



INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ



Inovace studijních programů AF a ZF MENDELU směřující k vytvoření mezioborové integrace CZ.1.07/2.2.00/28.0302

Tato prezentace je spolufinancovaná z Evropského sociálního fondu a státního rozpočtu České republiky

TROPICAL AND SUB-TROPICAL FRUITS

Fruit species coming from tropical and sub-tropical regions

Enrich conventional assortment of fruits from temperate zone

Rich in vitamins, bioflavonoids, and minerals



Satelitní

Doprava



Kalaallit Nunaat (Greenland)

Ísland (Iceland)

Suomi (Finland)

Sverige (Sweden)

Norge (Norway)

Россия (Russia)

Canada

United Kingdom

Polska (Poland)

Deutschland (Germany)

France

España (Spain)

Italia (Italy)

Україна (Ukraine)

Türkiye (Turkey)

Қазақстан (Kazakhstan)

Монгол Улс (Mongolia)

United States

中国 (China)

대한민국 (Japan) (South Korea)

México (Mexico)

North Atlantic Ocean

الجزائر (Algeria)

ليبيا (Libya)

مصر (Egypt)

العراق (Iraq)

ایران (Iran)

افغانستان (Afghanistan)

السعودية (Saudi Arabia)

پاکستان (Pakistan)

India

ประเทศไทย (Thailand)

Venezuela

Colombia

Perú (Peru)

Brasil (Brazil)

Bolivia

Chile

Argentina

Mali

Niger

تنزانيا (Tanzania)

السودان (Sudan)

Kenya

DR Congo

Angola

Nigeria

Kenya

South Africa

Indonesia

Papua New Guinea

South Atlantic Ocean

Indian Ocean

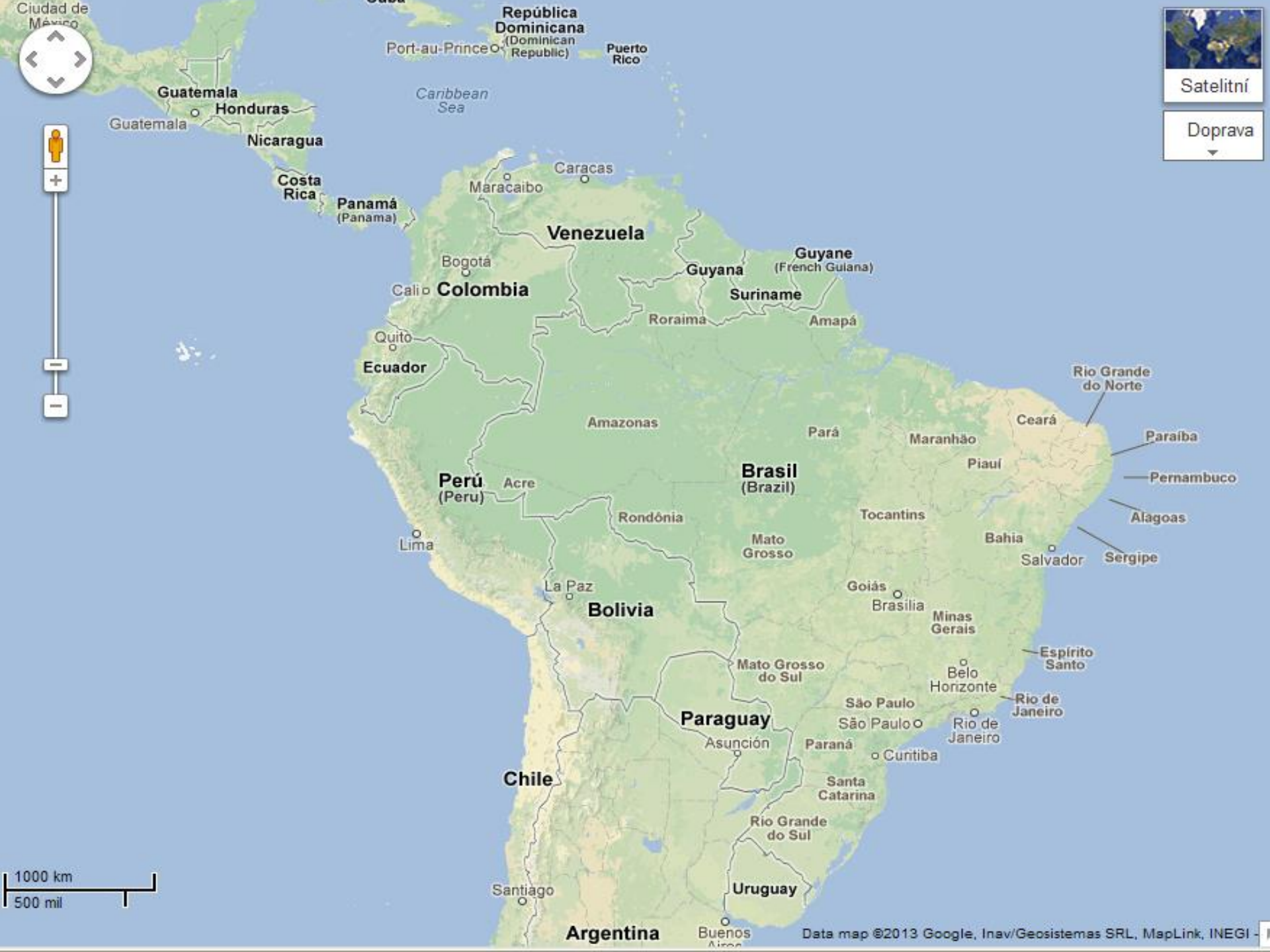
Australia

Southern Ocean

ern

2000 km

2000 mil



Satelitní
Doprava

1000 km
500 mil





موريتانيا
(Mauritania)

Mali

Niger

تشاد
Tchad
(Chad)

السودان
(Sudan)

Red Sea

Jeddah

صنعاء
Sana'a

إرتريا
(Eritrea)

جيبوتي
(Djibouti)

አትዮጵያ
(Ethiopia)

Soomaaliya
الصومال
(Somalia)



Dakar

Senegal
(Senegal)

Guinea-Bissau
(Guinea-Bissau)

Guinée
(Guinea)

Sierra Leone

Liberia

Côte d'Ivoire

Ghana

Togo

Benin
(Benin)

Nigeria

Cameroon
(Cameroon)

Equatorial Guinea

Gabon

Congo

DR Congo

Angola

Zambia

Malawi

Mozambique
(Mozambique)

Zimbabwe

Namibia

Botswana

Lesotho

Swaziland

South Africa

Madagasikara
(Madagascar)

