tall; the bark silvery-grey with blue-red stripes; annual shoots glabrous or pubescent, sometimes somewhat glandular; leaves broadly ovate, glabrous, 5-6 cm long, acute, cordate at base, irregularly serrated, teeth directed forward; fertile catkins 2.5-3 cm long, bract scales pubescent and ciliate. Rocky Mountains.

'Chickadee' - A dense, pyramidal habit, narrowly columnar when juvenile, grows more slowly than the type; outer bark of beautiful white colour. Found among 100 seedlings collected near Whitecourt, Alberta, Canada.

***Calocedrus decurrens* (Torrey) Florin - Incense-cedar**

Cupressaceae

Syn.: *Libocedrus decurrens* Torrey

Czech: pazerav sbíhavý, cedrový

Description

An evergreen coniferous tree 20-35 (60) m tall, with a trunk diameter of 1 (3) m. It has a cylindrical crown with a blunt, in the old age even irregular apex. Branches short, horizontally patulous, twigs ± vertical, flabellate. Outer bark cinnamon-red, fissured into rounded scales. Scale-like leaves oblong-ovate, acuminate, noticeably elongated on the primary twigs, only about 3 mm long on the lateral twigs, lateral with tips protruding, middle with an indistinctive gland, dull to grey green on both sides, sometimes with a sign of a pattern in the underside. The lateral paired leaves never touching lengthways. Twigs remarkably flat, scars after shed leaves (articulation) seen on older twigs. Cones oblong, consisting of three pairs of woody, flat seed scales that possess a sharp tip attached below the tip, 2.0 to 2.5 cm long, pale red-brown, ripening on year 1.

Distribution and ecology

The distribution area covers the western USA, the slopes of the mountains of the Pacific Coast, particularly in California and Oregon; to the south it extends by small sub-ranges to north-western Mexico. Found in the Cascade Range, Coast Range and in the Sierra Nevada, at elevations from 50 to 2,800 m. Typically found in association with the Douglas pine (*Pseudotsuga menziesii*), Californian white fir (*Abies concolor* var. *lowiana*), giant sequoia (*Sequoiadendron giganteum*) or the sugar pine (*Pinus lambertiana*), it is an important tree of mixed-species coniferous forests. Grows in areas with precipitation of 380-2,400 mm on different soil types. Introduced to Europe in 1853, which in Bohemia took place in 1865 (Hluboká Chateau). A semi-shady species, it is also able to grow very well as a solitary tree or withstand even stronger shading, almost like a fir tree. The good growth requires sufficient soil and humidity, but can copy even with short-term droughts. Shallow and dry soils insufficient for good growth. No special requirements as to the soil nutrient content - grows on neutral to strongly acidic soils. The best conditions found on sandy-loamy fresh nutrient soils in the humid valleys. Amongst the species quite tolerant of drought, dust and gaseous immissions, it lasts in an urban environment. Suffers from frost in Central Europe on rather tough winters. It belongs to the species that are rather not attacked by pests.

Practical importance

In North America, this tree stands for a highly valued economic species. The wood is light, soft, but solid. The heartwood is resistant to fungi and insect pests. It is used for building houses, making furniture, windows and veneers, constructing boats, producing packaging materials, and especially, in pencil production.

In Europe, it is one of the well-known ornamental park woody species and is well suited for hedges or plantings in cities. Due to the slow growth, it was never used by forestry in Europe. Although natural regeneration is common, the plant is not among invasive species in the Czech Republic.

***Calycanthus floridus* L. - Carolina Sweetshrub**

Calycanthaceae

Other names: Eastern Sweetshrub, Carolina Allspice

Czech: Sazaník květnatý

Description

A deciduous shrub 1-3 m tall, often forming root suckers. The bark smells strongly of camphor. Leaves opposite, simple, ovate-oblong, 5-12 cm long, entire, glaucous on the underside, densely hairy. Annual shoots tomentose, buds naked, hidden in the petiole base. Flowers bloom singly at the end of the lateral branches, are strongly fragrant, deep brown-red, 4-5 cm in diameter, have 15 to 30 petals. Blooms in June and July. Fruits are monospermous, poisonous achenes, enclosed in a shrinking obovoid hypanthium 6-7 cm long.

Distribution and ecology

The species is native to south-eastern North America from Virginia to Alabama, where it grows in deciduous or mixed forests and forest verges, along streams, in a zone from the coast up to the elevation around 1,850 m. Introduced to Europe in 1726 (England); in Bohemia, it took place in 1865 (Hluboká Chateau). Best thrives at a sunny, sheltered site with a deep, freshly moist, drained soil; tolerates a half-shade. If the annual shoots mature through the summertime, they are frost resistant. Pruning should be done immediately after the tree has ceased to bloom. A low-demanding plant, it does not suffer from pests.

Practical importance

An attractive shrub with unusually coloured flowers, notably aromatic, this tree is grown mainly in parks and is suitable for smaller gardens or open hedges as well.

In this country, it is cultivated as an ornamental, solitary, pretty-flowering shrub. Currently does not grow wild.

The flowers are used for extracting essential oil used in some high-quality perfumes.

The plant contains calycanthin - a strychnine-like alkaloid, toxic to humans and livestock. The leaves contain a small amount of camphor; can be used as a repellent or disinfectant.

Aromatic bark is dried and used as a substitute for cinnamon; it is however toxic.

In traditional medicine of indigenous cultures, the plant was used as a disinfectant and an antispasmodic, diuretic and as an emetic, possesses a strong suppressive effect on the heart, plus the decoction was used e.g. to treat eye problems.

Variability and cultivars

var. *floridus* - Annual shoots, petioles and the underside of leaves densely tomentose.

var. *glaucus* (Willd.) Torr. & A. Gray - Annual shoots, petioles and the underside of leaves almost glabrous.

'Alease' - The leaves are larger and with a broader blade, almost heart-shaped; flowers fragrant, wine-red colour.

'Margarita' - Flowers yellow, pleasantly fragrant

Note

The *Calycanthus* genus has four to six species, all of these of shrubby growth, aromatic and with natural range only in North America.

***Campsis radicans* (L.) Seem. - Trumpet Vine**

Bignoniaceae

Syn.: *Bignonia radicans* L., *Tecoma radicans* (L.) Juss.

Other names: Trumpet Creeper, Cow Itch Vine (U.S.), Hummingbird Vine (U.S.)

Czech: Křivouš kořenující

Description

A lush-growing deciduous twining plant climbing to a height of 5-10 m, with numerous aerial roots. Leaves opposite, pinnate; leaflets ovate-lanceolate, 3-6 cm long, coarsely serrated, hairy on the middle vein underside. Annual shoots are thick, whitish, with broad pith, thickened in nodes. Flowers pentamerous, narrowly funnel-shaped, orange to red, 6-9 cm long, in terminal cymes of 4 to 12. Blooms from July to September. The fruit is an oblong, bivalve, elongate-cylindrical capsule, carinate, curved, 8-12 cm long, with flat winged seeds.

Distribution and ecology

Native to south-eastern North America - Pennsylvania, Missouri, Texas and Florida, it is found in forests and on riverbanks. Introduced in 1649, to Europe, and in 1835 to Bohemia (Prague - the park of Královská obora). Suitable for rather warmer areas because of the tending to freeze in strong winters, it needs light, drained, but nutrient soils, southern, sunlit sites and shading of the shrub base by lower plants. An annual cut is recommended, as in vine, because shrubs bloom on the young wood. Propagates best in autumn through root cuttings.

Practical importance

An ornamental climber plant advisable for growing on walls, pergolas and the like, it grows well on gazebos, fences, telephone poles and trees that it can however cause to break over time. It should be planted at least 2.5 from the road.

In North America, the species is grown even in the far north beyond the native range, thriving very well in southern Canada and considered invasive species in several states of the USA (such New England states). Aggressive manner is observed such as in colonising arable land. In this country, it is rather rarely grown in warmer regions. Currently does not grow wild in the territory.

The flowers and leaves can cause irritation of the skin in sensitive persons.

Variability and cultivars

Dozens of varieties are grown, differing chiefly in the colour of flowers.

'Atropurpurea' - Purple flowers.

'Flava' - Leaves light green, flowers orange-yellow to pure yellow. Created in 1842, the variety received the AGM.

'Summer Snowfall' - leaves white-mottled over 20% of the blade surface, but often in an uneven manner; red-orange flowers.

Note

The only species of the genus other than the trumpet vine [*Campsis grandiflora* (Thunb.) K. Schum is found in East Asia. A delicate plant, it is not cultivated in this country, but a hybrid of the two species does occur locally - *C. x tagliabuana* (Vis.) Rehd. It was selected in 1858 at ornamental nursery of Tagliabue, Lainate by Milan.

***Carya ovata* (Mill.) C. Koch - Shagbark Hickory**

Juglandaceae

Syn.: *C. alba* auct.non (Mill.) C. Koch., *Hicoria ovata* (Mill.) Britton, *Juglans ovata* Mill.

Czech: Ořechovec vejčitý

Description

A stately, deciduous tree 20-35 (40) m tall, with an obovoid crown. Outer bark is noticeably peeling off in long strips. Leaves alternate, spirally arranged, obovate in outline, pinnate, 2-3-jugate, 20-30 cm long, leaflets obovate-lanceolate, 8-15 cm long (the terminal leaflet is the largest), ciliate-serrate, on the underside hairy and glandular in the young age and later glabrous. Annual shoots thick, full-pithed, scaly hairy and glandular in the young age, later glabrous, red-brown, leaf scars heart-shaped, terminal buds large, ovoid, sparsely tomentose. Male flowers on last year's twigs in pendant catkins 10-12 cm long, in clusters of three; female flowers in spikes at the ends of annual shoots. The fruit is a flattened-globose, whitish, square, 3-6 cm long nut with a coriaceous pericarp at maturity snapping to form four flaps, with a woody, smooth shell, thin, with a sweet core.

Distribution and ecology

The species is native to eastern North America, in the north to southern Quebec, in the south as far as Central Mexico. A common species in its native range, it grows not only on moist sites around watercourses, but also on rocky slopes, in the zone extending from the sea coasts as far as the elevation of some 1,400. Introduced to Europe in 1629; in Bohemia, it took place in 1865 (Hluboká Chateau). Quite a frost-resistant species, protection is recommended only in juveniles. Requires nutrient soils. Life span reaches over 200 years. Transplanting is not easy because of the strong and fragile roots.

Practical importance

In the USA, this is an economic woody species. Historically, experimental plantations for forestry use were set up even in Europe, such as Germany. It is also an appreciated tree for parks, a huge and ornamental with leaves, especially with the autumn colour and noticeably peeling off outer bark. Yet it is rarely planted, the reasons including the difficulty of transplanting.

In this country, it is sometimes cultivated in parks as an ornamental tree, a fast-growing and quite frost-resistant plant. An alley of about 30 trees can be found in Domoušice near Louny. Currently does not grow wild in the territory.

Wood is of high-quality, fine-grained, flexible and very hard. Originally used for making bows, today it is favoured as a lumber, for the manufacture of tools, axles, sticks of axes, ploughs and skis. Was also appreciated for smoking ham and bacon.

A yellow dye was sourced from the inner part of the bark.

Indigenous cultures used the sap to source sugar; bark was also in use for flavouring maple syrup. Nuts were much-sought food, although this species produces fruits on an irregular basis. They were consumed raw or used as filler for pastries. The seeds are also used for extracting fat that can be used similarly as raw butter. Nuts are also a source of diet for a wide variety of animals from mice, squirrels, wild turkeys and rabbits to foxes or bears.

Cultivars with thin-shelled fruits have now been selected.

Young annual shoots were used for inhalations in headaches; the decoction of the bark was used to treat rheumatism.

Variability and cultivars

var. *australis* (Ashe) Little - Trees up to 40 m high, annual shoots reddish-brown; leaves 20-30 cm long, leaflets 4-19 cm long, blades only sparsely hairy on the underside; male catkins 6 cm long; fruit diameter 2.5 to 3.0 cm. USA.

var. *ovata* - Trees up to 46 m high, annual shoots greenish, reddish or greyish brown; leaves 30-60 cm long, leaflets 6-26 cm long, blades harshly hairy on the underside; male catkins up to 13 cm long; fruit diameter 3.5 to 4.0 cm. USA.

Note

Rarely, other North American species are cultivated, such as *Carya tomentosa* (Lam.) Nuttall - the mockernut hickory (syn.: *C. alba* (Mill.) C. Koch non Nutt.) with a smooth, only in the old age shallowly striate outer bark, densely hairy leaves and annual shoots (Europe: 1766, Bohemia: 1865, Hluboká Chateau), or *C. cordiformis* (Wagenheim) K. Koch (syn.: *C. amara* Nutt.) with diminutive nuts. (Europe: 1679, Bohemia: 1865, Hluboká Chateau).

***Catalpa bignonioides* Walt. - Southern Catalpa**

Bignoniaceae

Syn.: *C. cordifolia* Moench, *C. catalpa* (L.) Karsten, *Bignonia catalpa* L.

Other names: Cigar Tree, Indian Bean Tree

Czech: Katalpa obecná, trubačovita

Description

A deciduous tree 8-15 (20) m tall, with a patulous crown and tortuous branches. The wood has light brown core and is light, soft. Outer bark light grey, thin, scaly. Leaves and annual shoots give bad smell when rubbed. Leaves opposite or in whorls of three, ovate, rarely with signs of two lobes, 10-20 (30) cm long, with 3-5 veins at the base, cuneate to slightly cordate, hairy on the underside, in the axils of veins with reddish-brown glandular spots. Petiole 8-16 cm long. Annual shoots are green to reddish, later grey-brown, pubescent, with a broad white pith, leaf scars elliptical, buds semi-globose, small, brown, pubescent. Flowers in rich panicles 15-20 cm long are pentamerous, campanulate, bilabiate, 4-5 cm wide, white with two yellow stripes and purple-brown spots. The fruit is a cylindrical, two-valve capsule 16-40 cm long, 8 mm in diameter, thin-walled, with numerous flat, oblong seed, long hairy on both ends.

Distribution and ecology

Native to the south-eastern portion of North America from Georgia to Florida and Alabama, Louisiana and Mississippi, where it grows in river valleys and in forests, found on rich moist soils. Introduced in 1726 to Europe and in 1880 to Bohemia (Sychrov Chateau). A light-requiring species, it prefers rather moister but not wetted, nutrient soils; tolerates also droughts and can be planted on compacted areas. Sensitive to soil salinity. Tending to be damaged by severe frosts, it is cultivated in rather warmer regions; sites protected from winds are advisable. Propagated by seeds collected from old trees.

Practical importance

A very decorative woody plant, ornamental with its flowers and leaves as well as fruits; very widespread in North America, outside the native range, domestication occurred as far as southern Canada. Furthermore, as a fast-growing tree with a massive root system, the species is used in erosion control plantings.

In this country, planting is favoured in chateau and urban parks and as part of street alleys. Experimental planting also occurred in forest stands near Lednice. Currently, growing wild is observed only occasionally in this country.

The wood is soft, strong, coarse-grained, rot-resistant, thus is used for fence posts and railway sleepers and less-frequently on interior panelling, cabinets etc.

In traditional medicine, a decoction of the bark was taken as an antiseptic agent, antidote for snake bites, or even as a laxative. It also had soothing and mildly narcotic effects, so used for treating whooping cough in children, asthma and dry (non-productive) cough. A decoction of the seeds was used in a similar manner. The bark was used as a substitute for quinine in treating malaria. The leaves were used as a poultice on wounds and friction burns.

The roots are highly poisonous.

Variability and cultivars

'Aurea' - Sprouting leaves golden-yellow, later yellow-green. Grown before 1877. Gained the AGM.

'Nana' - Up to 3 m high; dense, broad crown; leaves 10-15 cm. Selected in 1850, France.

Note

A hybrid is also cultivated: *Catalpa x erubescens* Carrière - Purple hybrid catalpa (*C. x hybrida* Spaeth., *C. bignonioides* x *ovata*). with leaves heart-shaped leaves to deltoid, often with 1-2 lobes, dark green, reddish when unfolding, without brownish glands in the axils of leaves on the underside, flowers yellowish or white, with yellow stripes and purple spots, in rather spars panicles; fruits are capsules, up to 45 cm long, 0.5 cm in diameter. Described in 1869, it began to be cultivated later. Several cultivars have been selected.

***Catalpa speciosa* Ward. - Northern Catalpa**

Bignoniaceae

Syn.: *C. cordifolia* Jaume St. Hil.

Other names: Frost-resistant Catalpa, Western Catalpa, Cigar Tree, Catawba Tree

Czech: Katalpa nádherná

Description

A deciduous tree 15-30 m tall, with a conical crown and deeply furrowed outer bark. Leaves and annual shoots do not give bad smell when rubbed. Leaves opposite or in whorls of three, ovate, 10-30 cm long, rarely with signs of being two-lobed, with 3-5 veins, densely hairy on the underside. Petiole 10-16 cm long. Annual shoots are red-brown, sometimes glaucous, with broad, white pith. The pith is septate in the nodes up to hollow in older branches. Leaf scars elliptical, buds semiglobose, small, brown, pubescent. Flowers in scarce panicles 10-15 cm long are pentamerous, campanulate, bilabiate, with a diameter of 5-6 cm in the opening, white with two yellow stripes and inconspicuous reddish-brown dotting. Blooms in June, three weeks earlier than *C. bignonioides*. The fruit is a cylindrical two-flap capsule 25-50 cm long, 1.5 cm in diameter, thick-walled, with many flat, oblong seeds, long-hairy on both ends.

Distribution and ecology

The tree is native to the relatively small area of middle-east of North America, at the confluence of the Mississippi and Ohio rivers, abundant in Illinois and Indiana, where it grows on the banks of watercourses and is frequent on the nutrient-rich soils of floodplains. The native range is yet difficult to reconstruct - east of the Rocky Mountains, the species was often grown as an ornamental tree from ancient times. Introduced to Europe in 1754, it is a frost-resistant tree, quite low-demanding in terms of soil moisture and nutrients, grows well on dry soils as well as tolerates seasonal flooding. Grows best on nutrient-rich, neutral, drained (incl. sandy) soils, at sunlit sites, copes with half-shaded locations. The issue of planting is that the wood is relatively fragile and even thick branches can break.

Practical importance

In North America, it is a highly appreciated, often grown ornamental tree, favoured for street plantings as well as a solitary tree in parks. Can also be used for planting on wet areas, or conversely for planting of dry, poor soils. Particularly showy when blooming, over the remainder of the growing season the plant raises attention with its large leaves. These may be damaged very early by hail, winds or even insects and lose their ornamental value.

In this country, it is planted less than *Catalpa bignonioides*, although it is more durable. It does not grow wild.

The wood is soft, strong, lightweight, rot-resistant, and very little shrinking. While formerly it was used as posts for fences and less-frequently for railway sleepers, telegraph poles etc., today it finds its application in the production of furniture and for interior panelling. It is also good for the manufacture of boats. The crooked habit is a drawback.

Variability and cultivars

'Albovariegata' - Leaves irregularly mottled whitish or yellowish. Known before 1894.

'Pulverulenta' - A tree of up to 15 m height, with thick branches, leaves up to 30 cm long, densely soft-white dotted. Selected in 1908, England.

***Celastrus scandens* L. - American Bittersweet**

Celastraceae

Other names: Climbing Bittersweet, Bittersweet

Czech: Zimokeř popínavý

Description

A twining, deciduous liana about 7 metres high. Leaves alternate, ovate to ovate-lanceolate, 5-10 cm long, serrated, glabrous, yellow in autumn. Annual shoots are glabrous, with full pith. A mostly dioecious species, its flowers are pentamerous, small, unisexual, greenish, in terminal, 5-10 cm long panicles. Blooms in June. The fruit is a yellow globose capsule, about 0.8 cm in diameter, opening along three valves, the seeds enclosed in a crimson-red follicle.

Distribution and ecology

The plant is native to central and eastern North America, from Quebec in the north towards the south to North Carolina and New Mexico, where it typically grows on rich-nutrient soils, in forests, dense moist thickets and coastal scrubs. Introduced to Europe in 1736; in Bohemia, it took place in 1865 (Hluboká Chateau). Tolerates partial shade, but flowers and fruits best when fully exposed to the sun; is frost-resistant. Low demands in terms of soil. Pruning is not necessary; alternatively, it is conducted in late winter to early spring. Grows well from root suckers, is widely distributed by birds.

Practical importance

A lush-growing twining plant, decorative through coloured fruits and distinctive autumn colour, it is well-suited for quick coverage of gazebos, bars, columns or walls, can overgrow piles of stones or old stumps. Because it is a very-fast growing and stately plant, it can damage smaller trees and bushes, after which it climbs. It has a deep-reaching root system and can be used for reinforcement of banks.

In some parts of the USA, the plant is a protected species, threatened among other things by *Celastrus orbiculatus* - the oriental bittersweet, native to Asia.

In this country, it is grown only rarely. Currently does not grow wild.

Branches with ripe fruits are valued for indoor dry-flower arrangements; gathering branches in the wild is believed to be substantially harmful to natural populations of this species in some parts of the native range.

Reports exist that annual shoots and bark were used boiled as food, probably in cases of material need.

The plant contains toxic glycosides. Fruits are poisonous to humans, but they are favoured bird diet. The leaves are poisonous to some animals (e.g. horses).

Indigenous cultures and the first immigrants used roots for medicinal purposes, such as induced vomiting, treatment of venereal diseases and symptoms of tuberculosis, liver and various skin diseases and rheumatism. Externally, the roots were used as a poultice for ulcers and rashes, bark served for making ointments for burns, friction burns and rashes.

Variability and cultivars

'Diana' - Height up to 6 m; leaves glossy dark green; flowers yellow-white in May to June; fertile more than the base species, fruits yellow-orange.

'Sweet Tangerine' - Height up to 9 m; dark green leaves; fruits mandarin-orange.

***Celtis occidentalis* L. - Common Hackberry**

Ulmaceae/Cannabaceae

Other names: Nettletree, Beaverwood, Northern Hackberry, American Hackberry

Czech: Břestovec západní

Description

A stately deciduous tree 10-18 m tall, with a broad crown, with blackish outer bark with cork-like bosses and very hard wood. Leaves alternate, oblong-ovate, 5-12 cm long, slightly asymmetric, three-venate at the base, margins sharply dentate, extending to the long entire tip, glossy green, glabrous on the upper side, sparsely hairy on the underside. Annual shoots are tortuous, green to green-brown, hairy in the young age, later glossy black-brown with yellow lenticels, with distinct leaf cushions, buds purple-brown, finely tomentose, ovate, flattened, pressed to the twig, the lower buds are the largest. Flowers unisexual, monoecious, in the leaf axils on annual shoots. Fruits are round drupes on long, thin stems, yellow when unripe, red when ripe, flour-sweet, 0.7-1 cm in diameter, stones rough.

Distribution and ecology

The species is native to North America from southern Ontario and Quebec through a part of New England to Northern Carolina (Appalachian Mountains) southwards, to northern Oklahoma westwards, and to South Dakota northwards. It is a common woody species disseminated in different types of forest communities. It grows on dry slopes, prefers limestone outcrops and soils rich in calcium. In western Nebraska, it grows on the north side of sand dunes and in river valleys. Introduced in 1636 to Europe, and in 1835 to Bohemia (Prague - the park of Královská obora). A heliophilous species, tolerates half-shade, frost-resistant, drought-resistant, grows even in extremely dry conditions of the Great Plains, but quite durable in regularly flooded zones (can withstand to 46 days of flooding without damage); permanently waterlogged soils are however not tolerated. In other regards, it is a quite low-demanding species in terms of soil. It is resistant to wind and exhalations. Best suited for cultivation are moist but well-drained humus-rich soils, fully exposed to the sun.

Practical importance

Although a nice-looking and durable tree, fast-growing when juvenile, disease-resistant, decorative through the leaf, it is planted only occasionally. Used as a street planting tree, but needs plenty of space - the crown is broad in the old age.

Used by forestry is in the Balkans. Extensive stands of the plant are known from Serbia (Ridjica and Sombor), where the species is called *kustelic* or *galagunja*, and also in the Slovak Republic (street plantings in Bratislava).

In this country, the species is rarely planted in parks. Grows wild e.g. in the surroundings of Lednice.

The wood is pale yellow, heavy, soft, coarse-grained and very vulnerable, so rarely used for the production of rather cheaper furniture, sporting equipment, or crates and packaging.

Indigenous cultures gathered and ate fruits either raw or roasted, using them to prepare hot drinks. They also served to flavour meat, or were mixed into the roasted corn. In the native range, fruits are foraged by a number of birds and small mammals.

Variability and cultivars

var. *canina* (Raf.) Sarg. - Leaves narrow, oblong-ovate, 8-14 cm long, long acuminate, glabrous on the underside or hairy only on the nerves, pale green. Known since 1898.

var. *cordata* (Pers.) Willd. - Branches hairy, leaves oblong-ovate, 9-15 cm long, up to cordate at the base coarse; rough on the upper side, hairy on the underside on the nerves. Southern USA. Known since 1825.

var. *pumila* Muhl (syn.: *C. pumila* Pursh.) - A shrub to 4 m high, branches softly hairy, leaves ovate, 3-8 cm long, acuminate, only slightly rough or smooth on the upper side, lighter, glabrous on the underside, fruits orange-red, 8 mm. Central and southern USA.

Note

A species resistant to diseases, thus often used today to provide an alternative for elms in horticulture and landscaping.

***Cercis canadensis* L. - Eastern Redbud**

Caesalpiniaceae

Other name: Spicewood

Czech: Zmarlika kanadská

Description

Deciduous tree 4-12 m tall, often with multiple trunks, with a patulous crown, sometimes a stately tree. Leaves alternate, broadly ovate to rounded, 7-12 cm long, entire, shallowly cordate at the base, shortly acuminate, on the upper side dull, green to blue-green, on the underside hairy to glabrate, with palmate venation. In autumn they turn pale yellow. The petiole is thickened at both ends, stipules small, deciduous. Annual shoots are thin, tortuous, at first greenish, later grey-brown. Flowers bisexual, pentamerous, symmetrical (papilionate), pink, 1-1.2 cm long, in clusters of 4-8 even on thicker branches and on the trunk (cauliflorous). Blooms in April-May, before foliation. The fruit is an oblong, flat, reddish-brown pod, 6-8 cm long, with 6-12 seeds.

Distribution and ecology

The tree is native to south-eastern North America, from New Jersey to the south to northern Florida, where it grows as part of the undergrowth in moist forests and coastal scrubs, in mixed forests and forest verges, as well as on rather drier bushy slopes facing south and in canyons. Introduced to Europe in 1640 and to Bohemia (Sychrov Chateau) in 1880. A light-requiring species, it tolerates shade and is frost-resistant. It has very low demands on soil land - it grows on dry, sandy or alkaline soils, tolerates even wet soils, but not permanent waterlogging; very sensitive to soil salinity. Suitable for cultivation are nutrient-rich, calcareous, mesic soils. Since it has brittle wood and can be damaged by strong winds, not very exposed sites are better for planting. A short-lived species, the average lifespan is 30 years, rarely more.

Practical importance

The most resistant species of the *Cercis* genus, decorative through the flower and particularly interesting with being cauliflorous, the species is suitable for planting in street alleys and parks and in shrub hems as well as a solitary tree or as part of hedges. A relatively short life span is a drawback.

In this country, the species is sometimes planted in parks. It does not grow wild.

The wood is heavy and solid, but the tree reaches only small dimensions.

In some parts of the Appalachian Mountains, annual shoots are used as a seasoning for game meat and opossum, hence the local name for the tree - spicewood. Indigenous cultures consumed the tree flowers, raw or boiled, as well as roasted seeds. Seeds are also diet of birds.

Variability and cultivars

A very flexible species, planted are dozens of cultivars of different height, flower colour or foliage.

var. *mexicana* (Rose) A. E. Murray - Leaves smaller, glossier, margins sinuate

var. *orbiculata* (Greene) Barneby - Leaves almost orbicularly reniform and on the top blunt or more frequently curved, 2-10 cm in diameter, from the petiole palmately five to seven-venate; flowers on peduncles 5-14 mm; pods 45-80 × 12-17 mm large, the wing is 1.5 to 2.5 mm wide. USA

var. *texensis* (S. Watson) Hopkins - A stately shrub, rarely a small tree, often multiple trunks from the base, but also only 1-2 m tall; leaves reniform, eventually dark green and glossy on the upper side, lighter, glabrous to slightly hairy underneath, 5-7 cm wide; flowers in small clusters or small racemes; pods 5-10 cm long. Texas, Colorado

'Alba' - Flowers pure-white.

'Alley Cat' - The leaves are beautifully white-striped and the variety is very stable, resistant to burns when fully exposed to the sun. A randomly found seedling.

'Burgundy Hearts' - Leaves bright-reddish purple, the colour is kept until summer, much longer than with 'Forest Pansy'.

'Forest Pansy' - Leaves dark purple, later purplish-green, 7-14 cm long. 1974, US National Arboretum, Washington D.C. AGM holder.

Note

Cercis canadensis is the official state symbol of Oklahoma.

***Cladrastis lutea* (Michx. fil.) K.Koch - Kentucky Yellowwood**

Fabaceae

Syn.: *C. tinctoria* Raf., *Virgilia lutea* Michx. fil., *Sophora kentukea* Dum. Cours., *Cladrastis kentukea* (Dum.Cours.) Rudd (1971)

Other name: American Yellowwood

Czech: Křehkověťvec žlutý, žlutník bělokvěťý

Description

A deciduous tree 5-10 (15) m tall, often a multiple-trunk form, with a patulous crown and brittle, pendant branches. Leaves alternate, pinnate 3-5-jugate, with alternate leaflets; leaflets entire elliptic to ovate, 7-10 cm long, glabrous, yellow in autumn. Buds are hidden in the petiole base. Flowers symmetrical, papilionate, white, in pendant sparse panicles 20-40 cm long. Blooms in May and June. The fruit is an oblong, compressed pod, 7-8 cm long.

Distribution and ecology

Native to south-eastern North America, primarily in North Carolina and Tennessee, this species ranks amongst the rare woody plants of eastern North America. It grows mainly on limestone, is part of forests on nutrient-rich, well-drained limestone soils, in river valleys, on slopes, on ridges and along watercourses. Introduced to Europe in 1812, and to Bohemia (Prague - the park of Královská obora) in 1844. A heliophilous species, it is rather sensitive to frost when young, later totally frost-resistant, tolerates even high pH of the soil. Like other *Fabaceae* plants, this species has developed a symbiosis with nitrogenous bacteria. It requires nutrient-rich soils, thrives when fully exposed to the sun and in a well-drained soil. Lasts in urban areas.

Practical importance

A nice park tree ornamental when flowering, suitable for larger gardens. The tendency to forming multiple trunks is the only drawback. In the USA it is often grown as an ornamental tree for its attractive flowers and became locally naturalised in many regions of the eastern United States outside the natural range.

In this country, it has been grown very rarely in collections of woody plants, or in parks and gardens as an ornamental tree. It blooms at a very late age. Currently does not grow wild.

Named after the brittle branches and also the yellow heartwood that is hard, heavy, fine-grained and durable. It is used rarely, serving for the production of high-quality furniture, rifle butts and decorative objects.

Use of this species in traditional medicine is not known.

Variability and cultivars

f. *tomentosa* (Steyermark) Spongberg - Leaves densely hairy. Alabama.

'Rosea' - Height of 9-15 m, crown rounded; flowers pale pink with a yellowish base; from a distance, however, they are purely pink, in inflorescences about 30 cm long, blooms in June; leaves bright green, nicely yellow to slightly gold.

Note

The stateliest known specimen in the USA grows in Spring Grove, Cincinnati, Ohio. 22 m tall, its trunk diameter is 2.2 m. Although the highest known tree stands 27 m tall, its trunk diameter is only 0.55 m; it is found at Plott Cove.

The *Cladrastis* genus is represented with a single species in North America and three to five species in eastern Asia.

Although very similar to the Asian genus of *Maackia*, *Cladrastis* woody plants are easy to recognise with their buds hidden under the petiole unlike with *Maackia* where the buds are loose, pendant flowers and alternate leaflets in leaves.

***Cornus florida* L. - Flowering Dogwood**

Cornaceae

Syn.: *Cynoxylon floridum* (L.) Britton et Shafer

Other names: Florida Dogwood, Indian Arrowwood, Cornelian Tree, White Cornel, False Boxwood

Czech: Dřín květnatý

Description

A wide-branched, deciduous shrub / small tree 3-5 (10) m tall, with a broad crown late in the life. Leaves opposite, simple, elliptic to ovate, 6-15 cm long, with 6-7 pairs of veins, entire, deep-green on the upperside, whitish-green on the underside. In autumn, scarlet-red to purplish. Annual shoots are glabrous, often glaucous; buds split into leaf and flower buds. Flowers bisexual, tetramerous, small, greenish-white to yellow, in heads with four white to pinkish, 4-5 cm long, rounded leaves. Blooms in May. The fruit is an ellipsoidal drupe, about 1 cm long, scarlet-red, with a persistent calyx and two seeds in the stone.

Distribution and ecology

The plant is native to eastern North America, from southern Canada (Ontario) and Maine south to Florida, west to Wisconsin, Kansas and Texas. Separate populations are found in eastern Mexico (*Cornus florida* ssp. *urbiniana*). Grows in moist as well as drier deciduous forests. Introduced in 1731 to Europe, and in 1835 to Bohemia (Prague - the park of Královská obora). Advisable for growing is a medium-moist, well-drained humus-rich, acid soil, sites fully exposed to the sun to partially shaded. Mulching the root zone is recommended. Difficult to transplant. The tree is sensitive to a quite large number of diseases, the dogwood canker being the most serious of them.

Practical importance

In North America, it is one of the most popular ornamental woody species. It is commonly grown as a solitary tree or in small groups around houses, near patios or on lawns. Advisable for natural gardens, it is valued for landscaping and urban forestry, used in soil protection plantings as well. An excellent ameliorative woody plant - its leaf litter decomposes more rapidly than that in other species and is a major source of calcium.

In this country, it is occasionally grown in orchards, parks and gardens. Growing wild has not been reported.

The wood is very solid and hard with soft texture, light brown or reddish. Formerly it was typically used for the manufacture of shuttles for weaver' looms, while today it is used for special products such as golf club heads, mallets, tool handles, spools, wooden pulleys, jewel boxes and butcher blocks.

The bark of the roots and branches has stimulating and boosting effects and was used as a substitute for quinine. The bright-red fruits are bitter and inedible to humans (eve toxic according to some authors), but are favoured by birds and a number of other animals.

Variability and cultivars

More than a hundred cultivars are known.

ssp. *urbiniana* (Rose) Rickett - Bracts white; north-eastern Mexico.

f. *rubra* (Weston) E.J. Palmer et Steyer. - Leaves sinuate along the margins, red in the young age, flower bracts large, pink to reddish.

'Apple Blossom' - Bracts pale pink.

'Barton's White' - Bracts white, flowers from the young age.

'Cherokee Chief' - Bracts dark red, sprouts in light red. Grown since 1958.

'Fastigiata' - Narrowly erect growth. Selected in 1910, Arnold Arboretum.

'Pendula' - A cascading habit, branches drooping. Created in 1887, Vienna.

Note

Cornus florida is the official state symbol of Virginia, Missouri and North Carolina.

In 2012, the United States sent 3,000 seedlings of this species to Japan in return for a donation of 800 seedlings of cherry (*Cerasus x yedoensis*) donated by Japan to the U.S. in 1912.

***Crataegus crus-galli* L. - Cockspur Hawthorn**

Rosaceae/Malaceae

Other name: Cockspur Thorn

Czech: Hloh kuří noha

Description

Densely branched, spiny-thorny tree 6-10 m tall, with a patulous, flattened-globose crown, with a ridged, scaly outer bark. Leaves alternate, coriaceous, entire, oblong-obovate to oblanceolate, 2-6 (8) cm long, serrated, glossy dark green on the upperside, orange-red in autumn. Petiole 0.4-1.2 cm long. Annual shoots glabrous, thorns erect, 4-8 cm long. Flowers arranged in corymbs 5-7 cm wide, at the end of lateral branches, pentamerous, bad-smelling, white to pink, about 1.5 cm in diameter. Blooms in May and June. Pomes globose, 0.8 to 1.2 cm in diameter, green for a long time, then dirty-orange to red, slightly glaucous, lasting into the spring.

Distribution and ecology

The tree is native to eastern North America from the Great Lakes south to Texas and Florida, where it grows in forest verges as well as outside forests at sunlit sites. Introduced in 1656 to Europe, and in 1835 to Bohemia (Prague - the park of Královská obora). A very frost-resistant species, heliophilous, but tolerates even moderate shading; copes well with air pollution. Grows best on moderately moist, well-drained soils fully exposed to the sun, but can tolerate even drier soils.

Practical importance

A species ornamental with leaves and flowers as well as fruits, it is widely used in horticulture in North America. Good for grassy areas as a less-vigorous solitary tree and beneficial for difficult-to-penetrate hedges and to form the boundary of plots, it is not recommended for children's playgrounds and close to pedestrian trails, which however can be addressed with use of a thornless cultivar.

In this country, the plant was of widespread use, principally in the 19th century, while today it is grown only occasionally in parks and blocks of flats as a showy, ornamental woody plant. Grows wild only rarely.

Wood is hard, pink-brown, and used for the production of small items, similarly to that of other hawthorn species .

The use in the medicine is the same as with other hawthorns.

Variability and cultivars

'Inermis' - A small tree, thornless.

