

Department of Agrosystems and Bioclimatology
Faculty of Agronomy, Mendel University in Brno

Summer school

Current Trends in Agronomy for Sustainable Agriculture

Excursion Guide

September 11–12, 2013

The Summer School is organized within the framework of the project number
CZ.1.07/2.3.00/20.0005



European
social fund in the
Czech Republic



EUROPEAN UNION



MINISTRY OF EDUCATION,
YOUTH AND SPORTS



OP Education
for Competitiveness



INVESTMENTS IN EDUCATION DEVELOPMENT

Department of Agrosystems and Bioclimatology
Faculty of Agronomy, Mendel University in Brno

Summer school

Current Trends in Agronomy for Sustainable Agriculture

Excursion Guide

September 11–12, 2013

zpracovala: Ing. Soňa Dušková, Ph.D.

**The Summer School is organized within the framework
of the project number CZ.1.07/2.3.00/20.0005**

Dear participants of the Summer School,

this brochure is to give you a brief information about the farms, institutions and places of interest which we will visit during the excursions in days 11th and 12th September 2013. This brochure should help you to get better insight to the issues and problems of the farms and enable you to prepare for a fruitful discussion with the people from praxis. You can also find here the brief information about the places of interest we plan to visit to introduce you the history and culture of the South Moravian region of the Czech Republic. This will help you to create a comprehensive picture of our region.

We hope that you will enjoy the Summer Scholl and learn new experiences and inspirations which will encourage you in your scientific activities.