Cape Town

Gulf of Guinea

South Atlantic Ocean

1000 km
500 mil

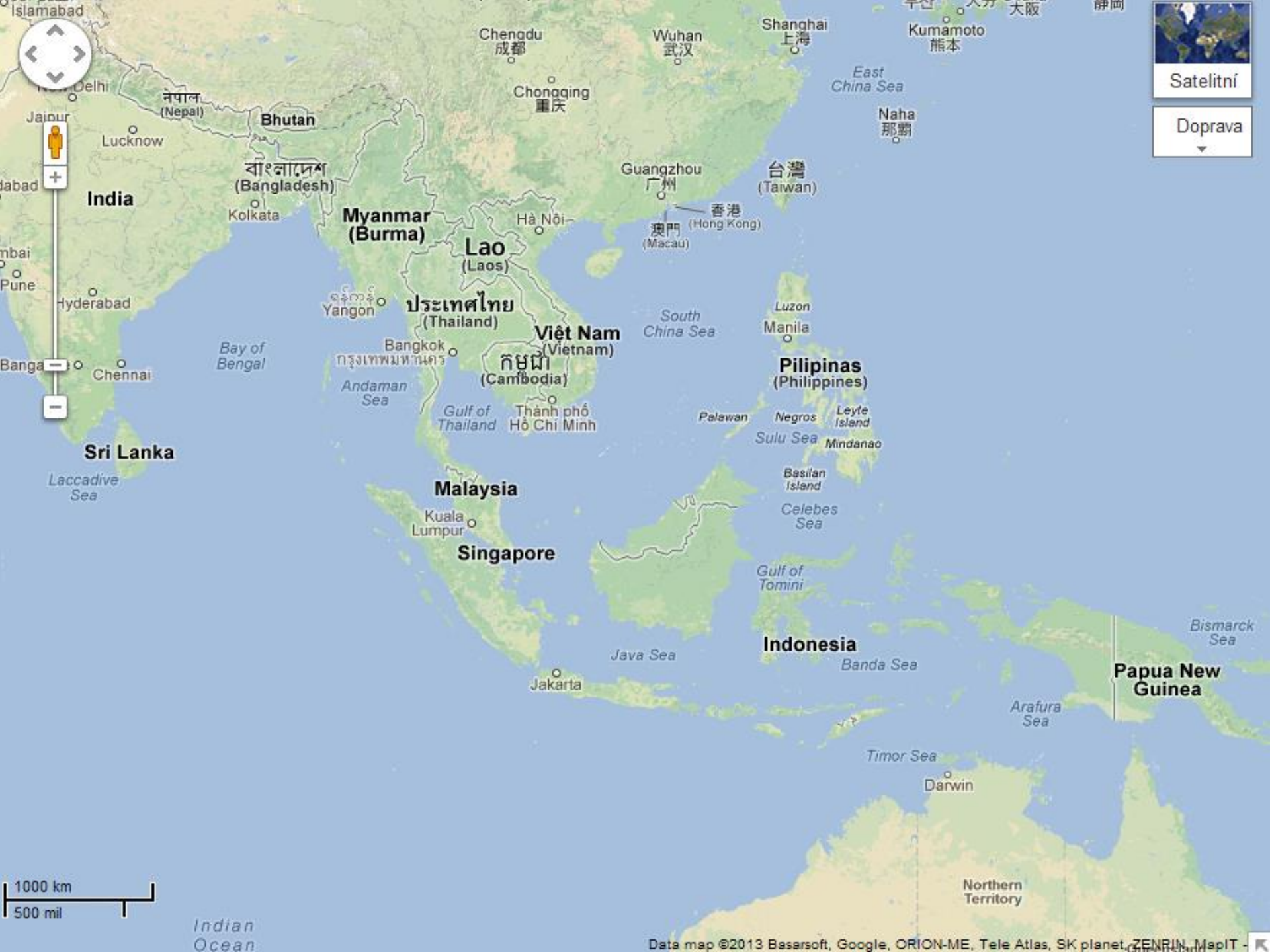
Satelitní
Doprava

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Satelitní
Doprava

1000 km



Satelitní

Doprava

1000 km
500 mil

ACCA

Acca sellowiana syn. *Feijoa sellowiana*

Native to South American continent

Grows wildy in sub-tropical regions of Brazil, Paraguay, Uruguay, and Argentina

Myrtle Family

Myrtaceae



Distribution:

Widely grown in sub-tropical regions today:

Southern France, Italy, Portugal, Spain

Northern Africa, New Zealand

USA: Florida, California

Black Sea area of Abkhazia

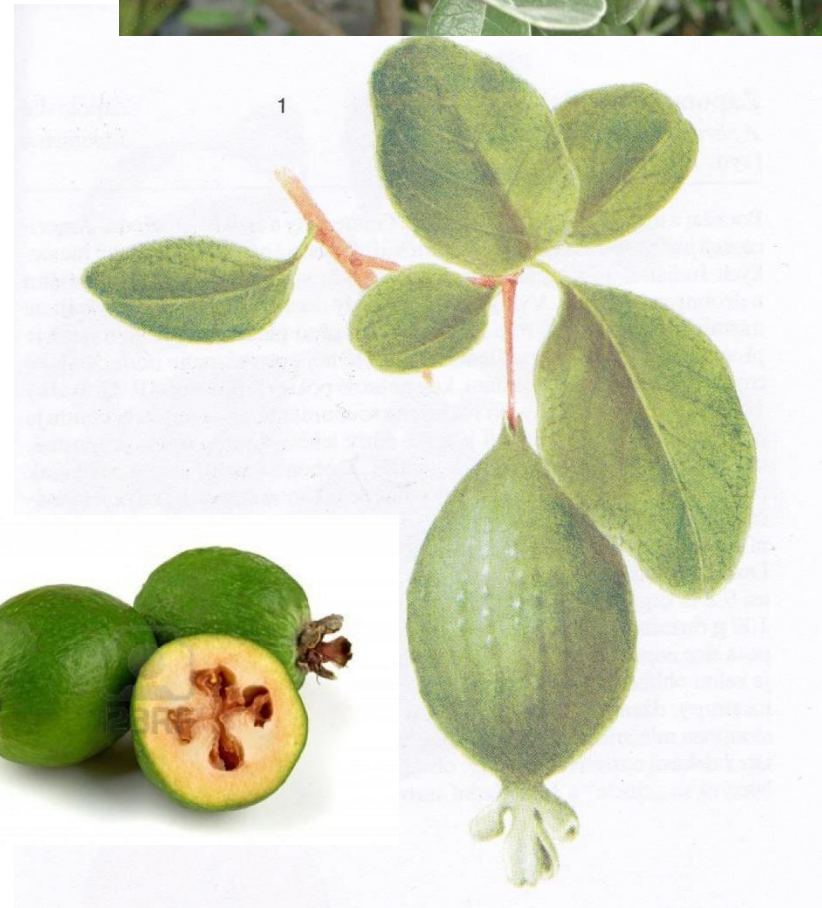


Evergreen shrub or low-growing tree, 2.5-6 m

Essential oil glands on leaves

Fruit: 4-lobed, round, elliptic or egg-shaped, greenish to grey-green berry, 20-70 mm, 35-100 g