Note

The species epithet "*crus-galli*" translates from Latin as "cock's foot" to refer to the reported similarity of thorns to cock spurs.

Note 2

The white flower of the hawthorn (*Crataegus* sp.) Is a state emblem of Missouri.

***Crataegus pedicellata* Sarg. - Scarlet Hawthorn**

Rosaceae/Malaceae

Syn.: *C. ellwangeriana* Sarg., *C. coccinea* L. p.p.

Czech: hloh břekolistý (stopečkatý, javorolistý)

Description

A sturdy shrub to tree 3-7 (10) m tall, densely branched, spiny-thorny. Leaves alternate, rigid, broadly ovate, 5-8 cm long, with 4-6 pairs of sharply acute lobes, roughly hairy on the upperside, while only sparsely hairy on the veins on the underside. Petiole 2-5 cm long, glandular. Annual shoots are glabrous, thorns erect to slightly curved, 3-6 cm long. Flowers grow in corymbs of 6-12 at the end of the lateral branches, pentamerous, white, smelly, 1.5 to 2.0 cm in diameter, with 3 (5) styles, pink anthers, with broadly triangular calyx lobes 1.5-2 mm long, with slightly hairy stems. Blooms in May and June. Pomes light to dark red, dotted, globose to obovoid, 0.9 to 1.8 cm in diameter, with mealy, yellowish, tartish flesh, with 3-5 sclerified stones. Ripen in September.

Distribution and ecology

The species is native to eastern North America, from south-eastern Canada south to Kentucky and North Carolina. A heliophilous, frost-resistant species, low-demands as to soil; tolerates even alkaline or heavy clayey soils. Quite rich in flowers and fruits, but sheds leaves earlier, so will not become colourful. Resistant to air pollution, it is considered as ecologically important species as an important source of food for birds.

Practical importance

In Central Europe, the species is planted as part of natural hedges, on embankments and along roads, as well as in gardens as a fruit tree or for the beautiful autumn colour of the leaves. In the U.K., it became naturalised.

In the Czech Republic, it is a widely grown species decorative through its fruit - the most common member of foreign hawthorns in the country. It is grown as part of chateau and municipal parks, greenery in blocks of flats, occasionally in gardens, tree avenues, hedges; planted outside settlements, sometimes growing wild.

The wood is heavy, hard, pink-brown, advisable for making small items such as tool handles, sticks etc.

The fruit with tartish pulp can be eaten fresh or processed into jams, canned fruit, liqueurs and pastry fillings; fermenting is also possible. Like other hawthorns, this species can be used to treat high pressure and certain diseases of the heart. Used are both flowers and fruits, as tea or as a tincture.

Note

The issue for most hawthorns is various diseases and pests. Since they are, for instance, among the hosts of rust that attacks *Juniperus virginiana*, growing hawthorns in the range of this juniper is not recommended. In addition, hawthorns are susceptible to bacterial fever, moulds, mildew, scab, etc. Attacks by aphids, spider mites, leaf-eating insects etc. are common.

***Cupressus arizonica* Greene - Rough-barked Arizona Cypress**

Cupressaceae

Czech: Cypřiš arizonský

Description

An evergreen tree 10-20 (30) m tall, only shrubby up to 5 m at dry sites, with a conical crown, trunk diameter up to 1 m, with ridged red-brown to green bark. Leaves scaly, about 2 mm long, grey-green to blue-green, with an ethereal gland. Cones globose, 20-27 mm long with (6) 8-10 (12) scales with a distinctive sharp tip, sometimes bluish glaucous. They persist on the branches a number of years. Seeds red-brown. Annual shoots rectangular, over 1 mm wide, grey.

Distribution and ecology

Native to south-western North America, where it grows from California to the east to Texas and to the south as far as Mexico. Usually occurs at higher elevations of 700 to 2,700 m. Creates an admixture in pine-juniper stands, grows in association with sclerophyte shrubs at dry, hot locations, with other conifers in the cuts of canyons and along streams. Five varieties are differentiated as part of the species, var. *arizonica* being a typical form within the range. Introduced in 1724 to Europe and in 1865 to Bohemia, it copes with dry and sandy soils and is heliophilous. Grows on both acidic and alkaline substrates, a very well growth is observed even on limestone or loess. It is a frost-resistant tree down to -25 °C, lasting in an urban environment.

Practical importance

In this country, the tree is cultivated in parks and gardens in the warmest zones, especially as the *glabra* (Sudw.) Little variety (Smooth Arizona cypress). Smaller than the type variety, the bark is thin, colourful, peeling off in flakes, needle are more silvery, with prominent glands. It is native only to Arizona. In Europe, it is used as a decorative tree with a typically conical crown. It is not an invasive species.

Note

Varieties are sometimes considered to be subspecies, sometimes even separate species.

***Elaeagnus commutata* Bernh. ex Rydb. - American Silverberry**

Elaeagnaceae

Syn.: *E. argentea* Pursh non Moench

Other name: Wolf-willow

Czech: Hlošina stříbrná

Description

A deciduous thornless shrub 2-5 m tall, forming abundant root shoots. Leaves alternate, ovate-lanceolate, 2-10 cm long, entire, glossy silvery and scaly hairy on both sides. Annual shoots are cinnamon-brown, silvery-scaly, flexible branches, thornless. Flowers small, apetalous, with four calyx lobes, funnel-shaped, silvery outside, inside yellow, fragrant, 1-3 in the axils of the leaves. Blooms from May to July. The fruit is a whitish elliptical, obscurely eight-ribbed nut 1 cm long, coated with a dry-farinoso hypanthium, silvery-scaly on the surface, of a drupe appearance.

Distribution and ecology

The plant is native to the western, boreal part of North America, from southern Alaska through British Columbia east to Quebec, south to Utah and across the Midwest USA to South Dakota and western Minnesota, where it grows on dry to moist sandy and gravelly soils of moist slopes and on the river banks, as well as on dry limestone slopes, on prairies and within forest verges. Introduced to Europe in 1813; in Bohemia, it took place in 1865 (Hluboká Chateau). A heliophilous, totally frost-resistant species, it is able to grow even on the driest soils and those of the lowest nutrient content; tolerates even strongly alkaline or saline soils. Develops a symbiosis with nitrogenous bacteria.

Practical importance

A species decorative through leaves, a very modest tree. Since the trees fix atmospheric nitrogen and enrich soil, they are advisable accompanying woody plants for rather demanding species. They possess fairly open crowns so are not recommended as a barrier against the wind.

In this country, the tree is only rarely grown in parks and planted along roads and motorways. In the Sokolov region, it became naturalised at the Antonín dump site, where the trees form the peripheral edges of stands and growing wild is common in the area.

The fibrous bark was used for the manufacture of coarse fabrics and ropes, while fruits were used for making soap.

The fruits are edible and can be used raw or boiled. They have an excellent capacity of gelling. They are also a rich source of vitamins (A, C, E) as well as minerals, flavonoids and essential fatty acids. Since it is unusual to observe in fruit woody species, the fruits are studied as a food to be capable of reducing the incidence of cancer as well as a means to stop the growth of tumours.

The bark was used in folk medicine for the preparation of ointments to treat frostbites. A decoction of roots combined with that of sumac roots was applied in the treatment of syphilis. This product was considered a very toxic material, and if the patient survived, they probably had become sterile.

Note

The plant contains beta-carbolines (MAO-A inhibitors) and is hallucinogenic if high dosage is administered.

***Fraxinus americana* L. - White Ash**

Oleaceae

Other names: American Ash, Biltmore Ash, Biltmore White Ash, Cane Ash

Czech: Jasan americký

Description

A deciduous, dioecious tree 20-25 (35) m tall. The bark is soon turning into a deeply-furrowed, dark brown to grey outer bark. Leaves opposite to obliquely opposite, pinnate, 20-30 cm long, 2-4-jugate, juga on the spindle sparsely, leaflets 6-15 x 3.5-7.5 cm, with a 0.4-1.0 cm long, non-winged petiolule; almost entire to shallowly crenate-serrate, dark green, glabrous on the upperside, whitish, verrucous on the underside, yellow in autumn, without stipules. Annual shoots are flattened in nodes, with distinct leaf cushions, dull grey, pubescent when young, later glabrous; buds broadly ovate to semi-globose, cinnamon-ferruginous-brown, leaf scars semi-circular. Flowers tetramerous, achlamydeous, unisexual, arranged in panicles rising from lateral buds. Blooms in April; male trees bloom profusely regularly every year, while in female trees any richer blooming is observed once per 2-3 years. The fruit is a samara 2.5 to 6.5 cm long, the seed locule is narrowly fusiform to subuliform, the wing is attached as far as the uppermost quarter.

Distribution and ecology

This tree is native to eastern North America, from Nova Scotia west to Minnesota, south to northern Florida and eastern Texas, where it grows from the lowlands to the mountains in wet forests on nutrient-rich substrates. Introduced to Europe in 1724, and to Bohemia (Prague - the park of Královská obora) in 1835. Deep, fresh, nutrient-rich soils and sunny locations fit the species; it however also tolerates exposed sites, alkaline soils and soils high in heavy metals. Resistant to air pollution, it tolerates saline soils. It is a frost-resistant tree. Young plants can cope with shading.

Practical importance

A nice-looking tree, ornamental especially with autumn colouring of the leaves. In North America, it is favoured and widely planted in parks and large gardens, which particularly applies to the cultivars with a beautiful autumn colour, such as 'Autumn Applause' and 'Autumn Purple', etc. In addition, it is distinguished as an important forestry species in that it provides hardwood ranked amongst those of the highest quality in North America. It is also advisable for forestry reclamation of mining sites due to its capacity to colonise soil with high concentrations of heavy metals.

At a smaller scale, it was tested for forestry use in the UK, Germany, Bulgaria, the Balkans, as well as in Argentina.

In Europe and the Czech Republic, the tree is grown in parks and street alleys. In the culture, it is also confused with *f. pennsylvanica*. Currently does not grow wild in this country.

The high-quality, hard wood is white and very dense, solid, straight-grained. Little durable in the moist environment. Used for making furniture and flooring, as well as sports equipment (baseball bats, hockey sticks, tennis racquets) and tool handles, recently is popular as a material for making musical instruments (electric guitars). It is also used for the manufacture of lobster traps. Indigenous cultures used the wood for tent poles, drum hoops, spears, bows, arrows, pipe stems, whistles and many other items. The bark was used as a source of yellow dye.

This ash species was widely used in medicine. Indigenous cultures used a variety of different parts of the plant for medicinal purposes. A decoction of the bark was used to treat a variety of ailments, including stomach disorders and skin diseases, and for skin parasite control. The leaves were used to calm the itching caused by mosquito bites and bee stings. The seeds were considered to have aphrodisiac effects.

Variability and cultivars

var. *juglandifolia* (Lam.) D. J. Browne - Leaves 9-35 cm long, leaflets larger, 10-16 x 4-7 cm, serrate or crenate-serrate to some extent, less glossy from the upper side, the underside not so distinctively blue and white, pubescent to some degree.

'Acuminata' - Leaves entire, dark green on the upper side, almost white on the underside, dyeing to violet. A high-quality tree for parks.

'Alba Marginata' - Leaflets white-rimmed.

'Autumn Applause' - Small, dense, broadly erect, oval tree, height 12 m, width 7.5 m; leaves purple when falling, dark green in other periods, fine texture; male.

'Autumn Purple' - Height up to 14 m, autumn leaves yellow or orange to dark purple, sometimes with violet to brown spots.

'Pendula' - Branches and twigs pendant.

***Fraxinus pennsylvanica* Marsh. - Green Ash**

Oleaceae

Syn.: *Fraxinus lanceolata* Borkh.

Other names: Red Ash, Downy Ash, Swamp Ash, Water Ash

Czech: Jasan pensylvánský

Description

A deciduous, dioecious tree, 15 to 20 (25) m tall, with deeply-furrowed, dark brown to grey outer bark. Leaves opposite to obliquely opposite, pinnate, 20-30 cm long, 3-4-jugate, juga on the spindle sparsely, leaflets 6-15 x 3.5-7.5 cm, with a 1-5 mm long, winged petiolule; almost entire to shallowly crenate-serrate, yellow on both sides, without stipules. Annual shoots are flattened in nodes, with distinct leaf cushions, dull grey, pubescent; buds broadly ovate to semi-globose, cinnamon-ferruginous-brown, leaf scars semi-circular. Flowers tetramerous, achlamydeous, unisexual, with a persistent calyx, grow in panicles from the lateral buds. Blooms in April. The fruit is a samara 2.5 to 6.0 cm long, the seed locule is narrowly fusiform to subuliform, the wing attached in the upper half.

Distribution and ecology

The species is native to central and eastern North America, east of the Rocky Mountains, where it grows in the moist lowlands and in swamps, often on the banks of rivers. It is the most widespread ash species in North America. Introduced in 1793 to Europe, and in 1835 to Bohemia (Prague - the park of Královská obora). A frost-resistant species, it requires deep, fresh, nutrient-rich soils and sunlit sites. Less resistant to drought than the white ash. Copes with air pollution and soil salinisation, it grows well in cities. In North America, an Asian beetle species (*Agrilus planipennis*, emerald ash borer, EAB) became widespread in plantations in an avalanche-like manner, causing this ash species a mass dying-off.

Practical importance

This ash was once amongst the most widely planted ornamental trees in the United States as well as in Canada, including the western regions, where it is not a native species. It was used as a tree for street alleys, greenery in settlements and as a park tree. Drawbacks include the short life span - it rarely exceeds 100 years, often it is a mere 30 to 50 years, plus the spread of EAB has been an issue very recently. Therefore, planting is not recommended in the U.S. today.

It is also widely cultivated in Argentina and the countries of the former Soviet Union.

In this country, it is quite often planted in parks and gardens for decoration, sometimes even in forests. Grows wild in floodplain zones.

The high-quality, hard wood has similar properties as with the wood of the white ash; the wood of both ashes is supplied to shops under the generic name "white ash". The wood in this species is preferred, for example, in the production of electric guitars because it is slightly more lightweight than that of the white ash.

Variability and cultivars

A greatly variable species, there are more than three dozens of cultivars.

var. *lanceolata* (Borkh.) Sarg. - Annual shoots thick, pale green, glabrous; foliage dense, dark green; leaflets slender, acuminate.

var. *viridis* (F. Michx.) C. K. Schneid. - Leaf stems and leaflets abaxially glabrate.

'Aucubaefolia' - Yellow-spotted leaves.

'Niobrara' - A pyramidal habit.

***Gaultheria procumbens* L. - Eastern Teaberry**

Ericaceae

Other names: See note.

Czech: Libavka poléhavá

Description

A low, evergreen, creeping shrub about 0.1 m tall, with underground suckers, forms dense stands. Leaves alternate, stipate at the ends of annual shoots, simple, elliptic to obovate, 1-3 (5) cm long, distantly serrate, glossy, strongly aromatic, shortly petiolate. Flowers five-, exceptionally tetramerous, with ten stamens, white or pink, broadly bulbous, about 0.6 cm long, drooping, single, rarely in a scarce racemes. Blooms from June to August. The fruit is a red, 5-locular, globose capsule enclosed in a pulposus calyx (of a berry appearance), 0.8-1.0 cm in diameter, strongly aromatic.

Distribution and ecology

The plant is native to north-eastern North America from Newfoundland west to Manitoba, south to Alabama, where it grows in open forests and on clearings, on sandy, acidic soils. Introduced to Europe in 1762.

A totally frost-resistant species, with low demands on moisture and nutrients, it can grow even on highly acidic and nutrient-poor soils. It even tolerates considerable shading. Grows well in a sandy heathland soil at a half-shade site, such as under pines or oaks.

Practical importance

One of the major soil-covering woody plants for this country's climate, ornamental with its fruit. AGM holder.

Grown in this country as part of heather exhibits. It does not grow wild.

The fruits and leaves are good for preparing tea; leaves can also be fermented. Fruits serve to prepare jams, fillings for cakes, etc.

The plant was used by various Native American tribes from ancient times. The leaves were used in the treatment of pain and as a means to release the airways in hunting or carrying heavy loads.

A wintergreen oil was sourced from the leaves (96-99% salicylic acid methyl ester); now produced synthetically or from the bark of *Betula lutea*, it is still used in the U.S. as a flavouring agent not only in candies, ice creams and chewing gums (e.g. Clark's Teaberry Chewing Gum), but also in beer.

Analgesic, anti-inflammatory, diuretic, carminative, stimulant and tonic substance, it also has an astringent effect. In medicine, the pure extracted wintergreen oil was formerly used as an ointment for muscle pain, in the treatment of acute cases of rheumatism, ischiatic conditions, neuralgia, strained joints, and gastric catarrh. Today is rather used in perfumery industry and as a flavouring agent for toothpastes, or to treat cellulite. Pure distilled essential oil is toxic in high doses; when used internally, it may aggravate stomach ulcers or cause liver or kidney damage. Topical application may cause contact dermatitis.

Note

A number of folk names can witness the favour and the importance of the species in America: American mountain tea, American wintergreen, boxberry, Canada tea, canterberry, checkerberry, chickenberry, chinks, creeping wintergreen, deerberry, drunkards, gingerberry, ground berry, ground tea, grouseberry, hillberry, mountain tea, one-berry, partridge berry, procalm, red pollom, spice berry, spicy wintergreen, spring wintergreen, squaw vine, star berry, teaberry, wax cluster, youngsters.

***Gleditschia triacanthos* L. - Honey Locust**

Caesalpinaceae

Other name: Thorny Locust

Czech: Dřezovec trojtrnný

Description

A deciduous tree 20-30 (45) m tall, forming 8-20 cm long, branched spines on the branches and often on the trunk. Produces root suckers as well as stump suckers. The bark smooth, grey-black, shallowly longitudinally fissured and peeling in strips in the old age. Leaves alternate or stipate at brachyblasts, 1-2x irregularly pinnate, 10-40 cm long, leaflets 1-4 cm long, crenate-serrate, diffuse-pubescent, shortly petiolulate, golden-yellow in autumn. Annual shoots are flexuous, green to brown, pubescent in the young age, lack spines, later glabrous, shiny, thickened at nodes; older twigs grey-brown, very thorny; flattened thorns grow from buds. Leaf scars narrowly arcuate, remnants of petioles are often left on the branch. Buds serial under thorns, tiny, hidden. Flowers polygamic, ternate to pentamerous, slightly symmetric, yellow-green, strongly fragrant, in 3-6 cm long axillary racemes. The fruit is a many-seeded pod 20-40 cm long, violet-brown, glossy, coriaceous, belt-shaped. Inside the pods, seeds are located in a fresh, edible, gelatinous mass. The seeds are flattened, ellipsoid, hard, pale brown, 0.8-1.0 cm long.

Distribution and ecology

The species is native to eastern North America, the territory between Pennsylvania, Nebraska, Texas and Missouri. In these regions, it usually grows at moist, nutrient-rich sites in the river valleys, but sometimes even on dry, sterile, gravelly soil of slopes. It is found mostly in forests as a disseminated woody plant; nearly pure stands are rarely developed. Introduced in 1700 to Europe, and in 1835 to Bohemia (Prague - the park of Královská obora). A rather heliophilous, quite frost-resistant, undemanding species, deep, fresh, nutrient-rich soils fit the tree which however can grow on sands as well and is drought-resistant and copes with salinity. Due to the brittle wood, it needs a location protected from the wind. Resisting to air pollution and soil salinisation, it grows well in urban areas. Does not suffer from diseases, difficult to propagate from seeds. However, root suckers enable the plant to spread quite quickly; considered invasive species by farmers, it can quickly overgrow pastures and grasslands. Supplies nitrogen to the soil through symbiosis with *Rhizobium* bacteria.

Practical importance

A species of ornamental leaves and fruit, it is often planted in cities or in parks; use in hedges and tree avenues exists, but is rare. Favoured is also the 'Inermis' cultivar that possesses thornless branches. The plant is a honey-producing species.

In the USA, it is a species valued for high-quality wood and is also used in reclaiming areas damaged by mining. It was introduced into the former Soviet Union and Yugoslavia states for forestry use; the same occurred in South America (Argentina, Uruguay). Sometimes it grows wild in Central and Southern Europe.

In the Czech Republic, the species is often grown in parks and gardens as an ornamental species (especially in warmer regions) and as a very thorny species is highly advisable for use in hard-to-penetrate hedges (very thorny). Rarely grows wild.

The wood has a red-brown core, is of high-quality, easy to polish, resistant to rot. It is used for carving and wheelwright work, for the manufacture of agricultural implements, in the building industry, for railings, fence posts and sleepers. It is also promising for the production of high-quality furniture.

The hard spines of younger trees were formerly used as nails.

Unripe fruit pulp is sweet and was used by indigenous people as food, or for fermenting beer. It can also serve for the preparation of soft drinks and as a sweetener. Unripe seeds were consumed raw or boiled. They contain up to 30% sugar, up to 24% protein as well as calcium and phosphorus; the flavour is reminiscent of pea. When roasted, ripe seeds rich in tannins were used as a coffee substitute.

In medicine, the tea of pods was used for treating digestive disorders, in catarrhs and various childhood diseases. Similar ways applied to other parts of the plant. The juice from the pods has antiseptic effects. The current research studies the leaves as a potential source of anticancer compounds. Twigs and leaves contain alkaloids gleditschin and stenocarpin. While stenocarpin was used as a local anaesthetic agent, gleditschin causes drowsiness and loss of reflex activity.

Variability and cultivars

A quite variable species, it is known to have produced several dozen cultivars.

f. *inermis* Willd. (= 'Inermis') - Type's appearance, but thornless or with only sporadic thin and simple spines.

'Columnaris' - A columnar habit. The original tree can be found at the headquarters of Lowen, Belgium.

'Pendula' - Crown elongated broadly ovoid, thin with arcuate-pendant branches and drooping twigs, leaves smaller.

'Rubylace' - Young leaves at the tops of the branches bright-ruby and red to dark red, later turn bronze; trees have no thorns and are not fertile.

'Sunburst' - A fast-growing tree, crown broadly conical, without thorns, young leaves and annual shoots golden-yellow, then green. USA, 1954.

Note

The genus is named after the German botanist Johann Gottlieb Gleditsch, 1714-1786. The scientific name of the genus oscillates between *Gleditsia* and *Gleditschia*, which is due to changes in perceptions of the grammatical rules of the scientific nomenclature.

***Gymnocladus dioicus* (L.) K. Koch - Kentucky Coffeetree**

Caesalpinaceae

Syn.: *G. canadensis* Lam.

Czech: Nahovětvec dvoudomý

Description

A deciduous, thornless tree 15-30 m tall with a thin crown formed by strong branches. Develops an abundance of root suckers, especially after damage of the trunk. The bark smooth, grey-black, shallowly longitudinally fissured and peeling in strips in the old age. Leaves alternate, 2x paripinnate, 30-90 x 25-60 cm, leaflets ovate to elliptic, 2.5 to 7.0 cm long, entire, irregularly spaced on the stalk, shortly petiolulate. Annual shoots are thick, blue-and-white glaucous, with a rusty-coloured pith and large leaf scars. Buds set off above the leaf scar, serial, tiny, almost hidden in the bark. Flowers unisexual, pentamerous, slightly symmetric, whitish, inconspicuous, in sparse terminal panicles 10-30 cm long. Blooms in May to June. The fruit is a thick pod 9-16 x 4-5 cm, violet-brown, glossy, coriaceous, hard, with large seeds placed in a pasty mass. Seeds round, laterally flattened, 1.0-1.6 cm in diameter, pale brown, hard.

Distribution and ecology

Native to the interior of North America from the Great Lakes to Oklahoma in the north and Arkansas in the south, from Kentucky and Pennsylvania in the east, Kansas and Oklahoma in the west. Here it is usually found in floodplains of river valleys, but sometimes also on rocky limestone slopes. It mostly occurs only as a disseminated woody plant. Seemingly native stands are found in the north-eastern portion of the range which however indicates the presence of an earlier settlement. Introduced in 1748 to Europe, and in 1844 to Bohemia (Prague - the park of Královská obora). Grows best in moist, humus-rich, nutrient-rich, drained soils at fully sunlit sites, it is a calcareous plant. It however tolerates poorer soils and drought, not growing in heavy clayey soils. Easy to adapt to urban environments, it withstands salinity. Light shading is tolerated only by juveniles; a frost-resistant species. In the wild, it develops colonies of individuals from root sprouts with an interconnected root system. Have neither diseases to suffer nor insect pests.

Practical importance

An ornamental woody plant, noticeable with its open crown, thick branches and late foliation, decorative chiefly through its leaves. It has been planted as such in towns across the U.S. and eastern Canada, included California. Considered a rare species in the U.S.; although it is widespread in the wild, the distribution is scattered so monitoring is recommended for any threats to the species' populations.

In this country, it is quite often planted in parks and gardens, the most abundant plantations exist in southern Moravia. It does not grow wild.

The wood has a red-brown core and a very narrow sapwood and is used in joinery and carpentry; due to its rarity, however, it is not used very widely.

The name ("coffeetree") comes from the use of roasted seeds as a coffee substitute in times of scarcity. Consumed were sometimes roasted beans as well that have a mild laxative effect.

A poisonous plant, it contains cytisin - an alkaloid that can be neutralised by roasting the pods and seeds.

Variability and cultivars

'Variegata' - Leaflets distinctively creamy-white spotted, nicely pinkish in the young age.

Note

From 1976 to 1994, the species was the state tree of Kentucky; today, it was replaced by *Liriodendron tulipifera*.

A tree of the greatest known dimensions found in Europe was located at La Turpinerie near the municipality of Geay, southwest France. It was a 26-m tall tree with a trunk diameter of 2.8 m. Lewisham (Mountsfield Park) in London can boast a tree planted as early as 1812.

The *Gymnocladus* genus covers only two species, of which one is found in North America, while the other grows in China. The Chinese species, *Gymnocladus chinensis* Baill., is too sensitive for the Central European setting. Pith of the fruits of this species is used for washing because of the saponin content.

***Hamamelis vernalis* Sarg. - Ozark Witchhazel**

Hamamelidaceae

Other name: Vernal Witchhazel

Czech: Vilín jarní

Description

A stolonate, deciduous shrub, 1-2 m tall. Leaves alternate, simple, asymmetric, obovate to oblong-obovate, 6-12 cm long, coarsely sinuate-dentate, more or less glabrous, green to cinereous, with large deciduous stipules, shortly petiolate. Autumn colour: orange. Annual shoots are shortly-hairy, buds pedunculate, bare. Flowers small, tetramerous, bisexual, fragrant, petals linear, reddish at the base. Flower colour is highly variable, even in the wild, from orange to dark red, or occasionally deep-yellow; differences can be found among plants, as well as among flowers on the same individual. Blooms from January to March. The fruit is a woody capsule with two black, glossy, spiky seeds, 7-9 mm long.

Distribution and ecology

The plant is native to central North America in the River Mississippi Basin from Missouri to Louisiana in the Ozark Plateau, where it grows on riverbanks. Introduced to Europe in 1909, it grows best in evenly moist, humus-rich, acidic, deep soils fully exposed to the sun and in the shade. Blooms however best at full sun. It tolerates rather heavier clay soils as well, provided they are well drained. If necessary, it can be pruned in the spring after flowering.

Practical importance

It is a rarely grown species, ornamental with leaf and autumn colouring; in winter, it is decorative through the distinctively fragrant flowers. Due to the time of blooming, planting is advisable near roads and places with high rate of traffic. It is best for group planting in large gardens and parks, fits well into the fringe of vegetation and informal, open hedges.

Appreciated as a plant for cutting in making unconventional winter bouquets.

In this country occasionally grown in collections of woody plants and in parks. Does not grow wild.

Variability and cultivars

f. *tomentella* Rehd. - Leaves tomentose, especially on veins abaxially; flowers pure yellow.

'Blue Moon' - Young leaves blue-green, adult leaves grey-green and yellow in autumn; flowers violet-blue. Kohout, about 1993

'Holden' - Young leaves pale yellow-green, adult leaves apple green, pale yellow in autumn; petals 8 mm long, curved and sinuous, pale orange; blooms in autumn. Lane, 2003.

'Lombart's Weeping' - Pendant branches, permanently pubescent young leaves pale yellow-green, adult leaves blue-green; flowers orange-yellow to red; blooms in late winter to early spring. Selected in 1954, the Netherlands.

'New Year Gold' - Young leaves yellow-green, adult leaves dark apple-green, cinereous on the underside, yellow in autumn; petals 6 mm long, straight or sinuous on the margin, yellowish-orange; blooms in winter. McDaniel, 1971.

'Red Imp' - Young leaves pale yellow-green, adult leaves medium-green, yellow in autumn; petals 8 mm long, curled and sinuous along the margin, pure-red to wine-red, calyx purple-red, blooming in mid to late winter. Dummer 1966.

'Spring Magic' - A dwarf cultivar densely growing, up to 1 m tall; young leaves pale yellow-green, adult sage-green, yellow in autumn; petals 4 mm long, straight, copper-orange, blooms in late winter to early spring. Willoway Nurseries, 1980.

***Hamamelis virginiana* L. - Common Witchhazel**

Hamamelidaceae

Other name: American Witchhazel

Czech: Vilín viržinský

Description

Patulous, deciduous shrub, 3-5 m tall, with black-brown outer bark. Leaves alternate, simple, asymmetric, obovate, 8-15 cm long, coarsely crenate-dentate, the shape reminiscent of a hazelnut tree leaf; on the underside pubescent with stellate hairs, soon glabrescent, with large deciduous stipules, shortly petiolate. Yellow in autumn.. Annual shoots are hairy in the young age; buds greyish-tomentose, pedunculate, bare. Flowers small, tetramerous, bisexual, strongly fragrant, petals linear, pale yellow. Blooms in September and October, when leaves drop. Fruits are widely obovoid, woody capsules, 1.2 to 1.4 cm long, with two black, glossy seeds. After maturing, the seeds shoot up to 9 m away.

Distribution and ecology

The species is native to eastern North America from Nova Scotia and Minnesota in the north to Florida and Texas in the south. Here it usually grows in thickets and forest verges, on deep, rich soils, as well as on rocky banks of watercourses. Introduced to Europe in 1736, and to Bohemia (Sychrov Chateau) in 1880. Grows best in freshly moist, humus-rich, nutrient, deep soils at fully sunlit sites and in the half-shade. Tolerates rather heavier clay soils as well. If necessary, it can be pruned in the spring.

Practical importance

The species is a shrub of ornamental leaf, suitable for fringe plantings or as a solitary tree. Best suited for large gardens and parks, as solitary shrubs need space. It is also used as a stock to graft other species/cultivars.

It is also grown on plantations as a source of raw materials for the cosmetic industry.

In this country, it is grown in parks and gardens; it used to be the most commonly cultivated species of the genus.

The wood is heavy, hard, very fine-grained, pale rusty-brown with almost white sapwood; the woody plants however reach only small dimensions, so do not present a usable source of timber.

Leaves and twigs have always been used to prepare tea,

applied by indigenous people as therapeutic agents. The first settlers took up the habit and the species has long been a widely used and important medicinal plant in the USA. Decoction was used for healing wounds, treatment of oedema, inflammation and tumours, and eye conditions. The bark was used internally to treat diarrhoea, colitis, dysentery, haemorrhoids and various gynaecological problems, for internal bleeding, etc.

Currently, the use of the plant is much more important in the cosmetics industry and in medicine. The extract of the leaves, twigs and bark is part of slightly astringent skin lotions and floressence waters, aftershaves, skin creams; in medicine, it is part of eye baths and soothing ointments after insect bite and burns and in dermatitis caused by *Toxicodendron* sp., plus is used for ointments to heal bruises, sore muscles, varicose veins, haemorrhoids, painful nipples and various inflammations.

Long-term use is not recommended due to the risk of cancer (high tannin content); when ingested, can cause vomiting, nausea. Topical use may cause dermatitis.

The plant is very rich in tannins, with some of these substances exhibiting a specific cytotoxic activity against tumour cells of the large intestine.

Variability and cultivars

A considerably variable species, both in the wild and in cultures.

var. *angustifolia* Nieuwl. - Twigs long; leaves 6-12 cm long, petioles 1.5-2 cm long; petals 1.5 cm long, very narrow. USA: Indiana

var. *henryi* Jenne ex C. Lane - Erect shrubs, usually 5-7 (to 10) m tall; rarely stolonate from the base; leaves have blades with a sloping base, apex acuminate to rounded, 6-7 × 4-5 cm large, adaxially tomentose to almost glabrous, abaxially tomentose, at least in the young age, later often glabrate to glabrous; flowers similar to the *virginiana* var., but smaller; petals 7-15 mm long, rather pale, pale lemon yellow to almost creamy.

var. *mexicana* (Standl.) C. Lane - Erect shrubs, up to 4 m high; blade oblique at the base, apex acuminate to rounded, the margin coarsely dentate or sinuate above the centre, size up to 8.5 x 5.5 cm, on both sides hairy-stellate-pubescent; young leaves of pale grey-green, intensely grey-green in adulthood, yellow in autumn; petals 4, belt-shaped, pale yellow, 10-15 mm long, calyx pale green with fine brownish tint. Mexico; is frost-resistant to -7 °C.

var. *orbiculata* Nieuwl. - Twiglets glabrous, smooth, grey; leaves small rather and nearly rounded, 1.5-5 cm long. USA: Indiana

var. *virginiana* - erect to rounded shrubs, up to 3 m tall, in the wild sometimes small trees 5-10 m high, leaves orbicular-obovate, crenate in the upper half, shallowly crenate in the lower half, blunt on the top; base obliquely cordate, 9 × 6.5 cm long, petioles

12 mm, pale green leaves when young; glabrous, dark green adult leaves, yellow in autumn; flowers have petals 16 mm long, slightly curled, pale yellow, calyx green with yellowish tinge, sweetly scented.

'Green Thumb' - Leaves yellowish green when young, adult leaves glabrous, with a green central spot and wide yellow margin, yellow in autumn, petioles 2 mm long; petals 10 mm long, slightly curved and sinuous, pale yellow; blooms in the fall. Neubauer, 2002

'Mohonk Red' - Young leaves light pale green, adult glabrous and dark green, yellow in autumn; petals 18 mm long, sinuous, pale brick-red, fragrant, blooming in autumn. Huth, 1998.

'Pendula' - Patulous shrubs, 2 m high and 4 m wide, branch terminal slightly pendant; young leaves yellowish-green, dark green and glabrous when adult; yellow in autumn; petals 15 mm long, pale yellow, fragrant, blooming in autumn. De Belder, 1955.

Note

The twigs were used to search for sources of water (similarly to hazel rods), and prophecy.

***Holodiscus discolor* (Pursh) Maxim. - Ocean Spray**

Rosaceae/Spiraeaceae

Other names: Creambush, Ironwood

Czech: Celoterčník různobarvý

Description

A patulous, deciduous shrub, 2-5 m tall. Leaves alternate, simple, ovoid, 3-9 cm long, pinnatilobate, lobes rounded, dentate on the tops, sharp notches, the leaves on the upper side glabrous and corrugated, whitish tomentose on the underside. Annual shoots greyish to grey-brown. Flowers pentamerous, yellowish-white, about 0.4 cm in diameter, in rich pendant panicles 8-20 x 5-15 cm. Blooms in July to August. The fruit is a small, pilose, indehiscent follicle with 1-2 seeds.

Distribution and ecology

The species is native to western North America from southern British Columbia and Alberta to northern Mexico, from the coast to about 2,150 m AMSL, where it grows in a variety of sites ranging from very dry to moist. It occurs, for instance, in the stands of *Pseudotsuga menziesii*. Most frequent occurrence is at open sites (open woods, clearings, shrubby stands, and edges of ravines and coastal cliffs). In arid areas, it is a common component of shrub communities known as *chaparral*, which are subject to periodic wildfires. At such sites, it is often the first woody plant to regenerate after the fire. Introduced to Europe in 1827. No special requirements as to cultivation; thrives on freshly wet, nutrient-rich soils.

Practical importance

The species is noteworthy with its large inflorescences that appear in summer. It can be recommended for open forest parks.

In this country, it is occasionally grown in parks and gardens. Currently does not grow wild in the territory.

Historically, the plant was used for many purposes. Many Native American tribes used wood and bark for the production of tools and furniture. Wood was renowned with its hardness ("ironwood") and therefore used for the manufacture of spears, arrows, bows, harpoons and nails. It was often hardened by fire and then polished using horsetail plants..

Indigenous cultures used flowers as a remedy against diarrhoea, while leaves served as a poultice. A decoction of the fruit was also used, as a remedy for not only diarrhoea, but also for small-pox and chicken-pox, plus it was in use as a blood tonic.

Variability and cultivars

var. *ariaefolius* (Sm.) Aschers. & Graebn. - Somewhat deeper lobed leaves, grey-green pubescent on the underside.

var. *dumosus* (Nutt.) Maxim. - Height from 0.3 to 0.7 (1.5) m, growth procumbent, annual shoots erect; leaves 2-4 cm long, nearly sessile, obovate, softly hairy on the upper side and whitish-tomentose on the underside; panicles narrow, flowers yellowish-white. From Utah to New Mexico, in rocky valleys of 2,000-3,500 m AMSL. Introduced to Europe in 1879.

'Carneus' - Deeply lobed leaves, flowers pale pink. Of ornamental flowers. Grown since 1911.

Note

The *Holodiscus* genus incorporates 2-5 (8) similar species, all growing in western North America.