The team of organizers

Mendel University in Brno

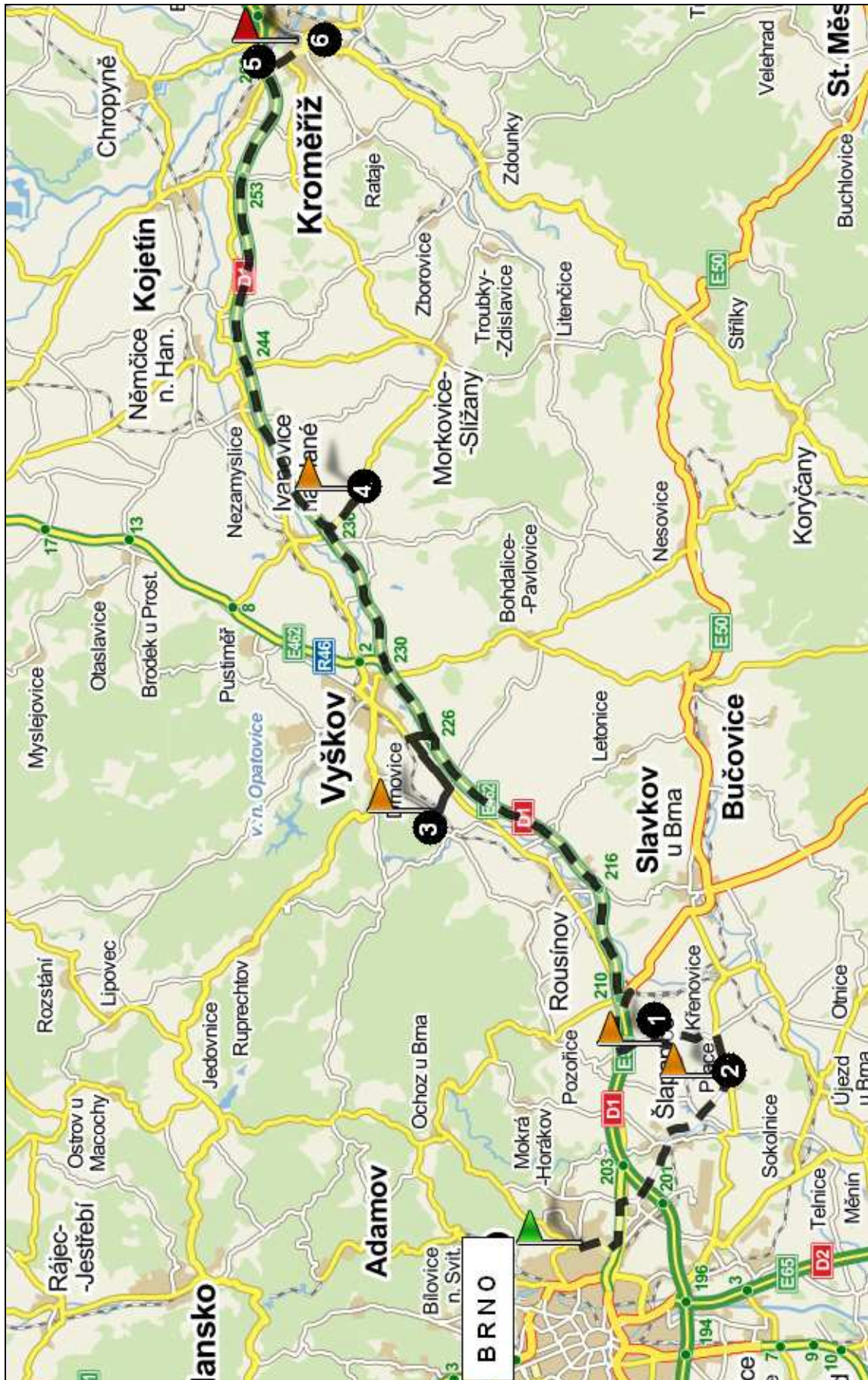
Mendel University in Brno is the oldest agricultural university in the Czech Republic. It was established in 1919 under the name University of Agriculture in Brno. This new institution developed from a transformation of the Regional Agricultural Academy in Tábor into a university, which was then relocated to Brno. Its seat was established in a building of the Regional Institute of Blind People in Brno – Černá Pole (Black Fields). The faculty of Agronomy as well as Faculty of Forestry and Wood Technology seat here till today and the campus area in Černá pole has been still developing. Today there are also Faculty of Business and Economics, Faculty of Regional Development and International Studies and Institute of Lifelong Education. On more than 10 ha there is also Botanical Garden and Arboretum. Besides the mentioned faculties which are all situated in Brno, there is Faculty of Horticulture placed in the small town Lednice approximately 50 km south of Brno. Students can participate in practical training in specialized learning facilities at the Training Forest Enterprise Masaryk Forest (TFE) in Křtiny and in University Training Farm Žabčice with two separate centers in Žabčice and Lednice.. At present, the Mendel university in Brno has about 10 500 students.

Mendel University in Brno, Faculty of Agronomy



Foto: www.mendelu.cz

Wednesday, SEPTEMBER 11th, 2013



**Excursion to the farms on Wednesday,
September 11th, 2013**

8:00 – departure from the hotel Velká Klajdovka

8:30 – 10:00 **1. BONARGO JSC., Blažovice**

10:30 – 11:30 **2. The Battle of the three Emperors Memorial**

12:00 – 13:00 **3. lunch time**

13:30 – 15:00 **4. BUREŠ agro, s.r.o., Švábenice**

15:30 – 16:30 **5. Castle in Kroměříž**

17:45 – 19:00 **6. The Agricultural Research Institute
Kroměříž, Ltd**

20:00 – arrival to Brno

1. Farm BONAGRO Jsc., Blažovice



This farm is focused on a primary agricultural production. It was established in 1994 after transformation of agricultural cooperative in Šlapanice. In that time, it was about 3 200 ha large. During the years 2004 and 2006 a merger with another two agricultural companies in the area was done. Today BONAGRO has an acreage of 4 145 ha in cadasters of 10 villages. It also has a livestock production – milk cattle. The livestock production on the most farms in this region was closed or reduced. BONAGRO got rid of pig and poultry production in recent years too. The farm also produces compound feed and offers tractor works and stocking of cereals. There was the biogas plant (1MW) launched last year on the farm.