Flesh: Cream-white to greenish, gel-like, refreshing, slightly acidic flavour



Easy wood plant:

Tolerant to -10 °C temperatures

Tolerant to dry weather, grows in regions with 500-600 mm precipitation

Low requirements on soil; prefers calcareous soil



Propagation:

From cuttings: commercial growing, grafting using seedlings

From seeds: heterogamous, uneven, less fertile offspring



Nutritional value:

Carbohydrates 5-10 %

Malic acid: 1.5-3.6 %

Vitamin B, C (like tangerines)

Iodine compounds: 2-4 mg per 1 kg of fruits

Bactericide effect

Eating:

Fresh (botanically ripe fruits fall on the ground)

Salads, marmalades, juices, liquors, wine

Thick petals: Sweet, excellent flavour, salads and beverages



ZAPOTA (SAPODILA)

Achras zapota syn. *Manilkara zapota*

Native to tropical lowlands of Yucatan, Guatemala, and Belize in Central America

Sapotaceae Family



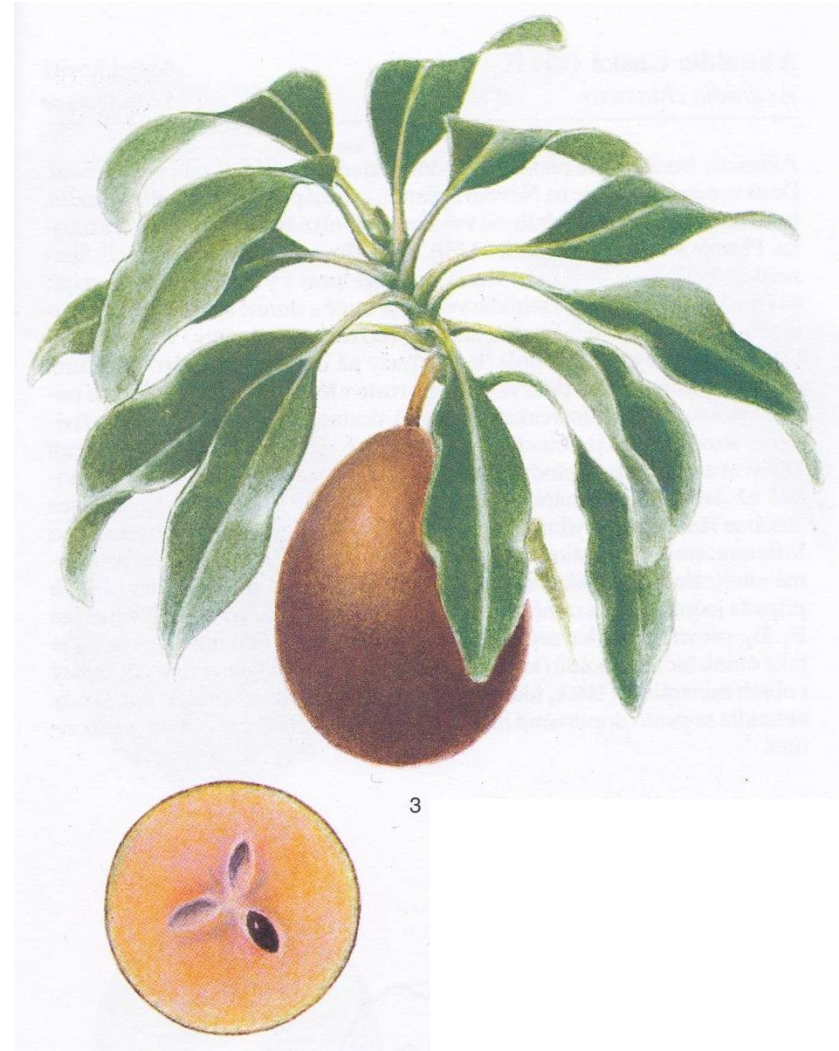
Name derives from Aztec language

Common all over tropics, especially with small-scale growers

Evergreen, 5-20m tall tree with short trunk and thick, round crown



Fruits mature gradually
Available on local markets all year round
May be transported



Fruit

Round, egg-shaped or elliptic berry

Greyish white, yellowish to yellowish brown flesh, very sweet to dull flavour, granule-like consistency resembles overripe pear; usually sticky due to latex



Nutritional value:

Carbohydrates 16-20 %

Protein 0.4 %

Fats 0.5 %

Organic acids 0.2 %

Vitamin C 200-300 mg/kg

Not a first-grade fruit, very popular though

Contains laticifer and supplies latex (by cutting the bark)

Eating:

Fresh – peeled fruits

Syrups, salads, jam



Requires hot and humid tropical climate

Intolerant to temperatures below 0 °C

Precipitation: 1,000-2,000 mm, evenly distributed

Easy on soil, prefers light, loamy-sandy, permeable, slightly acidic to neutral

Propagation:

Vegetative: layering, budding and grafting

From seeds



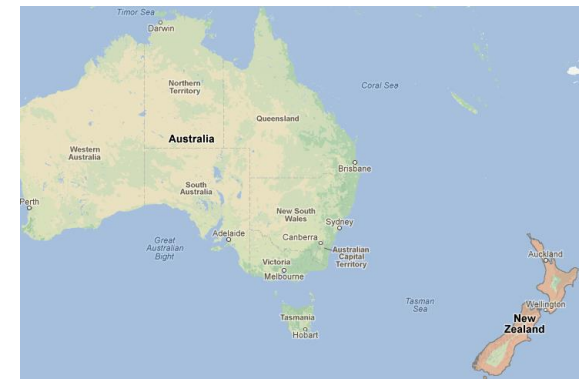
KIWI

Actinidia chinensis

Native to western and central China

Mostly grown in New Zealand, USA (California), France, Italy and the Balkans

Actinidiaceae Family



Woody vine, up to 8 m tall
Dioecious plant, rarely monoecious
Fruit: Oval to elliptic berry, 50-90 mm, 80 g
Thin peel with dense, rusty fuzz
Greenish, juicy, sour-sweet flesh
Seeds are not a flaw