***Hydrangea arborescens* L. - Smooth Hydrangea**

Hydrangeaceae

Other names: Wild Hydrangea, Sevenbark

Czech: Hortenzie stromečkovitá

Description

Deciduous erect shrub 1-2 (3) m tall, with soft wood, the older branches with outer bark peeling off in strips. Can form colonies from root suckers. Leaves opposite or in whorls of three, ovate, 6-15 (18) cm long, hairy on the veins on the underside, sometimes tomentose. Petiole 2-5 cm long. Annual shoots are thick, with a broad pith, pale grey-brown to reddish-brown, glabrous to diffuse-hairy. Flowers tetramerous or pentamerous, white, in semi-globose corymbs at the ends of annual shoots, 8-15 cm in diameter. Blooms in July and August. The fruit is a capsule on the top with a semi-globose calyx with trim, truncate, with small seeds.

Distribution and ecology

This species is native to eastern North America from New York to Florida, in the west to Ohio, eastern Oklahoma and south-eastern Kansas. A common species in the Appalachian Mountains, where it grows on moist sites in the undergrowth of deciduous forests, often on the banks of watercourses, sometimes even on limestone rocks. Introduced in 1736 to Europe, and in 1835 to Bohemia (Prague - the park of Královská obora). Grows best on sufficiently moist, humus-rich, nutrient-rich soils in partial shade. It tolerates sunlit positions as well if planted in a sufficiently and permanently moist soil. Does not tolerate drought, the leaves dry quickly. A frost-resistant plant, cutting down at the ground level is recommended for this species in rather colder areas at the end of winter.

Practical importance

In North America, it is a widely planted ornamental woody plant, particularly the 'Anabelle' cultivar. Used for carpet plantations or groups planted at shady sites; is popular in natural gardens.

Rather rarely cultivated in this country, it is still a promising species for urban greenery if adequate moisture is ensured. It does not grow wild.

Indigenous cultures used to prepare tea from debarked twigs. Stripped annual shoots were eaten boiled or fried.

Natives used this species as a remedy for problems with kidney and bladder stones as well as other urinary tract diseases which later on was adopted by the first settlers; this use has been maintained in medicine to this day. Roots served in traditional medicine as an anthelmintic, diuretic and a cleansing and diaphoretic agent. Leaves were used in a similar way. Scraped bark was used as an poultice for wounds, burns, sore muscles, sprains, etc. The bark was also chewed when treating stomach and heart disorders. Excessive doses can cause dizziness and breathing difficulties.

Variability and cultivars

ssp. *arborescens* - Leaves on the underside green, glabrous or nearly glabrous; sterile flowers usually not developed. Eastern USA, introduced to Europe in 1736.

ssp. *discolor* (Ser.) McClint. - Leaves abaxially grey, silky hairy or tomentose, 6-15 cm long; hemispheric inflorescence with fertile, at the edge sterile flowers; eastern USA, introduced to Europe in 1906.

ssp. *discolor* f. *sterilis* Rehd. - All flowers sterile, forming a head, 8-15 cm in diameter

ssp. *radiata* (Walt.) McClint. - The underside of leaves densely whitish-tomentose to grey-tomentose, leaves 6-12 cm long, ovate, dark green from above; inflorescence hemispheric, 5-12 cm wide with fertile, on the outskirts sterile flowers 2-3 cm in diameter, at first white, later reddish; blooms in June and July. Carolina, Tennessee

'Annabelle' - Height 1 m; leaves medium-green, smooth, abaxially more pale green; veins raised, margins sinuate, petioles green and then brown; flowers in semi-globose to convex heads, sterile flowers very small, immature pale green to creamy, white or creamy when adult, fertile flowers green, later green-white.

'Invincibelle' - Height in year 10 about 1.5 to 1.8 m; dark green foliage; pink flowers, blooms on the new wood.

'Sterilis' - Inflorescence hemispheric, dense, only sterile flowers, a double-flowered cultivar of the *discolor* ssp.; blooms from June to August. Grown since 1910.

***Chamaecyparis lawsoniana* (A.Murray) Parl. - Lawson Cypress**

Cupressaceae

Other names: Port Orford Cedar, Matchwood, Oregon Cedar

Czech: Cypřišek Lawsonův

Description

Coniferous, evergreen tree, reaching a height of 30-50 (60) m, has a trunk diameter of up to 2 (3) m. Life span can be up to 300 (500) years. The crown is narrowly conical, with a bent to a pendant terminal top, remains a relatively slender tree until the old age. Crown colour from dark green to cinereous (to silvery), very variable. Trunk straight, non-tapering. The bark glossy, smooth, grey-green in rather young trees, later rougher, purple-brown or reddish-brown, cracked, with fibrous longitudinal grooves. Older specimens develop a typical swelling base of the trunk. Assimilation organs are scaly, small, lateral scales are usually larger than the centre scales, carinate, blunt-ended, with the terminals only slightly projecting from the twig. The centre leaflets tend to have an elongate gland, their peak is 0.5-1 mm above the tip of the lateral leaflets. Scaly leaflets are dark green from the above, from the underside they are lighter and lined with a more or less distinct whitish pattern, often X-shaped. Cones ripen at the end of the first growing season, are globose, 8-10 mm in diameter, consisting of 8 seed scales, light brown in full maturity. Cone shields rugose with a sign of a thorn. Small seeds, 2-4 pieces behind the scale, are winged.

Distribution and ecology

The species range extends in the western USA, on slopes of the mountains of the Pacific Coast, especially on the boundary between California and Oregon, from the Pacific Ocean to Mt. Shasta. The cypress grows here at elevations of up to 1,500 m, while in the isolated part of the range, on patches near the River Sacramento springs, it extends perhaps up to 1,800-1,950 m AMSL. Usually occurs in association with the Douglas fir (*Pseudotsuga menziesii*), the white fir (*Abies concolor*), the western redcedar (*Thuja plicata*), the sitka spruce (*Picea sitchensis*) and the western hemlock (*Tsuga heterophylla*). It grows in areas with high precipitation (1,500-2,400 mm) on different soil types. Introduced to Europe in 1854, which in Bohemia took place in 1859 (Nové Hradý). A half-shade species, it is however able to grow very well as a solitary tree can withstand even longer shading. The good growth requires sufficient soil and humidity, but can copy even with short-term droughts. Shallow and dry soils insufficient for good growth. No special requirements as to the nutrient content of the soil. It grows well on both podzolic and calcareous soils, finding the best conditions on sandy-loamy fresh nutrient-rich soils. In its native range, the tree often occurs on serpentine rocks. Amongst the species quite tolerant of dust and gaseous immissions, it lasts in an urban environment. It is a frost-resistant species. It belongs to the species that are little attacked by pests in both its native range and in the Czech Republic.

Practical importance

In North America, it is a highly recognised woody species. The wood is lightweight, but hard and solid. Strongly aromatic, it is resistant to fungi and insect pests. It is used to build houses, produce furniture, veneers, construct boats, make packaging material and even in pencil-making industry. Especially important is timber export to Japan, where this is a highly appreciated woody plant for constructing and refurbishing buildings. The wood contains oil that is an effective diuretic. Known to be an ornamental park woody plant.

Used in forestry as well in Western Europe, such as on the British Isles on plantations, along with other West American species. It however finds its practical application especially in landscape horticulture and is recommended for hedges and road/street alleys. In the Czech Republic, it does not belong to invasive species.

Variability and cultivars

There are more than 200 cultivars.

***Chamaecyparis nootkatensis* (Lamb.) - Nootka Cypress**

Cupressaceae

Syn.: *Xanthocyparis nootkatensis* (D. Don) Farjon & Harder

Other names: Alaska Cedar, Alaska Cypress, Yellow Cypress, Alaska Sound Cypress, Sitka Cypress

Czech: Cypřišek nutkajský

Description

A medium-sized conifer, reaching a height of 20-30 (50) m, it has a trunk diameter of up to 1 m. At higher elevations, it also takes shrubby forms. The life span can be over 1,000 years. The trunk is erect; crown is narrowly conical peak with a drooping top. Leaves scaly, middle and lateral of the same length, about the size of 3 mm, acute with tips projecting from the twig. Dull on both sides, blue-green, without a clear whitish pattern, give bad smell when rubbed. Persist 3 years on the twigs. Buds inconspicuous, green. Annual shoots are square, 2 mm thick, pendant at the ends. Cones globose, 10-12 mm in diameter, consisting of 4-6 scales with a strong tip, dark brown. Mature on year 1-2.

Distribution and ecology

The range extends in the coastal part of the Pacific Ocean, from Alaska to north-western California. The tree occurs from the sea level up to 1,200 m AMSL in Alaska and British Columbia, where it mostly found along with *Tsuga heterophylla* and *Thuja plicata*. In Washington and Oregon, it reaches up to 2,100 m AMSL, along with *Tsuga mertensiana*, *Abies lasiocarpa* and *Pinus albicaulis*. It can extend as high as the upper forest boundary. In California, it forms stands with *Abies magnifica*, *Picea breweriana* and *Calocedrus decurrens*. Introduced in 1853 to Europe and in 1863 to Bohemia (Červený Hrádek Chateau). A heliophilous species, it can tolerate a partial shade. Requires rather higher humidity. Not very demanding in terms of soil, it tolerates even organic, nutrient-poor soils as well as skeletal subsoils. Thrives best in sandy-loamy soil of sufficient moisture. It does not tend to be damaged by frost, is among the most frost-resistant conifers. Tends to be damaged by browsing and breaking by game; otherwise there are no diseases to suffer. It can withstand flue gases to a moderate extent.

Practical importance

An important economic species of Alaska and British Columbia. The wood is of high quality, durable, fragrant.

The experimental efforts of forestry planting in the U.K. were not very successful. Almost not used in Europe's woodlands. A very decorative woody plant, it is particularly advisable in landscaping from the lowlands to mountain zones. Growing makes use of both the original type and the ornamental cultivars. In this country, the species almost does not naturally regenerate and is not among invasive species.

***Juglans cinerea* L. - Butternut**

Juglandaceae

Other name: White Walnut

Czech: Ořešák popelavý

Description

A stately deciduous tree, 15 to 25 (30) m tall, with ellipsoidal crown. Outer bark light to dark grey, soon deeply furrowed. Aromatic leaves alternate, narrowly oblong in outline, pinnate (sometimes paripinnate), 5-9-jugate, 30-50 (60) cm long; leaflets oblong-lanceolate, 6-12 cm long, the largest is in the middle of the leaf, asymmetric on the basis, with an elongated tip, serrated, hairy on both sides, the leaf underside, stem and petiole glandular hairy. Annual shoots thick, with septate pith, red-brown, glandular hairy, glutinous in the young age, pith dark brown, leaf scars large, heart-shaped, buds semi-globose, the terminal buds glandular tomentose. Inflorescence monoecious, unisexual, male catkins on the previous year's twigs, 6-10 cm long, female flowers at the end of annual shoots, 3-7 pieces. The fruit is a false drupe with a fleshy skin (exocarp) and a woody, grooved shell (nut). It is oblong-ovoid, 5-8 cm long; the glutinous glandular hairy brownish fleshy skin becomes pulpous at maturity. The nut is 3-6 cm long, oblong-ovoid, sharply acute, irregularly deeply grooved, dark brown, thick-walled; the seed is edible.

Distribution and ecology

The species is native to eastern North America from New Brunswick and southern Quebec to the west to Minnesota, to the south to northern Alabama and northern Arkansas, to the west as far as the foothills of the Rocky Mountains, where it extends to higher elevations than *J. nigra*. In Virginia, it occurs at elevations up to 1,500 m. It grows on nutrient-rich, freshly wet alluvial soils in deciduous forests and on river banks, as well as on dry rocky soils, especially on limestone substrates, mostly as a disseminated solitary woody plant. Introduced in 1633 to Europe, and in 1835 to Bohemia (Prague - the park of Královská obora), maybe even earlier (Lednice, 1811). It is more resistant to frost than *J. nigra*. A heliophilous species. Roots excrete juglone (5-hydroxy-1,4-naphthoquinone) that acts as an inhibitor on other plants (juglone is contained in fruit peels and leaves as well). In a culture, growth requirements are satisfied with deep, nutrient-rich and humus-rich soils with sufficient calcium content, neutral to slightly alkaline, sandy-loamy to loamy, warm sites and sufficient space for the development of the crown. It is sensitive to cancer caused by the fungus *Melanconis juglandis*.

Practical importance

In Canada and in some U.S. states, the tree is considered endangered/vulnerable species. Grown rarely as an ornamental tree in North America, cultivation as a fruity woody plant is however common. The species is particularly suitable not only for large lines of trees and tree avenues, but also for high groups in large parks.

In the Czech Republic, it is rather rarely grown for decoration in parks; experimental planting occurred in forest stands in rather arid locations of floodplain forests in the Pannonian thermophyticum (Židlochovice, Mutěnice, Kunovice). Currently does not grow wild.

The wood is porous semi-circular, with a yellow-brown core, lightweight, soft, resistant to rot, but with attractive colouring and a nice pattern. Favoured by carvers, it is used for furniture, doors, etc.

The peel of fruit are the source of a yellow to orange dye, while young twigs, leaves, buds and unripe fruits produce light brown dye and young roots are used to produce a black dye. Nuts are of a very strong shell, the halves of which are not separated from each other; sometimes are used as a material for wooden jewellery and other ornaments, set up from nut cross sections.

The species is valued for its fruit rather than for wood. The kernels are difficult to peel, the yield is only about 20% of the nut weight; yet they are favoured by the food industry as an ingredient in baking and preparing special sweets. Unripe fruits are used for pickling. The sap is used to make syrup or refreshing drinks.

Indigenous cultures used the tree for therapy, as a laxative and tonic, for the treatment of rheumatism and arthritis, headaches, toothaches, for dysentery, etc. Today the bark is used as a strong laxative cortex as well as an agent to control cholesterol. The content of naphthoquinone may however cause irritation of the stomach or gall bladder.

Note

The dye of the skins was used for dyeing fabrics to light/dark brown in households. During the American Civil War, the Confederate soldiers were taunted "butternuts" because of the colour of their uniforms.

***Juglans nigra* L. - Eastern Black Walnut**

Juglandaceae

Czech: Ořešák černý

Description

A stately deciduous tree, 30-40 (50) m tall, with a broadly patulous crown. Outer bark black, deeply furrowed. Aromatic leaves alternate, narrowly oblong in outline, pinnate (sometimes paripinnate), 7-11-jugate, 30-60 cm long; leaflets oblong-lanceolate, 6-12 cm long, the largest is in the middle of the leaf, asymmetric on the basis, with an elongated tip, serrated, glabrous on the upper side, only scarcely hairy on the underside, stem and petiole glandular hairy. Annual shoots thick, with septate pith, grey to red-brown, hairy, later glabrate, light brown pith, leaf scars large, heart-shaped; buds semi-globose, terminal buds densely hairy. Inflorescences monoecious, unisexual, male catkins on the previous year's twigs, 5-10 cm long, female flowers at the end of annual shoots, 1-4 pieces. The fruit is a false drupe with a fleshy skin and a woody, striate shell (nut). The hairy brownish pulpy cover (exocarp) becomes pasty at maturity. The nut is globose, irregularly deeply grooved, dark brown, thick-walled.

Distribution and ecology

The species is native to eastern and central North America from Ontario to the south to Georgia, Florida and Texas, to the west as far as the foothills of the Rocky Mountains, where it grows on moist, nutrient-rich, alluvial soils, particularly within forest verges and on the banks of watercourses, or on wet slopes. Within this range, it also frequently occurs in secondary habitats (edges of roads/fields). Introduced to Europe in 1686, maybe even earlier (1656); in 1835 it arrived in Bohemia (Prague - the park of Královská obora), maybe even earlier to some resources (Lednice, 1803). A frost-resistant, relatively heliophilous species, it can withstand only a slight shading and is sensitive to salinisation. This species too contains and excretes juglone. It requires deep, well-drained and nutrient-rich soils with sufficient calcium content, neutral to slightly alkaline, sandy-loamy to loamy, warm sites and sufficient space for the crown to develop. In the Czech Republic, it is very often infested by the mistletoe (*Viscum album*).

Practical importance

In North America, this walnut is one of the most valuable forestry woody plants, even so much that courts handle cases of rape of the forest - illegal walnut logging. Even in Europe it grows to large dimensions and is used by forestry e.g. in Germany, Austria, Hungary, France and in the Balkans. Introduced as an ornamental tree into Europe, Central Asia, China and elsewhere. It is an appreciated tree for planting in parks and tree avenues, with the fall of fruit in autumn being the only drawback.

In the Czech Republic, it is frequently cultivated in parks, which in South Moravia (e.g. Židlochovice, Mutěnice, Kunovice) occurs even in forest stands and wind belts. It commonly grows wild in the territory.

Wood is solid and heavy, semi-circular porous, with dark brown to purple core, is one of the rarest and most sought-after hardwoods. In North America, but also elsewhere, it is widely used in furniture, producing aircrafts and ships, flooring and interior panels, rifle butts and a variety of other products; today, however, making veneers is the main application.

Fruit skins contain juglone, plumbagin and tannins and were used to obtain a durable yellow to black dye. Nut shells are used for various special purposes, for example as an abrasive for finishing precision gears or cleaning jet engines, as an additive in drilling mud for crude oil drilling, as a filler in dynamite, as a means for filtration of flue gas and water and as a carrier agents for various insecticides. In the Czech Republic, the nuts are used to make ornaments and jewellery similarly as the nuts of *J. cinerea*.

The kernels are highly valued and used in food industry (ice-creams, bakery and confectionary products, etc.), as well as the sweet oil source from the kernels by pressing, with however the rapid rancidity being a drawback. Immature fruits are pickled. Walnut sap is used to produce a syrup or for fermentation.

The bark and leaves were used in traditional medicine as an analgesic, an astringent, an emetic and a purgative agent, as well as to control external and internal parasites. They were used to treat skin diseases, toothache, headache, hypertension, etc.

The litter of black walnut leaves can cause laminitis in horses.

Variability and cultivars

'Laciniata' - Leaves mostly paripinnate, petals deeply, gently and irregularly incised to pinnate. Known since 1937.

Note

The largest known tree specimen: Sauvie Island, Oregon, diameter in $d_{1.3}$: 2.62 m, height 34 m, crown width 44 m.

The largest tree in Europe: the chateau park in Sered', Slovakia; the perimeter of 6.30 m, the height of 25 m, probable age 300 years (may be overestimated).

***Juniperus virginiana* L. - Pencil Cedar**

Cupressaceae

Syn.: *Sabina virginiana* (L.) Ant.

Other names: Eastern Red Cedar, Savin, Virginian cedar, Red Juniper

Czech: Jalovec viržinský

Description

Erect, usually single-trunk tree, 12-15 (32) m tall, with ovoid to rounded crown, with branches erect to patulous, twigs widely distributed in space, and red-brown outer bark, peeling off in strips. Trunk diameter up to 1.2 m, the average lifespan is up to 300 (700) years. Juvenile leaves (on young individuals or on the lower branches and sprouts) needle-like, opposite, quite salient, 5-10 mm long, not connate with bases, sharply acute, with a groove with two white stripes on the upper side. Adult leaves scaly, opposite, rhombic ovate, projecting from the twig on the tip, about 1-1.5 mm long, dark green, with small glands on the back. Annual shoots thin, rectangular, do not give bad smell when rubbed. Buds small, greenish. Cones on erect pedicels, globose or more often ovoid. 5-7 mm, dark blue, glaucous, var. *silicicola* only 3-4 mm. Mature on year 1-2, they contain 1-2 seeds and a sweetish pulp.

Distribution and ecology

The original *Juniperus virginiana* var. *virginiana* grows in eastern and central North America. Found from north-eastern Canada - Quebec to the west to Dakota, to the south through eastern Wyoming to north-eastern Texas, continuing eastward almost as far as the Atlantic. It grows in middle elevations, on drying soils, as well as in swamps and on river banks. It occurs from 30 to 1,000 m AMSL. Typical occurrence mainly in the Great Plains. *Juniperus virginiana* var. *silicicola* (Small) E. Murray extends more to the south and east, as far as the Atlantic coast and Florida. Grows mainly on sand dunes. Introduced to Europe as a species in 1664, to Bohemia in 1812 (Hluboš). Tolerates dry and sandy soils, rocky substrates. Often colonising abandoned fields. A quite heliophilous species, it dies off at shaded sites. Undemanding in terms of moisture - 380 mm of precipitation per year is sufficient. Under extreme circumstances, it can take shrub forms. Thrives best on rather deep, moist, but well-drained alluvial soils. A frost-resistant species, tolerates both urban settings and flue gases.

Practical importance

The wood soft, fragrant, with a strong red to violet-brown core. Lightweight, easy to process and decorative, the use ranges from fine-art products and turning to making pencils. Sometimes used to produce lightweight massive furniture. The leaves are used for extracting essential oils.

In this country, it is sometimes cultivated in parks and chateau gardens as an ornamental tree; used to any greater extent it was for planting in the Lednice-Valtice zone. Not classified as invasive species.

Variability and cultivars

'Glauca' - Silvery-grey, robust, columnar, up to 5 m tall. Known since 1855.

'Globosa' - A globose shrub to 1 m tall, densely branched, dark green. Known since 1891.

'Tripartita' - A shrub with upwards-growing branches. Known since 1867.

Note

Juniperus virginiana has the largest range of conifers in the territory of the United States.

***Kalmia latifolia* L. - Mountain Laurel**

Ericaceae

Other names: Calico Bush, Spoonwood, Ivybush, Sheep Laurel, Lambkill, Clamoun

Czech: Kalmie širokolistá, mamota širokolistá

Description

A patulous, evergreen shrub 1-3 m tall, in its native range up to 12-m tall tree. Propagation occurs via root suckers. Leaves alternate, sparsely converging of 2-3, simple, oblong, 5-10 cm long, 1-4 cm wide, entire, glossy dark green on the upper side, yellow-green on the underside, glutinous glandular when sprouting. Annual shoots hairy only in the young age, brownish from the upperside, abaxially greenish. Flowers pentamerous, with a corolla broadly campanulate, white to dark rose, 2-2.5 cm in diameter, in umbellate, glandular hairy racemes 7-10 cm broad. Blooms in May to June. Capsules with a persistent style are flattened-globose, 0.5 to 0.8 cm in diameter, indehiscent with five valves, contain numerous small seeds.

Distribution and ecology

The plant is native to eastern North America from southern Maine and New England to Florida, west to Indiana and Louisiana, where it grows in both dry and swampy forests, on rocky slopes and on the sands, on acidic soils (soil pH range 4.5-5.5). Often forms extensive thickets. It is part of the early succession stages and climax communities. Regenerates very well after fire through rootstock that can be found in the depth of as many as 0.7 m. Introduced in 1734 to Europe, and in 1844 to Bohemia (Prague - the park of Královská obora). A shade-tolerant, frost-resistant, calciphobic plant. Thrives at fully sunlit sites when growing on sufficiently wet soils.

Practical importance

A species with showy foliage and beautiful flowers. A shade-tolerant woody plant, it is particularly suited for the understory of high woody species on acidic sites. Can be used as a natural (untrimmed) hedge.

Planting in this country is rather rare, given the soil-related demand. It does not grow wild in the territory.

The wood is heavy, hard, but brittle. Used for the production of small tools and tool handles, as well as furniture, bowls, wooden parts of clocks, etc., plus carving wooden spoons by indigenous cultures ("spoonwood"). Immature, green, soft wood was used for this that hardened after drying. Rootstock was used for making tobacco pipes instead of imported briar roots. Leaves serve as a source of yellow dye.

The entire plant is strongly poisonous, containing grayanotoxin and arbutin among other things. It can poison livestock, wildlife and even a human. Cases took place of poisoning after eating meat of game or birds that had been consuming parts of plants. This includes the nectar and pollen and consequently honey from the plant's flowers - poisoning however occurs rarely because the honey is bitter. Symptoms of poisoning start to appear about 6 hours after ingestion, manifest in respiratory problems, loss of appetite, salivation, eye tearing, heart anxiety, poor coordination, depression, vomiting and diarrhoea, weakness, convulsions, paralysis and coma to death. Indigenous cultures used the plant's leaves as a means of suicide.

In traditional medicine, leaves were used to treat skin diseases and inflammations, rheumatism, neuralgia, syphilis, angina pectoris and for parasite control. They have an analgesic effect and act as an astringent, antiseptic, narcotic and sedative. Due to the toxicity, today's use in modern medicine is rare.

Variability and cultivars

A large number of cultivars have been cultivated, differing chiefly in flower colours.

f. *angustata* Rehd. - Leaves narrowly oblanceolate to linear, 4-8 cm long and 5-10 mm wide. New Jersey.

f. *fuscata* (Rehd.) Rehd. - Flowers usually feature a continuous brownish, purple or cinnamon strip of pigmentation inside the corolla that splits to form small brownish spots towards the corolla base and margins and is variable in terms of size, shape and colour. Northeast USA.

var. *laevipes* Fernald - Inflorescences and pedicels glabrous. Southeast USA.

f. *obtusata* (Rehd.) Rehd. - A rare form with leaves oval to oblong-obovate, 25-65 mm long and about 38 mm wide, both ends rounded, petioles short, internodes shorter.

'Pink Charm' - Height up to 1.1 m, flowers in the flower-bud dark pink to red, rich-pink after opening; leaves dark green, dull. AGM holder.

'Tinkerbell' - Height to 0.8 m, leaves dark green, flowers pink, inside with a brown stripe.

Note

The *Kalmia* genus covers eight species occurring only in North America and Cuba.

Kalmia latifolia is the official state symbol of Connecticut and Pennsylvania.

***Larix laricina* (Du Roi) K. Koch - Tamarack**

Pinaceae

Syn.: *Larix microcarpa* (Lamb.) Desf.

Other names: American Larch, Black Larch, Hackmatack

Czech: Modřín americký

Description

A deciduous conifer, erect, usually a single-trunk tree, 10 to 25 (35) m tall, with an ovoid crown, with branches erect to patulous, with red-brown outer bark peeling off in flakes. Trunk diameter up to 1 m, the lifespan is up to 400 years. Needles are on reduced brachyblasts in bundles of 15-20 (25), are 1.5 to 3.5 cm long (usually 2-3 cm), triangular in cross-section, blue-green. Annual shoots are thin, flexible to pendant, red-brown, sometimes cinereous glaucous. Buds small, dark red, slightly resinous. Cones on short peduncles, globose to ovoid, 1-1.5 (2) cm long, orange-brown during ripening, later grey-brown. Contain 10-20 glabrous seed scales. Bract scales hidden.

Distribution and ecology

The species is native mostly in the boreal forests of North America. Occurs from western Canada - British Columbia through Alberta and Manitoba to the east to Newfoundland, the southern boundary running along the Great Lakes, through Minnesota, Ohio, Illinois, Pennsylvania, New Jersey to Maine. Separate sub-ranges are found in Alaska, in the territory of Yukon, as well as in the southeast in the mountains of West Virginia. The plant grows from the sea level to the elevation of 1,000 m and to 500 m in Alaska. It occurs mainly on waterlogged, muddy soils, peat bogs, etc., often with *Picea mariana*; is part of forest-tundra stands. Introduced to Europe as a species in 1737, to Bohemia in 1744 (Prague). It tolerates wet, acidic, nutrient-poor soils, but grows on sands and clayey soils as well. Often colonises abandoned fields. A quite heliophilous species, it dies off at shaded sites. Of high demands on moisture, it tolerates even long-term waterlogged sites. Under extreme circumstances, it grows very slowly. It is a frost-resistant, not very tolerant of flue gases.

Practical importance

A species of a durable, dense wood. The wood is heavy, but easy to process. It is used in structures, buildings, sleepers, timbering in mines, etc., also used for outdoor joiner products - windows, doors. However, sourcing fibre is the most common use. Often serves for production of poles and lumber, battens, crates, etc. Roots were used for sewing canoes from birch bark.

In this country, the tree is sometimes cultivated in parks and chateau gardens as an ornamental tree, but freezes quite often in the local variable weather. Not classified as invasive species.

Variability and cultivars

'Hartwig Pine' - small, bushy-growing, compact; needles lush-green. The height to 2 m.

***Leucothoe fontanesiana* (Steud.) Sleum. - Highland Dog Hobble**

Ericaceae

Syn.: *L. catesbaei* auct. non (Walt.) A. Gray, *Andromeda fontanesiana* Steud.

Other names: Mountain Doghobble, Switch Ivy, Drooping Leucothoe, Fetter Bush, Dog Hobble, Fetterbush

Czech: Leukothoé horská, Desfontainova, Catesbaeova

Description

An evergreen shrub 0.7-1.2 (2.0) m tall, with long pendant tortuous branches, propagating through root suckers. Leaves alternate, simple, narrowly lanceolate, 6-13 cm long, long-acuminate, aristate-serrated, glossy dark green on the upper side, brown-spotted on the underside, diffuse-hairy, red in autumn and winter. Petiole 0.8-1.5 cm long. Annual shoots are red in the young age, shortly pubescent. Flowers pentamerous, white, bulbous, about 0.6 cm long, with 10 stamens, in axillary racemes 3-6 cm long, sometimes in panicles up to 8 cm long. Blooms in May. The fruit is a flattened-globose capsule, indehiscent along five valves, with numerous small seeds.

Distribution and ecology

The plant is native to south-eastern North America from New York south to Alabama and Georgia, especially in the Appalachian Mountains, where it grows in moist mountain forests, thickets, often along streams and in ravines. Tolerates a moderate shade, is frost-resistant, calciphobic, not tolerating dry and windy sites. Prefers rather cooler, humic, freshly moist, well-drained soils and a partial shade. In sufficiently moist soils it thrives at fully sunlit sites. Pruning and rejuvenation of the plant is advisable in spring.

Practical importance

A less known ornamental woody plant with attractive foliage and flowers. Recommended for planting in groups with other ericaceous plants, within the understory of higher woody species, as well as for instance to stabilise shady banks of watercourses and reservoirs.

Rarely cultivated in this country, the locations particularly include collections of ericaceous plants. It does not grow wild in the territory.

A poisonous plant, it contains andromedotoxin like many other members of the family. Symptoms of poisoning comprise salivating and nasal discharge, sweating, numbness, headaches, depression, weakness, abdominal pain, nausea and vomiting, diarrhoea to paralysis.

Variability and cultivars

'Nana' - A compact cultivar, height to 0.6 metres.

'Rainbow' - Leaves cream, pinkish and yellowish colourful when sprouting. Selected in 1949, Ohio.

'Rollissonii' - A compact growth, branches arched, leaves narrower. Selected in 1914, Kew Gardens. The cultivar received the AGM.

***Liquidambar styraciflua* L. - American Sweetgum**

Hamamelidaceae/ Altingiaceae

Other names: Sweetgum, Alligator Wood, American Storax, Bilsted, Redgum, Satin Walnut, Star-leaved Gum

Czech: Ambroň západní, americká

Description

A deciduous tree, growing to 15-30 (50) m high, with a trunk up to 1-2 m in diameter, with a conical crown when young, later round, widely branched. Outer bark dark grey; thin, smooth in the young age, later deeply longitudinally striate, corky. Leaves alternate, palmately five- to seven-lobate, 7-25 cm long and 4-18 cm broad, with acute lobes, dark green, glossy on the upper side, the underside lighter and glabrous or with hairs in the axils of the veins, leaf margin serrulate to dentate. Petiole 4,5-16 cm long. Autumn colouring from orange to pink, purple-red or violet. Annual shoots are olive-green, light brown to dark red-brown, slightly angular, shiny, glabrous or downy, with lenticels; older branches with distinctive corky ribs. The buds 6-12 mm long, olive-green, orange or red-brown, ciliate. Flowers small, achlamydeous, unisexual, greenish-yellow, in globose heads about 1.5 cm in diameter. Male flowers with 4-10 stamens, female flowers with a single bottom ovary of two carpels, with numerous ovules. Blooms from March to May. Fruits are capsules with persistent styles (beaks), arranged by 20-50 in a globose infructescence 3-4 cm in diameter, yellowish, brown when ripe. Seeds are 1-2 mm long, angular, with wings.

Distribution and ecology

The species is native to the warmer regions of eastern North America from Connecticut south to Florida, west to Illinois, Missouri and Texas, where it grows from the sea level to 800 m AMSL in regularly flooded or swampy forests; it continues to the mountains of tropical regions of Mexico and Central America (Guatemala, El Salvador, Nicaragua and Honduras), where it grows in the misty mountain forests at an elevation of 400-1,800 m. Introduced to Europe in 1681, and to Bohemia in 1844 (Prague, the park of Královská obora). A heliophilous species, it is quite frost-resistant, not tolerating alkaline soils. From other soil aspects, it is a quite undemanding plant, prefers deep, moist, drained, rich soils, yet it thrives on heavy clayish soils and, conversely, on the sands and gravelly soils.

Practical importance

A valuable park tree used mainly as a solitary plant, ornamental especially through its autumn colouring, it needs a plenty of space. The falling fruits present a drawback when considering the use in street plantings. Amongst U.S. economically important woody plants, it was introduced to different regions (tropical and southern Africa, Australia, New Zealand, Cyprus , etc.) as a technology, amelioration and erosion control woody species.

In this country, it is planted as a noteworthy solitary tree in parks. Requires sheltered sites and winter protection when juvenile. It does not grow wild in the territory.

The wood is very hard, heavy, silky glossy, decorative through pinkish-coloured sapwood and the core in various tints of red-brown colour. Used particularly for the production of plywood, furniture, panelling, flooring, veneers, railroad sleepers, cigar boxes, barrels and other packages, as well as for the production of pulp and paper. Previously used on the inner lining of railway wagons, as well as gramophone, radio and TV set cases. Can be used as a substitute for tropical wood (ebony).

The bark contains balsam, which includes, inter alia, cinnamic acid; when the plant is injured, the substance flows out and becomes solid by forming a mass similar to amber. Used in the production of chewing gum and food industry, as well as an ingredient for tobacco, perfumes and cosmetics.

To indigenous cultures, the plant was an important component of natural medicine. They used resin to treat skin diseases, respiratory, gynaecological, urological and digestive disorders as well as mental and nervous illnesses. They cleaned their teeth by chewing the stiff resin; a mixture of crushed resin and lard was used for making a healing ointment for wounds, ulcers and various skin diseases. The Aztecs considered the plant not only a healing, but also a sacred tree.

Variability and cultivars

The American sweet gum is a highly variable species, with dozens of cultivars produced, differing mainly in autumn colour of the leaves or by the habit.

'Anja' - Branching horizontal, bright-red autumn colour, leaves have an elongated central lobe.

'Aurora' - Pyramidal habit, leaves yellow-varied.

'Pendula' - growth erect, weaker branches pendant.

'Worplesdon' - A pyramidal crown, leaves strongly serrated, colourful in autumn.

***Liriodendron tulipifera* L. - Tulip Tree**

Magnoliaceae

Other names: American Tulip Tree, Tuliptree, Tulip Poplar, Canoe wood, Whitewood, Fiddle Tree, Yellow Poplar

Czech: Liliovník tulipánokvětý

Description

A deciduous tree 15-35 (60) m tall, fast-growing, with bark containing balsam, with deeply furrowed outer bark, reminiscent of poplar. Leaves alternate, simple, with four to six lobes, rarely bilobate, on top truncate or emarginate, lyrate, 7-15 cm long, shallowly lobed, light green or cinereous on the underside, with noticeable, deciduous stipules; golden yellow in autumn. Petiole 5-10 cm long. Annual shoots brown, glossy, glabrous, slightly angular, segmented; buds brownish, shortly pedunculate, noticeably flattened, glaucous, covered with two ovate stipules. Flowers grow singly at the ends of annual shoots, large, bisexual, with 3 + 6 petals, yellow-green, with orange patches up to 6 cm in diameter, the flower bed elongate. Blooms in May to June. The compound fruit is reminiscent of a cone, is 5-8 cm long, disintegrating at maturity. Fruit: 1 (2) achenes (-s) 3-5 cm long, acute, with a carinate wing rib. Seeds with a very low germination rate.

Distribution and ecology

The species is native to eastern North America from Massachusetts and Wisconsin to Florida, Louisiana and Mississippi, where it grows in deciduous forests in river valleys and on moist hillsides and rather lower mountains from the sea level to the elevation of 1,500 m. Considered a species of early stages of succession; as a disseminated species, it can survive 50-150 years in the stands and then disappear; under optimal conditions, however, it is able to create a stable monocoenosis. Introduced to Europe in 1663 and to Bohemia in 1865 (Hluboká Chateau). A heliophilous species, it is quite frost-resistant, with young plants mostly succumbing to frost. Grows best on deep, drained, nutrient-rich soils. Does not tolerate if the soil is too dry or conversely wet. Sensitive to salting. The lateral branches are often damaged by wind, snow, icing, or excessive loads by creepers. Due to the fleshy, easy to break roots transplanting in early spring is most recommended. The life span can be up to 500 years.

Practical importance

A large-sized tree, ornamental with leaves and flowers. It is advisable as a solitary plant for large gardens and parks, especially for water surfaces; planting in street alleys is not recommended. In Germany, however, it is a popular street tree. As a park and ornamental woody plant, it has spread all over the world; in Europe, Sykkylven (Norway) is the northernmost planting site.

In the USA, the species is an important forestry woody plant that features one of the tallest growths in eastern North America, plus its wood is one of high quality. A fast-growing species, it still lacks the usual drawbacks of woody plant of such type, e.g. low-quality wood and short life span. Used in forestry is also in Germany, Hungary, the countries of the former Soviet Union, and elsewhere. It is advisable for cultivation in plantations to produce wood for energy and other purposes.