It represents a common farm in the Czech Republic which has kept its original acreage. It is possible to discuss advantages and disadvantages of these bigger farms, including livestock production.

Farm is about 4 145 ha large today, from which 3 988 ha is arable land, 73 ha orchards and 20 ha vineyards. Of this acreage only less than 5 % is owned by the company (mostly the land under the buildings).

The farm is located on the edge of the hottest and driest agricultural area in the CR (maize production area) with average annual temperature of 7-9°C and 500-600 mm of precipitation. Altitude is from 230 to 400 m a.s.l. and only about 4,5% of the farms land is steeper than 7°. The soils are mostly chernozems on loess, haplic luvisols or rendzic soils on sand. Texture is mostly loamy or sandy. The depth of the topsoil horizon is about 30 cm. Almost whole area of the farm is included in the nitrate vulnerable zone.

Basic information on main grown crops

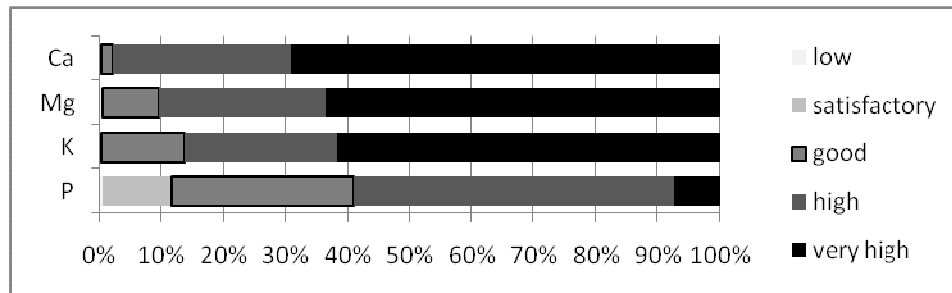
	Share in crop structure	Average yield	Average nutrients doses	
			N	P ₂ O ₅
wheat (mostly winter and some summer wheat)	36-42%	2,0-7,7 t/ha	180-200 kg/ha 100-160 kg/ha	35-60 kg/ha 14-40 kg/ha
maize (silage and grain)	20-23%	49-66 t/ha 8,5-10,9 t/ha	180-240 kg/ha	50-120 kg/ha
sugarbeet	12%	58-69 t/ha	240 kg/ha	97-109 kg/ha
alfalfa	12%	33-52 t/ha		
malting barley	8,5-10%	2,8-7,7 t/ha	50-115 kg/ha	30-45 kg/ha
oilseed rape	3,5-5,5%	1,4-3,4 t/ha	190-220 kg/ha	25-55 kg/ha

Cereals in total occupy 46-52% of the farms arable land. Besides crops listed in table the land is used to grow mustard, beet for feed and sorghum.

Straw of winter wheat and barley is partly used for bedding and all the farmyard manures are used to fertilise the fields. The main source of phosphorus and the

only source of potassium are farmyard manures and byproduct of crops incorporated into the soil. Calculated **phosphorus** balance is from -16 to +11 kg P_2O_5 /ha and **potassium** balance is from -46 to -115 kg K_2O /ha. Quite a lot of **organic matter** enters the soil and calculated balance is slightly over 200 kg C_{ox} /ha.

Content of available nutrients in soil – analysis 2010



Soil tillage system is based on replacement of ploughing by loosening except for incorporation of farmyard manure before sugar beet and maize.

Situation of the farms fields



2. The Battle of The three Emperors – Memorial near Austerlitz

The Battle of Austerlitz, also known as the Battle of the Three Emperors, was one of Napoleon's greatest victories, where the French Empire effectively crushed the Third Coalition. On 2nd December 1805 a French army, commanded by Emperor Napoleon I, decisively defeated a Russo-Austrian army, commanded by Tsar Alexander I and Holy Roman Emperor Francis II, after nearly nine hours of difficult fighting. French army of 68,000 troops reached brilliant victory and defeated Russian-Austrian army of over 89,000 troops in one day. Subsequent peace agreement was signed in Slavkov Chateau. This famous battle profoundly altered the nature of European politics.