Nutritional value:

Minerals: P, K, Ca, Fe

Vitamin C: 1,200-16,000 mg/kg

Vitamin B1, B2

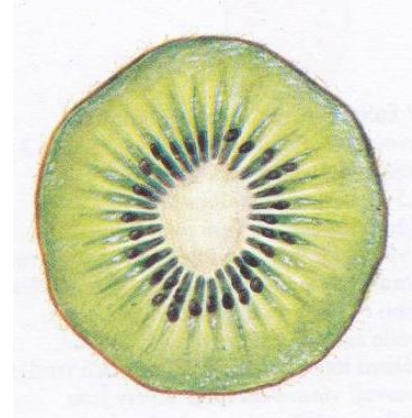
provitamin A

Good for children, elderly and
convalescents

Eating:

Fresh – peeled fruits

Syrups, salads, jam



Requires warm and sunny locations
Protected against noon sun
Protected against chill winds
Tolerates -15 °C during dormancy (must be covered)
Prefers light, permeable, humus soil
pH 5-7
Enough water and nutrients



Propagation:

From seeds: Problematic

One-or two-year old seedlings should be preferably grafted or budded

Rooted cuttings from herbaceous soft-wood cuttings or layering
4-6 female seedlings are planted per 1 male seedling

Hardy kiwi vines: Arctic Beauty Kiwi, Tara
Vine
Actinidia kolomicta, *Actinidia arguta*

These two species are, out of more than 30 species from the *Actinidia* genus, more resilient to harsh conditions during vegetation and dormancy (especially concerning temperature)

Wild growing: Amur region in Russia, Sakhalin, Kuril Islands and northeast China
Both species are monoecious as well as dioecious

Arctic Beauty Kiwi
Lower growth
Thinner stalk
Narrower fruits





Actinidia kolomicta



Actinidia kolomicta, Tara Vine *Actinidia arguta*

Vigorous climber in its homeland

Stalk diameter: Over 100 mm

Climbs up the trees and if there are no trees, it forms thick stands

Wider fruits



Counter-clockwise climber

Branching at 0.5-1 m above the ground

Fruits

Green, juicy berries with soft flesh

Very sweet, 2.0-3.2 g, 17-24 mm long

Arctic Beauty Kiwi: Oval, mildly ribbed, light green

Tara Vine: Wide oval, ribbed, dark green, shorter and wider

Fruits are harvested 3-7 days prior to eating ripeness, mature fruits fall down immediately

Nutritional value:

Water 70 %

Minerals: P, K, Ca, Fe

Sugars, organic acids

Vitamin C 7,000 mg/kg

Vitamin B1, B2, provitamin A

Good for children, elderly and convalescents

Eating

Fresh

Syrups, salads, jams, wine (similar to champagne)



Optimum location:

Half-shade

Wind-protected area

Soil: Light, semi-permeable, neutral

1 male pollinator per 5-6 female plants

Propagation:

Woody and soft-wood cuttings

From seeds

Simple layering

ALMOND TREE

Amygdalus communis

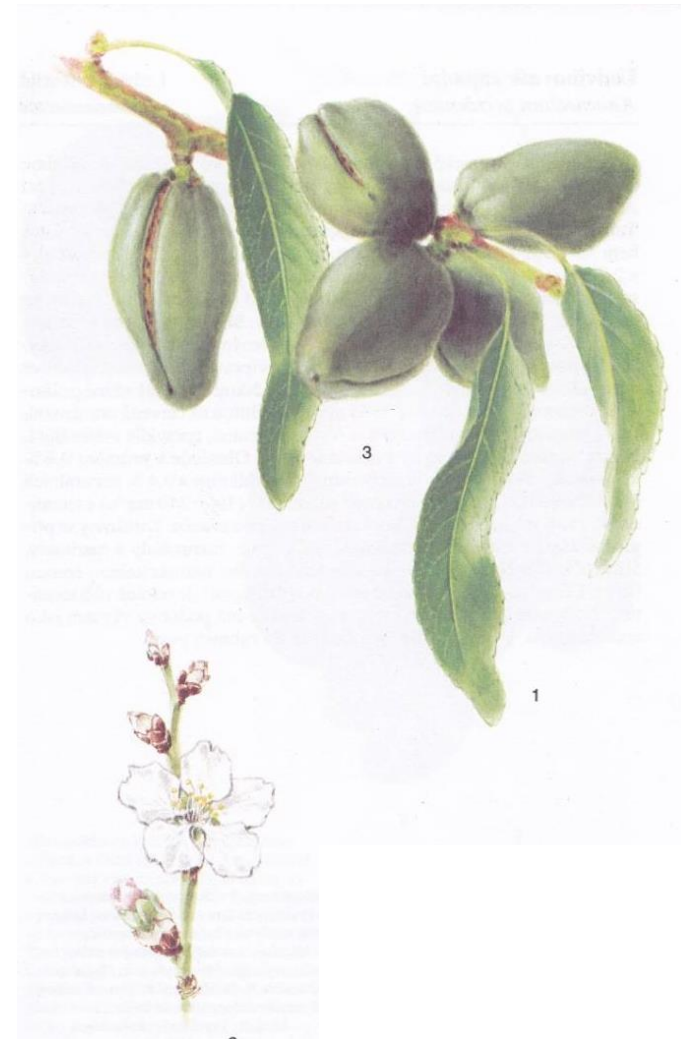
Native to west Asia

Grown mostly in Southern Europe: France, Italy, Spain, Portugal

Wild trees grow up to 3-6 m

Forms a wide crown with fruiting wood

Rose Family Rosaceae



Fruit

Stone

Various sizes, variety-dependent

Core is enclosed in a stone

Core flavour:

- var. dulcis – sweet core
- var. amara – bitter core



- *Nutritional value:*
- *Sugar*
- *Protein*
- *Up to 50 % oil*
- *Vitamin B*
- *Eating*
- *Fresh: Pour boiling water over the core, and peel off the brown*
- *Roasted almond*
- *Oil*

Optimum locations: Warm slopes, light soil with good soil heat retention properties

Tolerates less fertile topsoil

Tolerates higher amounts of calcium in soil – rootstock for peach and apricot trees

Propagation:

Grafting and budding

PINEAPPLE

Ananas comosus

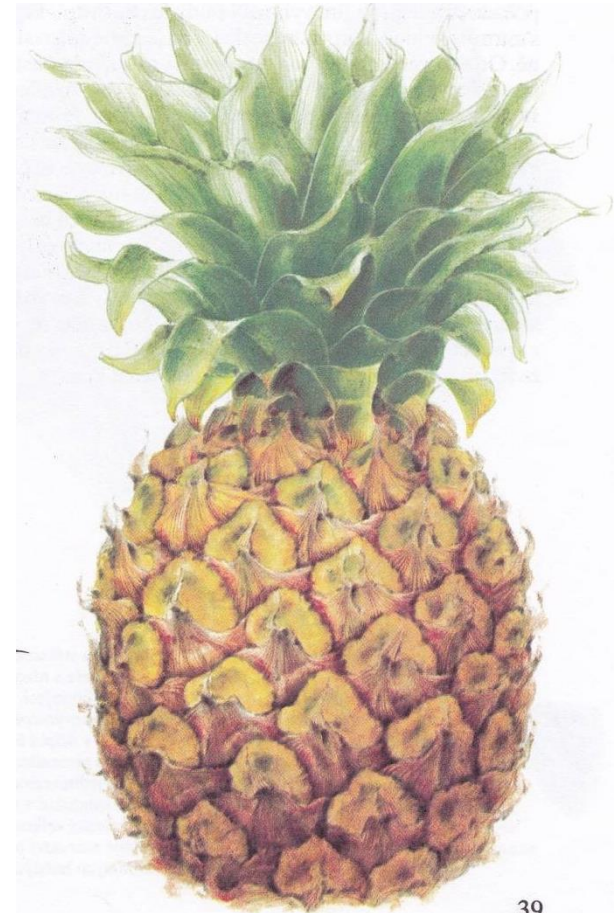
Native to Central and South America

Grows wild on sandy coasts of Mexico, Costa Rica and Brazil

Spread into other tropical regions: south Asia, Africa, Australia

Nowadays: Mostly grown in Hawaii, Brazil, China, Malaysia

Bromeliaceae Family



Hawaii

Herbaceous perennial, up to 1.5 m high
Forms ground rosette of sword-shaped, thickened leaves



Grows in the monsoon or coastal tropical regions around the Equator (high requirements on temperature and air humidity)

Prefers light, humus, slightly acidic, nutrient-rich soil

Propagation:

Leaf rosettes

Rosettes are developed on various parts of parent plant

Nutritional value of the multiple fruit:

Water 85 %

Fibre 0.5 %

Sugar 11.6 %

Protein 0.4 %

Fats 0.1 %

Minerals 0.4 %

C 290 mg/kg

Vitamin A, B₁



Ananas comosus

Helen Eyre Pickler

Eating

Fresh

Crystallization, drying, freezing, preservation in sugar solution, jams, jelly-type candy, marmalades, syrups

Juice is fermented for production of alcoholic beverages: wine, spirits

Leaves

Contain 8 % of fibre, pineapple silk, fine fibre for production of textile fabrics



CARAMBOLA

Averrhoa carambola

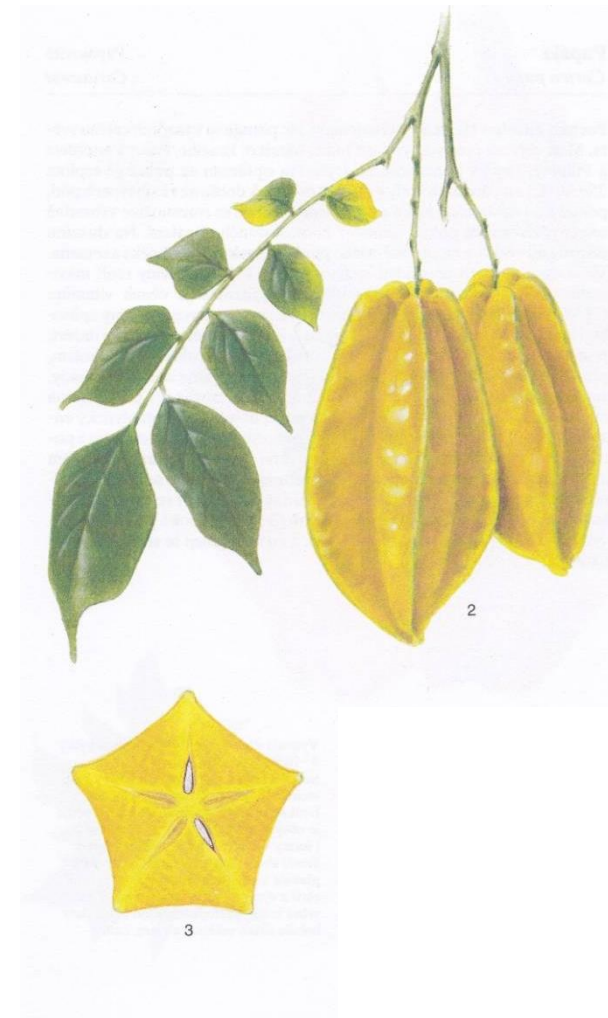
Typical plant of Equator regions

Widespread in Southeast Asia and other tropical regions

Thick branching, irregular crown

Grows up to 9 m high

Oxalidaceae Family



Fruit

Longitudinally 4- to 5-angled berries,
elliptic shape with thin, firm, shiny, light
yellow to orange-yellow peel

Brittle, crispy and juicy flesh

Each lobe contains 2 oval, flat, light brown
seeds



Nutritional value:

Vitamin C 350 mg/kg

Eating

Fresh

Fruits salads, jams, juices, wines,
crystallization

Unripe fruits: In vinegar, lactic fermentation

Decorative use



Carambola

Optimum growing temperature: 25-30 °C

Very sensitive to cold, only in regions with max. altitude of 300 m

Low requirements on soil: Permeable, slightly acidic

Trees blossoms several times a year (various stages of blossoms and fruits on one tree)

Overripe fruits fall down and go bad easily, timely harvested fruits tolerate transport

Many types and varieties: Different flavours (sweet, sour) and fruit sizes

Propagation:

High-yielding varieties: Grafting and budding using carambola seedlings

From seeds: Lower fruit quality

PAPAYA

Carica papaya

Native to south Mexico and Guatemala

Grown in tropics all over the world

Biggest producers: India, Mexico, Brazil, Peru, Venezuela, Philippines

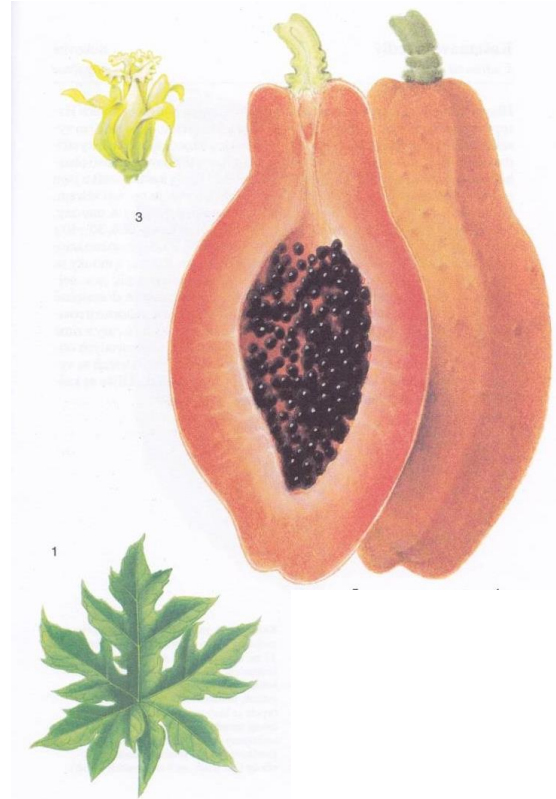
Herbaceous perennial

Growth: 3-10 m

Resembles a palm tree

The whole plant contains laticifer, leaks latex when cut:
Cutting of unripe fruits, capture of latex into containers,
drying at 50 °C

Caricaceae Family



Fruit

Hollow berry, various sizes and shapes,
0.5-2 kg (even 10 kg)

Resembles pumpkin and watermelon

Peel is firm, yellowish green, yellow to
orange red

Flesh is yellow to dark red

60-80 % of the fruit is made up by flesh



Nutritional value:

Carbohydrates 7-11 %

Protein 1 %

Organic acids 0.5 %

Vitamin C 460-1,000 mg/kg

provitamin A

Eating

Fresh, dessert

With salt and pepper

With sugar and alcohol

With lemon juice

Fruit salads, lemonades, ice-cream, jams,
crystallization



High requirements on heat (optimum temperature for growing: 25-30°C) and soil moisture

Grows on all types of soil if they are sufficiently wet and permeable

Propagation:

Only seeds from controlled pollination



CITRUS

Citrus

Large genus with over 160 species

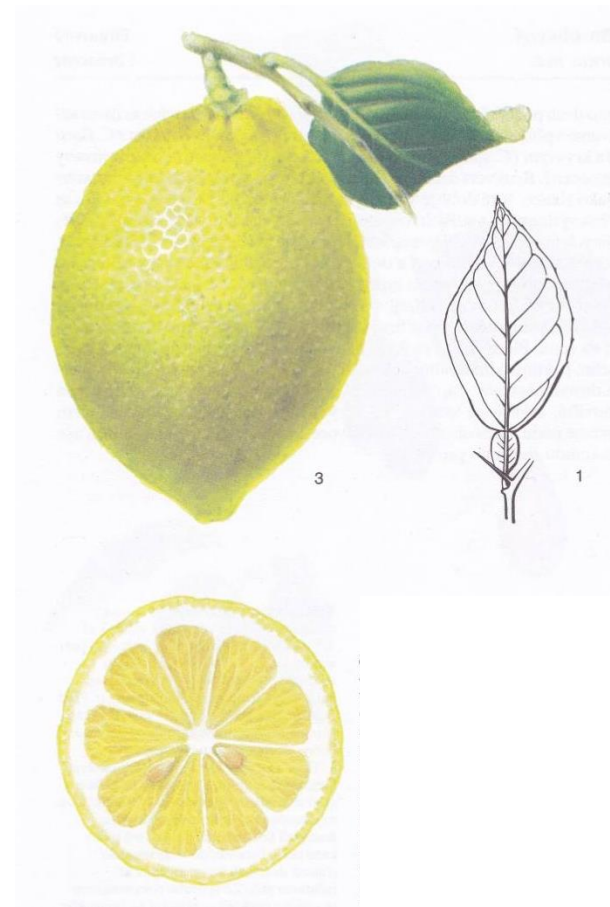
Native to Asia, only grapefruit Native to Central America

Mediterranean: the so called secondary genetic centre of citrus expansion, optimum conditions for growth and development

Shrubs and small trees

Containers in bark tissues, leaves and fruits contain essential oil

Rutaceae Family



- *Fruit*
- *Berries of various sizes and shapes, the so called hesperidium:*
- *Flavedo: Yellowish to red orange pericarp*
- *Albedo: parenchymatous tissue beneath flavedo*

Nutritional value:

- provit. A 0.7-1.2 mg/kg
- B1 0.4-0.9 mg/kg
- B2 0.1-0.3 mg/kg
- B12 1-2 mg/kg
- C 450 – 550 mg/kg

Eating

Fresh, very refreshing

Fruits salads, lemonades, ice-cream, jams,
jelly-type candy, dried, frozen, etc.

Essential oil: Perfumes and food industry

Healing and melliferous

Ornamental

Heat-requiring tropical to subtropical plants

Light-requiring, demand lot of soil moisture and high air humidity

Low requirements on soil (tolerate high water table and slightly salinized soil)

Propagation:

Cultivars are grafted on rootstock (a rooted plant, close relative of the propagated variety, which is able to accept the grafted part)

Lot of rootstock for citrus fruits: Various impact on growth, life, productiveness onset, amount and quality of fruits (size, colour of pericarp, juice composition, shelf-life, adaptability to soil and climate, resistance to pests and diseases, etc.)