In this country, it is a woody species planted quite often in parks and gardens. It does not grow wild in the territory.

The wood is lightweight, the heartwood is light green or striped red to black, the sapwood is almost white. Easy to work, polish and pickle, it is used in the USA to produce furniture, panelling, veneers, plywood, tools, as well as a cigar boxes or coffins; it is also a raw material for the production of cellulose. Due to the resistance against termites, it is used as timber for building houses and outbuildings in southern regions. Indigenous people manufactured canoes from the wood. The bark serves as a source of yellow dye.

A species appreciated as a melliferous plant, the flowers provide a large amount of pollen and nectar; the honey is dark red in colour. The bitter bark of young branches and roots was used as fever control as an alternative of quinine bark, and as an anthelmintic. The green bark was also used as an aphrodisiac. The bark contains tulipiferin, an alkaloid that has enormous effect on the heart and nervous system.

Variability and cultivars

'Aureomarginatum' - Leaves irregularly lobed to lacking lobes, dark green, irregularly yellow-lined. Received the AGM.

'Crispum' - Leaves broader than longer, lobes deep and wavy.

'Fastigiatum' - Growth strictly conically erect, the height is up to 20 m.

'Medio-Pictum' - large trees, leaves with a yellow spot in the middle.

'Obtusilobum' - Leaves with two rounded lobes at the base, top truncate.

Note

The scientific name of the *Liriodendron* genus is derived from the Greek *leirion* that which translates as "lily". It covers only two species - one in North America and one in China, the Chinese species being more sensitive and is not cultivated in this country.

Liriodendron tulipifera is a state tree of Indiana, Kentucky and Tennessee.

***Maclura pomifera* (Rafin.) C. K. Schneid. - Osage Orange**

Moraceae

Syn.: *M. aurantiaca* Nutt., *Toxylon pomiferum* Raf.

Other names: Hedge Apple, Horse Apple, Monkey Ball, Bodark, Bodock, Bowwood

Czech: Maklura jablkovitá, pomerančovka oranžová

Description

A dioecious, deciduous thorny tree 6-15 (20) m tall, with furrowed, orange-brown outer bark. Leaves alternate, simple ovate to ovate-lanceolate, 4-12 cm long, entire, on the upper side dark green, glabrous, glossy, on the underside hairy on the veins. Petiole 2-5 cm long. Young annual shoots are hairy, later glabrous; buds ovate or globose, brown, with 3-6 scales, the apical bud is missing. Distinctive brachyblasts grow on older branches. Male flowers are green, in short panicles, the female flowers are in dense globose heads with salient styles. Blooms in May-June. The infructescence is globose, 8-14 cm in diameter, compact, varicated, greenish when immature, green when mature, inedible. Seeds about 1 cm long, light brown.

Distribution and ecology

The species is native to south-eastern North America: Louisiana, Arkansas, Oklahoma and Texas. The secondary range extends over a large area of the USA, where it was formerly used as a resistant tree in windbreaks and hedges. Introduced to Europe in 1818 and to Bohemia in 1865 (Hluboká Chateau). A heliophilous and fairly thermophilous species, it is recommended for warm, sheltered sites. A fully modest tree in terms of soil and moisture. Does not suffer from fungal diseases and pests, resistant to wind damage. Very well tolerant of extensive pruning. In some areas of the USA it grows wild very easily, propagating intensely by seeds and root suckers, colonising ditches, ravines, banks and ground incisions and spreading around abandoned farmsteads.

Practical importance

A fast growing, thorny woody plant with attractive fruits; in Central Europe sensitive. It is suitable for hard-to-penetrate hedges. When used in ornamental plantings, flowers and fruits falling from the trees can present a drawback.

It was one of the key species used in the "Great Plains Shelterbelt" WPA project of President FD Roosevelt, one that was launched in 1934 as an ambitious plan to protect the soil against wind erosion in the Great Plains states. Until 1942, 29.900 km of protective belts were planted and contained 220 million trees. Before implementing barbed wire, the tree was planted as part of hedges around cattle pastures and later became an important source of fence posts. All of these plantings in prairie areas still deliver environmental services by providing essential shelters and nesting sites for quails, pheasants and other animals. It was also used with success in the reclamation of surface mine territories.

Forestry use also exists in the countries of the former Soviet Union and in the Balkans, Italy, Romania, India and elsewhere.

In this country, it is planted as an ornamental woody plant especially in southern Moravia, in Slovakia it also takes place in rather warmer areas, in the River Danube and River Tisza basins; in other regions, it often freezes. Does not grow wild; fruits do not become mature in this country.

Heavy, close grain, very dense, non-shrinking yellow-orange wood with very narrow sapwood is resistant to termites and decay.

It is prized for making fence posts, sticks, wooden nails, and other products. Straight, thin trunks are rare and good for use in making bows. Indigenous people often travelled hundreds of miles to obtain them; the wood was also a commodity to trade in between indigenous tribes. The wood also serves for producing a yellow-orange dye. When dry, the wood is one of the fuels of the highest heating value; however, it strongly sparkles and crackles during combustion. The bark is a source of tannin. Currently, fruits are used in the floristic sector for decorative purposes. Leaves can serve as food for silkworms.

Fruits are not poisonous, but are reportedly unpalatable. Seeds as a source of diet are used by squirrels and other animals. Chemical composition of fruits and other parts of the plant is still under investigation. Fruits contain an antioxidant that can be used as a preservative, especially for oils. The lacteous juice of fruits can cause dermatitis in some people.

Tea made from the roots is used as a bath for sore eyes. A non-toxic antibiotic was sourced from the heartwood and roots and is useful as a preservative.

Variability and cultivars

'Inermis' - No thorns. Known only from the culture.

'Pulverulenta' - Leaves whitish-mottled, as if floured.

Note

The *Maclura* genus is closely related to the genus *Cudrania*; according to some authors, both are classified under *Maclura*. A hybrid is known: x *Macludrania hybrida* André: *Cudrania tricuspidata* x *Maclura pomifera* 'Inermis'. It is a small-sized tree with short, spiny thorns.

***Magnolia acuminata* (L.) L. - Cucumber Tree**

Magnoliaceae

Syn.: *M. virginiana* L. var. *acuminata* L., *Tulipastrum americanum* Spach.

Other names: Cucumber Magnolia, Blue Magnolia, Yellow Cucumber tree, Yellow-flower Magnolia, Mountain Magnolia

Czech: Magnolie přišpícatělá, špičatolistá, šácholan špičatolistý

Description

A deciduous tree 12-20 (30) m tall, with a conical crown and dark brown, deeply furrowed outer bark. Leaves alternate, spirally arranged, simple, entire, broadly elliptical, 10-25 x 8-13 cm, acuminate at the top, dark green, glabrous on the upper side, pale green, hairy on the underside, golden-yellow in autumn. Petiole 2.5-3.5 cm long. Annual shoots green to reddish-brown, glabrous, buds covered with 1-2 scales, acuminate, grey, silk-appressed-hairy, terminal bud 2-3 cm long, the lateral buds much smaller. Flowers single, large, bisexual, cup-shaped, yellow-green, non-fragrant, 6-8 cm in diameter, with 6-9 petals, flower bed elongate. Flowers from April to June, after the sprouting of the leaves. The fruit is a follicle, woody at maturity, the compound fruit is erect, reminiscent of a cone, red at maturity, 5-8 cm long. Seeds large, red; after opening of the follicles pendant on long funicles.

Distribution and ecology

The species is native to eastern North America, from New York to Georgia, west to Alabama and Ontario (SE Canada). Here it is disseminated in mixed forests, mainly in the hills, on the mountain slopes facing north to northeast and on rocky banks of watercourses, at cold, wet locations, up to an elevation of 1,500 m. Introduced in 1736 to Europe, and in 1844 to Bohemia (Prague - the park of Královská obora). One of the most durable members of the genus, yet it is sensitive to late frosts. Thrives on deep, nutrient-rich, humus-rich, freshly-moist soils; does not prosper on dry soils or too much waterlogged sites. One of a shallow root system quite prone to damage; transplanting has poor results. The branches are brittle.

Practical importance

It is the only *Magnolia* species widespread as far as Canada, where it is amongst endangered and protected species.

One of the tallest growth throughout the genus, a relatively quickly growing plant, it is highly advisable for ornamental planting, especially in parks and large gardens. It is an ornamental plant with flowers and fruits, attractive leaves and outer bark. It needs a plenty of space; does not fit very well into street alleys. It is grown with success even north of the native range. The species is used for the breeding of resistant, yellow-flowered cultivars of magnolias. The roots resist well to diseases and are used as rootstock for less-vigorous species.

In this country, it is grown in parks; requires protected locations. It does not grow wild.

The wood is fine grained, soft, lightweight, durable, glossy, the heartwood is pale brown, the sapwood is of light colour. In trading, the wood of this species is interchangeable with that of *Liriodendron tulipifera* and is used in the furniture industry, for making wooden panels, windows and doors, shutters, plywood, boxes, crates, pallets, etc.

Indigenous cultures used the bark as a medicine. Tea made from the bark is aromatic, diaphoretic, acts as a laxative, stimulant, tonic, was used for rinsing the mouth to treat ill cavities and teeth. It was used as a substitute for quinine in treating malaria.

Chewing the bark was used for smoking cessation.

The seeds serve as diet for birds and rodents; birds consume young fruits as well.

Variability and cultivars

f. *aurea* (Ashe) Hardin - the interior of the flower is golden-yellow.

'Blue Opal' - The flowers are slate-blue in the bud and bluish-green after opening to eventually turn green and yellow; blooms early.

'Candollei' - Flowers greenish.

'Ellen' - Leaves speckled with yellow; the habit erect.

'Kinju' - Yellow flowers.

'Philo' - Flowers green, showy blue-white glaucous; leaves yellow in autumn.

'Striata' - Tepals pink-striped.

'Variegata' - Leaves whitish-varied, speckled and striped.

Note

The most stately tree in the USA: Stark County, Ohio: trunk diameter 2 m, height 24 m.

***Mahonia aquifolium* (Pursh) Nutt. - Oregon Grape**

Berberidaceae

Czech: Mahónie cesmínolistá

Description

Thornless, evergreen shrub 0.6 to 1.5 (2.0) m tall, with yellow wood and greyish, slightly cracked outer bark. Leaves alternate, semi-coriaceous, imparipinnate, 2-5-jugate, 15-25 cm long; leaflets ovate, 4-8 cm long, thorny-serrated, glossy dark green on the upper side, red in autumn. Annual shoots grey-yellow, glabrous. Flowers bisexual, trimerous, yellow, in erect racemes compound in panicles. Blooms in April. The fruit is a globose, dark blue glaucous berry.

Distribution and ecology

The species is native to western North America, from southeast Alaska and British Columbia to northern California, where it grows in the undergrowth of mixed forests with *Pseudotsuga menziesii* as high as 2,000 m AMSL. Introduced to Europe in 1823, and to Bohemia in 1844 (Prague, the Královská obora park). A totally frost-resistant and shade-tolerant plant, it mostly prefers rather light, humus-rich and freshly moist soils and semi-shady sites, but it is able to grow in almost any setting.

Practical importance

An ornamental woody plant with its leaves, flowers and fruits, the tree is used as a cover and undergrowth shrub, for non-treated hedges and as a ground cover plant. In some areas of the United States, outside its native range, it is classified as an invasive species that displaces native vegetation. The species is common species in parks and gardens in Central and Western Europe - sometimes even growing wild in the regions, for instance the UK and other countries. May exhibit invasive behaviour.

In this country, the plant is a commonly-cultivated and naturalised species. Seeds spread via endozoochory by means of fruits being consumed by birds. Like the common barberry, the Oregon grape was being exterminated in Europe in the 1950s due to being suspect that it is an intermediate host for the stem rust. Later it was discovered that it hosts a different species of rust that does not infest cereals.

Twigs are used in floral design for autumn and winter arrangements, as well as grave bouquets and wreaths. The inner bark of branches and roots serves as a source of yellow dye, leaves provide green dye and fruits are used to obtain violet, dark blue-purple and dark green dye.

The wood contains slightly toxic alkaloids (berberine), while in fruits, the content of the substances is harmless minimum.

Fruits of the plant were part of the traditional diet of Pacific native tribes, especially mixed with fruits of *Gaultheria shallon* or other rather sweeter fruits. They contain dyes, sugars, vitamin C, organic acids, and substances promoting haematopoiesis. Fruits can be used fresh or dried, or can be processed further and were used even in this country for preparing preserves, jellies or jams, or were fermented to make wine (with added sugar), while the juice of fruits served for adding colour to wines. In Germany, cultivars are grown and designed for the collection and commercial processing of fruits. Flowers can be eaten raw and can also be used to prepare soft drinks.

Some native American tribes used the fruits to treat dyspepsia, loss of appetite and weakness, as well as a mild laxative. Today, they are used in medicine to treat gastritis and to stimulate kidney and gallbladder function. The roots and bark of the roots are considered a blood tonic and to possess cholagogue, diuretic and laxative effects. A decoction is used externally as a gargle for sore throat and as a bath in some diseases of eyes, or to treat inflammatory skin diseases such as eczema and psoriasis.

The Oregon grape, barberry and other plants with berberine content may not be used during pregnancy and lactation and also for problems with the thyroid gland.

Variability and cultivars

Cultivated are a number of cultivars of different habits and foliage.

'Atropurpurea' - Up to 0.6 m tall, leaves bronze-brown in winter; flowers in numerous small racemes; blooms in April and May.

'Compactum' - A dwarf cultivar, height 45-60 cm; leaves very glossy, bronze in winter.

'Juglandifolia' - Height up to 2 m; leaves green, with large leaflets.

'Orange Flame' - New leaves yellow-green, then orange, purple-brown in autumn, red in winter; flowers golden-yellow; blooms in March and April.

'Versicolor' - Leaves pink, cream and orange colourful

Negundo aceroides Moench - Box Elder

Aceraceae/Sapindaceae

Syn.: *Acer negundo* L.

Other names: Box Elder, Boxelder Maple, Ash-leaved Maple, Maple Ash

Czech: Javorovec jasanolistý, javor jasanolistý

Description

Dioecious, deciduous, fast-growing tree with a short life span, 10 to 20 (25) m tall, with a tortuous trunk and thin, patulous crown. Outer bark cracked lengthwise-reticulate, grey, cracks slightly ferruginous. Leaves opposite, pinnate one, 2-3-jugate, 10-25 cm long; leaflets ovate to lanceolate, coarsely serrated, the terminal leaflet irregularly trilobate; leaves glabrous on the upper side, pubescent on the underside. Annual shoots are glabrous, green, blue-grey glaucous, leaf scars connected with a V-shaped line, buds small, white tomentose. Flowers pentamerous, apetalous, without the glandous disc, male clustered on pendant, 3-6 cm long peduncles, female in grapes, infructescences remarkably large and rich. Blooms in March and April, before foliation. The fruit is a samara. The achenes are white-yellow, 4 cm long; the achene wings form an acute angle.

Distribution and ecology

The species is native to eastern North America from Ontario to Florida, to the west as far as the Rocky Mountains. It grows in the lowlands along watercourses, lakes, and on alluvial soils. Introduced to Europe in 1688, to the territory of this country in 1835 (Prague - the park of Královská obora). A fast-growing, short-lived woody species, resistant to frost, drought, immissions, tolerant of slight shading, preferring nutrient-rich soils with good water supply, it has a brittle wood and is sensitive to soil salinity.

Practical importance

In the USA and Canada, it is used by forestry. Valued by indigenous cultures in the past and used for various purposes as one of the few trees growing in the forestless areas of the Great Plains, as well as introduced to a number of countries, such as the states of the former Soviet Union and Yugoslavia, Bulgaria, Italy or India, the plant is considered an invasive species even in some regions of North America, in Central Europe (Germany, Czech Republic, Poland and elsewhere). While listed as a harmful invasive species in rather colder parts of the Australian continent, it is naturalised in eastern China.

In this country, the tree is commonly planted in parks, gardens and tree lines as an ornamental species. Pollen can cause allergies. Experimental planting in forestry was not successful with the tortuous, impossible to shape trunk despite the best site conditions. Planted quite often in windbreaks and refuges, growing wild is common in this species, particularly in alluvial forests and along watercourses, and in recent decades even at railway stations and agricultural/industrial premises. It is classified as an invasive species.

The wood is of poor quality, suitable only for the production of fibreboards. Indigenous people used it to make a variety of objects (tools, bowls, stems of pipes) while highly valuing it as a fuel. Rotting wood was used to prepare sponges to carry cinders.

The species was amongst the maple trees serving to natives to source sap to produce syrup. The sap was collected in bags made from deer stomachs and then thickened by boiling or freezing the water. It was also used for making candies by boiling it along with scrapings from animal skins. In traditional medicine, the sap was used as a medicine.

Variability and cultivars

A variable species even in the wild, the tree became a source for producing a number of garden cultivars, differing mainly in the colouring of the foliage.

var. *californicum* (Torr. & A. Grey) Wesm. - A tree up to 25 m tall, twigs hairy tomentose, the bark of darker colour than the type; leaves trimerous, rarely 2-3-jugate, leaflets 4-8 cm long, ovate, more serrated and lobate than the source species, young leaves white tomentose from the underside, later permanently white-hairy, yellow in autumn; fruits yellowish, slightly pubescent, with wings sometimes slightly overlapping. California, Arizona.

var. *interius* (Britton) Sarg. - Young annual shoots pale, shortly hairy, rarely almost glabrous throughout; leaves trimerous, abaxially glabrous or slightly hairy along the midrib, shortly petiolate, long. Rocky Mountains and Great Plains, Canada, New Mexico.

var. *mexicanum* Wesm. - Although usually a small tree, sometimes up to 23 m high, with a trunk 30-45 cm thick, young branches often purplish glaucous, densely pubescent, eventually glabrate; leaves long-petiolate, trimerous; leaflets petiolulate, ovate or lanceolate-ovate to elliptic, sizing 6-14 × 2.5-5 cm, acute or long acuminate, the base obtuse or cuneate to rounded, orderly or irregularly serrated, sometimes shallowly tricuspid, glabrate and dark green from the above with the exception of veins, abaxially lighter and usually very densely pale hairy to tomentose, eventually sometimes even glabrate; flowers

apetalous, usually purplish red, staminate inflorescences short and compact, pistillate inflorescences long and slender, often up to 30 cm long; fruit wings 25-35 mm long. Mexico, Guatemala.

var. *orizabense* (Rydb.) Standl. & Steyerl. - Trees 6-15 m high, similar to the *mexicanum* var., but branches glabrous and leaves less pubescent. Mexico, Guatemala.

var. *pseudo-californicum* Schwer. - A general name for a form with annual shoots green and significantly white glaucous, never brown or purple; strong growth.

var. *texanum* Pax - Annual shoots pale tomentose hairy; leaves trimerous, leaflets broadly elliptic, hairy bottom in the young age, later almost glabrous, irregularly serrated; fruits finely hairy. Arizona, Texas, Missouri.

var. *violaceum* Booth ex G. Kirchn. - A tree 15-20 m tall, of strong growth, annual shoots brown-green to violet-black, bluish-glaucous, leaves ternate to 5-jugate, abaxially often softly hairy; flowers purple-pink. Central North America.

'Fleming' - A shrub to a little tree 5-10 m tall, leaves smaller than those of the type, pink when sprouting, then green with a white to pink margin.

'Odessanum' - A tree to 10 m, young annual shoots thick whitish pubescent, sprouting leaves bronze, golden-yellow in the sun, pale green in the shade.

'Variegatum' - A tree up to 12 m tall, annual shoots non-glaucous, leaflets pink when sprouting, later widely unequally creamy-white rimmed, most of the blade surface is white.

Note

The *Negundo* genus covers three similar species, all of them naturally spread only in North America.

***Oxycoccus macrocarpus* (Ait.) Pursh - Large Cranberry**

Vacciniaceae

Syn.: *Vaccinium macrocarpon* Ait.

Other names: American Cranberry, Bearberry

Czech: Klikva velkoplodá, americká

Description

Creeping, evergreen shrub with thin, rooting stems 0.5 to 1.0 m long. Leaves alternate, coriaceous, elliptic to oblong, 0.8 to 1.8 cm long, rounded at both ends, entire, the margin slightly revolute, shortly petiolate. Flowers grow on hairy peduncles in the leaf axils, are tetramerous, pink, with a rotate, partite almost to the base, pink-red corolla with lobes 0.6 to 1.0 cm long, recurved, and with 8-10 stamens. Blooms from June to August. The fruit is a juicy berry about 1 cm in diameter, red or cinereous-glaucous.

Distribution and ecology

The species is native to eastern North America, from north-eastern Canada to northeast USA south to the mountains of North Carolina. Was introduced to western North America, the Pacific Coast and Alaska where it grows on marshy to peaty soils. Introduced to Europe in 1760, it is a totally frost-resistant species growing best on peaty, moist soils.

Practical importance

A small-sized woody plant for peat exhibits that can make use of it as a ground cover woody species with nice-looking flowers and fruits. Far more important is the use of the plant cranberries as a fruit woody species. Cultivated in the USA at a commercial scale with a number of cultivars produced. It is a major economic crop in the U.S. states of Massachusetts, New Jersey, Oregon, Washington and Wisconsin (more than half of the U.S. production), as well as in the Canadian provinces of British Columbia (20% of the world production), New Brunswick, Ontario, Nova Scotia, Prince Edward Island, Newfoundland and Quebec.

Today, 90% of fruits is harvested in North America via a "wet way" when the plantation is flooded (about 0.5 m of water) with ripe berries floating to the surface and transported to the conveyors using rakes. Then they are immediately frozen or otherwise processed by industrial methods. 5-10% of the crop is harvested by hand; such fruits are less damaged and sold as fresh fruits in the market. Dried, fresh as well as canned fruits are imported to this country from the USA and usually sold as "cranberries".

Outside of North America, the plant is cultivated at a smaller scale in South Argentina, Chile, New Zealand and in West and East Europe. In such regions, such as the UK, it sometimes grows wild.

In the Czech Republic, growing is rare and restricted to botanical gardens. It does not grow wild.

The fruits are processed into juice, wine, canned fruit and jelly, or dried. They are used as an ingredient in baked goods and a raw material for the preparation of "cranberry" sauce, so form part of the traditional cuisine at English Christmas and American celebrations of Thanksgiving Day. They contain vitamins B, C, E and K, minerals - manganese and smaller quantities of phosphorus, potassium, magnesium, zinc, etc., polyphenols, flavonoids, agents with antibacterial action, etc. Fruit ingredients are still under investigation.

Native cultures have always used the fruits as food - they were e.g. an important part of Pemmican. The fruits also served to heal wounds, while a decoction of the twigs was used to treat pleuritis. Today, in addition to being used for example in the treatment of urinary tract infections and in kidney stone control, the fruits act against caries.

Variability and cultivars

'Holden' - Drought tolerant; fruits are about 13 mm in diameter. Found in the wild, Ohio.

'Langlois' - A dwarf variant, flowers drooping; fruits large, red.

Note

The *Oxycoccus* genus covers three (four) species, distributed from the mild to the subarctic zone throughout the northern hemisphere.

***Padus serotina* (Ehrh.) Borkh. - Black Cherry**

Rosaceae/Amygdalaceae

Syn.: *Prunus serotina* Ehrh., *Cerasus serotina* (Ehrh.)Loisel.

Other names: Wild Black Cherry, Rum Cherry, Mountain Black Cherry

Czech: Střemcha pozdní

Description

A deciduous tree 8-16 (30) m tall, sometimes only a size of a shrub. Outer bark dark brown, longitudinally fissured, peeling in platelets. Leaves alternate, spirally arranged, elliptic to oblong, 5-12 x 4-6 cm, coriaceous, elongated at the top to form a short tip, finely serrate along the margin, adaxially glossy dark green, glabrous, abaxially rather pale green, the middle veins densely yellowish to reddish hairy along the bottom portion, yellow in autumn. Petiole 1-2 cm long, with 2-4 disciform glands, stipules early deciduous. Annual shoots glossy, glabrous, chestnut-brown to dark brown with abundant, yellowish lenticels; the bark gives a pleasant scent. Buds ovate acuminate, small, glossy, red-brown. Flowers pentamerous, white, fragrant, 0.8 to 1.0 cm in diameter, peduncles 0.3 to 0.6 cm long, in direct, later pendant, dense, slender, leafy racemes 10-15 cm long. Blooms in May to June at foliation. Fruits are globose to ovoid drupes, 0.8 to 1.0 cm in diameter, red-black, later black, juicy, bitter. The stone is globose, smooth.

Distribution and ecology

The plant is native to eastern North America, from eastern Canada where it grows in the lowlands, to Texas and Florida. Separate populations exist in Arizona, New Mexico, in the mountains of Mexico and Guatemala. In the Appalachian Mountains, the range extends up to 1,500 m AMSL. The plant grows at a variety of sites, often on dry, deep, sandy soils, in oak and pine forests and in the shrub layer, spreading also to agricultural land. An undemanding species in terms of soil composition and moisture; grows to the less-satisfactory extent only on waterlogged soils. Introduced in 1629 to Europe and in 1865 to Bohemia (Hluboká Chateau), the species was known in the territory of this country as early as 1811, according to some resources. A frost-resistant and shade-tolerant plant, it grows best on humus-rich, acidic, fresh moist soils provided there is good drainage and full sun.

Practical importance

In eastern North America, it is amongst the most abundant species. Reaching the largest size of all the American species covered by the *Prunus* genus, it is also an important woody plant in terms of forestry, with the wood being highly valued. It is used in landscaping and reclamation of excavated surface mines.

It has long been cultivated as an ornamental tree in forest stands in northern, western and central Europe, particularly in Germany, Denmark, the Netherlands, Poland, Sweden, Norway, Estonia and Russia. In many countries it became naturalised, grows wild and is classified as an invasive species.

In this country it is grown in parks and is also planted in the woods where it grows wild. Classified an invasive species.

The wood is deep red-brown, hard and dense; it is one of the most valuable woods for making quality furniture, veneers, panelling, toys and parts of various instruments. Furthermore, it is used in food treatment by smoking.

The leaves were once used for dyeing to green, while the fruits served as a source of green to dark grey dye. Indigenous cultures used the rods to make arrows, tent pegs, or even bows when needed (of lesser quality than those of ash or juniper).

The fruits are used for flavouring spirits to which they add a cherry aroma. The flesh of the fruit is edible and is also used in the production of wines and jellies, jams, pastry fillings, flavouring soft drinks and ice creams; similarly, the extract from the bark is used for flavouring foods.

To indigenous cultures, the fruits were amongst the basic foodstuffs. The uses ranged from crushing the fruits including stones to make a paste that was turned into pancakes and dried, adding the fruits into Pemmican or using them to cook mash to even trading in dried pancakes as seen in some tribes.

Indigenous cultures used the plant to treat fever, cold, sore throat and diarrhoea or washing ulcers. The inner bark, high in glycosides, was once used as a cough medicine, tonic and sedative.

All the plant parts (except fruit pulp) contain cyanogenic glycosides. The game (e.g. the white-tailed deer) in fact consumes leaves without any effect; poisoning in cattle reportedly does occur when feeding wilted leaves.

Variability and cultivars

var. *montana* (Small) Brit. - Leaves more elliptical, more rigid, shorter-acuminate, abaxially whitish green; the inflorescence shorter, scarcer, salient, sepals and filaments hairy. Virginia to Alabama.

'Asplenifolia' - Leaves narrow, oblong-elliptical, deeply serrated to deeply lobed. Known since 1864.

'Pendula' - height up to 8 m, grows slowly, the crown cascade-pendant, the main branches strongly pendant, twigs drooping.
Known since 1882.

***Parthenocissus inserta* (Kerner) Fritsch - Thicket Creeper**

Vitaceae

Syn.: *P. vitacea* (Knerr.) Hitchc., *Vitis inserta* Kerner, *Vitis vitacea* (Knerr.) Bean, *Ampelopsis quinquefolia* (L.) Planch., var. *vitacea* Knerr. Valid scientific name preferred by the American botanical literature: *Parthenocissus vitacea* (Knerr) Hitchc.

Other names: False Virginia Creeper, Woodbine, Grape Woodbine

Czech: Loubinec popínavý, křovištní

Description

A deciduous creeper with a solid, non-peeling outer bark, climbing to a height of 5-15 m. Leaves alternate, palmate pentamerous, leaflets ovate to oblong-lanceolate, 5-12 cm long, coarsely serrated, bright green on both sides, crimson-red in autumn. Annual shoots are with white pith, greenish; buds green; tendrils 3-5-tipped, without suction discs. Flowers bisexual, pentamerous, in lateral cymes. Blooms from June to July. The fruit is a small, globose, dark blue heavily-glaucous berry, 0.8 cm in diameter, with 3-5 seeds.

Distribution and ecology

Native to eastern North America, from south-eastern Canada to Texas and Colorado, the tree occurs in California as well where it was probably introduced. It grows in open forests, on clearings and in forest verges, in floodplain woodlands and coastal thickets. Introduced to Europe in 1800, it is a frost-resistant and shading-tolerant species; when shaded, however, it is colouring to the lesser extent. Undemanding as regards soil composition.

Practical importance

A lush-growing, stately twining plant ornamental with its leaves, especially their autumn colour, its cultivation is common in many regions of the world; very often grows wild.

In this country, growing wild has been occurring since some early 20th century, primarily around the major cities. Spreading is particularly common in the vicinity of human settlements and gardens, along fences, roadsides and railway lines, in floodplain woodlands and thickets along the river banks, on rubbles and landfills. Currently, it is classified as invasive species.

Variability and cultivars

var. *dubia* (Rehd.) Rehd. - Stems more or less densely coarsely hairy, with bristly hairs on the nodes, petioles bristly at the base; leaflets 5-8 cm wide, more coarsely serrated than on the type, darker green on both sides, less glossy, abaxially on veins coarsely hairy; inflorescence denser than the underlying species, coarsely hairy.

var. *laciniata* (Planch.) Rehd. - Leaflets lesser than those of the type, deeper and incisely-serrate, most frequently yellow-green. USA.

Note

This species is often confused with the Virginia creeper (*Parthenocissus quinquefolia* (L.) Planch.). Both species are chiefly distinguished by the climbing capacity in that the thicket creeper has tendrils with 3-5 tips that lack suction discs and are unable to climb the wall without support.

***Parthenocissus quinquefolia* (L.) Planch. in DC. - Virginia Creeper**

Vitaceae

Syn.: *Hedera quinquefolia* L., *Vitis quinquefolia* (L.) Lam., *Vitis hederacea* Ehrh., *Ampelopsis hederacea* Ehrh., *P. pubescens* (Schlecht.) Graebn.

Other names: Five-leaved Ivy, Five-finger

Czech: Loubinec pětिलistý, psí víno

Description

A deciduous creeper with a solid, non-peeling outer bark, climbing to a height of 20-30 m. Leaves alternate, palmate pentamerous, leaflets pedicelate, oblong, 4-10 cm long, shallow-serrated to almost entire, dull-green adaxially, cinereous abaxially, crimson-red in autumn. Annual shoots with white pith, reddish, tendrils 5-8-tipped, with suction discs. Flowers bisexual, pentamerous, in terminal, cymose panicles. Blooms in July and August. The fruit is a small, globose, blue-black, non-glaucous berry, 0.6 cm in diameter, with 1-4 seeds.

Distribution and ecology

The species is native to eastern and central North America, from south-eastern Canada to eastern Mexico and Guatemala, west to Manitoba, South Dakota, Utah and Texas. It grows in open forests, forest verges and thickets, in ravines and on rocks. A solid support or substrate is essential for this plant that can totally cover, shade and destroy the woody plant on which it climbs. Introduced in 1622 to Europe and in 1835 to Bohemia (Prague - the park of Královská obora). A frost-resistant species, it is also shade-tolerant, but shading reduces its capacity of autumn colouring. Undemanding as regards soil composition.

Practical importance

A lush-growing, stately twining plant with the capacity of overgrowing various surfaces without any support, such as walls, rocks, poles and tree trunks; it has ornamental leaves, particularly when turning into the autumn colour. Its cultivation is common in many regions of the world; very often grows wild.

In this country, it is a favoured species used for covering walls and fences, planted in gardens, parks and special-purpose plantations, planted, for example, as part of greening noise barriers along motorways and various objects. Growing wild is common, especially near human settlements, parks, cemeteries, rubbles and landfills. It became naturalised.

Fruits were once used for dyeing pink.

The fruits are said to be consumed raw when needed, but are of bad taste and even slightly toxic due to the presence of oxalic acid. In addition, indigenous people were eating boiled roots and annual shoots. They also used the plant as an herbal medicine for urological problems, swelling and spasm of the jaw muscles. The fruits were used to control fever. A decoction of the leaves was used for bathing swelling and wounds caused by the poison ivy (*Toxicodendron radicans*), while a decoction of roots served to treat jaundice, syphilis and diarrhoea.

Touching the leaves in autumn can cause dermatitis in some persons.

Variability and cultivars

var. *engelmannii* (Koehne et Graebn.) Rehd. - Annual shoots thin, orbicular in the cross section, glabrous, tendrils 4-6 or 7-tipped, petioles glabrous, reddish, up to 15 cm long, leaflets up to 12 cm long, sharp, evenly serrated, abaxially significantly blue-glaucous; inflorescence 4 cm long. Eastern North America.

var. *hirsuta* (Pursh) Planch. - Tendrils with 2-3 long and the same number of short tips; annual shoots and leaves patent-downy, annual shoots and leaves red; leaves with leaflets 12-18 cm long, narrowed abruptly at the base to form about 1 cm long petioles, the apices short, the margin slightly bluntly-serrated. Eastern North America to Mexico.

var. *murorum* (Focke) Rehd. - Annual shoots glabrous, orbicular; tendrils with 6-12 orderly distichous arms; leaflets shorter and wider than the underlying species, more thickened; outer petals round at the base, abaxially initially diffuse-shaggy-hairy, later glabrous; inflorescence about 10 cm long and wide, blooms from August to September.

var. *saint-paulii* (Koehne & Graebn.) Rehd. - Very vigorous, twigs often with aerial roots; annual shoots, petioles and leaves abaxially and adaxially softly hairy on the midrib, tendrils with 8-12 orderly distichous arms; leaves elliptic to oblong-elliptic, 12-15 (-20) cm long, sharply and deeply serrated, leaves persist a long time, dark red in autumn. Iowa to Texas.

Note

P. quinquefolia can be used as shading vegetation on bricked buildings. The suction discs do not damage the masonry by growing into the depth and the plant provides the structure with efficient shading and cooling in summer. Forcible removing the live plant can cause damage to the surface of the building, cutting the plant from the tendrils, however, causes the remainder of the suction discs to fall off over time.

***Physocarpus opulifolius* (L.) Maxim. - Common Ninebark**

Rosaceae/Spiraeaceae

Syn.: *Spiraea opulifolia* L.

Other name: Atlantic Ninebark

Czech: Tavola kalinolistá

Description

A patulous, deciduous shrub 2-3 m tall, with red-brown, papery-peeling off outer bark. Leaves alternate, orbicular-ovate, three to five-lobed, 3-8 (10) x 2-6 cm, the middle lobe is the largest, serrated to crenate-serrate, glabrous on both sides or abaxially with sporadic hairs. Petiole 0.6 to 2.0 cm long, stipules deciduous. Annual shoots pale brown, glabrous, glossy, buds elongated, appressed to the twig, 0.5 to 0.8 cm long, hairy on the top. Flowers small, pentamerous, whitish to pinkish, 1.0 to 1.2 cm in diameter, on lateral twigs in semi-globose corymbs about 5 cm in diameter. Blooms in May to June. Fruits are flatulent, yellow-green, glabrous, glossy follicles 0.6 to 1.0 cm long, dehiscent along both of the seams. Contain 2-5 hard, glossy seeds.

Distribution and ecology

Native to central and eastern North America, from New York to Minnesota and South Dakota, south to Florida, to Arkansas and Kansas but naturalised within a much larger area of North America, this plant grows on rocky slopes, on the banks of streams, in damp thickets, mainly on acidic and moist humus-rich soils. Introduced in 1687 to Europe and in 1835 to Bohemia (Prague - the park of Královská obora). A frost-resistant species, it is undemanding in terms of composition of the soil and tolerates air pollution. Grows best in drained soils, at fully sunlit sites, but tolerates shade as well. Pruning is advisable immediately after blooming; in winter, the shrub can be reduced to the ground.

Practical importance

An undemanding shrub, ornamental with leaves and flowers, it is used in the USA for erosion control planting as well as grown as an ornamental plant, with numerous cultivars already produced.

In this country, it is an ornamental species commonly planted in parks, used for planting in large groups as well as solitary plant; it can be recommended for open, untrimmed hedges. It was also used for landscape planting (woody cover in refuges, planting around motorways, etc.). It often grows wild in the valleys of watercourses, in forests and nearby settlements, which is the most abundant in southern and western Bohemia and in the River Vltava Basin, mainly in the Mesophyticum, with the Černý Kříž site, Šumava, being the maximum (900 m AMSL).

Although it was used in traditional medicine, it is toxic in rather larger doses. Tea from the inner bark served as a purgative and emetic, as well as to treat gynaecological problems and venereal diseases; reportedly, it increases fertility.

Variability and cultivars

'Dart's Gold'- Leaves yellow when sprouting, then yellow-green or fulvous. Found in 1969, the Netherlands, the origin is unknown. A highly-valued cultivar, it gained the AGM.

'Diabolo'- Leaves purple-green to dark purple-brown, flowers pink to purple. Received the AGM.