The three emperors



Foto: internet

Memorial of the battle



Foto: internet

4. BUREŠ agro, Ltd., Švábenice

Bureš agro, Ltd. is a family farm established in 1992 on the acreage of 72 ha. Today it has about 600 ha and 4 employees. There has been the biogas plant launched in 2008 (1MW). About 25% of the farmland is owned by the family and each ear 4-10 ha are purchased. The crop structure is very dynamic. Focus is on growing market crops for sale and also agricultural services are provided when working capacity is available.

Discussion topics might be the situation of family farms which are in the Czech Republic often relatively large and strictly specialized.

The farm is situated in the best agricultural region (sugar beet production region) with average annual precipitation is 520 mm with risk of dry periods in June and July. Average annual temperature is 8,2 °C. Altitude of the area is from 262 to 336 m a.s.l. and the slope steepness varies from 3 to 10° which means no or medium erosion risk according to GAEC rules. Soils are mainly chernozem or luvisol on loess with loam texture. The depth of the topsoil is 20-35 cm.

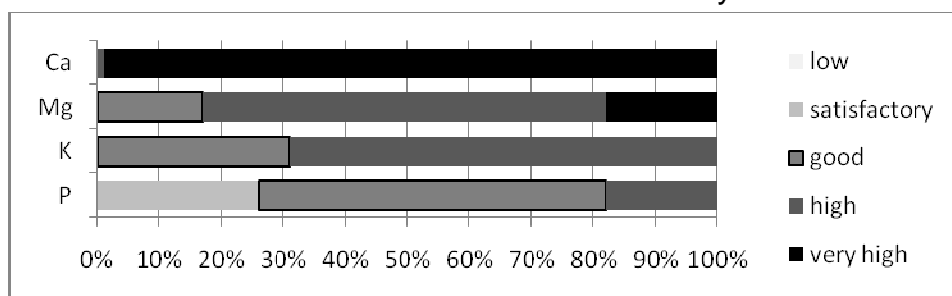
Main crop is silage maize to feed the biogas plant. Other produced crops are wheat, malting barley, rape seed and sunflower. Some years ago also sugar beet was grown but near sugar factory was closed in 2007 so there was no market for sugar beet anymore. Growing caraway (*Carum carvi*), poppy and pea was also given up.

There are only data from the period 2004-2006 available. In that time the yield of barley, as a crop which is still grown today, was 4,8-5,8 t/ha and average doses of nutrients in mineral fertilizers were 36-94 kg N /ha, 40-60 kg P₂O₅ /ha and 3 kg K₂O /ha. These nutrients were applied using precision farming techniques. Calculated nutrients balances for the whole crop production in this period were 46,5 kg N /ha, 13,3 kg P₂O₅ /ha and -11,3 kg K₂O /ha. Organic matter balance was negative for this period.

All the byproducts stay on the field and as well as phacelia intercrop they cover the soil surface but no farmyard manures were used.

There are minimization techniques in soil tillage used on the farm. Ploughing is replaced by 2 or 3 loosening treatments and during vegetation no mechanical, only pesticide treatments are done.