KAKI

Diospyros kaki

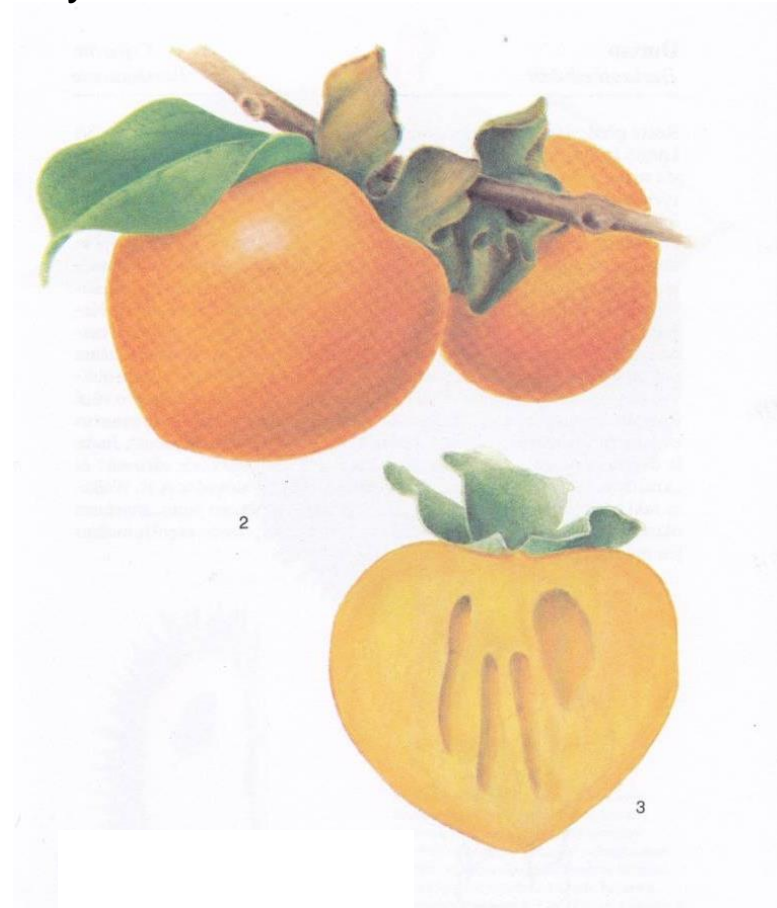
Native to western and central China, grows in altitudes of up to 1,200 m

Today: All sub-tropical and tropical regions, mostly in China and Japan

3-15 m high shrub/tree

Original locations: Wet, hot summers and mild, dry winters with max. -4°C (today's varieties sustain up to -18°C)

Ebenaceae Family



Low requirements on soil, high yields on loamy, deep and sufficiently moist soils

Average precipitation: 1,500-2,000 mm

Propagation:

Benefits from grafting, using its own seedlings or other variety's seedlings

From seeds (productiveness starts the 6th year after sowing)

Fruit

Rounded and/or flat/elongated

Weight: 0.1-0.5 kg

Yellowish orange to red or brownish red
pericarp with thin, smooth, prunoise skin
and persistent calyx

Yellow to light brown flesh



Nutritional value:

Protein 0.75 %

Fats 0.55 %

Sugars (glucose, fructose) 17.3 %

Organic acids 0.24 %

Fibre 1.5 %

Minerals 0.50 %

vit. C 200 – 900 mg/kg (decreases with maturation)

provitamin A

Eating

Unripe fruits are bitter (tannin: 1-1.5 %)

Eating at full ripeness, flesh must be greasy

Table fruits, marmalades, jams, syrups, spirits, ice-cream

Dried fruits contain 62 % sugar, and have better flavour than figs and dates



DURIAN

Durio zibethinus

Grows in Indonesia, Malaysia, India, Indochina, Philippines, Sri Lanka; expanded to eastern Africa and South America (Brazil)

Today: All sub-tropical and tropical regions, mostly in China and Japan

Bombacaceae Family

More than 20 m high tree, irregular, lowly branched crown

Fruit: ellipsoid, almost rounded, 2.5 kg, hard pericarp has dense conical spikes

Thick fruit walls are divided into 5 segments, each contains 1-4 oval, light brown seeds in fleshy, light yellow aril



Nutritional value:
Starch 11 %
Sugar 5 %



Eating

Locals eat raw aril

Marmalades, candy, fermented beverages, Lempog: mixture of sugar and rice with durian, Sauces, salads

Mixed with sugar and various tropical fruits (bananas)

Unripe fruits are cooked as vegetable: soups, side dish

Seeds are roasted and baked, oil

Most of southeast and south Asians as well as Europeans like durian and its specific smell, a mixture of garlic and rotten eggs. Durian is called the “God dish” and the “king of tropical fruits”

Mr Wallace, a scientist, said: "It is worth travelling to south-east Asia only to taste durian".

Durian is a fruit that is either loved or despised

LOQUAT

Eriobotrya japonica

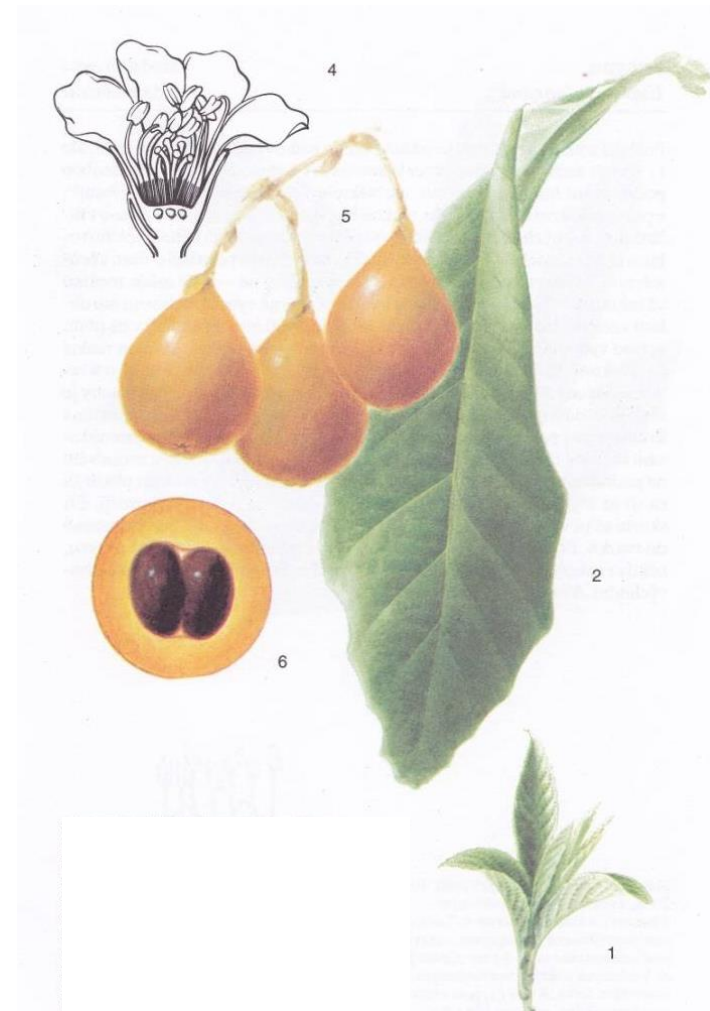
Grows wild in India in the Himalayas region, and in China

Grown in Japan and China, 2nd most grown fruit after citrus fruits; further cultivation: Australia, USA, the Mediterranean (Spain, Italy)

Tree has a dense, round crown with vigorous branches; young branches and leaves are tomentose