'Nanus' - Up to 1 m high, leaves dark green, shallowly lobed. Prior to 1864.

***Picea breweriana* S. Wats. - Brewer's Weeping Spruce**

Pinaceae

Other name: Weeping Spruce

Czech: Smrk Brewerův

Description

An evergreen conifer, erect, single-trunk tree, 10 to 25 (40) m tall, with a broadly conical crown, with noticeably pendant second-order branches. Trunk diameter to 1 (1.5) m, outer bark from chocolate in young specimens to greyish-brown, scaly in the old age, the average lifespan is 300 years. The needles on the twigs are usually in a radial position, are quite long: 1.8 to 2.5 (3) cm, triangular in cross section, flattened. Dark green from above, abaxially with striking bands of whitish stomata. Annual shoots are thin, flexible to pendant, red-brown, hairy, later turn greyish. Buds rather large, about 6 mm, of a narrowly ovoid shape, red-yellow, resinous. Cones narrowly cylindrical, 6-14 cm long, violet-brown at first, later during ripening to orange-brown, with coriaceous, unguiform, entire scales.

Distribution and ecology

Native only to the mountains on the western border between California and Oregon, the tree occurs in the mountain ranges of Siskiyou, Klamath and Trinity Alps at elevations from 700 to 2,290 m. It chiefly grows on mountain peaks in the western part of the range and on slopes/valleys in the east. It is a narrow strip c. 110 km wide featuring rapidly changing climate with precipitation declining from 2,800 mm to 1,000 mm from the west toward the east. The species occurs most frequently in association with *Abies magnifica*; in the Klamath Mountains, it can be found along the upper forest boundary in association with evergreen oaks and *Pinus balfouriana* (the foxtail pine). It is usually found on rather poor soils where there is no competition from other species. Introduced as a species to Europe in 1893; in Bohemia, it took place in 1927 (Hluboká Chateau). It tolerates not very nutrient-rich soils, litosols and serpentine rocks and can withstand summer short-term spell of drought. It is not very demanding as to the light, yet it will best stand out as a solitary tree. It often colonises rocky outcrops covered with a thin layer of peatified soils. Under extreme conditions, it grows slowly. A frost-resistant plant, it is not very tolerant of urban settings.

Practical importance

The species' wood is reminiscent of that of the Norway spruce and useful for a variety of processing applications, from framework or furniture to paper industry. Due to the small number of trees, it is a rare, endangered species, not commonly harvested.

In Europe and in this country, the species is cultivated in parks and chateau gardens as an ornamental tree and is amongst the most beautiful conifers with its curtain-shaped pendant secondary branching. Not classified as invasive species.

***Picea engelmannii* (Parry) Engelmann - - Engelmann Spruce**

Pinaceae

Other names: Columbian Spruce, Arizona Spruce, Mountain spruce

Czech: Smrk Engelmannův

Description

An evergreen conifer, erect, mighty tree, 20-40 (55) m tall, with a narrow conical crown, with a trunk diameter of up to 1.5 (2) m, outer bark brown, slightly scaly, the lifespan can be 500 years. The needles on the twigs are usually in a radial position, are 1.5 to 2.5 cm long, square in the cross section. They have a bluish-green to silvery colour, are soft, blunt-ended, with pores on all sides, foul-smelling when rubbed. Annual shoots pale yellow to brownish-yellow, pubescent (become glabrous on year 3). Buds about 4 mm, cone-shaped, brownish, usually with appressed scales, resinous. Cones ovoid-cylindrical, 3-8 cm long, pale brown with papery scales that are dentate on the tip, but less longitudinally wavy than in the Colorado spruce.

Distribution and ecology

This spruce is native chiefly to the mountains of western North America, from the coast to the Rocky Mountains. In the coastal zone, it occurs less frequently from British Columbia, Canada, to southern California. It is a woody species typical of the Rocky Mountains, from Alberta, Canada, through Wyoming, Colorado, Utah and New Mexico to Arizona. It occurs in a variety of site conditions at elevations of 700 to 3,600 m. The spruce often grows in the lower-elevation zones in the north and in the mountains in the south mostly along with *Abies lasiocarpa*, in the northern part of the range it is also found in association with the white spruce (*Picea glauca*), the black spruce (*Picea mariana*) and the Douglas fir (*Pseudotsuga menziesii*), while to the southwest in the mountains it is found in association with the whitebark pine (*Pinus albicaulis*) and the mountain hemlock (*Tsuga mertensiana*). Finally, to the southeast it is accompanied by the Colorado spruce (*Picea pungens*), the white fir (*Abies concolor*), the lodgepole pine (*Pinus contorta*) and the bristle-cone pine (*Pinus aristata*). Typically, it is located on rather poorer, crystalline soils, less often on nutrient-rich, deep soils. Introduced as a species to Europe in 1862; in Bohemia, it took place in 1879 (Sychrov Chateau). Tolerant of not very nutrient-rich soils, it colonises litosols as well and despite it growing at rather moist sites around streams, it can withstands summer droughts. It is a little more demanding as to the light than other spruces. Under extreme conditions, it grows slowly. A frost-resistant species, quite tolerant of the urban environment.

Practical importance

The species' wood is reminiscent of that of the Norway spruce and useful for a variety of processing applications, from frameworks of houses, furniture, timber and reinforcement in mines, railway sleepers and poles, to plywood and paper making. It serves as a source of fibre. It is also a source of high-quality resonant wood for the production of musical instruments. Included in the production woody species of the American West, the tree is grown in Europe and in this country in parks and chateau gardens as an ornamental tree, with yet the Colorado spruce - a similar tree - being planted more often. Not classified as invasive species.

***Picea glauca* (Moench) Voss. - White Spruce**

Pinaceae

Syn.: *P. alba* Link

Other names: Canadian Spruce, Cat Spruce, Double Spruce, Skunk Spruce

Czech: Smrk sivý

Description

An evergreen conifer, growing to the height of 15-30 m (up to 55 m for the var. *albertiana*), with a narrow, conical crown, with a trunk diameter of 40-60 (120) cm. The life span can be up to 250-300 years. The trunk is quite straight, the crown broadly conical, densely branched. Outer bark is grey-brown, slightly scaly. The needles on the twigs are in a radial position, are square, rather soft, bluntish, give an aromatic, and even unpleasant odour when rubbed. They are 1.0 to 2.5 cm long, square in cross section, of bluish-green to silvery colour, with vents on all sides, often curved. Annual shoots pale yellow to brownish-grey-yellow (the colour of the skin), glabrous. Buds about 4 mm, conical, pale brown, usually with appressed scales, non-resinous. Cones cylindrical, 3.5-6 cm long, seed scales soft, unguiform, entire, pale brown.

Distribution and ecology

A North American tree with an extensive transcontinental range, from Labrador to Alaska and from 45° to 70° NL south to Minnesota, Wisconsin and Maine, and partly to the mountains of Montana and South Dakota. It occurs from the sea level in the north to the elevation of 1,600 m in the south. It forms pure or mixed stands on sandy and rather moist and alluvial soils, retreating to other species, such as the black spruce, at heavily waterlogged sites. There are various geographic forms known. From the east to the west, the tree's biomass increases. Introduced to Europe in 1700; in Bohemia, it took place in 1835 (Prague). It is a strongly heliophilous woody plant, unable to grow in the shade. Even slight shading will lead to the needles falling off and the shoots becoming dry. The species forms sparse vegetation. Sites on rather lighter, sandy, sufficiently moist soils are the most common. The tree suffers from extreme waterlogging or drying of the soil. It requires more humidity and often suffers from stress by draught in urban settings. Undemanding in terms of soil composition, it tolerates both acidic and calcareous substrates and is able to grow on dump sites. It can withstand both oceanic and continental climates. The tree is amongst the woody plants that are rather tolerant of immissions.

Practical importance

It belongs to the most important economic species in the northern USA and Canada. Versatile in terms of applicability of the wood, it is used in joinery, construction etc., a considerable portion of the production being processed in paper industry. Initially, the species' silvery forms were used as decorative trees.

In this country, the tree was tested in the past in the mountains of Krušné hory in the development of alternative stands. From the forestry point of view, the *albertiana* variety could be significant in that it yields more wood.

Variability and cultivars

'Conica' - Stunted growth, orderly conical, non-fruitful form with different needles.

Note

In the western portion of the range, crossing also occurs with the sitka spruce - *P. x lutzii*.

***Picea mariana* (Mill.) Britt. - Black Spruce**

Pinaceae

Syn.: *P. nigra* (Ait.) Link)

Other names : Bog spruce, Swamp Spruce, He Balsam

Czech: Smrk černý

Description

An evergreen conifer, of a rather small stature, reaching heights of 6-20 (27) m, found in the mountains and scrubby forest-tundra (60 cm), with a very narrow, conical crown reaching as low as the ground, with a trunk diameter of up to 0.5 m. Outer bark is red-brown, scaly. The species' life span can be 250 years. The needles are densely arranged on the twigs, are 0.6-1.2 (1.8) cm long, square in the cross section. They are bluish-green, soft, blunt-ended with vents on all sides, adaxially 1-2 rows, abaxially 3-4 rows, fragrant when rubbed. Annual shoots red-brown, densely hairy. Buds about 4 mm, shortly ovoid, pale red; lower scales subulate-elongated, often as far as over the tip, non-resinous. Cones 2-3 (4) cm long, dull grey-brown, initially virescent, seed scales rounded, gently dentate, persist on the tree for many years. A slow-growing woody species propagating under rather extreme circumstances by the rooting of prostrate branches.

Distribution and ecology

In North America, it often forms a polar forest boundary. A transcontinental range, from Labrador to Alaska. To the south, it extends as far as Pennsylvania, Wisconsin and Michigan (42° NL). It grows from the sea level to the elevations of 1,800 m. Forms pure stands on swampy soils, outside of these, it grows in mixed stands with the white spruce, the American larch and other species. Typical sites are poor in minerals, waterlogged, often it involves gravelly moraine soils. Introduced to Europe in 1700; in Bohemia, it took place in 1835 (Prague). A demanding species in terms of light, but tolerant of rather strong shading when juvenile. It usually grows in places with sufficient precipitation and soil moisture and tolerates waterlogged soils (peat bogs). The highest degree of tolerance of permafrost. Undemanding as to nutrients. Gives the best results on rather deeper, drained alluvial soils. It can withstand extreme climatic conditions and is not damaged by frost.

Practical importance

A woody plant of commercial use that ranges from joinery products to lightweight structures; the wood quality similar to that of *P. glauca*. Often used for producing paper. From the forestry aspect, it is not very advisable woody species, chiefly for its slow rate of growth. It can be used for planting of waterlogged, inverse sites; in this country, it was tested in Northwest Bohemia. In the horticultural practice, it is a less-frequent tree; ornamental cultivars are sometimes planted. Not classified as invasive species.

Variability and cultivars

'Doumettii' - Broadly conical, densely branched, slowly growing, reaching the height of 6 m.

***Picea pungens* Engelm. - Colorado Spruce**

Pinaceae

Other names: Blue Spruce, Parry's Spruce, Silver Spruce, Prickly Spruce

Czech: Smrk pichlavý

Description

An evergreen conifer growing to heights of 15 to 30 (40) m with a trunk diameter of 60-100 (150) cm. The lifespan can be as many as 600 years. The trunk quite upright, with a slightly wavy course. Outer bark grey-brown, slightly scaly. The crown is broadly conical, densely branched. Stiff prickly needles are variously coloured, sometimes up to silvery-bluish. Needles on the twigs are arranged radially, square, stiff, sharply acute, variously coloured. They are 1.5 to 3.2 cm long, square in the cross section, have a bluish-green or silvery colour (dubbed "silver spruce"), with vents on all sides, often curved. Annual shoots are pale yellow to brownish-grey-yellow, glabrous. Buds about 6-8 mm, conical, yellow-brown, usually with loosely appressed, recurved scales, non-resinous. Cones cylindrical, 6-12 cm long, fruitful scales soft, papery, longitudinally wavy, irregularly dentate at the end, entire, light brown.

Distribution and ecology

It is a North American woody species with a small range in the southwest USA. It grows in the southern extremities of the Rocky Mountains in the states of Colorado, New Mexico, Utah, Wyoming, Idaho and Arizona; a separate site is also found in Montana. It occurs scattered along streams in ravines and on wetlands at the elevation from 1,800 to 3,100 m, usually in association with *Picea engelmannii*, exceptionally in inverse zones of rather large canyons. Natural sites are found on the most diverse bed rocks with the prevalence of not only basalts, andesites and rhyolites, but also limestones and less-abundant granites, sandstones and alluvium soils consisting of various materials. Grows singly or forms relatively small groups. The species introduced to Europe in 1856; in Bohemia, it took place in 1910 (Jezeří Chateau). It is a strongly heliophilous woody plant, unable to grow in the shade. Even slight shading will lead to the needles falling off and the shoots becoming dry. The species forms sparse vegetation. Rather light, neutral soils are the most common sites. The tree suffers from extreme waterlogging. Low demand as to humidity, grows up very well in an urban setting. Undemanding in terms of soil composition, it tolerates both acidic and calcareous substrates and is able to grow on dump sites. It can withstand both oceanic and continental climates. The tree is amongst the woody plants that are rather tolerant of immissions.

Practical importance

Belongs to economic woody plants of minor importance in the American Southwest. Versatile in terms of applicability, the wood is used in joinery and construction industry, to make paper, etc. The silvery forms are grown as decorative woody plants. In the temperate and cold zone, the spruce is now widespread throughout the world. Of minor importance in terms of production of wooden mass, yet its tolerance of air pollution in industrial agglomerations made the plant briefly a fashionable species in forestry in replacing plantations dying through exhalations - e.g. the mountains of Krušné hory in the case of this country. Its successful use stems from the mere fact that it is a very durable, undemanding woody plant that can cope with extreme sites in various aspects. Currently a permanent element of urban plantings, it is cultivated as a Christmas tree as well as for decorative twigs.

Variability and cultivars

About three dozens of varieties are grown and differ chiefly in needles and stature.

'Argentea' - A cultivar with a regular, conical crown, silvery-grey.

'Glauca' - A cultivar with blue-white needles.

Note

In the northern portion of the range, crossing exists with the white spruce as well as with other spruces in cultures.

***Picea sitchensis* (Bongard) Carr. - Sitka Spruce**

Pinaceae

Other names: Great Tideland Spruce, Menzies Spruce, Western Spruce

Czech: Smrk sitka

Description

A stately tree, reaching a height of 45-70 (90) and a trunk diameter of over 3 (5.5) m. The species can reach a quite high age - the average lifespan is 600 to 800 years. The trunk is erect and slender; the crown is regular, conical. Needles are flat, adaxially glossy dark green, abaxially with two white bands of stomata, 15-25 (30) mm long, about 1 mm wide, strongly sharply acuminate, prickly. Annual shoots are yellowish, pale, glabrous and glossy. The buds are rather small, ovoid, yellowish-brown to light brown, scales blunt, slightly resinous. Cones 5-10 cm, cylindrical, blunt-acuminate, light brown, fruitful scales papery, narrow and dentate at the end, reminiscent of those of the Colorado spruce. The root system is well developed along the surface, anchoring the woody plant quite well in the soil. The species has the ability to regenerate on the trunk, which is distinctively displayed in the release. It has a great regenerative capacity and can easily form a new apex after breakage. Roots very well from cuttings.

Distribution and ecology

Native to western North America, but widespread only in the Pacific zone of the continent. The seaside part of the range covers the Cascade Mountains and the Coast Range from Northern California to Alaska, within a strip of c. 100 km wide. Grows also on the islands off the coast - named by the town of Sitka. In the northern portion of the range, it grows from the sea level to about 900 m AMSL, forming even an upper forest boundary. In southern zones, extending to 600 m AMSL is common. The spruce can be found in very diverse zones of precipitation - from 600 to 5,600 mm. It forms mixed forests especially with *Tsuga heterophylla* (the western hemlock), the Douglas fir or *Thuja plicata* (the western redcedar) and other species. Introduced to Europe in 1831; in Bohemia, it took place in 1910 (Jezeří Chateau). Tolerant of moderate shading, will not last very long in the second tier. It requires sufficient precipitation and soil moisture; at sites with consistently high relative humidity it grows on drier substrates as well. Bedrocks of the sites greatly vary; the tree is found on basalts and andesites, weathered lava and tuffs, in various crystalline rocks, on sediments and even on limestones; usual soil pH is 4-5.7. Grows best on rather deep, drained alluvial soils in valleys. A frost-resisting species, it can cope with flue gases to a moderate extent, but is not very useful for planting in cities due to low humidity.

Practical importance

In its native range, the sitka spruce is an important economic species. Proved itself well in Atlantic Europe (e.g. Denmark, Ireland and Scotland), where it grows well even in areas with intense winds from the sea, which other species are unable to withstand, and where it is the most frequent woody species used in forestry. A very fast-growing woody plant, it can reach over 30 m in height as early as year 50. The soft, light-coloured wood is an important source of fibre; it is also used for lightweight structures and packaging materials. The use as resonance wood is of particular importance.

In this country, it is occasionally cultivated as a decorative tree. It is not of invasive nature.

Note

In the northern portion of the range, it crosses with the white spruce - *P. × lutzii*. In cultures, it can also cross with the Serbian spruce or the Jezo spruce.

***Pinus aristata* Engelm. - Bristle-cone Pine**

Pinaceae

Other names: Rocky Mountain Bristlecone Pine, Hickory pine

Czech: Borovice osinatá

Description

A rather small tree, reaching a height of 5-15 (20) and a trunk diameter of up to 1 m. At extreme sites, it is found only as a shrubby form or as a small tree with multiple trunks. The lifespan can be long, perhaps up to 4,000 years. The bark is smooth, greenish in the young age, later grey, creating a scaly outer bark. Branching is irregularly verticillate. The needles are set in bundles of (4) 5, are 20-50 mm long, entire, triangular in the cross section. From the outside, they are dark green with noticeable white drops of wax, inside with whitish bands of stomata, persist for 10-12 years. Annual shoots are pale yellow-brown to red-brown, later cinereous green, densely hairy to pubescent (sometimes nearly glabrous). Buds are broadly conical, 7-10 mm long, sharp-terminated, covered with membranous scales of pale brown colour. The cones are 4-10 cm long, ovoid, blunt-ended, non-disintegrating, sessile to the twig. Conspicuous are the thorns, about 8 mm long, on the seed scales. The root system is richly developed nearly along the surface, but anchors the plant in the soil very well.

Distribution and ecology

A species typical of the upper forest boundary in south-western United States, especially the Rocky Mountains. It is found in Colorado, Utah, Arizona, New Mexico and California, typically growing on dry mountain slopes and ridges from 2,400 to 4,000 m AMSL. Introduced to Europe in 1861 and to Bohemia in 1865 (Hluboká Chateau).

A strongly heliophilous species, does not tolerate shading. Undemanding as to the soil quality, it still prefers rather nutrient-rich soils. Can cope with drying soils and a lower humidity. It is resistant to frost, but later on the light demand is rather increasing. It requires sufficient precipitation and soil moisture; at sites with consistently high relative humidity it grows on drier substrates as well. It grows best at moderate elevations on deep soils, often colonising litorols as well. A frost-resisting species, it can moderately withstand flue gases and persist in urban settings. Damage by the red band needle disease is often.

Practical importance

Amongst the smallest pines in its native range, it is nearly not used as an economic species. The wood is dense, tough and finds application in the manufacture of decorative items. Of particular importance is the protective planting, stabilising slopes, anti-avalanche planting etc. In this country, it is occasionally cultivated as a decorative tree, typical with its habit. A very slow-growing woody species, with the high capacity of adapting to the conditions, it is suitable for use as mobile greenery. Damage by the red band needle disease is rather frequent in this country. Natural regeneration does not occur. Rather a decoration of the collection, the pine is advisable for alpine gardens and rather small-sized areas.

***Pinus banksiana* Lamb. - Jack Pine**

Pinaceae

Other names: Banksian Pine, Canada Horn Pine, Check Pine, Labrador Pine, Scrub Pine, Hudson Bay Pine

Czech: Borovice Banksova, banksovka

Description

An evergreen conifer, a 7-20 (25) m tall tree, sometimes tortuous, with multiple trunks, with irregular, thin crown; a shrub form may occur at extreme sites. Outer bark grey-brown, with deep fissures, scaly. Typical lifespan is a mere 100 (max. 250) years. Needles in bundles of two, light green, 2-5 cm long, curved, twisted, finely serrated on the margin, falling off after 2-4 years. Needle sheaths 3 mm long, mostly deciduous on year 2. Annual shoots yellow-green, glabrous, terminal shoots consist of two segments. Buds oblong-ovoid, 6-8 mm long with appressed scales, light brown, intensely resinous. Cones curved at the tip, 3-5 cm long, persist closed on the tree for several years. Shields flat, glossy grey-yellow, without the thorn. Seeds black-brown. The species neither forms sprouts nor roots from cuttings.

Distribution and ecology

A North American species with the range in the northeast and in the middle almost throughout the continent. Forms a major component of forests in Canada. The northern boundary of the range extends from the Atlantic coast from Nova Scotia through Quebec, Ontario, Manitoba, Alberta and Saskatchewan to the River Mackenzie with however no continuation over the ridge of the Rocky Mountains toward the Pacific side. To the south, the range extends from Canada to the neighbouring U.S. states, particularly around the Great Lakes (Michigan, Wisconsin, Minnesota and occasionally elsewhere). In the northern part of the range, in rather low elevations up to the forest boundary, the tree is found as a shrub form. Small proportions are also reached on the sites typical of nutrient-poor moraine soils. In the southernmost part of the range, it extends to the elevations from 500 to 800 m. Introduced to Europe in 1783; in Bohemia it took place in 1865 (Hluboká Chateau). A considerably light-requiring woody species, tolerant of only a sparse canopy, its natural occurrence is characteristic in regions with low precipitation; however, places with lack of soil moisture are avoided. The geological bedrock consists mostly of sandy, gravelly and even rocky moraine material, highly drained to moisture. The tree usually grows on acidic, light soils, sometimes even on the sand dunes along the coast. Sites typical of the species include burnt areas. Can withstand extreme conditions of the continental climate with harsh winters and relatively hot summers. Can last in extreme frost hollows. Suffers from polluted air of large cities.

Practical importance

The key economic species of the Canadian taiga, where it often forms extensive pure stands or mixed-species vegetation in association with birch trees, white spruces and black spruces. The wood finds a versatile use and is very often processed into fibre. In Europe, the fir was tested primarily as a woody plant for the amelioration on nutrient-poor sands. Sometimes planted as a decorative woody species, attractive with its bizarre shape and the quantity of cones, it has never gained interest as an economic species in Europe although growing quite rapidly when young.

Note

The fir starts to produce very early, often before year 10. The curved cones persist on the tree 10 to 25 years after ripening. The quantity of cones on the tree tends to be striking - the old cones persist even on very thick branches inside the crown. The seed flies out over several years because cone opening is very difficult and requires high temperature, as is the case of forest fires. As a result, mass germination can be often observed on burned areas. The seed in cones retains germinating capacity for many years.

***Pinus contorta* Dougl. ex Loud. - Lodgepole Pine**

Pinaceae

Other names: Tamarack Pine, Shore Pine, Sand Pine, Twisted Pine

Czech: Borovice pokroucená

Description

A rather smaller, evergreen tree, 10-25 m (35 m), often only a shrub, usually with twisted branches and distinctive scaly cracked outer bark, trunk diameter 60 cm, age about 150 years. Needles in bundles of two, usually 3-5 (7) cm long, dark green with indistinct bands of stomata. They persist for 5-8 years. Annual shoots yellow-green, glabrous, terminal shoots consist of two segments. Buds oblong-ovoid, 10-12 mm long with appressed scales, red-brown, resinous. Cones tiny, 3-6 cm long, with short spines on the shields. They are usually asymmetrical, non-disintegrating, persist on the branches for several years. The trunk can be straight (ssp. *latifolia*, *murrayana*) and variously twisted. The crown is usually slender, disorderly, very thin. The species develops a taproot or a fascicled root system.

Distribution and ecology

A species native to western North America. The extensive range is found from central Yukon, West Canada, to southern Colorado, the USA, and northern Mexico. The tree grows from the Pacific Ocean, actually from the sea level up to elevations of 3,600 m in the Rocky Mountains, reaching a maximum in southern Sierra Nevada - up to 3,900 m. Four subspecies are normally listed: ssp. *contorta* - grows in the coastal area, reaching a height of 11 m; ssp. *bolanderi* - covers the Mendocino White Plains region, southern California, often only a shrubby form; ssp. *murrayana* - grows in the Cascade Range in the coastal zone, in Sierra Nevada to the mountainous regions in northern Mexico (California Peninsula); ssp. *latifolia* - occurs in the northern Cascade Range, on the plains in the region between mountain zones and in the Rocky Mountains. Introduced to Europe in 1858; in Bohemia it took place in 1865 (Hluboká Chateau). A considerably light-requiring woody species, tolerant of only a sparse canopy, forms sparse pure stands similarly as the jack pine. The relationship to moisture greatly varies between subspecies/ecotypes; the species grows on waterlogged soils, the coastal *contorta* subspecies even requires higher humidity. Extending more to the south, the *murrayana* and *bolanderi* subspecies are indifferent in terms of moisture, even tolerant of soil that dries up in the summer. The species grows on any soil - from limestone to peats, prefers rather acidic substrates and is often found on gravelly substrates; a tree of a modest demand. Thrives best at rather deep, loamy-sandy and moderately moist sites. Under this country circumstances, it is a frost-resistant species, quite tolerant of emissions. It does not tend to be damaged by game to any greater extent; browsing is usually not something to suffer from.

Practical importance

An important economic species in many U.S. regions, mass germination can be often observed on burned areas (e.g. Yellowstone NP). Suitable as a woody species that grows fast when young. Used in Europe as well, particularly in southern Scandinavia, the British Isles and northern Germany, plus it has found an application in New Zealand. In this country, the pine has been tested on experimental plots with quite good results. Advisable, as a durable, pioneering species, for emission regions, e.g. the mountains of Krušné hory etc. In the landscaping practice, the pine is used as a solitary tree as well as in groups of trees in urban areas. Frequently found in urban settlements.

Note

P. contorta ssp. *latifolia* is sometimes reclassified as a separate species - *P. murrayana*.

***Pinus jeffreyi* Grev. et Balf. - Jeffrey's Pine**

Pinaceae

Other names: Blackwood Pine, Sapwood Pine, Truckee Pine

Czech: Borovice Jeffreyova

Description

A stately, evergreen coniferous tree growing to 40-50 (60) m, trunk diameter 1 (2) m, with a broad, relatively thin crown and red-brown trunk. The life span can be 600 years. The needles are in bundles of three, rarely of just two. Needle length c. 12 - 26 (30) cm, width about 2 mm; they are cinereous to green, hard, sharply acuminate at the end. Annual shoots of circular cross-section, cinereous to green on the surface, fragrance of citrus and pineapple when injured. Buds are 20-25 mm long, whitish with protruding tips of bud scales. Cones about 12-25 (30) cm long, the width 4-8 cm up to 15 cm when open, consisting of a large number of scales, ripen on year 2. After releasing the seeds, the cone falls off, seed scales remain on the twig to some extent and the cone develops a depression. The seed scale possesses distinctive shields and very striking and protruding spines curved inward to the cone.

Distribution and ecology

The range spreads in North America, in the USA chiefly in southern Oregon, in California, partly in Nevada and in northern Mexico, on the slopes of mountains or elevated valleys. The Jeffrey's pine is found at rather higher elevations, usually above those of the ponderosa pine (*Pinus ponderosa*), from 1,400 to 2,700 (3,050) m. Exceptions exist when the tree can reach as low as 200 m AMSL. The average precipitation is 380-1,600 mm. It occurs in association with the ponderosa pine (*Pinus ponderosa*), limber pine (*P. flexilis*), sugar pine (*P. lambertiana*), subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*), incense-cedar (*Calocedrus decurrens*) and various juniper species. Introduced to Europe in 1853; in Bohemia, it took place in 1865 (Hluboká Chateau). A distinctively heliophilous species, it can accept only slight lateral shading. It does not require any particularly high soil moisture - can withstand longer periods of drought provided sufficient humidity is available. It is even not very demanding as regards soil - indeed, it can thrive on both igneous rocks and alkaline substrates. A high skeleton admixture in the soil is not an issue. Nutrient-rich, sandy-loamy and sufficiently moist soils best suit the species. Thrives on serpentinite rocks as well. It is resistant to frost, ending the growth earlier and sprouting later than the ponderosa pine. Suffers from being broken and browsed by game. Very recently, it tends to be affected by the red band needle, a disease causing the needles to fall off. Larger trees can however regenerate quite well. Quite tolerant of urban air.

Practical importance

A not very preferred woody species in the USA today, its wood being used less than with other pines. The wood is moderately heavy, fairly solid; primarily, sapwood is used that is straw-yellow to pale honey; the core is red-brown. The wood is soft, strongly aromatic; it needs impregnating to control fungi and insect pests; apart from that, it is highly durable and resistant to rot. The use ranges from building houses, making furniture and outdoor joinery elements, flooring and panelling to the production of packaging materials.

The species has never been used in Europe's forestry as an economic woody plant. It is sometimes planted as an admixture on dry, rocky slopes, at extreme sites. In this country, a relatively small group can be encountered at Sofronka - an arboretum in Pilsen. Practical use of the species, however, is particularly in landscape gardening. It is a woody species recommendable for diverse types of planting where the tree is decorative through its long needles, glaucous annual shoots and especially large cones at the time of production.

Note

The forestry sector could be making use of the hybrid *P. jeffreyi* × *coulteri*, which is characterised by heterosis effect. Several very well growing specimens of this hybrid (*P. jeffreyi* × *coulteri*) × *jeffreyi* can be found at the Sofronka arboretum.

***Pinus ponderosa* Dougl. ex Laws. - Ponderosa Pine**

Pinaceae

Other names: Western Yellow Pine, Big pine, Bull Pine, Heavy Pine, Long Leaf Pine

Czech: Borovice těžká, žlutá

Description

A stately, evergreen conifer 30-40 (70) m tall, usually 0.5 to a maximum of 2.5 m in diameter with regular, thin, conical crown and a distinctive, yellowish outer bark peeling off in plates. The lifespan can be 300 (700) years. Bundles of three needles, usually 10-26 cm long, dark green with indistinct bands of stomata. Needles persist for 3-4 years. Annual shoots are thick, yellow-green to yellow-brown, glabrous, non-glaucous. Buds oblong-ovoid, 10-12 mm long with appressed scales, red-brown, resinous. Cones large, 7-15 cm long, with short spines on flattened tags, light brown. Cones are usually symmetrical, non-disintegrating, firmly holding onto the branch and when falling off, a part of the scales remains around the stem on the annual shoot. The species forms a taproot.

Distribution and ecology

A woody species native to western North America. It has the most extensive range of all North American species; extending from British Columbia in the north across all the western states of the USA to the south and onwards into the mountains of Mexico, it overlaps in the Sierra Nevada and in the Coastal Range with the range of *Pinus jeffreyi*, the similar species, while spreading to the interior from the Pacific to Dakota, Nebraska, Colorado and New Mexico. Within such an extensive area, the species' elevation span considerably varies - the tree grows almost from the sea level in the northwest across various mountainous zones up to 2,500 m in the southeast. In Mexico, it can be found even higher (up to 3,200 m). The tree finds its best conditions between 1,200 and 2,000 m. It was introduced to Europe in 1827 and to Bohemia in 1845 (Sychrov Chateau). It also grows in areas with a lack of moisture, which it can withstand with its deep-reaching ranging root. Colonising diverse types of soil of highly different geological substrates, the best stands are found on drained, sandy to gravelly soils, if the groundwater table is within reach. Can cope with extreme climatic conditions. Young stands fall victim to fires. A frost-resistant tree, it is moderately tolerant of emissions.

Practical importance

A major economic species of the western USA with high yields of quality timber. In rather warm areas is planted far outside the USA. Outstanding as a nice solitary tree in parks. Suitable as a woody species that grows fast when young. In the landscaping practice, the pine is used as a solitary tree as well as in groups of trees in urban areas. It is not of invasive nature.

Variability and cultivars

Pinus ponderosa var. *scopulorum* Engelm.

Rocky Mountains ponderosa pine, a variety of the ponderosa pine, also listed as *Pinus scopulorum* Lemmon - the taxon is often listed as a separate species.

It has a number of common traits. Needles are shorter, forming bundles of 2 or even 3. Cone size 4-7 cm. Compared with the ponderosa pine, the subspecies grows rather slowly and reaches smaller dimensions; found in higher elevations, is more frost resistant.

***Pinus rigida* Mill. - Northern Pitch Pine**

Pinaceae

Other names: Black Norway Pine, Hard Pine, Longschad Pine, Rigid Pine, Torch Pine

Czech: Borovice tuhá

Description

A rather smaller, evergreen conifer 10-20 (30) m tall, commonly 0.5 m, max 1 m in diameter with a not very regular, thin, ovoid crown, tortuous trunk, noticeable with trunk sprouts or bundles of needles that grow even from thicker outer bark. The lifespan can be 200 (300) years. It has three needles per bundle, 6-9 (14) cm long, grass-green to dark green with indistinct bands of stomata. The needles persist for three years. Annual shoots thick, greenish-brown, later red-brown, glabrous, non-glaucous. Buds oblong-ovoid, 5-14 mm long, acuminate, red-brown, resinous. Cones 4-8 cm long, with short spines on the tags, light brown. Cones are usually symmetrical, non-disintegrating, in clusters of several cones, firmly fused with branches and persisting on the tree for a number of years. Seeds of blackish colour. The species forms a taproot.

Distribution and ecology

A North American woody species with the range in the Atlantic (eastern) part of the USA and south-easternmost Canada. Occurring from coastal states in the northeast (Maine, New Hampshire) to the southwest across the mountainous regions (the Appalachians) as far as Georgia, it is most abundant in the coastal areas of New Jersey. It grows from the sea level and extends up to 1,400 m AMSL in the mountains of the southern portion of the range. Introduced to Europe in 1750, it entered Bohemia in 1844 (Prague). An intensely heliophilous woody plant, it will perish even in only slight shading when mixed with rather lush vegetation. Tolerant of both drying and waterlogged sites, it will copy even with very nutrient-poor, sandy and podzolic soils. Extreme weather will not damage this tree. In regions with intense precipitation in winter, however, it suffers from hanging snow. Can withstand even pollution that exists within industrial agglomerations.

Practical importance

As an excellent pioneer woody species thriving at a variety of extreme locations such as sands, rocks, burnt areas or dump sites, it was soon used elsewhere in the world. The instances include the extensive use on coastal dunes in South Korea and experimental forestry plantings that took place in Germany, although without much result. The heavily resinous wood was used for lighting as candlewoods or to source resin. It was employed in shipbuilding or as timbering in mines; today, the uses include sourcing fibre and fuel. Does not regenerate naturally in this country and is not an invasive species. It is used as a notable decorative woody species in urban areas.

***Pinus strobus* L. - Weymouth Pine**

Pinaceae

Other name: White Pine, Eastern White Pine, Apple Pine, New England Pine, Tonawanda Pine, Soft Pine

Czech: Borovice hedvábná, vejmutovka

Description

A huge stately, evergreen conifer 30-45 (65) m tall, normally 1 m, but up to 2 m in diameter, with a broadly conical, later irregular crown and erect trunk. The lifespan can be 200 (400) years. Needles in a bundle of five, 5-12 (14) cm long, grey-green, laterally serrated, soft, thin. Persist for three years. Annual shoots thin, greenish-brown, soft indumentum, glabrescent, non-glaucous. Buds oblong-ovoid, 5-7 mm long, acuminate, red-brown, slightly resinous. Cones 8-15 (20) cm long, cylindrical, with elongate seed scales and short, thin peduncle, light brown, resinous. They are usually symmetrical, disintegrating, soon fall off. Seeds brown.

Distribution and ecology

A North American woody species with the range in the east of the continent. It grows around the Great Lakes, in Canada from south-eastern Manitoba as far as Newfoundland and in the neighbouring part of the USA from Minnesota and northern Iowa as far as the Atlantic Ocean. To the south, the range runs through the Appalachians to northern Georgia. In the northern portion of this range, the pine occurs from the sea level to about 500 m AMSL, while more to the south, in the Appalachians, it is spread within 400 and 1,200 m AMSL. Introduced to Europe in 1705 and to Bohemia in 1812 (Hluboš). A highly heliophilous species, it is tolerant of only slight lateral shading. It grows in areas with considerably high humidity. It also requires adequate soil moisture, provided there is a drained substrate. Stagnating soil moisture is sustained worse. The tree grows on various substrates, with however mostly acidic rocks prevailing, such as granite, gneiss, phyllites and sandstones; limestone sites are rare. The pine thrives best on drained, sandy substrates with good water supply. A frost-resistant species, it copes quite well with metropolitan climate and air pollution.

Practical importance

In America, it is one of the major woody species, its wood being versatile in use. Formerly used especially for ship masts, it was among the first North American woody species that were tested for forestry use in Europe. Gradually, this pine reached a wide application even in this country's forests and became one of the most widely planted foreign woody plants. If there is enough moisture, it grows very quickly in the first decades. Suffers with a variety of pests, of which aphids and the white pine blister rust disease tend to spread to the extraordinary extent. In addition, damage by snow windbreaks occur. This pine is amongst the most favourite woody species in parks; solitary trees of older age look very decorative. It is moderately tolerant of immissions. In this country, it regenerates naturally and is assessed as an invasive species.

Variability and cultivars

'Nana' - A dwarf cultivar.

***Platanus occidentalis* L. - American Sycamore**

Platanaceae

Other names: American Planetree, Occidental Plane, Buttonwood, Buttonball Tree

Czech: Platan západní

Description

A stately deciduous tree 20-35 (50) m tall, with a wide-branched crown, with a thick trunk and outer bark peeling off in small flakes. Leaves alternate, usually palmately 3-5-lobed, lobes shallowly incised, broader than longer, cordate to truncate at the base, abaxially stellate hairy along veins, stipules fused into a sleeve-shaped formation. Annual shoots tortuous, glabrous, the leaf scar ring-shaped; buds with a single scale conical, brown, longitudinally canaliculate, enclosed in the hollow bases of the petioles. Flowers unisexual, in dense, long-pedunculated heads, ripen into club-shaped, on top semi-globose nuts, with remains of the stylus, with a wreath of brittle hair at the base. Infructescences 2-3.5 cm in diameter, mostly singly on the peduncle, rarely of two; not bristly.

Distribution and ecology

A tree commonly found in eastern North America, in the northern part of the range, it occurs from Maine in the east to Wisconsin in the west, while in the south it extends to Georgia and North Florida and westwards to Texas. Isolated sub-ranges are found in the mountains of north-eastern Mexico. It became naturalised in North America outside the native range as a forestry woody plant. It grows on riverbanks and lake sides, in coastal and wetland areas, on nutrient-rich alluvial soils; sometimes it occurs even in hills - on limestones. Secondary habitats involve abandoned, unmanaged agricultural land; the tree is also amongst pioneer species to overgrow dump sites and areas left by surface coal-mining operations. Introduced in 1640 to Europe; in Bohemia, it took place in 1923 (Průhonice). A fast-growing, long-lived, quite undemanding woody species, it tolerates air pollution of big cities very well. In this country, it is not totally resistant to frosts.

Practical importance

In the USA, the tree is a major forestry species grown for wood, more recently also in the form of plantations as a source of biomass (rotation period: 4-10 years, achievable production when fertilised intensely is reported to be 11.2-29.1 tonnes of dry matter per hectare). It is recommended for planting as part of reclamation after coal mining; as a wind-resistant tree, it is planted as part of windbreaks and protective forest belts, etc.

The former preferences of this tree in landscaping activities as a plant that fits to the environment of large cities and as an appreciated solitary tree became currently restricted due to the outbreak of canker (the *Apiognomonia veneta* fungus) which has been introduced into North America along with the non-native *P. orientalis*. Thus, the species has been largely replaced in the plantings with *P. × acerifolia* of better resistance.

The species was introduced into countries such as Argentina and Australia; in the latter country, it is now widespread particularly in rather cooler southern states (Victoria and New South Wales). In Germany, the tree is grown only rarely.

In this country, it can be found in parks and dendrology collections only rarely, in the warmest regions.

The wood is coarse-grained, hard, very durable, hard to chop. It is used for instance for the production of butcher blocks and cutting boards (for kitchen), as well as for furniture, interior panelling, musical instruments, boxes and crates. Trunks of old trees that reached up to 4.5 m in diameter were used for manufacturing hollowed boats capable of carrying several tonnes of cargo.

The spring sap was a source for preparing a syrup and sugar.

Indigenous cultures used the inner bark of sycamore as a remedy. In addition to its astringent, diuretic and emetic as well as laxative effects, it was used internally in the treatment of dysentery, coughs, colds, lung disease, bleeding and measles, in urological problems and as a blood tonic. Externally, it was employed in washing wounds and in foot baths to treat rheumatism.

A decoction of the bark of the sycamore and the honey locust (*Gleditsia triacanthos*) was used as a gargle to treat hoarseness and sore throat.

The hairs of the fruits and leaves may in sensitive persons cause an allergic response under hot and dry conditions.

Variability and cultivars

var. *glabrata* (Fernald) Sarg. - Leaves smaller, tougher, more deeply lobed, the base usually truncate, the notches extend to about one third of the leaf blade, lobes acuminate and often entire or coarsely and sparsely dentate. Iowa to Mexico.

Note

The *Platanus* genus encompasses ten species, of which seven are growing in the southwest USA and Mexico, one in the eastern USA, one from southern Europe to northern Iran and one in Indochina.

The greatest measured specimens of *Platanus occidentalis*: currently, it involves a tree 51 m high, with a diameter of almost 4 m.

The diary of George Washington reports a tree growing at the confluence of the rivers Kanawha and Ohio that had a circumference of 13.67 m at a height of 0.9 m above the ground.

***Populus balsamifera* L. - Balsam Poplar**

Salicaceae

Syn.: *P. tacamahaca* Miller

Other names: Bam, Bamtree, Eastern Balsam Poplar, Hackmatack, Tacamahac Poplar, Tacamahaca, Balm-of-gilead, Heartleaf Balsam Poplar

Czech: Topol balzámový

Description

A tree 15-25 (30) m tall, with erect branches, thin crown and greyish, deeply furrowed outer bark. Leaves broadly to narrowly ovate, 5-12 cm long, rounded at the base, sometimes with two glands, acuminate, around the perimeter ciliate, dark green, abaxially whitish to yellowish with reticulate venation; petiole round, 3-5 cm long. Annual shoots are round, red-brown, glabrous; buds glutinous, terminal buds up to 2.5 cm long, strongly balsam-fragrant when sprouting. Catkins 7-10 cm long.

Distribution and ecology

The balsam poplar is native to the northern portion of North America, from Newfoundland to Alaska, south to New England, Iowa and Colorado. In North America, it is a northernmost deciduous tree. Typically, it grows in flooded areas, on deep, moist, sandy soils of alluvial plains, on the banks of streams and lakes and in swamps. Introduced in 1689 to Europe and in 1842 to Bohemia (Prague - the park of Královská obora). The root system is flexible, easily forms another layer of roots into a freshly alluvial material. A typical pioneer species, heliophilous, fast-growing and of short lifespan, which usually is 100 years or up to 200 years, conditions permitting.

Practical importance

In the northern part of the range where the choice of hardwoods to cultivate is significantly limited, it is a valuable species for planting in urban areas. Drawbacks involve the brittle branches, the litter of catkins and fruits and the vigorous root system that forms a multitude of root suckers when trimming the trees. Special-purpose planting operations make use particularly of hybrids and cultivars. *Populus x jackii* (*P. balsamifera* x *deltoides*) is planted in wind belts in the northern regions. Other hybrids are tested in plantations for biomass production, reaching in northern Wisconsin 3-4 times higher biomass yield than the quaking aspen (*P. tremuloides*) if following the correct cultivation practice.

A species of use in forestry, it is widely logged even in the formerly unused natural forests in the north of the range.

It was introduced as a prospective economic woody species, e.g. in the territory of former Soviet Union.

In this country it is grown only rarely; references, however, list it as a naturalised species.

The wood is soft, lightweight, used for cellulose production, a variety of structures and making crates; it is also used as fuel, giving a pleasant smell when burning. The bark was used for making carved souvenirs.

Indigenous cultures used the resin sourced from buds for sealing canoes. It is also used, along with burnt bark, as a repellent to control mosquitoes.

Natives used the ground and dried inner bark in the same manner as that of the eastern cottonwood. Cuisine practice used catkins as well, whether eaten raw or boiled.

The balsam poplar has always been used in traditional medicine, especially for treating skin problems and lung disease. In modern medicine, it is valued as a source of expectorant and antiseptic agents. The resin covering the leaf buds finds its application particularly as alcohol tincture. It serves as an ingredient in ointments to treat wounds, rheumatism, muscle pain, inflammation, etc. and applied internally in the treatment of cough and diseases of the lungs. Buds pickled in oil ("Balm of Gilead") is used as a remedy for constipation.

Variability and cultivars

'Aurora' - Leaves yellowish-white, in the middle with light and dark green spots. Cultivated since 1954, England.

Note

More commonly grown in this country is a very similar species - *P. canadensis* Ait. [synonyms: *P. balsamifera* var. *canadensis* (Ait.) A. Grey, *P. gileadensis* Rouleau] - the balm-of-Gilead. It differs from the balsam poplar with square, brown-orange, pubescent annual shoots and broadly cordate leaves with hairy petioles. Probably a hybrid taxon of uncertain origin, perhaps *P. balsamifera* x *deltoides*, with only sterile female trees grown; not known from the wild.

An international registry of poplars for forestry cultivars is managed by International Poplar Commission, Rome, Italy, this being a site to receive mandatory reports of brand new hybrids and cultivars.

***Populus deltoides* Batr. ex Marsh. - Eastern Cottonwood**

Salicaceae

Syn.: *P. monilifera* Ait., *P. canadensis* Michx. fil. non Moench

Czech: Topol kosníkolistý, bavlňkový, deltovitý

Description

A dioecious, stout tree 22-35 (50) m tall, with a broad, irregular crown. It has an extensive root system, but does not form root suckers. Leaves alternate, spirally arranged, triangular ovate, 6-12 (17) x 8-12 cm, at the base truncate to slightly cordate with 2-3 glands, ciliate along the perimeter, long petiolate, petiole flat, 4-8 cm long, reddish. Annual shoots with pentagonal pith are rounded, with distinct leaf cushions, only the sprouts are distinctively square, yellow-brown, buds longly conical, acute, covered with multiple scales, brown, 1-2 cm long, glutinous, fragrant. Flowers grow in the axils of lacinate bracts, the corolla is calyciform, converted in a nectarium, anthers red, inflorescence (catkins) pendant, anemophilous, 5-10 cm long. The fruit is a capsule 8-12 mm long, dehiscent along 3-4 valves. Seeds are ellipsoidal to club-shaped, very small, downy, with a bundle of longer fluff near the funicle. A fully-grown poplar can have up to 50 million seeds.

Distribution and ecology

This species is native to the east and the interior of North America. Found in the east of the range is the *deltoides* ssp. (the eastern cottonwood), from Quebec west to Dakota and Manitoba, south to Texas, east to Georgia and northern Florida. In the west - the inland part of the range, there is the *monilifera* ssp. (the plains cottonwood), from southern Alberta, Saskatchewan and Manitoba southward across the Great Plains as far as northern and southern Dakota, Nebraska, Kansas, Oklahoma, Texas and New Mexico. Occurring to the southwest is the *wislizeni* ssp. (the Rio Grande cottonwood), from Texas west to Arizona and north to Wyoming across Colorado. It grows chiefly in river valleys on the banks of watercourses, on nutrient-rich soils. Seeds germinate on bare soil; good sites involve sediments after floods. It also regenerates on managed land. Introduced to Europe in 1750. It thrives best on drained, constantly moist soils, but can sustain drought. Roots from cuttings and layered branches. The tree is sensitive to a wide range of diseases. Typical lifespan is 70-100 years, or as much as 200-400 years under the best conditions.

Practical importance

It is generally considered a species unsuitable for ornamental purposes, with drawbacks for urban areas comprising litter of fruits and leaves, as well as the extensive root system damaging roads and sewers. It is a commercially used woody species in the USA, which particularly applies to the *deltoides* and *monilifera* subspecies. In addition to being planted in cultures for biomass production, it is a good pioneer species in forestry use. Employed in landscaping for planting along watercourses and in terrain depressions, as part of erosion control and as a fast-growing woody plant for shading buildings. It is an important part of wind belts in the Great Plains. It seeks attraction as cattle feed because it contains no tannins and is rich in protein - particularly the leaves that possess higher levels of amino acids than e.g. wheat, corn, rice or barley; poplar brushwood was a horse foodstuff as early as in Native American tribes.

As a promising forestry woody species it was introduced into western Europe, Asia, North and South Africa and South America. In this country it is rarely cultivated, but is the parental species for the most commonly grown hybrid black poplar, *P. × canadensis* (*P. nigra* x *deltoides*), one assessed as an invasive plant in the territory.

The wood is coarse and soft, lightweight, but fairly solid. The heartwood is light yellowish-brown, the sapwood is almost white. The wood is mainly used for pallets and interior parts of furniture, as an untreated construction lumber for outbuildings, for the manufacture of cellulose and as a source material for the production of methanol to power internal combustion engines. It is a much-sought commodity for the production of high-quality, glossy paper.

The Cheyenne tribe used the trunk of the cottonwood as the central pole of the Sun Dance ritual. The wood also served for producing friction wood to make fire, the rotten wood being used as a sponge to carry hot coals or even as diapers for Native American babies.

The leaf buds served in the spring as a source of dyes - green, yellow, purple, red and black.

The indigenous tribes were making use of dry, ground inner bark as a flour additive or soup thickener. The poplar sap was also finding its application in cuisine.

The traditional medicine was chiefly making use of bark; containing salicin, it has analgesic, anti-inflammatory and febrifuge effects. Internally, the bark was particularly used in the treatment of rheumatism and fever and as a remedy for scorbute, pertussis and tuberculosis, plus was used as anthelmintic. A poultice of leaves was used to treat rheumatism, bruises and ulcers.

Variability and cultivars

ssp. *monilifera* (syn.: var. *occidentalis* Rydb.) - Leaves distantly dentate, 5-15 teeth on each side, the leaf base rounded with 1-2 glands. Buds shortly pubescent.

Note

The oldest and largest individuals:

Currently, a specimen called Balmville Tree and located in the USA is the oldest *P. d.* ssp. *deltoides* individual.

Populus deltoides ssp. *deltoides* - Sheridan County, Kansas: height 29.3 m, trunk diameter 10.85 m.

Populus deltoides ssp. *monilifera* - Ravalli County, Montana: height 34.1 m, trunk diameter 10 m.

Populus deltoides ssp. *wislizeni* - Bernalillo County, New Mexico: height 25.6 m, trunk diameter 10 m.

The tree has been the official symbol of the State of Kansas since 1937.

***Pseudotsuga menziesii* (Mirbel) Franco - Douglas Fir**

Pinaceae

Syn.: *Pseudotsuga taxifolia* (Lamb.) Britt., *Pseudotsuga douglasii* (Sab.) Carr.

Czech: Douglaska tisolistá

Description

A stately, evergreen coniferous tree growing to 40-70 (100) m in height and a trunk diameter of 1-3 (5) m, with a medium-broad pyramidal crown, has a dark brown trunk with a distinctive corky, ridged outer bark. In the young age, the bark is smooth with resinous blisters. It can reach 600-1,000 (1,200) years. Branches arranged in whorls. Needles are about 25 (35) mm long, c. 1 mm wide and are blunt ended. On the upper side, there is a lengthwise groove, from the bottom there are two rows of whitish bands of stomata, are generally dark green for the *menziesii* variety and grey-green for the *glauca* variety. The needle base is tapered as if into a short petiole. Needles arranged spirally on the twigs, on shaded shoots even distichous, persist for 4-8 years, and give an intense citrus scent when rubbed. Annual shoots of circular cross-section, give resinous fragrance when injured. In the late growing season are yellow-brown, glabrescent. Very striking are the buds; they are about 3-6 (10) mm long, ovate-lanceolate, strongly acuminate, red-brown and almost non-resinous. Cones about 4-10 (12) cm long, 3-4 cm wide, composed of a large number of scales, ripen on year 1 (late September). Bract scales are salient, very noticeable with three distinct lobes. The triangular, brown seed has a wing with dark brown stripes.

Distribution and ecology

Normally, two varieties of the species are discerned - *P. menziesii* var. *menziesii* and *P. menziesii* var. *glauca* (the blue Colorado Douglas fir). The species' range extends in western North America, when the *menziesii* var. is found chiefly on the Pacific coast (the coastal Douglas fir / green fir) from c. 32 to 52° NL, while the *glauca* var. (the blue Colorado Douglas fir) occurs in the Rocky Mountains from Mexico to Canada from 15 to 54° NL. The species occurs from the sea level up to the slopes of mountains or higher-elevation valleys in foothills and montane zones up to 2,300 m. The *menziesii* variety grows from California (Yosemite NP) to British Columbia, namely in the territory of moderate zone rainforests, in association with *Thuja plicata* (the western redcedar), *Picea sitchensis* (the sitka spruce) and *Tsuga heterophylla* (the western hemlock), while in the Olympic Mountains it is extended as far as the upper forest boundary along with *Chamaecyparis nootkatensis* (the nootka cypress) and *Abies lasiocarpa* (the subalpine fir); pure stands are often formed as well. In Europe, the species was introduced in 1827; in Bohemia, it occurred in 1842 (Chudenice). A specimen from the period still grows in the area. A significantly heliophilous species, it does tolerate a quite strong shading when young; later on, only lateral shading is accepted. It does not require any particularly high soil moisture if humidity is sufficient, as well as does not need any specific soil. It grows mainly on acid igneous rocks (pH 4-6), any high skeleton admixture in the soil is not an issue. A nutrient-rich, sandy-loam and sufficiently moist soil best suits the species provided it is well drained. A frost-resistant species, it will normally tolerate a temperature of -25 °C. When young, it suffers from being grazed and broken by game. In this country, it suffers from needle diseases (Rhabdocline needlecast, Swiss needle cast); *Heterobasidion annosum* and *Armillaria* are however the most frequent fungal pathogens. Is amongst species quite tolerant of urban environments - especially the *glauca* var.

Practical importance

In North America, the species is a major production woody plant, its wood being widely used e.g. to produce furniture, plywood, as a structural material to build houses, panelling, sleepers, mine timbering etc. Unlike with firs, the wood is discerned to dark heartwood and light sapwood. The wood is soft; any use outdoors necessitates impregnation to protect the wood from fungi and insect pests; uses include production of furniture, packaging materials and paper.

In Europe, the species is often used as an economic woody plant in forest stands.

In this country, it has been planted on over 5,000 ha of reduced area. The importance in the forest management and the representation in stands are likely to increase. It is grown for use as a Christmas tree. Essential oil is used in pharmacy. It is also a prospective species for ornamental plantings at higher elevations.

***Ptelea trifoliata* L. - Hoptree**
Rutaceae

Other names: Stinking Ash, Wafer Ash

Czech: Křídlatec trojlistý

Description

Deciduous shrub to tree, 2-5 m tall, patulous, strongly aromatic. Leaves alternate, trimerous, leaflets ovate to obovate-lanceolate, 2.5-10 cm long, the middle are largest, the lateral are often asymmetrical, long acuminate, entire or obscurely crenate, with translucent glands, abaxially dull grey-green, hairy on the veins. Petiole 7-10 cm long. Annual shoots are hairy, yellow-green, later red-brown; buds yellow-brown, hairy. Flowers at the ends of annual shoots in corymbs, polygamic, tetramerous, greenish-white, 0.8 to 1.2 cm in diameter. Blooms in June. The fruit is a sonora with two seeds, rigid, rust-veined, circular rim 1.5-3 cm in diameter, of bitter taste, gives bad smell when rubbed (ethereal reservoirs).

Distribution and ecology

The species is native to eastern North America from south-eastern Canada through the eastern United States to central Mexico. It grows in open forests, on rocky slopes, on arid, calcareous soils, or in humid areas near watercourses on various soil types. Introduced in 1721 to Europe, and in 1835 to Bohemia (Prague - the park of Královská obora). An undemanding and easy-to-adapt species, dry to moderately moist, drained soils and semi-shady to shady sites meet the needs of the tree. It tolerates sunlit sites as well.

Practical importance

In the states of New Jersey, New York and Pennsylvania, the plant is considered one of the endangered species.

An ornamental woody plant, used in North America for informal hedges and boundary walls. In Europe, it is quite often grown in parks as a solitary tree or in small groups; several cultivars have been selected.

In this country, it is rarely grown as a solitary plant in parks. It sometimes grows wild.

The wood is yellow-brown, heavy, hard, dense, silky glossy, but not of commercial use, because the plant will not grow to any larger dimensions.

Fruits were previously used in brewing beer as a substitute for hops; reportedly, they also stimulate faster rising of bread. Although bitter, they were a favourite food for small children.

For indigenous cultures, the plant was an important part of natural medicine; was considered a sacred plant, amplifying the effects of other medicinal herbs.

The bitter root bark was, like other aromatic barks, used in medicine as a stomach tonic and an agent to soothe irritated mucous membranes and support appetite. It was also used to treat malaria, fever, asthma, heartburn, and as an anthelmintic. Externally, it was applied to wounds. Leaves were used in a similar manner; they were also administered to control intestinal parasites and added into arrow poisons.

In sensitive persons, the plant may cause photosensitive irritation of the skin.

Variability and cultivars

var. *mollis* Torr. & A. Grey - Leaflets are wider than with the underlying species, abaxially densely and permanently hairy, as well as young twigs and inflorescence. Texas, southern USA.

f. *pubescens* (Pursh) Voss - Leaves adaxially dull-green without gloss, abaxially hairy; annual shoots, petioles and inflorescence glabrous or almost glabrous.

'Aurea' - Leaves permanently lively yellow. Cultivated since 1886, it received the AGM.

Note

The *Ptelea* genus covers about seven to eleven species occurring in North America, the USA and Mexico.

***Quercus rubra* L. - Northern Red Oak**

Fagaceae

Syn.: *Q. borealis* Michx.fil.

Other names: Champion Oak, Common Red Oak, Eastern Red Oak, Mountain Red Oak, Gray Oak

Czech: Dub červený

Description

A deciduous tree 20-40 m tall, with a patulous, often irregular crown. The grey-green bark remains smooth for a long time; later on, outer bark grey, shallowly fissured. Leaves alternate, elliptical to obovate, pinnatifid to pinnatifid, 12-22 cm long, petiolate (2.5 to 5.0 cm), with spiny dentate lobes, adaxially green, glabrous, abaxially lighter, with tufts of hairs in axils of veins in autumn orange, scarlet to red-brown. Compared with the pin oak, the leaves have the lobes broader than the notches. Annual shoots with pentagonal pith are red-brown with tiny yellow lenticels, glossy, glabrous, costate, buds arranged in a spiral, crowded at the end of annual shoots, small, ovoid, acuminate, pentagonal; hairy, red-brown on the top. Flowers anemophilous, unisexual; male flowers on last year's twigs in pendant, thin catkins 10-13 cm long, 1-2 female flowers per short, thick stem in the leaf axil. Fruits are ellipsoid to ovoid achenes (acorns), 1-2 per short stem, 1.2 to 2.5 cm long, barrel-shaped, red-brown, the cupule is woody, flat, red-brown, with a revolute margin. They ripen on year 2.

Distribution and ecology

The species is native to eastern North America, from Nova Scotia in the west to Minnesota, in the south to Georgia and Alabama as far as close to Florida. In the native range, the tree grows at a variety of sites and under different climatic conditions. The species finds its optimum on slightly acidic, mineral-rich, loamy to clayey freshly wet soils; yet it is able to grow even on substrates very low in minerals and acidic substrates; does not sustain dry or too wet and flooded soils. Introduced in 1691 to Europe and in 1724 to Bohemia, it is resistant to air pollution. Suffers from chlorosis on calcareous soils. A heliophilous plant, mature trees tolerate more shading than Central European oaks; it also sprouts later and is less damaged by late frosts. A fast-growing and relatively long-lived tree, the lifespan can be up to 500 years.

Practical importance

It is one of the most important economic species of oak in North America. It is also favoured in park design and landscaping as a low-demanding, fast-growing tree ornamental with its autumn leaf colour, is advisable for large gardens and parks as a solitary tree, shading tree, can also be used in street plantings. It is grown in parks and large gardens as a solitary tree.

Introduced to Europe as a potential economic species. In this territory, it spreads into oak, oak-hornbeam, pine-oak, fir and beech woodlands, classified in some countries as an invasive woody plant.

In this country it is widely planted in parks; in forest stands, it is one of the most frequently introduced species of deciduous trees. In forestry, it is planted as a soil-protecting and amelioration woody species on poor, acidic and degraded soils; it is also suitable for the reclamation of pit heaps. It is considered an invasive species.

The wood is coarse-grained, hard, solid, heavy, but little durable. It is sought for the production of flooring, furniture, veneers, for the building industry, manufacturing sleepers and fence posts. The bark is a source of tannin and red dye.

To indigenous cultures, the red oak was an important source of food. Acorns were leached, dried and ground to make flour or, when roasted, used by early settlers as a substitute for coffee. Acorns are also food for small mammals, turkeys and deer.

Traditional medicine was making use of bark and inner bark, or leaf galls, as an antiseptic, astringent, emetic and febrifuge, as well as a tonic. The bark was used to treat diarrhoea, dysentery, chronic digestive problems, asthma, cough, hoarseness, fever, bleeding, etc., while externally was applied in baths for skin rashes, burns, etc.

Variability and cultivars

var. *borealis* (Michx.fil.) Farwell. - Trees with larger fruits and flatly bowl-shaped cupules.

'Aurea' - Leaves golden-yellow, greenish only in late summer. Cultivated since 1878.

'Heterophylla' - Leaves variable, oblong-ovate to oblong-lanceolate or linear to linear-lanceolate, often sickle-shaped, shallowly dentate or with 1-2 large teeth on each side.

'Schrefeldii' - Leaves 15-20 x 10-14 cm, lobes of the leaves overlap, segments very narrow, a distinctively cuneate leaf base. Cultivated since 1890, found in Park Muskau.

Note

Quercus rubra is a state tree of New Jersey and an iconic tree for the Province of Prince Edward Island.

The largest individuals:

Ashford, Connecticut - a tree fragment of an old tree, girth of 8 m.

Anne Arundel, Maryland - A three-trunked tree, the girth is 6.7 m, height 41.5 m, the crown width is 29.9 m.

***Quercus palustris* Muenchh. - Pin Oak**

Fagaceae

Other names: Swamp Spanish Oak, Swamp Oak, Water Oak

Czech: Dub bahenní

Description

A deciduous tree 15-25 (40) m tall, with branches in the lower part of the crown pendant. The bark long smooth, only later in life finely fissured, black-grey. Leaves alternate, elliptical, pinnatipartite, 8-11 cm long, lobes almost diffuse, spiny dentate, glossy on both sides, abaxially with tufts of hairs in the axils of veins; compared with the red oak, lobes are narrower than the incisions. Annual shoots are thin, with pentagonal pith, red-brown, glabrous with a number of lenticels, buds arranged in a spiral, crowded at the end of the shoot, small, ovoid, glabrous, acuminate, red-brown. Flowers anemophilous, unisexual; male flowers on last year's twigs in pendant, thin catkins, female flowers on short, thick peduncles in the leaf axils. Fruits are ellipsoid to ovoid achenes (acorns), located mostly singly, almost sessile, about 1.0-1.5 cm long, barrel-shaped, with woody, flat, red-brown goblets with hairy scales. They ripen on year 2.

Distribution and ecology

The tree is native to central and north-eastern North America, from New England west to Michigan, Iowa and eastern Kansas, south to Georgia, Arkansas and Oklahoma. The optimum for growth is in the River Ohio catchment area. In the native range, it grows in alluvial and coastal woodlands with a short flooding period. It finds its optimum on acidic, wet clayey soils; yet it thrives even on drier soils. Introduced in 1770 to Europe, and in 1835 to Bohemia (Prague - the park of Královská obora). A heliophilous species, it withstands only slight shading. It is resistant to salting and air pollution. Suffers from chlorosis on calcareous soils.

Practical importance

An excellent, easy to cultivate park tree, fast-growing, tolerates transplanting very well. Ornamental with its autumn leaf colour. Received the AGM.

It was introduced into Europe and the British Isles, Australia - where it grows mainly in rather colder southern states such as Victoria and New South Wales, and to South America, Argentina in the Río de la Plata region being its stronghold.

In this country, it is grown in parks, especially near the bodies of water. It does not grow wild.

Due to its ease of cultivation, rapid growth and zero demand in terms of soil, the tree is widely used for planting in the countryside as well as in cities such as a street, shading and ornamental tree. Pendant lower branches are drawback in streets.

The wood is hard and heavy and is occasionally used for furniture and structures; mostly it is used as firewood. It is usually sold along with wood of the red oak, but is of lower quality. Oak galls serve as a source of tannin and producing a black pigment and ink.

Acorns have the same use as with those of the red oak. They are also an important food for wild ducks, turkeys and other birds, as well as for small mammals and deer. The species is planted in areas of duck hunts into "green tree reservoirs" that are artificially flooded in autumn and winter and serve to attract migrating waterfowl.

Indigenous cultures used the bark to prepare tea for treating intestinal pain; any other utilisation in traditional medicine is the same as with the red oak.

Variability and cultivars

'Carnival' - Leaves of similar shape and size as the underlying species, but intensely and noticeably, densely white and creamy dotted; dots are usually very small.

'Crownright' - A narrowly tapered shape.

'Crozam' - The shape nicely pyramidal.

'Pendula' - Branches pendant to a greater extent than with the original species.

'Swamp Pygmy' - A small to medium-sized shrub, branches short, crowded; leaves 3-7 cm long, deeply irregularly lobed, bright-red in autumn.

***Rhododendron catawbiense* Michx. - Catawba Rhododendron**

Ericaceae

Other names: Purple Rhododendron, Mountain Rosebay, Red Laurel, Catawba Rosebay

Czech: Pěnišník americký

Description

An evergreen, patulous, richly branched shrub 2-4 m tall, with grey-brown outer bark. Leaves alternate, spirally arranged, elliptical, 6-12 x 3-5 cm, acute, glabrous on both sides, adaxially glossy dark green, abaxially light green. Petiole 1-2 cm long, hairy early in the life, then glabrous. Annual shoots tomentose in the young age, buds ovoid, the terminal bud noticeable. Flowers pentamerous, slightly symmetrical, with a funnel-shaped corolla, violet-purple with greenish spots, rarely white, up to 5 cm in diameter, in dense terminal panicles of 15 to 20. Blooms from May to June. The fruit is an ovoid capsule about 2 cm long, with small winged seeds.

Distribution and ecology

The species is native to eastern North America, from Virginia to the south to northern Alabama and Georgia, particularly in the southern Appalachians. In the native range it grows in mountain valleys, where it forms continuous stands. Its optimum is on acidic, moist, well drained soils. A frost-resistant plant. Prefers wet, cold, humus-rich, drained soils and sites with the morning sunlight to semi-shady locations, protected from strong sunlight and wind.

Practical importance

A hardy species, ornamental through the leaves and flowers, it is used for the selection of frost-resistant hybrids. In North America and in Europe it is a favourite ornamental woody species. It is grown as a solitary plant, in groups, as a fringe woody plant or one suitable for loose hedges or for the undergrowth of higher woody plants. In some areas it is a naturalised and wild-growing plant - such as in North America, Massachusetts. *Rhododendron catawbiense* is closely related to *Rhododendron ponticum*, the Caucasian species with which it forms hybrids in the culture. One of these hybrids is reportedly an invasive species in northeast Scotland.

A highly toxic species, all the parts of the plant contain andromedotoxin. Poisoning is manifest in salivation, lacrimation, abdominal pain, depression, nausea, vomiting, diarrhoea, overall weakness, breathing difficulty, progressive paralysis of the limbs and coma. Cases of fatal poisoning are known.

Variability and cultivars

Around hundreds of cultivars are known and vary mainly in flower colours that range from white to dark red or dark violet.

'Album'- Height up to 2.5 m, flowers white to lilac when starting to bloom, white with a yellow-brown pattern when blooming.

'Catharine Van Tol' - Height of 1-2.3 m, flowers purple-pink.

'Grandiflorum' - Up to 4 m tall; leaves bright-green; flowers large, violet.

'Hero' - Flowers white with a green pattern.

'Querele' - Flowers dark violet, almost without any pattern, semi-early blooming.

'Stella' - Flowers lilac-rosy with a dark brown pattern.

Note

The evolution centre of the *Rhododendron* genus is located between the Indian Himalayas and Japan. Over a thousand species are widespread largely in the northern hemisphere, chiefly in southeast Asia, extending in the southern hemisphere to Indonesia, New Guinea and Australia: in the mountain and subalpine zone, in the undergrowth of forests, occasionally as epiphytes (tropics). Mostly cultivated are the hybrids of Himalayan and North American species.

***Rhus typhina* L. - Staghorn Sumac**

Anacardiaceae

Syn.: *R. hirta* (L.) Sudw.

Other name: Stag's Horn Sumach

Czech: Škumpa očetná, orobincová

Description

Deciduous shrub to lower tree 2-5 (10) m tall, spreading by means of root suckers. The bark exudates a resinous sap. Trunk damage results in numerous root suckers being generated. Leaves alternate, pinnate, 5-15-jugate, 20-50 cm long; leaflets lanceolate, 4-9 (12) cm long, serrated, adaxially dark green, glabrous, abaxially cinereous to green, slightly hairy, orange to deep-red in autumn. Leaves lactescent when torn. Annual shoots thick, villose brown-hairy, buds ferruginous hairy, tiny, hidden beneath the petiole. Small, yellow-green, unisexual flowers are densely crowded in the terminal panicles. The fruit is a globose to flattened-globose, dry, monospermous drupe with a red-brown, hairy outer pericarp of sour taste. Fruits in the dense terminal panicle persist on the branches through the winter.

Distribution and ecology

The tree is native to eastern North America, from south-eastern Canada south to Georgia, west to Iowa. In its natural range, it grows in lowlands and hilly areas around streams, as well as in secondary habitats along roads, railway embankments and on the verges of forests. Introduced to Europe in 1752, to Bohemia in 1835 (Prague, the park of Královská obora). It is a frost-resistant species, can withstand strong winds, tolerates saline soils. Drained to dry, but nutrient-rich soils and sunlit sites suits the species, but can also grow on waterlogged or rocky, sandy and nutrient-poor soils. A short lifespan.

Practical importance

A favoured ornamental tree commonly cultivated throughout the temperate zone, it is decorative through its habit, autumn colouring, and fruits in winter, it is widely cultivated in parks and gardens. In the USA, it is also used in erosion control plantings and wind belts.

In this country, it is favoured for cultivating in parks, gardens and urban greenery as well as planting along the roads, especially motorways. It is considered a naturalised species.

The wood is soft, light, brittle, yellow-green to orange-red. Due to the small-size trunk, it is used only in wood carving.

All parts of the plant are high in tannin and can be used as a mordant or to obtain various dyes. The leaves in autumn colour are used as a source of brown dye. Roots can be a source of yellow dye, while the inner bark and branch pith yield orange dye (in the mixture with *Sanguinaria canadensis*). The leaves and fruits produce black ink when boiled. Indigenous cultures added the leaves and fruits into tobacco blends and used annual shoots to make tubes for tapping the sap of maple trees or for production of flutes.

Seeds were a source of oil used for making candles. It does burn well, but gives acrid smoke. Beekeepers use dried fruits as fuel in their smokers.

The fruits were traditionally used as food as well and consumed boiled, especially as a filling for baked products. Soaking the fruit spadices in water was a way to prepare a refreshing, sourish drink ("Indian lemonade").

To natives, the tree was an important part of natural medicine and valued chiefly for its astringent properties; bark, roots and leaves were used for treating diarrhoea, as a diuretic, emetic and tonic. A specific use was that of wood - it was chewed as a means to support milk production in nursing mothers.

In modern medicine, the plant is not used because of concerns about toxicity.

The whole plant contains urushiol - a polyphenol, a potent allergen and a contact poison, causing dermatitis to sensitive skin, which is characterized by redness, rash, blisters, and skin lesions.

Variability and cultivars

'Dissecta' - Leaflets deeply pinnatisect. Known since 1898, it is an AGM holder.

'Laciniata' - Leaflets as with 'Dissecta'; inflorescence contains numerous pinnatisect bracts. Received the AGM.

Note

The specific name (*typhina*) is explained in the description of the plant by Linne and Torner as "*Ramis hirtis uti typhi cervini*", which translates as "the branches are rough like antlers in velvet".

***Rhus glabra* L. - Smooth Sumac**

Anacardiaceae

Czech: Škumpa lysá

Description

A deciduous shrub, 2-3 (5) m tall, spreading by means of root suckers. The bark exudates a resinous sap. Leaves alternate, pinnate, 5-15-jugate, 20-30 cm long; leaflets lanceolate, 5-12 cm long, densely serrated, glabrous on both sides, cinereous on the underside. Bright-red in autumn. Annual shoots are thick, glabrous, violet-swollen and glaucous. Small, greenish, polygamic flowers grow in dense, hairy terminal panicles, 10-25 cm long. Blooms in July and August. The fruit is a globose to flattened-globose, dry, purple-red monospermous drupe with a glandous, velvet hairy outer pericarp. Infructescences persist long on the branches

Distribution and ecology

The plant is native to large parts of North America, from southern Canada southward to northern Florida and into northern Mexico (Tamaulipas), from the coast of the Pacific in Oregon to the Atlantic coast in Maine. Grows on dry sites in the river valleys, forest verges and clearings, most often on nutrient-poor skeletal soils; extends to the elevations around 1,000 m. Secondly, it colonises abandoned fields, railway embankments, road edges or plot boundaries, spreading even to previously non-forest, prairie sites where it forms thickets from root suckers, overshadowing the native plant species. It occurs in all of the mainland states of the USA. Introduced in 1620 to Europe and in 1844 to Bohemia. A plant resistant to frost and strong winds, it tolerates saline soils. Dry to moderately moist, well-drained soils and sunlit sites suits the species, but can also grow on rocky, sandy and nutrient-poor soils; tolerant of semi-shaded places

Practical importance

In the USA, the species is used for stabilising embankments or as reinforcement, as well as for erosion control in areas with rather poorer soils. It has ornamental leaves, flowers and fruits, but is not suitable for hedges because it is too thin and spreads in an invasive manner.