Fruit: Rounded, ellipsoid or pear-shaped false drupe, 20-75 g; pericarp: thin, slightly downy, light yellow to orange, juicy, sour-sweet to sweet flavour; contains 2-5 large, shiny, dark brown seeds

Rosaceae Family



Nutritional value of the flesh:

Protein 0.7 %

Fats 0.3 %

Carbohydrates 10.2 %

Fibre 0.9 %

Minerals 0.5 %

Fruits

Fresh: One of the most delicious dessert fruits

Jelly, salads

Pressed juice: Refreshing beverage, fermented wine

Seeds substitute coffee



Tolerates temperatures down to -12°C
Blossoms and fruits fall down at -5 °C
Flourishes in ocean subtropical climate
with enough moisture and mild winter; low
requirements on soil (light, enough
moisture)
Low requirements on cultivation, fruits are
susceptible to low temperatures and
bacterial diseases
Subtropical regions: Loquat blossoms in
autumn, fruits mature in March through
May
Harvest: Whole panicles are picked, wide
assortment of varieties
Propagation:
Grafting, cutting, layering
From seeds: Uneven quality of all features

LONGAN

Euphoria longana

Native to south China

Grown all round south-east Asia, India, mostly in Sri Lanka

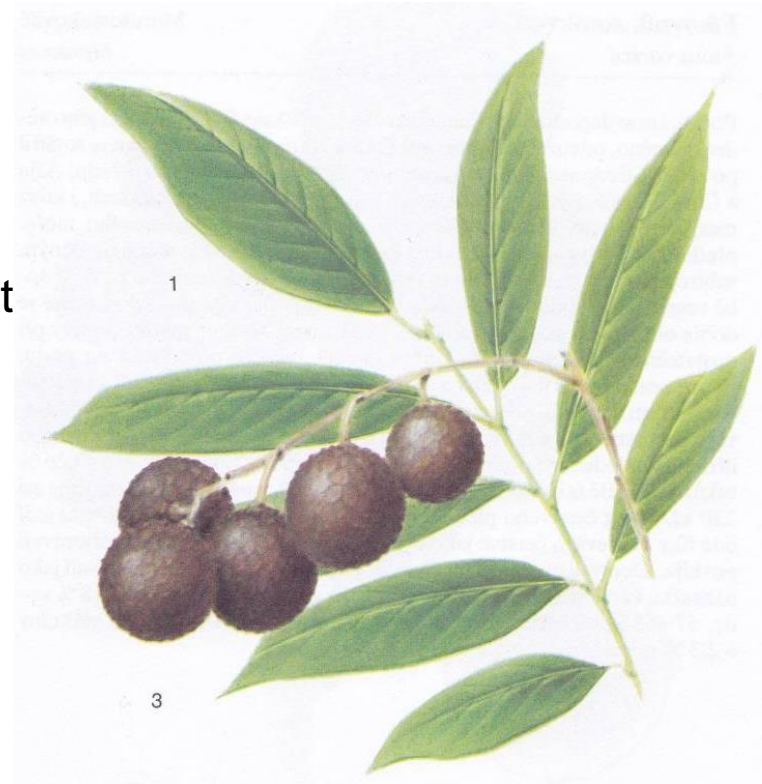
Evergreen tree, 10-20 m tall, erect, low-branched trunk, rounded crown

Fruit: Rounded, 2 cm long stone, thin; pericarp: thin, yellowish to red brown, leather-like, almost smooth

Inside: Large, dark seed, shows from whitish, jelly-like aril (Chinese name: “dragon eye”)

Aril: Juicy, sour-sweet, sometimes bitter, pleasant taste

Sapindaceae Family



Fruits

Sweet, juicy aril is eaten fresh as well as dried

Lower quality than lychee, very popular in China and south-east Asia though



Adapted to humid tropical regions, certain species are grown in semi-tropical climate - Vietnam

Requires enough heat throughout the year, without major fluctuations

Optimum temperature: 22-24 °C, -2 °C may kill the whole plant

High requirements on water: 1,800-2,400 mm

Low requirements on soil (slightly acidic)

Harvest: Whole branched with fruits are cut and bunched together



Propagation:

Vegetative: Aerial layering, budding, grafting using same species rootstock

From seeds: ?, late onset of productiveness, quality varies



FIG

Ficus carica

Native to western parts of the Anatolian region

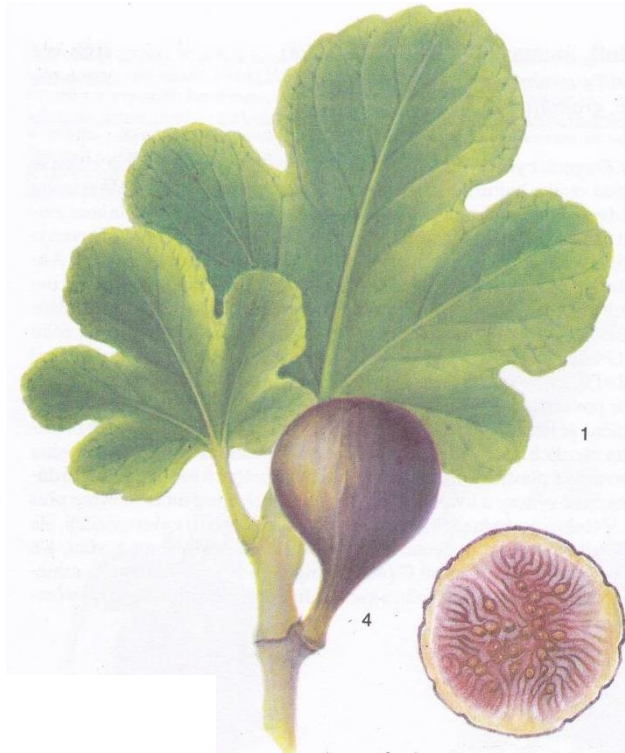
Expanded throughout the Mediterranean, Black Sea coast around Caucasia, central Asia and China

Today: In all sub-tropical regions, largest producers: Mediterranean region (Portugal, Turkey, Greece, and Italy)

Dioecious, deciduous shrub/tree, up to 15 m tall

The whole plant contains laticifer, leaks white, sticky latex when cut

Moraceae Family



One of the less demanding sub-tropical wood plants, tolerates Mediterranean climate

May sustain -5 to -15 °C freeze in dormancy; if damaged, the tree regenerates well from underground parts

Tolerates direct sunlight as well as high temperatures, if water supplies are sufficient

Low requirements on soil, intolerant to shallow and dry soil