In this country, cases of cultivating are rare. Currently does not grow wild in the territory.

Traditional use of all parts of the plant is similar to that of *R. typhina*. It is also assumed to possess a similar toxicity as *R. typhina*, with however cases of dermatitis not known. Unconfirmed are reports of eating the bark of young shoots and peeled roots. It is sometimes also used in modern medicine for its antiseptic and astringent effects.

Variability and cultivars

'Laciniata' - Leaflets deeply pinnatisect.

Note

In Europe, *Rhus x pulvinata* (*R. typhina* x *glabra*) is sometimes grown under the species' name.

***Ribes sanguineum* Pursh - Flowering Currant**

Saxifragaceae/Grossulariaceae

Other name: Red-flowering Currant

Czech: Meruzalka krvavá

Description

A thornless deciduous shrub 1.5-3 m tall, with grey-brown, slightly peeling outer bark. Leaves alternate, rounded to reniform, three to five-lobed, with blunt lobes, with palmate veins, adaxially sparsely pubescent, abaxially greyish tomentose, with scattered, fragrant resin glands, without stipules. Petiole 1-2 cm long, densely hairy and glandular. Annual shoots yellow-red, hairy, often sparsely glandular, buds red-brown. Flowers blood-red to pinkish, about 1.2 cm long, in salient to pendant racemes 5-8 (10) cm long. Blooms in April and May. The fruit is an almost black, slightly glandular, glaucous, juicy, multiple-seed berry, on top with persistent remnants of the calyx.

Distribution and ecology

The species is native to the west coast of North America from Canada to British Columbia to California. It grows on rocky, dry, less-often wet sites in the valleys and foothills. The best sites are located on the western slopes of the Cascades. Introduced in 1818 to Europe, and in 1844 to Bohemia (Prague - the park of Královská obora). A heliophilous species, it can tolerate sites in the vicinity of the sea. Easy to maintain, it blooms well even without pruning. Any pruning should be done after blooming. It is the intermediate host of the white pine blister rust disease.

Practical importance

A favourite ornamental shrub, valued for its colourful and fragrant flowers. Planted in groups or into fringe vegetation, it is also used in non-trimmed hedges, although the plant is thin outside the vegetation season and does not provide cover. In Great Britain, it sometimes grows wild.

In this country, it is a plant quite often grown in parks, less-frequently in gardens as an ornamental shrub. It sometimes grows wild.

Fruits are edible, though of bland taste. They are processed into jams, wine, or eaten raw. Harvested in August, they can last until November; storing makes the taste slightly better.

Any use in traditional medicine is not known.

Variability and cultivars

'Albescens' - Flowers whitish or pink-white. Had been cultivated by 1894.

'Atrorubens' - Height to 1 m, flowers dark red, in dense racemes. Selected in 1838, England.

'Carneum' - Flowers pale pink, in wide racemes. Selected in 1870, Germany.

'King Edward VII' - Height to 1 m, thick; flowers rather large, pure-red, in large bunches.

Note

A very similar North American species *Ribes malvaceum* Sm. is cultivated less frequently (flowers light pink, red fruits).

***Ribes aureum* Pursh - Golden Currant**

Saxifragaceae/Grossulariaceae

Czech: Rybíz zlatý, meruzalka zlatá

Description

A thornless, deciduous shrub, 1.5 to 2.5 m tall, erect. Outer bark red-brown, later greyish, peeling off. Leaves alternate, round, mostly trilobate, with palmate venation, small, 3-5 cm long, nearly entire, only at the tops of the lobes distantly bluntly dentate, glabrous, only on the margin and at the base pubescent, without stipules. Petiole 1-2 cm long. Annual shoots yellow- to red-brown, only in the young age shortly pubescent, buds appressed to the twig, distinctly pedunculate, oblong, acute. Flowers golden-yellow, tubular, in slightly pendant racemes of 6 to 12. Blooms from April to May. The fruit is a black-brown, juicy, many-seeded berry, edible.

Distribution and ecology

The plant is native to a large portion of North America, missing only on the southeast of the territory (Florida), on the part of the eastern coast (New England, Newfoundland), and in northern Canada. It grows in ravines, on rocky slopes, river banks and in floodplain forests on sandy, humus-rich soils. Introduced in 1806 to Europe, and in 1844 to Bohemia (Prague - the park of Královská obora). A heliophilous, significantly drought-resistant species, it tolerates saline soils. Since the plant is an intermediate host of the white pine blister rust disease, it is sometimes deliberately removed from the undergrowth in wooded areas in the USA.

Practical importance

Widely grown as an ornamental tree, the species is used in the USA for planting in protective strips and as part of natural landscaping projects.

In Europe, it is often planted as an ornamental shrub and is suitable for dense groups. It commonly grows wild.

In this country, growing is actually rather rare - *Ribes odoratum* Wendl. fil. is probably the species chiefly cultivated as "golden currant"; this may even involve a group of closely related North American species. These species were also used in South Moravia as rootstocks for tree forms of gooseberry and currant. *Ribes aureum* is documented particularly in rather warmer areas of the Czech Republic, where it rarely grows wild or persists from older plantings at rather dry sunny sites in the vicinity of settlements, on shrubby slopes, etc.; the Hazmburk castle (380 m AMSL) is the maximum elevation.

Indigenous cultures used the berries as food; they were consumed raw, dried or processed into sauces and jellies. Edible are also the flowers and possess a nicely sweet flavour.

The gold currant was also used in traditional native medicine - the dried inner bark served for powdering ulcers, a decoction of the bark was used to treat swollen legs.

Note

The *Ribes* genus covers nearly two hundred species distributed in the cold and temperate zones of the northern hemisphere, as well as in South America from the Andes to Patagonia.

***Robinia pseudoacacia* L. - Black Locust**

Fabaceae

Syn.: *R. acacia* L.

Other name: False Acacia

Czech: Trnovník bílý, trnovník akát

Description

A thorny, deciduous tree, 10-25 m tall, usually with a tortuous trunk and a thin crown - umbrella-shaped in old age. The bark of cinereous and brown colour, soon shallowly fissured, later deeply, reticulate-cracked. Leaves alternate, pinnate, 15-30 cm long, 3-9-jugate, with pubescent petioles. Leaflets opposite, entire, narrowly elliptic to ovate, 2-4 cm long, on the top rounded or notched, apiculate, adaxially green, abaxially cinereous, only in the young age appressed-hairy, with petiolules 2-4 mm long. In autumn yellow. Annual shoots are pentagonal, with distinct leaf cushions, with pairs of thornified stipules, glabrous, olive green, then red, pith up to 5-riate, buds obscured, hidden beneath a convex leaf scar. Flowers symmetrical, papilionate, white to slightly pinkish, strongly scented, 1.5 to 2.0 cm long, in pendant racemes of 5-15, 8-20 cm long. Blooms in May to June. Fruits are flat pods, sized 5-10 x 1 cm, snapping in two seams, dark grey-brown, glabrous, with 6-10 reniform, flattened, grey-brown seeds.

Distribution and ecology

The native range of acacias is not exactly known; the black locust is assumed to have formerly spread in two regions of North America: eastern from Pennsylvania and Ohio to Alabama, Georgia and South Carolina, with a centre in the Appalachian Mountains, and western including parts of Missouri, Arkansas and Oklahoma (Ozark Plateau, Ouachita Mts.). Isolated populations potentially occurred in southern Indiana and Illinois, Kentucky, Alabama and Georgia. On a large area of North America, including southern Canada, the black locust has always been commonly grown and often grows wild. A woody species typical of early succession stages, it secondarily occurs on abandoned agricultural land. It is a very adaptable tree - occurs on both nutrient-poor and nutrient-rich substrates and on relatively lighter or heavier, both dry and wet soils. To Europe, it was introduced in 1601 (France); the first mentions in this country date back to 1710. A heliophilous species, it is significantly resistant to drought and copes very well with air pollution of large cities. Unsuitable for cultivation are permanently wet or heavy clayey soils. Like other legumes, the black locust lives in a symbiosis with the nitrifying bacteria of the *Rhizobium* genus. In the early 20th century. the vegetation in North America (except mountainous forests) was virtually destroyed by *Megacyllene robiniae*, a long-horned beetle detrimental to wood of the trunk and branches. In fact, surviving trees are economically worthless.

Practical importance

A species commonly grown not only in North America, but also in Europe, Asia, South America, South Africa, Australia and New Zealand, in most areas, it became naturalised and is very often a highly invasive species. It was formerly used as a source of wood, in windbreaks and erosion control strips and for stabilising slopes, embankments and river banks, as part of the revitalisation of excavated surface mines, but also for afforestation of contaminated or depleted soils,

In this country, it is found in open-canopy forests, forest verges, windbreaks, along roads, in tree avenues around gardens and parks, in the vicinity of human settlements. It also used to be planted as a valued honey-producing tree. It spreads into natural communities of open forests and bushy hillsides, where it is suppressing native vegetation. It is classified as invasive species.

The wood is very hard, durable even when in the ground, ring-porous, with a dark yellow-brown core. Used in ship construction, production of fence posts, sleepers, flooring, furniture etc., it is also valued as excellent fuel.

The flowers are a source of essential oil of high value for perfume industry. The bark serves as a source of yellow dye (robinetin), in addition to a former use for paper making.

As a source of high-quality honey, the tree is favoured particularly in the USA, as well as in France, Hungary and other countries.

With rising prices of fertilisers, the importance of black locusts is being contemplated in terms of nitrogen supply to the soil, hence the testing the species as auxiliary vegetation in forest nurseries in the USA.

The seeds and young pods were used as food and consumed boiled, similarly as peas. Dry pods reportedly served for preparing a drink with heavily narcotising effects. The flowers are traditionally eaten fried in batter, particularly in France and Italy, but also in this country. They are also used as a fragrance ingredient of jams, or to prepare syrup.

Traditional medicine used flowers as an antispasmodic, a diuretic and a laxative; when boiled, they were used to treat eye diseases. The inner bark and roots were used as an emetic, or tonic.

All parts of the plant (except flowers) are poisonous to both humans and animals. They contain, among other things, robin (toalbumin) and robinin (glycoside). Bark and young shoots are for instance highly poisonous for horses, yet there are areas where the tree is grown as a source of livestock feedstuffs.

Variability and cultivars

'Bessoniana' - Up to 10 m, the crown widely umbrella-shaped, twigs almost thornless; blooms rarely. Selected in 1860, Germany.

'Inermis' - No thorns. Selected in 1800, France.

'Monophylla' - Thornless, leaves composed of 3-5 leaflets, often simple.

'Pendula' - Up to 15 m, the secondary branches arcuate-pendant, crown semi-globose. Selected in 1822, Germany.

'Tortuosa' - Twisted branches, annual shoots suberous, blooms rarely. Selected in 1813, France.

'Umbraculifera' - A globose shrub, usually grafted onto the trunk. Selected in 1813, Austria.

Note

The *Robinia* genus is native only to North America, especially Mexico and southern/south-eastern parts of the USA; ten to twenty species are found in this territory.

***Robinia viscosa* Vent. - Clammy Locust**

Fabaceae

Syn.: *R. glutinosa* Sims.

Czech: Trnovník lepkavý

Description

A deciduous tree 3-10 m tall, with a patulous crown and smooth bark, usually grown grafted onto acacias. Leaves alternate, pinnate, 8-25 cm long, 5-10-jugate, with petioles villose-hairy and glandular, glutinous. Leaflets opposite, entire, narrowly elliptic to ovate, 1-4 (5) cm long, on the top rounded, apiculate, adaxially dark green, abaxially cinereous and green, sparsely hairy, with petiolules 2-4 mm long. Annual shoots dark brown, villose-hairy and glandular, glutinous, later covered with red-brown resin, with distinct leaf cushions, with pairs of thin, thornified stipules. Flowers symmetrical, papilionate, pale salmon and pink, non-fragrant, 2.0 to 2.5 cm long, banners with yellow spots, grow in patent racemes of 6-15, 5-8 cm long. Blooms in May and June. Pods flat, dehiscent along two seams, 5-8 x 1 cm, villose glutinous hairy and glandular, with numerous reniform flattened seeds.

Distribution and ecology

The plant is native to the southeast of North America, from Pennsylvania to Alabama. It grows in the mountains, in rather drier open forests and thickets, on slopes up to 1,200 m AMSL. Introduced to Europe in 1791; in Bohemia, it occurred in 1835 (Prague, the park of Královská obora). A heliophilous species, resists to draught. Pruning in the above-ground portion promotes the formation of an extensive root system.

Practical importance

In the USA, it is planted as an ornamental tree in parks and gardens as well as in the streets. It is also used in erosion control and stabilisation plantings.

In this country, it is occasionally grown in gardens or parks as well as planted in the streets from time to time. Currently does not grow wild in the territory.

The wood is heavy, hard, dense, is used similarly as that of the black locust.

The plant is not known to have been used in cuisine or in traditional medicine.

Note

Rarely, the purple robe locust (*Robinia x ambigua* Poir. in Lam.) is grown in parks and gardens. A hybrid produced by crossing *R. pseudoacacia* and *R. viscosa*, it features pale pink flowers and twigs diffuse-glandular in the young age.

***Rubus odoratus* L. - Purple-flowered Raspberry**

Rosaceae

Syn.: *Rubacera odoratum* (L.) Rydb.

Other names: Flowering Raspberry, Virginia Raspberry, Thimbleberry

Czech: Ostružiník vonný, ostružinec vonný

Description

A stoloniferous, deciduous shrub 0.7-1.5 (2.5) m tall, with straight, branched, double or even multi-annual shoots; older shoots possess a longitudinally peeling outer bark. Leaves alternate, simple, usually five-lobed, 8-25 (30) cm in diameter, heart-shaped at the base, green on both sides and diffuse-hairy, petiolate, with persistent stipules. Annual shoots hairy and densely pedunculate-glandular in the young age, rounded. Flowers arranged in terminal corymbs/panicles are pentamerous, purple-red, fragrant, 3-5 cm in diameter, with a hypanthium and persistent sepals, the calyx as well as pedicels with red-violet pedunculate glands. Blooms from May to July. The fruits are orange to red drupelets in a flattened, semi-globose, compound fruit (blackberry) on a conical fructiferous receptacle, about 1 cm in diameter, of bland taste.

Distribution and ecology

The species is native to eastern North America, from Nova Scotia west to Wisconsin and Illinois, south to Alabama and Georgia - here it is found chiefly in the Appalachian Mountains. It grows in forests, forest verges and moist thickets. To Europe, it was introduced in 1635; in Bohemia since 1835 (Prague, the park of Královská obora). It is a woody plant tolerant of mild to moderate shading. It prospers on loamy, freshly moist to moist humus-rich soils, on non-calcareous substrates. Pruned after flowering.

Practical importance

In Europe, as far as Finland in the north, it is grown as a woody plant ornamental with its flowers, with a long flowering time, with decorative foliage and also as an excellent fast-growing understory species in gardens and parks. In Great Britain, it has gone wild.

In this country, it is grown in parks as a higher ground-covering woody species, is naturalised and grows wild in rather warmer regions, usually near old chateau parks, in open woods and on clearings.

Violet to dark blue dye is sourced from the fruit.

In the native range, the fruit is used in jams, jellies, preserves, pastry fillings etc., very rarely consumed raw. In Britain, they do not ripen.

Leaves, roots and bark of roots possess astringent effects; a decoction was used in treating diarrhoea and washing old sores and ulcers. Roots were also used to treat toothache. A decoction of the leaves and stems serves to treat kidney problems. The fruits are also used as a diuretic.

Variability and cultivars

'Albus' - Bark and leaves brighter, flowers whitish.

Note

The *Rubus* genus encompasses more than a thousand species which are mostly apomicts and widespread throughout the world except Antarctica.

***Salix fluviatilis* Nutt. - River Willow**

Salicaceae

Syn.: *S. columbiana* (Dorn) Argus, *S. melanopsis* Nutt.

Czech: Vrba poříční

Description

A deciduous shrub with a height of 3-4 (6) m, forming a continuous musciform stand from root suckers, in which the original shrubs are not apparent. Annual shoots possess numerous short lateral shoots during the vegetation, falling off along with leaves. Leaves alternate, spirally arranged, narrowly lanceolate, 1 cm wide, distantly serrate, abaxially silvery tomentose. It has a long growing season; the leaves remain on the shrubs until November. Annual shoots grey-green to grey-brown, slightly tomentose, buds covered with a single, cucullate scale. Flowers unisexual, small, achlamydeous, in the axils of entire bracts, inflorescences (catkins) c. 5 cm long. The fruit is a capsule forming two valves when snapping, the valve margins become twisted. Seeds very small, glabrous, with a bundle of fluff.

Distribution and ecology

The tree is native to western North America - Washington and Oregon. It grows on the banks of watercourses, lakes and reservoirs on sands and muddy surfaces where it forms extensive thickets. It is a highly light-requiring species. In the natural range, it forms hybrids with a closely related species, *S. sessilifolia* Nutt. Propagates in a vegetative manner very well.

Practical importance

In North America, it is reportedly an advisable woody plant to precede target woody species on mudified soils as part of afforestation. In this country, there have been occasional growing experiments to reinforce the banks of reservoirs, e.g. Nové Mlýny, the dam in Brno, due to the species' good capacity of spreading and the resulting dense root carpet that prevents abrasion of banks; the plant can also grow across a stand of grass.

In the USA, basketry use still persists. The bark was used to produce binders.

Indigenous cultures used the willow wicker to build dwellings, make sleeping mats, fish traps, etc.

Traditional medicine employed the bark of various willow species of willow as an analgesic and fever control remedy. Bark was also attached to the wound as a means to stop bleeding.

Note

The *Salicaceae* family encompasses three hundred to six hundred species; its members are missing only in Australia, Polynesia and Antarctica.

***Sequoia sempervirens* (D. Don.) Endl. – Redwood**

Taxodiaceae/Cupressaceae

Syn.: *Schubertia sempervirens* (D. Don) Spach

Other names: Coast Redwood, California Redwood, Sequoia

Czech: Sekvoje vždyzelená

Description

Probably the highest evergreen conifer, 60-90 (114) m tall, commonly 3 m, but up to 6 m in diameter, with a broadly cylindrical, then irregular crown and an erect trunk. The life span can be up to 2,000 years. Assimilation organs are scaly on the long shoots and needle-like on the short shoots, flat, distichous, on the underside with two white bands of stomata. Needles are 1-3 cm long, grassy-green, similar to the yew-tree. They can persist for several years. Annual shoots are thin, greenish, later red-green, glabrous, non-glaucous. Buds ovoid, 3 mm long, acuminate, green, non-resinous. Cones globose, 1.3 to 3.5 cm long, with small seed scales and a short, thin peduncle, light brown, non-resinous, at the ends of the branches. They are disintegrating, ripen on year 1, caduceous on year 2-3.

Distribution and ecology

A North American woody species with the range on the coast of the Pacific Ocean, it grows chiefly in the misty zone from California to Oregon, from the sea level, i.e. (0) 30 to 750 (900) m AMSL. It occurs within a strip 8-56 km wide, particularly on the western slopes and in valleys with abundant water. In particular, the relative humidity, more specifically, the precipitation from 800 to 3,500 mm defines the species' range. It forms pure stands or occurs mixed with the Douglas fir, the western hemlock and the grand fir. The stock of wooden mass per ha can be 3,600 m³ on year 100 for pure stands, while in the mixed-species vegetation and in later ages it can in theory reach well over 10,000 m³. Introduced in 1843 to Europe, entering Bohemia in 1845 (Sychrov Chateau). Lasts for decades in the shade and is even tolerant of high extent of shading. It grows in regions with a considerable level of humidity. It also requires adequate soil moisture, provided the substrate is drained. Stagnating soil moisture is sustained worse. The tree grows on various substrates, with however mostly acidic to neutral rocks being prevalent. It thrives best on loamy-sandy substrates that possess good water supply and are well drained. In this country, the species usually tends to be heavily damaged by frost.

Practical importance

In the American southwest coast, it is one of the major woody species of commercial use, its wood being versatile. It has a reddish colour, is light and highly durable. The species was amongst the first North American woody plants that were tested for forestry use in the part of Europe with oceanic climate. There are countries where the tree is amongst favoured park woody plants, with rather older solitary trees looking highly decorative. It is moderately tolerant of immissions. In this country, it is a woody plant of collections, very rarely grown without a winter cover.

Note

Sequoyah (1770-1843) was the chief of the Cherokee tribe.

***Sequoiadendron giganteum* (Lindl.) Buchh. - Giant Sequoia**

Taxodiaceae/Cupressaceae

Syn.: *Wellingtonia gigantea* Lindl.

Other names: Wellingtonia, Big Tree, Mammoth Tree, Sierra Redwood

Czech: Sekvojovec obrovský

Description

The most stately evergreen conifer 50-60 (100) m tall, commonly 4 m, max. 9 m in diameter, with a broadly conical, later irregular crown and erect trunk with a massive outer bark of thickness of up to 90 cm. The life span can be up to 3,100 years. Short, spirally arranged, evergreen needles are appressed to the twig with the thickened base, the ends are salient. The needles are 4-6 mm long, up to 20 mm at the terminal, grey-green. They can persist for several years. Annual shoots are thin, greenish, later red-brown, glabrous, non-glaucous. Buds ovoid, 3 mm long, acuminate, green, non-resinous. Cones barrel-shaped, 4-8 cm long, with multiple seed scales and long thin peduncle on lateral shoots, light brown when ripe, non-resinous, at the ends of branches. They are not disintegrating, mature on year 2, persist on the tree for several years.

Distribution and ecology

A North American woody species with the range in the southwest, on the coast of the Pacific Ocean, It grows only at about 70 sites in the Sierra Nevada, California. It occurs on the western slopes at an elevation of 800-2,700 m, mostly between 1,400-2,000 m, with precipitation levels of 1,500-2,000 mm per year; in Sequoia NP in the south, it grows at average 300 m higher than in Yosemite NP found in the north of the range. It occurs on a reduced area of about 15,000 hectares, where there are more than 15,000 individuals with a trunk diameter exceeding 3 m. Forms pure stands or mixed vegetation with the Californian white fir, the incense-cedar or the sugar pine. Introduced to Europe in 1854; in Bohemia, it took place in 1859 (Nové Hradý). A woody species intolerant of strong shading, it grows best at full sunlight. It grows in regions with a considerable level of humidity. It also requires adequate soil moisture, stagnant water is sustained worse. It grows on various substrates, with however chiefly acidic to neutral rocks being predominant. It thrives best on nutrient-rich soils with good water supply. In this country, it is a frost-resistant tree; damage by late frosts can occur in early age.

Practical importance

In America, the wood is used in model making, wall panelling, furniture industry, to make telephone poles, in the pencil-making sector, etc. The red-coloured heartwood is light and durable, highly resistant. With its stately, conical crown the tree became a favourite decorative species for use in parks and forest glades. Interestingly, while growing slowly until the age of 10, later on it becomes a fast-growing plant. Since it seems to sustain the Central European climate quite well, it could potentially rank among the promising taxa for forest planting provided suitable sites are available.

Variability and cultivars

'Pendula'- A tree of enormous size with pendant branches.

Note

The volume of wood mass possessed by the massive specimens amounts to over 1,000 m³, the famous tree called "General Sherman" being the most voluminous with its calculated volume of wood over 1,450 m³. Surprisingly, trunk diameter of this tree is still over 4 m at a height of 50 m.

Spiraea douglasii* Hook. - Hardhack*Rosaceae/Spiraeaceae**

Other names: Hardhack Steeplebush, Douglas' Spiraea, Rose Spiraea, Steeplebush

Czech: Tavoľník Douglasův

Description

A vimeous, deciduous shrub 1.0 to 2.0 m tall, with root shoots. Leaves alternate, oblong to elliptic, 4-9 cm long, only in the upper half coarsely serrated, broadly cuneate to rounded at the base, abaxially whitish to greyish tomentose, with raised veins, stipules absent. Annual shoots greyish tomentose to glabrate, later red-brown. Flowers growing in constricted, 10-20 cm long panicles are small, pentamerous, pink; calyxes and pedicels grey-tomentose. Blooms from July to September. The fruit is a glabrous vesicle dehiscent along the ventral seam, later the dorsal seam, with numerous small, fusiform seeds.

Distribution and ecology

The species is native to western North America, from Alaska through south-western Canada to the Pacific northwest of the USA. It grows on the banks of watercourses and in swamps, is a common shelterwood species of stands containing *Sequoia sempervirens* (the redwood) and *Abies magnifica* on moist soils, from the sea level to the elevation of 2,100 m. Introduced to Europe in 1827. Mesic to wet, well-drained, but non-drying, acidic soils and sunlit to semi-shaded sites satisfy the needs of the species. A very undemanding woody plant.

Practical importance

Grown as an undemanding, ornamental shrub suitable for planting in the waterlogged ground depressions or on the banks of watercourses, it is not advisable for formal gardens; after cutting, it develops extensive thickets from root suckers. Rarely naturalised in Britain.

In the Czech Republic, it is sometimes cultivated for decoration, grows wild (e.g. Nové Město na Moravě) and is considered a naturalised species.

Branches of the shrubs were formerly used to make brooms.

Traditional medicine was making use of the decoction of the seeds to treat diarrhoea.

Note

Cultivated in this country is sometimes also *Spiraea x billardii* Dippel. - a *S. douglasii* x *salicifolia* hybrid. It can potentially grow wild - e.g. Brno, Malá Morávka, It was first cultivated around 1850 in France.

***Swida sericea* (L. emend Murray) Holub - Red Osier Dogwood**

Cornaceae

Syn.: *Cornus stolonifera* Michx., *S. stolonifera* (Michx.) Rydb.

Other names: Red Willow, Redstem Dogwood, Redtwig Dogwood, Red-rood, American Dogwood, Creek Dogwood, Western Dogwood

Czech: Svída výběžkatá

Description

A deciduous, large shrub 1-2.5 m tall, with prostrate, often rooting lateral branches. The leaves directly opposite, simple, oblong, narrowly ovate to lanceolate, 5-10 (15) cm long, entire, adaxially vivid-green, abaxially cinereous to whitish, with 5-6 pairs of nerves, petiole 1-2 cm long. Annual shoots are purplish-red. Flowers bisexual, tetramerous, white to yellow-white, at the ends of annual shoots in flat cymes 3-6 cm wide. Blooms in June and July. The fruit is a globose drupe, from 0.5 to 0.8 cm in diameter, white to bluish, often with a preserved style, with a globose stone.

Distribution and ecology

Probably native to the north and west of North America, from Alaska southwards to California, the plant became secondarily naturalised southwards in the Rocky Mountains as far as Mexico and eastwards to Newfoundland, Illinois and Virginia. It grows along watercourses, in floodplain woodlands and thickets, from 450 to 2,700 m AMSL. Introduced to Europe in 1686, to Bohemia in 1923 (Průhonice), but maybe as early as 1835 (Prague). Grows best on deep, rich loamy, moist, humus-rich soils. It tolerates shading. Propagates in a vegetative manner very well.

Practical importance

A woody plant that in North America has always been grown as a species ornamental by leaves and fruits, but especially by the showy winter colour of branches. It is also used as a cheap and easy-to-propagate shrub as part of large-scale erosion control plantings on the banks of watercourses. To indigenous cultures - such as the Cheyennes, the plant was a sacred shrub.

An ornamental species often grown in Western and Central Europe, planted in residential areas and around roads, growing wild and becoming naturalised particularly along major rivers.

The species is often grown in this country for decoration in parks, more recently even in housing estate vegetation and a species to accompany motorways, and is considered a naturalised species. It grows wild in coastal thickets as well as rather moister and floodland woods, or even at rubbles; in the open countryside, however, it quite rare.

Indigenous cultures used the bark to make ropes and red dye and wicker and roots to produce baskets. Rather thicker trunks served as material to make bows. Oil sourced from the seeds was used for lighting. The inner bark of was a traditional part of the Native American tobacco blend called "Kinnikinnick", with the leaves of the staghorn sumac, the *Arctostaphylos uva-ursi* plant (referred to as the "bearberry"), and the tobacco being the other components. In addition, dogwood wicker was used for making sacred arrows used in ceremonies.

The fruits are quite unpalatable, bitter; yet were dried and used as food, mixed with fruits of other plants, such as serviceberries. Peeled bark was also boiled and consumed.

Fruits were used in traditional medicine to treat colds and stop bleeding. Of much more value was the bark that was used internally as an analgesic, for treating fever, headaches, skin problems, diarrhoea, or externally for washing sore eyes, sores caused by the poison ivy and other sores. Bark was also used as stripes put on wounds to stop bleeding or powder used for cleaning the teeth.

Variability and cultivars

var. *coloradensis* C. K. Schneid. - Branches brownish-red, arcuate-pendant, leaves narrower, fruits blue and white.

'Flaviramea' - A stiffly erect shrub, annual shoots noticeably yellow, lateral branches arcuate-pendant, rooting. Selected in 1899, Berlin. Received the AGM.

Swida alternifolia (L. fil.) Small. - Green Osier**Cornaceae**Syn.: *Cornus alternifolia* L. fil.

Other names: Alternate-leaved Dogwood, Pagoda Dogwood

Czech: Svída střídavolistá

Description

A deciduous shrub and/or a small tree up to 6 m tall, with horizontally patent branches. Leaves alternate, usually stipate at the ends of annual shoots, elliptic to ovate, 6-12 cm long, entire, cuneate at the base, adaxially glossy dark green, abaxially cinereous, irregularly appressed hairy, with 5-6 pairs of veins; petiole 2-5 cm long. Golden-yellow to orange-red in autumn. Annual shoots green, glabrous. Flowers bisexual, tetramerous, white, at the ends of annual shoots in semi-globose cymes 4-6 cm wide. Blooms in May and June. The fruit is a round drupe, 0.6-0.8 cm in diameter, black and blue, glaucous, red pedicelate.

Distribution and ecology

The plant is native to eastern North America, from Newfoundland west to Manitoba and Minnesota, south to the Mississippi and northern Florida. A rare plant in the south of the range. It grows in open deciduous forests, within forest verges, coastal thickets and on the edges of swamps. Introduced to Europe in 1760; the period of introduction to Bohemia unknown (Průhonice). Grows best on moist, well-drained soils. It tolerates shading. If planted at dry sites or otherwise stressed, the individuals are prone to golden canker - a fungal disease caused by the fungi *Cryptodiaporthe corni*.

Practical importance

An attractive, rather small tree often used in ornamental plantings,

it is among the species that are rather rarely cultivated in this country. It does not grow wild.

In traditional medicine, the plant was used in the similar manner as the red osier dogwood, its astringent effects being particularly valued.

Variability and cultivars

'Argentea' - A medium-sized shrub up to 4.5 m tall, the branches spread horizontally, grows slower than the original species; leaves to 9 cm long, dark green, leaf margins are nicely (creamy) white. Received the AGM.

'Ochrocarpa' - The ripe fruits are pale yellow or yellowish-white.

***Symphoricarpos albus* (L.) Blake - Common Snowberry**

Caprifoliaceae

Syn.: *S. racemosus* Pursh, *S. rivularis* Suksdorf

Czech: Pámelník bílý, hroznatý

Description

A densely-branched, deciduous shrub, 1-2 m tall, spreading by means of root suckers. Leaves opposite, ovate to rounded, blunt, irregularly lobed on sprouts, entire, adaxially dark green, glabrous, abaxially light to grey-green. Annual shoots are thin, hairless, green, later grey-brown, bark on the older branches peeling off in thin whitish strips, buds ovoid, often collateral. Flowers small, bell-shaped, pink, in terminal racemes or axillary clusters. Blooms in June to July. Fruits are bloated white to slightly pinkish, globose, sponge-like fleshy berries with two seeds.

Distribution and ecology

The common snowberry is native to northwest North America, from Alaska to California. It grows on rocky mountain slopes, in shady, moist mountain forests, in floodplains and along the banks of watercourses in a variety of conditions; in California it extends to up to 1,200 m AMSL. Introduced to Europe in 1879. Grows best on moderately moist, well drained soils, at full sun or in partial shade, yet it can adapt to a variety of soils, including nutrient-poor and stony sites. The plant should be pruned in late winter. It is a very modest, fast-growing species.

Practical importance

In North America it is used in erosion control plantings on slopes and banks of streams, as well as in reclaiming mined-out open-pit mines. It is also used as a woody species ornamental with the fruit and is planted in fringe and cover stands or as part of hedges. It is not advisable for hard-to-penetrate hedges - farm animals such as cattle and sheep will pass through easily.

As an ornamental species, it is cultivated in many countries around the world; sometimes it can grow wild (the UK).

In this country it is planted chiefly in the low and medium elevation zones in parks, orchards, residential areas, roadsides and in the reclamation of quarries, where it grows wild and spreads into the surroundings of municipalities and along the roads; typically, it occurs in the ruins of old houses. It is considered an invasive species.

Branches were formerly used to make brooms.

The whole plant contains saponins. As a result, the fruits were used as soap, hair shampoo, or even as an antiperspirant (rubbed into the skin); a decoction of wood served as a washing solution.

Fruits were used in cuisine as well, consumed mostly boiled, rarely raw, always in small quantities and perhaps only in the case of necessity.

The plant was also used widely in traditional medicine as a disinfectant, diuretic or laxative, to treat fever or stomach, kidney and menstrual problems. A decoction of the leaves was used for colds and for parasite control, while externally for washing wounds and sore eyes and the treatment of skin diseases, burns, rashes, etc.

Variability and cultivars

var. *albus* - Native to eastern North America.

var. *laevigatus* (Fern.) Blake (syn. *S. rivularis* Suksdorf) - Annual shoots and leaves glabrous, fruits larger. Native to western North America. Most cases where *S. racemosus* Pursh is cultivated and/or grows wild refer to this variety.

f. *ovatus* (Spaeth) Rehd. - A higher plant, even over 2 m, leaves bluish to dark green, fruits larger, more decorative. Selected in 1888.

'Variegatus' - Leaves small, white-rimmed, the height up to 1.2 m.

***Symphoricarpos orbiculatus* Moench. - Coralberry**

Caprifoliaceae

Syn.: *Lonicera symphoricarpos* L., *S. vulgaris* Michx., *S. giraldii* Hesse

Other names: Buckbrush, Indian Currant

Czech: Pámelník červenoplodý

Description

A patulous, deciduous shrub, 1-1.5 (2) m tall, with pendant branches. Leaves opposite, ovate to rounded, blunt, 2-4 (6) cm long, often wavy, entire, adaxially dark green, glabrous, abaxially grey-green, hairy, red in autumn. Petiole 0.2-0.4 cm long. Annual shoots densely velvety-hairy. Flowers small, broadly campanulate, yellowish, pinky-swollen, 0.3 to 0.4 cm long, in dense axillary clusters. Blooms in July and August. Fruits are swollen, purplish-red, globose to ellipsoidal, sponge-like fleshy berries 0.4-1.6 cm in diameter, with two seeds, persisting on the shrub until spring.

Distribution and ecology

The species is native to eastern North America, from south-eastern Canada to Mexico, east of the Rocky Mountains. It grows in open forests, thickets and on the dry banks of watercourses. Introduced to Europe in 1727 and to Bohemia in 1865 (Hluboká Chateau). Grows best on well-drained soils, at full sun, tolerates light shading but can adapt to a variety of soils. The plants should be pruned in late winter. It is a modest, fast-growing species.

Practical importance

In North America, the plant is used in erosion control plantings on slopes. It is also favoured as a woody species ornamental with the fruit and planted in fringe and cover stands or as part of non-trimmed hedges.

In this country, it is grown as an ornamental woody species, chiefly in parks - in larger groups as a ground-covering stand. Rarely grows wild.

Fruits were reportedly eaten boiled or raw, probably only when necessary. The plant contains saponins.

In traditional medicine, a decoction of the bark, roots or leaves was used for bathing in diseases of the eye.

Note

The *Symphoricarpos* genus incorporates fourteen to eighteen, mostly difficult to recognise species in North America south to Mexico. A single species grows in western China.

Taxodium distichum* (L.) L. C. Rich. – Swamp Cypress**Taxodiaceae/Cupressaceae***

Other names: Deciduous Cypress, Bald Cypress, Gulf Cypress, Louisiana Cypress, Marsh Cypress, Southern cypress

Czech: Tisovec dvouřady

Description

A stately, deciduous conifer 25-40 (50) m tall, commonly 2.5 m, up to 5 m in diameter, with a very irregular, thin, conical crown and erect trunk. The species is noticeable with the formation of aerial roots (pneumatophors) that grow as stumps from the horizontal roots around the trunk. The life span can be up to 750 years. Needles on the brachyblasts distichous, arranged in an alternating manner, 0.7-1.7 cm long, flat, grass-green, turning orange-brown in autumn and falling off along with the twigs. Annual shoots are green, then brown, hairless, non-glaucous with leaves alternate, small, scaly. Buds small, axillary, almost indistinct over the winter. Cones 1.5-3.5 cm long, globose to ovoid, nearly sessile, brown. They are usually symmetrical, ripen on year 1, are irregularly disintegrating, seed scales with 2 ovules. The species develops massive root buttress and an extensive root system.

Distribution and ecology

A North American woody plant with the range in the south-eastern USA, it occurs in swampy coastal forests from Florida in the west to the Gulf of Mexico as far as southeast Texas, including the River Mississippi Basin as far as Indiana in the north. It typically forms forests near rivers and in swamps and marine coastal wetlands from 0 to 30 m AMSL, often in association with the black tupelo (*Nyssa sylvatica*), the American sweetgum (*Liquidambar styraciflua*), ashes and pines. Exceptionally extends to higher elevations - 300 to 500 m AMSL. The highest abundance is seen in coastal marshes. Introduced in 1640 to Europe; in Bohemia, it took place in 1835 (Prague). A moderately heliophilous woody species, it tolerates both drying and waterlogged sites or even water level above the ground in the long term. It can also endure on nutrient-poor, sandy and loamy soils, if moisture is sufficient. The precipitation requirement are somehow higher (700-1,700 mm per year). Cannot cope with extreme climatic conditions and frosts. It is moderately tolerant of environmental pollution of industrial agglomerations.

Practical importance

An ideal woody plant for marshy soils, it even tolerates moderately salty water. The heartwood is valued and belongs to the types highly durable in wet and aquatic settings. It is a much-sought park tree. Experimental forestry plantings took place in different parts of the world and were usually successful. Does not regenerate and is not classified as an invasive species in this country. An ideal woody species for use on the sides of fish culture and other reservoirs in urban areas. It can be used with success for riparian vegetation of slowly-flowing watercourses. Uses as an attractive decorative woody plant also exist.

***Thuja occidentalis* L. – White Cedar**

Cupressaceae

Other names: Northern White Cedar, Arbor-vitae, Swamp Cedar,

Czech: Zerav západní

Description

A medium-sized conifer, rarely a shrub; reaches a height of 20 (35) m and a trunk diameter of up to 1 (1.5) m. The maximum lifespan can be 450 (1,000) years. The trunk is erect; the crown is narrowly conical peak, then ovoid. Assimilation organs are scaly, dull dark green on the upperside, light green to yellow-green on the underside. The mid leaflet has a raised, orbicular glandule, while the lateral leaflets are about 2 mm, opposite, appressed with tips curved towards the twig. Leaflets lack the whitish pattern. Buds are small, almost inconspicuous, green. Twigs are dark green above, light and glabrous beneath. Cones 8-12 cm long, light brown, ovoid, consist of 4-5 pairs of thornless scales on a peduncle 4 mm long.

Distribution and ecology

An extensive range in north-eastern North America; it is particularly widespread in Canada, the Great Lakes region, with isolated sub-ranges extending via the bordering U.S. states as far as the Appalachians, south to Pennsylvania, North Carolina and Tennessee. Found chiefly in association with the white spruce and the black spruce, in the south it is accompanied by pines. It occurs from the sea level to the elevation of 900 m. Pure stands rarely exist, but typically, the tree grows in boreal forests with *Picea glauca* and *P. mariana*, extending northwards to forest tundra zones along with *Larix laricina*. More to the south, it is found along with *Pinus strobus* and *Tsuga canadensis*. Introduced to Europe in 1536 and to Bohemia in 1809 (Hluboš). Juvenile plants tolerate strong shading, while in the adult age the light requirements are rising. Prefers rather moist soils, often grows on waterlogged soils; requires sufficient precipitation and permanent high relative humidity. Found most often on rather poor, acidic soils and peat bogs, it also grows very well on sands or crystalline soils, even on nutrient-rich soils. Grows best at lower elevations on rather deep, neutral to alkaline soils. A perfectly frost-resisting species, quite tolerant of urban settings.

Practical importance

In its native range, the species is used for products that are in contact with soil or water. The lightweight, soft wood is very durable outdoors. Other uses may comprise making foundations, structures, doors, frames, packaging materials etc. The twigs are a source of "cedar leaf oil" that is obtained by distillation and used in both pharmacy and cosmetic industry. Fine branches were used as brushwood. Cultivation is frequent in this country and involves chiefly ornamental cultivars. Of no use in forestry - it tends to be heavily damaged or even destroyed by game. It is a quite slow-growing woody species, able to cope with the given conditions extremely well. In this country, it has not been suffering from any serious pests. Not an invasive species even though natural regeneration occurs. A tree of only a decorative value. Notable is the scent of its ethereal oil, one featuring a specific antibacterial effect and used for various treatment, such as gonorrhoea, digestive troubles, warts, etc.

Variability

The following cultivars are used in horticultural practice, chiefly for the formation of hedges:

'Brabant' - A heavily growing, regularly conical crown, forms a main trunk, greater resistance to snowbreaks. Leaves scurfy, fresh green, tolerant of shading; 1984

'Smaragd' – Medium-growing regularly conical crown, bright-green foliage, persisting during the year, dense, 1950.

'Malonyana' – Selected in the Mlyňany Arboretum (Slovakia).

***Thuja plicata* Donn ex D. Don in Lamb. - Western Red Cedar**

Cupressaceae

Syn.: *T. gigantea* Nutt.

Other names: Red Cedar, Pacific Red Cedar, Giant Cedar, Giant Arbor-vitae, Canoe Cedar, Shinglewood

Czech: Zerav obrovský

Description

A stately, coniferous tree, reaching a height of 50-60 (75) m and a trunk diameter to 3 (6) m. Life span can be 800-1,000 years. The trunk is erect; the crown is broadly conical, then narrowly conical. The assimilation organs are scurfy, glossy dark green on the upperside, lighter below. Leaflets with a showy white pattern beneath. Similarly to *Thuja occidentalis*, the mid leaflet has an orbicular glandule which is however less conspicuous; the lateral leaflets are about 3 mm, opposite, appressed with tips straight. Buds tiny, almost inconspicuous, green. Twigs dark green adaxially, light and glabrous beneath. Cones 10-12 cm long, light brown, ovoid, consist of 4-6 pairs of scales with a sign of thorns, on a 2 mm long peduncle.

Distribution and ecology

An extensive range in south-western North America, widespread chiefly in Canada, from south-eastern Alaska in the north to California in the south. To the east, it extends to the Rocky Mountains. The range comprises a coastal part and an inland part. The species occurs from the sea level to the elevation of 2,200 m, often creating pure stands. In the north, it is found in association with spruces and the subalpine fir; in the central, coastal part of the range it grows accompanied by *Tsuga heterophylla*, *Pseudotsuga menziesii* and *Picea sitchensis*, while more to the south it is accompanied by *Abies grandis*, *Chamaecyparis lawsoniana* or *Calocedrus decurrens*. In its inland sub-range, it occurs in common stands with *Larix occidentalis*, *Pinus contorta* and *P. ponderosa*, with *Picea engelmannii* and other species. Introduced in 1853 to Europe, with however Svoboda (1976) reporting the tree's presence in Bohemia as early as 1844 (Prague). Juvenile plants tolerate very heavy shading, while in the adult age the light requirements are somewhat rising. Prefers rather moister soils, often grows on waterlogged soils, and requires sufficient precipitation (800-6,600 mm) and permanent high relative humidity. Most often found on rather nutrient-poor, acidic soils, it grows very well even on heavy skeletal as well as nutrient-rich soils. Grows best at lower elevations on rather deeper soils, neutral to alkaline. Very often, propagation takes place by layering. A frost-resisting species, it is quite tolerant of urban settings, but does not sustain salinisation.

Practical importance

In its native range, it is an important species for forestry. The lightweight, soft wood with its distinctive, red heartwood is very durable outdoors and has excellent insulation properties. It can be used for lightweight building structures, as lumber, to make furniture, to produce packaging materials or paper etc. Specific uses involve making shingles and other roofing products. The twigs are a source of "cedar oil" that is obtained by distillation and used not only in pharmacy, but also in the production of insecticides, veterinary soaps, footwear polishes, deodorant and similar products. Fine branches are used as additional feedstuffs for game. In this country, it is cultivated particularly as a decorative park woody plant. It is of no use in forestry so far. It also tends to be heavily damaged or even destroyed by game. It is a fast-growing species reaching considerable dimensions. In this country, it has not been suffering from any serious pests. It is not classified as invasive species. It is only of decorative value. Similarly to *T. occidentalis*, the scent of the ethereal oil is notable in this species, the substance featuring antibacterial effects as well.

Variability

'Zebrina' - Twigs whitish-yellow varied and striped.

***Tilia americana* L. - American Linden**

Tiliaceae/Malvaceae

Other name: American Basswood

Czech: Lípa americká

Description

A deciduous tree 15-25 (40) m tall, sympodially branched, with broadly ovoid to globose crown. Thin, long, smooth bark with small, rhombic lenticels is longitudinally fissured later in the life. Leaves alternate, distichous, asymmetrical, broadly ovate, cordate at the base, 8-16 (20) cm long, coarsely aristate-serrated, adaxially dark green, abaxially light green, with tufts of hairs in the axils of veins (except basal veins). Petiole 4-8 cm long. Annual shoots bright-green, hairless, tortuous; buds covered with two to three scales. Flowers bisexual, pentamerous, yellowish, about 1.5 cm in diameter, 5 to 15 in pendant corymbs with a striking supporting bract 7-10 cm long. Blooms in July. The fruit is an achene-like, ellipsoidal to globose nut, 0.9 cm in diameter, with a smooth, woody pericarp, with 1 (2) seeds.

Distribution and ecology

The tree is native to eastern and central North America, in Canada from New Brunswick to Manitoba, south to South Carolina and Texas, west to Nebraska. It extends the furthest to the north of all the American *Tilia* species, with Juneau, Alaska, being the northernmost area of cultivation. A dominant species in lime-maple forests along with *Acer saccharum*, it grows disseminated in many other forest communities. Although it finds the optimum setting on deep, sufficiently wet, sandy-loamy to loamy, calcareous soils, it is capable of growing on sand dunes and dry, exposed rock ridges. It is found on soils with pH ranging from 4.5 to 7.5 and is more common in soils with higher pH levels. Introduced in 1752 to Europe, and in 1835 to Bohemia (Prague - the park of Královská obora). It tolerates shading and is wind resistant. Grow well from both seeds and sprouts. It quite often suffers damage from leaf-eating insect species; in North America, instances include *Popillia japonica*, an invasive Japanese beetle species.

Practical importance

In the eastern USA, it is planted as a street tree, a solitary tree and a shade tree in parks or as a protective tree on the windward side of orchards and as part of windbreaks. It is also amongst economic species in the country.

Cultivated in Europe as well - in parks and urban greenery,

in the Czech Republic it is a rather seldom planted species. Currently does not grow wild in the territory.

The soft, lightweight wood of light colour is used for making cheap furniture, fibre, in wood-turning and carving sectors. It is also good for the manufacture of musical instruments, used for electric guitars.

Phloem is sourced from the inner bark. Used formerly for the manufacture of ropes, woven products such as mats and bags, as well as clothing, knitting baskets and nets, and even sewing threads, today it is chiefly used in horticulture.

The species is also valued as a major beekeeping plant with flowers producing an abundance of nectar.

The leaves, flowers and fruits are edible. Young leaves are consumed raw or boiled and used mainly in salads, as well as flowers. Spring sap is used to prepare syrup. Flowers serve for preparing an herbal tea, while fruits and flowers were used for producing an imitation of chocolate - tasty, but little durable.

To Native Americans, the lime was an important part of natural medicine and is still used in healing. The active ingredients of flowers and other plant parts involve flavonoids, volatile oils, tannins and mucilage. The flowers are used to treat colds, cough, fever, various infections, inflammation, high blood pressure, headache (particularly migraine), as a diuretic, antispasmodic and sedative. Externally, the decoction is used for calming and relaxing baths. Leaves promote sweating, are used to reduce fever, externally for bathing the eyes, a poultice of the leaf was being attached to burns, swelling and fractures. A decoction of the inner bark was used to treat lung diseases, dysentery and stomach problems, externally for washing burns. The wood is used in diseases of the liver and gall bladder, as well as to treat cellulite. Charcoal from lime wood serves to treat bowel disease, externally to treat swelling, cellulite or ulcers of the lower limbs. A decoction of the roots served as an anthelmintic.

However, continuous, excessive, and often drinking tea from the flowers was found to potentially result in damage to the heart.

***Torreya californica* Torr. - California Nutmeg**

Taxaceae

Syn.: *Taxus myristica* Hook.

Other name: Stinking Cedar

Czech: Torejka kalifornská

Description

An evergreen conifer, erect, usually a single-trunk tree, 10-20 (32) m tall, sometimes only frutescent, with a broadly globose to ovoid crown, with irregular, verticillate branching, with partially pendant crown later in the life. Trunk diameter to 1 m; outer bark cracked, brown-red. The life span can be about 300 years. The needles on the twigs are usually distichous, quite long (3-7 cm), flattened, sharply acuminate at the ends. Dark green, glossy from above, yellow-green abaxially, with striking narrow bands of whitish stomata. Annual shoots thin, flexible to pendant, green, glabrous. Buds about 3 mm large, ovoid shape, green, non-resinous. The seed reminiscent of a drupe, narrowly ovoid, 2.5-3.5 cm long, enclosed in a pulpy follicle that is initially green, then up to red-brown when ripe.

Distribution and ecology

Native to the mountains in the American south-west. Found only in California, in the western Sierra Nevada and in valleys and stands along rivers at the elevation of 900-2,000 m; has a very small-sized range. Grows largely on mountain slopes in partial shading, at sites with sufficient humidity. Introduced as a species to Europe in 1851; in Bohemia, it took place in 1879 (Sychrov Chateau). Not very demanding species in terms of light, tolerant of strong shading when juvenile. It can endure even on nutrient-poor soils, but needs sufficient humidity. Grows best on fertile, freshly moist soils in slight shade. Growth increments are rather slow. A frost-resistant plant; tolerance of urban settings is not known.

Practical importance

The species is not of an economic importance. Due to the small number of individuals, it is a rare, endangered species, not commonly harvested. In Europe and in this country, the species is sometimes cultivated in parks and chateau gardens as an ornamental tree and is noticeable with its long needles. A species for collections. It is not classified as an invasive species.

***Toxicodendron radicans* O. Kuntze - Poison Ivy**

Anacardiaceae

Syn.: *Rhus radicans* L., *T. vulgare* Mill.

Czech: Škumpovník šplhavý, jedovatý

Description

A decumbent to climbing, deciduous shrub with aerial roots. Leaves trimerous, leaflets ovate to rhombic, 3-10 cm long, entire or distantly dentate to sinuous, adaxially hairless, glossy, abaxially hairy; petiole 5-10 cm long. Scarlet- and orange-spotted in autumn. Annual shoots usually sparsely hairy only early in the life. Flowers small, pentamerous, greenish-white, in 3-6 cm long panicles. Blooms from June to July. Fruits are whitish or yellowish, glabrous or very shortly pubescent, flattened-globose drupes, 0.6-0.8 cm in diameter.

Distribution and ecology

The species is native to eastern and central North America, from Canada to the mountainous regions of Mexico (to about 1,500 m AMSL), and east of the Rocky Mountains in all the U.S. states. It grows primarily in the verges of forests, on rocky slopes, as well as on agricultural land and rubbles. It is a common species spreading in urban areas. At present, it is much more frequent in the native range than before the arrival of Europeans in North America, because the colonisation caused the countryside to be structured and sites suitable for this species to spread increased in numbers. Introduced in 1640 to Europe, and in 1835 to Bohemia (Prague - the park of Královská obora). A modest species as regards soil and soil moisture requirements, it is able to grow at regularly flooded sites as well as in places nearby brackish water. Tolerates only slight shading. Similar species grow in North American west: *T. diversilobum* ([Torr.](#) & [A.Grey](#)) [Greene](#) and *T. rydbergii* ([Small](#) ex [Rydb.](#)) [Greene](#).

Practical importance

The most feared poisonous plant in North America, listed as a harmful species in Minnesota and Michigan and in Canadian Ontario. This refers to the toxic substance urushiol contained in the plant's sap. Simply touching a leaf causes in most of people dermatitis, itching, irritation, painful rashes and blisters.

Outside North America, the species is grown in the temperate zones of Asia, in Japan, Taiwan, Sakhalin and Kuril Islands, as well as in some Chinese regions.

While being formerly part of pharmacy gardens, the plant is grown in both Europe and this country only occasionally as a rarity for its toxicity.

Despite the property, it was probably used in traditional medicine, just as was *Toxicodendron quercifolium*.

Fruits of the tree are consumed by birds and small animals.

***Toxicodendron quercifolium* (Michx.) Greene - Eastern Poison Oak**

Anacardiaceae

Syn.: *Rhus toxicodendron* L., *T. toxicodendron* (L.) Britt., *T. pubescens* Mill.

Czech: Škumpovník zákeřný

Description

An erect, stoloniferous, deciduous shrub 0.5-0.9 m tall. Leaves trimerous, leaflets rhombic to obovate, 6-10 cm long, irregularly lobate, adaxially dark green, sparsely hairy, abaxially velvety hairy, scarlet-red and orange in autumn. Petiole 5-10 cm long. Annual shoots are densely hairy. Flowers small, greenish-white, in 3-7 cm long panicles. Blooms in May and June. Fruits are greenish-white, hairy when young, flattened-globose drupes, 0.6-0.8 cm in diameter.

Distribution and ecology

The tree is native to the southeast of North America, from New Jersey and Delaware south to Georgia, Alabama, west to Kansas and Texas. It grows in dry forests and thickets, on sandy, nutrient-poor soils. Introduced to Europe in 1937.

Practical importance

An extremely poisonous species causing in most of people dermatitis, itching, irritation, painful rashes and blisters like the poison ivy. Ingestion may cause depression of the central nervous system.

The plant is grown in both Europe and this country only occasionally for its toxicity; growing is restricted to chateau gardens and botanical collections where it kept as a rarity. It was reportedly cultivated in pharmacy gardens, but this may involve confusion with the poison ivy. Easily grows wild.

Leaves rich in tannin are used as a mordant or for the manufacture of brown dye. Oils was harvested from seeds and used for lighting. The milky sap (latex) which annual shoots emit when damaged can be used as an indelible dye for marking linen and served to impregnate footwear.

Despite its toxicity, the species was used in traditional medicine, mostly as a stimulant or a narcotic. The irritating juice of the fresh leaves was used in the treatment of paralysis, poliomyelitis and other diseases, while mashed leaves served to treat skin diseases, such as shingles. Roots were used for preparing an ointment for the treatment of non-healing wounds, etc.

Today, the leaves are used in homeopathy to treat mumps and skin diseases.

Note

Where it exists along with *Toxicodendron radicans*, hybrids occur between the two species.

***Toxicodendron vernix* (L.) - Poison Sumac**

Anacardiaceae

Syn.: *Rhus vernix* L., *R. ventenata* DC.

Other name: Thunderwood

Czech: Škumpovník lakový

Description

A deciduous shrub or a small, multiple-trunk tree, 3-5 (7) m tall. A highly toxic woody plant, the wood and sap giving a bad smell of spoiled meat. Leaves pinnate, 3-6-jugate, leaflets lanceolate to elliptic, 5-10 cm long, entire, hairy only earlier in the life, in autumn orange to scarlet. Petiole red, glabrous. Annual shoots glabrous, cinereous. Flowers small, greenish-yellow in slender, pendant, 10-20 cm long panicles. Blooms from June to July. The fruits are yellowish-grey, flattened-globose drupes, 0.5-0.6 cm in diameter.

Distribution and ecology

The plant is native to eastern North America, from Canada across Maine to Minnesota, south to Florida, Alabama and Texas. It grows mainly at marshy and peaty sites and in moist forests, on permanently wet or flooded soils. Introduced to Europe in 1713.

Practical importance

It is an extremely poisonous woody species, considered by some botanists the most toxic of the American sumac plants. The toxic substance involves urushiol contained in the plant's sap. Causing long-term contact dermatitis, itching, irritation, painful rashes and blisters is not only a direct contact with the plant, but also touching the plant substances adhering to footwear, clothing, dog hair and so on; includes even touching a herbarium item many years old. Even burning wood emits smoke, the inhalation of which can seriously damage the lining of the lungs, cause a pulmonary oedema and result in severe or fatal respiratory problems.

Despite its toxicity, the species is rarely grown in the collections of woody plants; it is recommended to plant in remote parts of the collection and add a warning sign.

In this country, it is grown only exceptionally in collections of woody species. Currently does not grow wild in the territory.

A quality black varnish is produced from the sap, similarly as from that of the related Japanese species *T. vernicifluum* (Stokes) f. Barkley. The sap can also serve to produce indelible black ink. Leaves rich in tannin are used as a brown dye or staining agent. Seeds were used to produce oil for lighting.

The substances the tree contains are probably toxic only to humans - a variety of mammals feed on leaves and fruits serve as diet for birds.

Like other sumac species, this plant was used in traditional medicine of Native Americans in the treatment of fever, chills, asthma, diseases of the bladder; externally, it was used for washing ulcers.

***Tsuga canadensis* (L.) Carr. - Eastern Hemlock**

Pinaceae

Other names: Canadian Hemlock, Hemlock Spruce, New England Hemlock

Czech: *Tsuga kanadská*, jedlovec kanadský

Description

A mid-large, evergreen conifer 30-40 (50) m tall; normally 1 m, max. 2 m in diameter, with a broadly conical, later irregular crown with a drooping top and erect trunk. The lifespan can be 300 (800) years. Needles typically distichous, often covering the twig from above, become restricted from the base toward the peak, sparsely serrulate along the perimeter. The needle length 0.8-1.8 cm, dark green abaxially, with two white bands of stomata beneath, pedunculate restricted. Reverse needles often occur, covering the twig from above. Annual shoots thin, yellow-brown, densely hairy. Buds oblong-ovoid, about 2-3 mm long, bluntly acuminate, light brown. Cones 1.5-2.5 cm long, ovoid, light- to ash-brown with short peduncles. They are usually symmetrical, non-disintegrating, ripening on year 1, soon falling off.

Distribution and ecology

A North American woody species with the range in the east of the continent. Grows in the surroundings of the Great Lakes, in south-east Canada and the north-east of the USA. West of the Atlantic Ocean, it extends as far as Minnesota, while southwards it is found as far as North Alabama. In the northern portion of the range, it grows from the sea level up to 800 m AMSL, while in the south it will not occur below 250 AMSL and grows as high as 1,500 m AMSL. It often forms mixed stands with the Weymouth pine. Introduced in 1736 to Europe; in Bohemia, it took place in 1812 (Hluboš). An intensely shade-tolerant woody plant, it grows on a variety of sites, typically on moist, humous, acidic soils. Does not cope with drying soils. Thrives in the vicinity of streams. Grows best on well-drained, loamy-sandy, neutral soils with good water supply. It is not damaged by frosts. Metropolitan climate and air pollution is not very well sustained.

Practical importance

Formerly, it was one of the major economic woody species in the eastern portion of America. Its wood is versatile in terms of application and employed as a construction material, to produce cellulose, or make boards. The bark is high in tannin. Due to the slow growth, it was never tested by forestry in Europe. Amongst rather preferred woody species for use in parks; solitary trees of older age look very decorative. The tree is moderately tolerant of immissions. In this country, it regenerates naturally and is not assessed an invasive species.

***Tsuga heterophylla* (Raf.) Sarg. - Western Hemlock**

Pinaceae

Other names: Alaska Pine, Pacific Hemlock, Hemlock spruce, Prince Albert Spruce,

Czech: Tsuga západní, jedlovec západní

Description

A stately, coniferous tree, reaching a height of 50-60 (75) m and a trunk diameter of 1.5 (2.5) m. Lifespan can be up to 400-500 years. The trunk is erect; the crown is narrowly conical with a drooping top. Needles typically distichous, of the same width throughout, almost inconspicuously serrate along the perimeter. The needle length 0.7-1.8 cm; needles dark green on the underside, with two white bands of stomata beneath, pedunculate restricted on the base. Annual shoots thin, yellow-brown, long-sparsely hairy. Buds oblong-ovoid, about 2-3 mm long, bluntly acuminate, light brown. Cones 2-2.5 cm long, ovoid, light brown, lack peduncles; seed scales hairy. Cones are usually symmetrical, non-disintegrating, ripening on year 1, soon falling off.

Distribution and ecology

An extensive range in south-western North America, widespread chiefly in Canada, from south-eastern Alaska in the north to California in the south. To the east, it extends to the Rocky Mountains. The range comprises a coastal part and an inland part. The species occurs from the sea level to the elevation of 2,200 m, often creating pure stands. In the north, it is found in association with spruces and the subalpine fir; in the central, coastal part of the range it grows accompanied by *Pseudotsuga menziesii* and *Picea sitchensis*, while more to the south it occurs in mixed stands with *Abies grandis*, *Chamaecyparis lawsoniana* or sequoia trees. In its inland sub-range, it shares stands with *Larix occidentalis*, *Pinus contorta* and *P. ponderosa*, with *Picea engelmannii* and other species. Introduced to Europe in 1851, the species entered Bohemia probably as late as 1900. Juvenile plants tolerate very heavy shading, while in the adult age the light requirements are somewhat rising. Prefers rather moister soils, often requires sufficient precipitation (600-6,600 mm) and permanent high relative humidity. Found most often on rather nutrient-poor, acidic soils, from sandy through clayey soils, it grows very well even in heavy skeletal substrates. Does not sustain basic, calcareous soils. Grows best at lower elevations on rather deep, nutrient-rich soils. A frost-resisting species, it is not very tolerant of urban settings.

Practical importance

In its native range, the tree is an important forestry species. The lightweight, medium-hard wood with its yellow-brown heartwood is very suitable for building structures and can be used for lumber, furniture, packaging materials, paper etc. The bark is high in tannin and was used as a source of dye. In this country, it is rarely cultivated; this chiefly occurs for decorative purposes. Insignificant in forestry thus far, even though competing with the Douglas pine in terms of growth rate on the British Isles. A fast-growing species reaching considerable dimensions, it has not been suffering from any serious pests in this country. It is not classified as an invasive species. It is only of decorative value.

***Tsuga mertensiana* (Bong.) Carr. - Mountain Hemlock**

Pinaceae

Syn.: *Hesperopeuce mertensiana* (Bongard) Rydberg

Other names: Alpain Hemlock, Black Hemlock, Patton's Hemlock

Czech: Tsuga Mertensova, jedlovec Mertensův

Description

A mid-sized, coniferous tree, reaching a height of 15-30 (50) m and a trunk diameter of 1.5 m. The lifespan can be 600 years. The trunk is erect; the crown is narrowly conical. Needles typically of radial arrangement, dense. The needle length is 0.5-2.5 cm, needles pedunculate restricted on the base, grey-green both above and beneath, with greyish bands of stomata on both sides. Annual shoots brownish-grey to red, hairy. Buds oblong-ovoid, about 2-3 mm long, bluntly acuminate, light brown. Cones 3-7.5 cm long, oblong-cylindrical, dark brown; seed scales hairy. They are usually symmetrical, non-disintegrating, ripening on year 1.

Distribution and ecology

An extensive range in north-western North America, widespread chiefly in Canada, from south-western Alaska in the north to central California in the south. To the east, it extends to the Rocky Mountains where it has separate inland sub-ranges, i.e., the range consists of a coastal part and an inland part. The species occurs from the sea level to the elevation of 2,000 m, often creating pure stands. In the north, it grows in association with spruces and the subalpine fir from the sea level to 1,000 m AMSL, while found growing along with *Pseudotsuga menziesii* and *Picea sitchensis* in the central, coastal part of the range. More to the south, it extends to 2,300 AMSL accompanied by *Abies lasiocarpa*. In the southernmost part, where it occurs as the *grandicona* subspecies, it grows as high as 3,050 m AMSL. In its inland sub-ranges, it is found in the mountains in association with *Pinus contorta* or *Picea engelmannii* and other species. The tree was introduced to Europe in 1854 and brought to Bohemia in 1879 (Sychrov Chateau). Juvenile plants tolerate shading, while in the adult age the light requirements are considerably rising. Prefers rather moister soils, often requires sufficient precipitation (600-4,500 mm) and permanent high relative humidity. Found most often on rather nutrient-poor, acidic soils, from sandy-loamy through gravelly soils; it grows very well even in heavy skeletal substrates. In the Rocky Mountains, it was not found on limestone. Grows best at lower elevations on rather deep, nutrient-rich soils. A frost-resisting species, it is tolerant of urban settings.

Practical importance

In its native range, the tree is not very important forestry species. Its lightweight, soft wood with brown heartwood is very suitable for lightweight building structures; the applications include production of furniture, packaging materials, paper etc. It often forms buffer forests in the subalpine zone. In this country, it is rarely cultivated; this chiefly occurs in parks for decorative purposes. It is of no use in forestry. It is a slow-growing woody species reaching however considerable dimensions. It has not been suffering from any serious pests in this country. It is not classified as an invasive species. It is only of decorative value.

***Vaccinium corymbosum* L. - Northern Highbush Blueberry**

Vacciniaceae

Syn.: *V. amoenum* Ait.

Other names: Blue Huckleberry, Tall Huckleberry, Swamp Huckleberry, High Blueberry, Swamp Blueberry

Czech: Borůvka chocholičnatá

Description

An erect, deciduous shrub 0.6-2.0 (4.0) m high. Leaves alternate, simple, narrowly elliptic to ovate-lanceolate, 3-8 cm long, finely serrated to entire, adaxially dull-green, glabrous, abaxially light green, hairy on the veins, scarlet-red in autumn. Annual shoots rounded, finely warty, green-brown, hairy in the young age, later mostly glabrous. Flowers tetramerous to pentamerous, narrowly bulbous, white to light pink, 0.6 to 1.2 cm long, in racemose clusters grouped at the end of last year's twigs. Blooms in May. Globose berries with persistent calyx are black, cinereous glaucous, 0.6 to 1.5 cm in diameter, edible, sweet and slightly sour, with numerous small seeds.

Distribution and ecology

The species is native to eastern North America, from Nova Scotia south to Florida and Texas. It chiefly grows at marshy and peaty sites, on permanently wet soils. Introduced in 1765 to Europe and in 1922 to Bohemia (Průhonice). Grows best on freshly moist, sandy, humus-rich soils. A light-requiring and calciphobic species. Cultivation needs planting multiple varieties for sufficient pollination of flowers.

Practical importance

In North America, it is the most important commercially-grown species of blueberries, namely in the states of New Jersey, Michigan, North Carolina and Washington. In 1989, it was cultivated on 40,000 hectares, the average yield ranging from 4.5 to 5.5 t per hectare. Since 1920, more than 50 cultivars were selected only in Canada. Introduced to many countries, the plant is naturalised in Japan, New Zealand, Great Britain, Lithuania and the Netherlands. It is cultivated as a fruit as well as an ornamental woody plant.

In this country, the plant is available under the trade name "Canadian Blueberry" for planting in gardens and is one of the fashion fruit shrubs. Sometimes can grow wild.

Indigenous cultures used the fruits in cuisine, boiled and dried. They can be used to prepare the filling into baked goods, jams, jellies, or dried as a replacement for raisins.

Leaves and flowers were used for a variety of medicinal purposes; possess astringent properties. Tea was also prepared from leaves and dried fruits.

Variability and cultivars

'Bluecrop' - A fertile, fast-growing and disease-resistant variety, tolerant of drought more than other cultivars.

'Jersey' - An old variety, erect growing, with large fruits.

'North Blue' - A stunted, self-fertile variety with large fruits.

'Sunshine Blue' - A moderately vigorous, self-fertile variety of pink flowers.

Note

The *Vaccinium* genus incorporates about two hundred species distributed mainly in the mountains of Southeast Asia, in the Pacific region, less in America and East Africa in the subtropics and tropics; only a few species grow in temperate to boreal zone of the northern hemisphere.

***Viburnum prunifolium* L. - Blackhaw**

Loniceraaceae /Adoxaceae

Other names: Black Haw, Blackhaw Viburnum, Sweet Haw, Stag Bush, Stagberry

Czech: Kalina višňolistá, slívolistá

Description

An erect, deciduous shrub/tree, 2-5 (8) m tall. Leaves opposite, simple, elliptical, ovate to obovate, 3-8 x 2-5 cm, finely serrated, adaxially deep-green, abaxially light green, glabrous, sparsely scaly, brown-red in autumn. Petiole 0.8 to 2.0 cm long, reddish, may be narrowly winged. Annual shoots are reddish, later greyish, glabrous, tough. Flowers small, white, 0.5-0.6 cm in diameter, in almost sessile umbellate cymes 5-10 cm broad. Blooms in June. The fruits are blue-black, glaucous, globose drupes about 1 cm in diameter, with a flat stone.

Distribution and ecology

Native to northeast North America, from Connecticut west to Kansas, south to Alabama and Texas, the plant grows in thickets, forest verges, on the banks of watercourses and on dry, rocky hillsides. Introduced in 1727 to Europe, and in 1922 to Bohemia (Průhonice). Grows best on rather drier, drained soils. A drought-tolerant woody species, heliophilous and tolerant of partial shade. To promote blooming, the shrub should be pruned immediately after the period has finished. When transplanting this as well as other species of the genus, one can perceive an unpleasant "latrine odour" of the roots.

Practical importance

It is a modest ornamental shrub, resistant to drought and very well tolerant of trimming, decorative through the flower and autumn colour of the leaves; berries are favoured by birds as food. Planted as part of fringe vegetation, in groups or as a solitary tree, it is suitable for trimmed hedges.

In this country, the species is only rarely cultivated in parks. It does not grow wild.

The wood is red-brown, heavy, hard, fine-grained, but is not industrially processed due to the small size.

The fruits are edible, sweet, more palatable when they have undergone freezing. Some cultivars provide fruit to be eaten directly, while others' fruits are more suitable for preservation.

The bark of the plant has been used in traditional medicine since time beyond memory, especially in gynaecological problems. It was chiefly used to treat various cramps (not only menstrual issues, but also biliary colic, stomach and intestinal problems) and morning sickness, to prevent miscarriage, to control dysentery, as an analgesic and to stop bleeding.

The active ingredients are, among other things., scopoletin, aesculetin, salicin, viburnin and tannin.

Note

Viburnum prunifolium is a parental species for the cultural hybrid *Viburnum* × *jackii* (*V. prunifolium* × *lentago*). The list of new hybrids and cultivars of the *Viburnum* genus is managed by U.S. National Arboretum Washington; reporting is mandatory.

***Zenobia pulverulenta* (Bartr. ex Willd.) Pollard - Honeycup**

Ericaceae

Syn.: *Andromeda pulverulenta* Bartr. ex Willd., *A. dealbata* Lindl., *Zenobia cassinefolia* (Vent.) Pollard

Other name: Dusty Zenobia

Czech: Zenobie poprášená, vřesenec poprášený

Description

Deciduous to semi-deciduous shrub, 0.5-1.0 (2.0) m high. Leaves alternate, elliptic to oblong, 2-7 cm long, shallowly crenate to entire, cinereous glaucous on both sides. Flowers pentamerous, white, campanulate, in clusters forming long racemes. Blooms in May and June. The fruit is a globose capsule with numerous angular seeds.

Distribution and ecology

The plant is native to the southeast of North America, the coastal areas of Georgia, North and South Carolina and Virginia. It grows in open pine forests on sandy soils and peat bogs ("pocosin" - translates as raised bogs). Introduced to Europe in 1801, it grows best on acidic, moist, well-drained sandy or peaty soils. A drought-tolerant woody species, heliophilous and tolerant of partial shade.

Practical importance

It is a woody plant ornamental with flower and nice foliage, blue-green during the vegetation season, red-violet in autumn.

Rarely cultivated in this country; it is an attractive plant suitable for planting along with rhododendrons and other ericaceous plants. It does not grow wild.

Note

Zenobia is a monotype genus.

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Maps



1. Geographic map of North America (source: WWW.freeworldmaps.net)

Key of shortcuts

AA	Arrecife Alacrán	ND	North Dakota
AB	Alberta	NE	Nebraska
AG	Aguascalientes	NH	New Hampshire
AK	Alaska	NI	Navassa Island
AL	Alabama	NJ	New Jersey
AR	Arkansas	NL	Newfoundland and Labrador
AZ	Arizona	NM	New Mexico
BC	British Columbia	NN	Nuevo León
BJ	Baja California	NR	Nayarit
BJ	Baja California Sur	NS	Nova Scotia
CA	California	NT	Northwest Territories
CI	Chihuahua	NU	Nunavut
CM	Colima	NV	Nevada
CO	Colorado	NY	New York
CP	Campeche	OA	Oaxaca
CT	Connecticut	OC	Quebec
CZ	Coahuila de Zaragoza	OH	Ohio
DC	District of Columbia	OK	Oklahoma
DE	Delaware	ON	Ontario
DF	Distrito Federal	OR	Oregon
DU	Durango	PA	Pennsylvania
FL	Florida	PE	Prince Edward Island
GA	Georgia	PR	Puerto Rico
GR	Guerrero	PU	Puebla
GT	Guanajuato	QA	Querétaro de Arteaga
HD	Hidalgo	QR	Quintana Roo
HI	Hawaii	RI	Rhode Island
CH	Chiapas	SC	South Carolina
IA	Iowa	SD	South Dakota
ID	Idaho	SI	Sinaloa
IL	Illinois	SK	Saskatchewan
IN	Indiana	SL	San Luis Potosí
JA	Jalisco	SO	Sonora
KS	Kansas	TA	Tabasco
KY	Kentucky	TL	Tlaxcala
LA	Louisiana	TM	Tamaulipas
MA	Massachusetts	TN	Tennessee
MB	Manitoba	TX	Texas
MC	Michoacán de Ocampo	UT	Utah
MD	Maryland	VA	Virginia
ME	Maine	VI	United States Virgin Islands
MI	Michigan	VL	Veracruz-Llave
MN	Minnesota	VT	Vermont
MO	Missouri	WA	Washington
MR	Morelos	WI	Wisconsin
MS	Mississippi	WV	West Virginia
MT	Montana	WY	Wyoming
MX	México	YC	Yucatán
NB	New Brunswick	YT	Yukon Territory
NC	North Carolina	ZA	Zacatecas