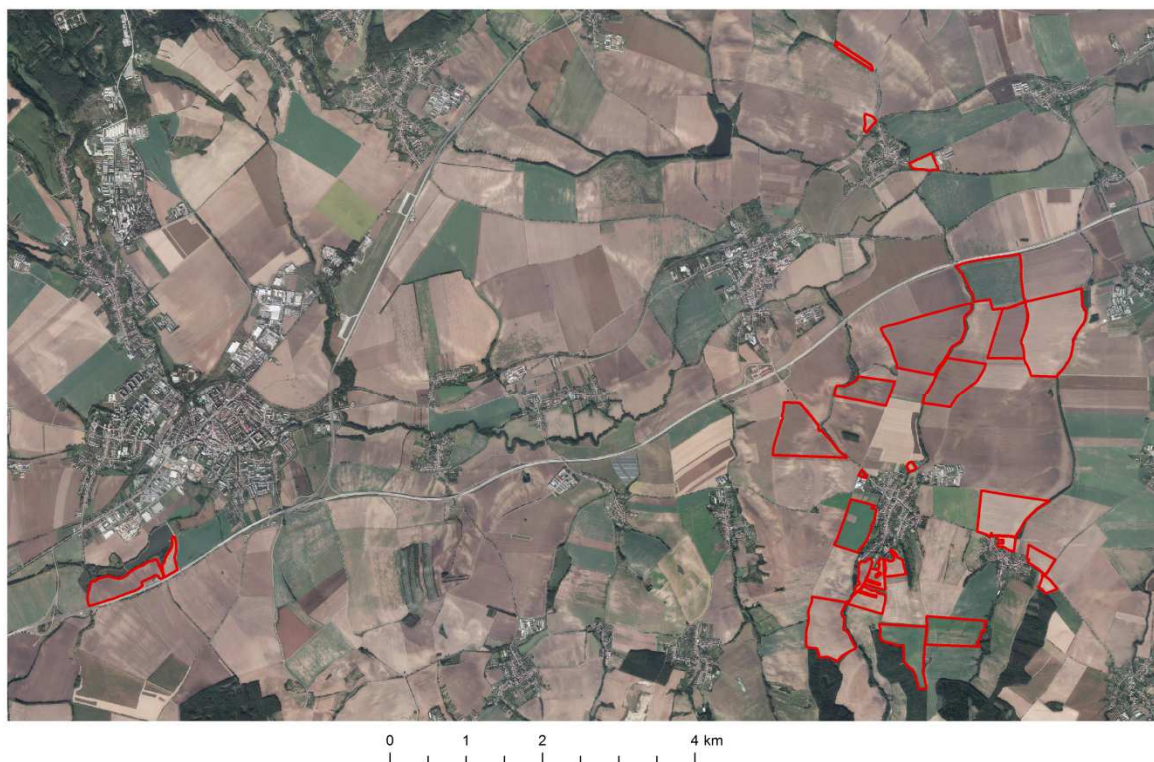
Content of available nutrients in soil – analysis 2005



The Bures farm



Situation of the farms fields



5. Arcibishop's Castle and Gardens in Kroměříž

The Arcibishop's Palace in Kroměříž used to be the principal residence of the bishops and (since 1777) archbishops of Olomouc. The gardens and castle of Kroměříž are an exceptionally complete and well-preserved example of a European Baroque princely residence and its gardens.

UNESCO lists the palace and garden among the World Heritage Sites. As the nomination dossier explains, "the castle is a good but not outstanding example of a type of aristocratic or princely residence that has survived widely in Europe. The Pleasure Garden (10 ha), by contrast, is a very rare and largely intact example of a Baroque garden". Apart from the formal parterres there is also a less formal nineteenth-century English garden (64 ha).

Thirty years ago a famous Czech director Miloš Forman made here a film "Amadeus" about life of a brilliant music composer Amadeus Mozart who spent some time in Olomouc and probably had also visited Kroměříž.

Arcibishop's castle in Kroměříž



Foto: internet

6. The Agricultural Research Institute Kroměříž, Ltd.



The Agricultural Research Institute Kroměříž, Ltd. is an institution of applied research in the agricultural sector. It is engaged particularly in scientific and research activities, breeding cereal crops, testing and advisory services in agriculture. The company has been continuing in activities of the former Cereal Research Institute Kroměříž and developing the tradition of agricultural research in Central Moravia, called Haná (which is a well-known area for breeding and production of height quality malting barley) dating back to 1951.

Today the Agricultural Research Institute Kroměříž, Ltd, is an organization of a holding type. The parent Agricultural Research Institute Kroměříž, Ltd. has founded subsidiary companies Agrotest Fyto, Ltd. and Agrotrial, Ltd.

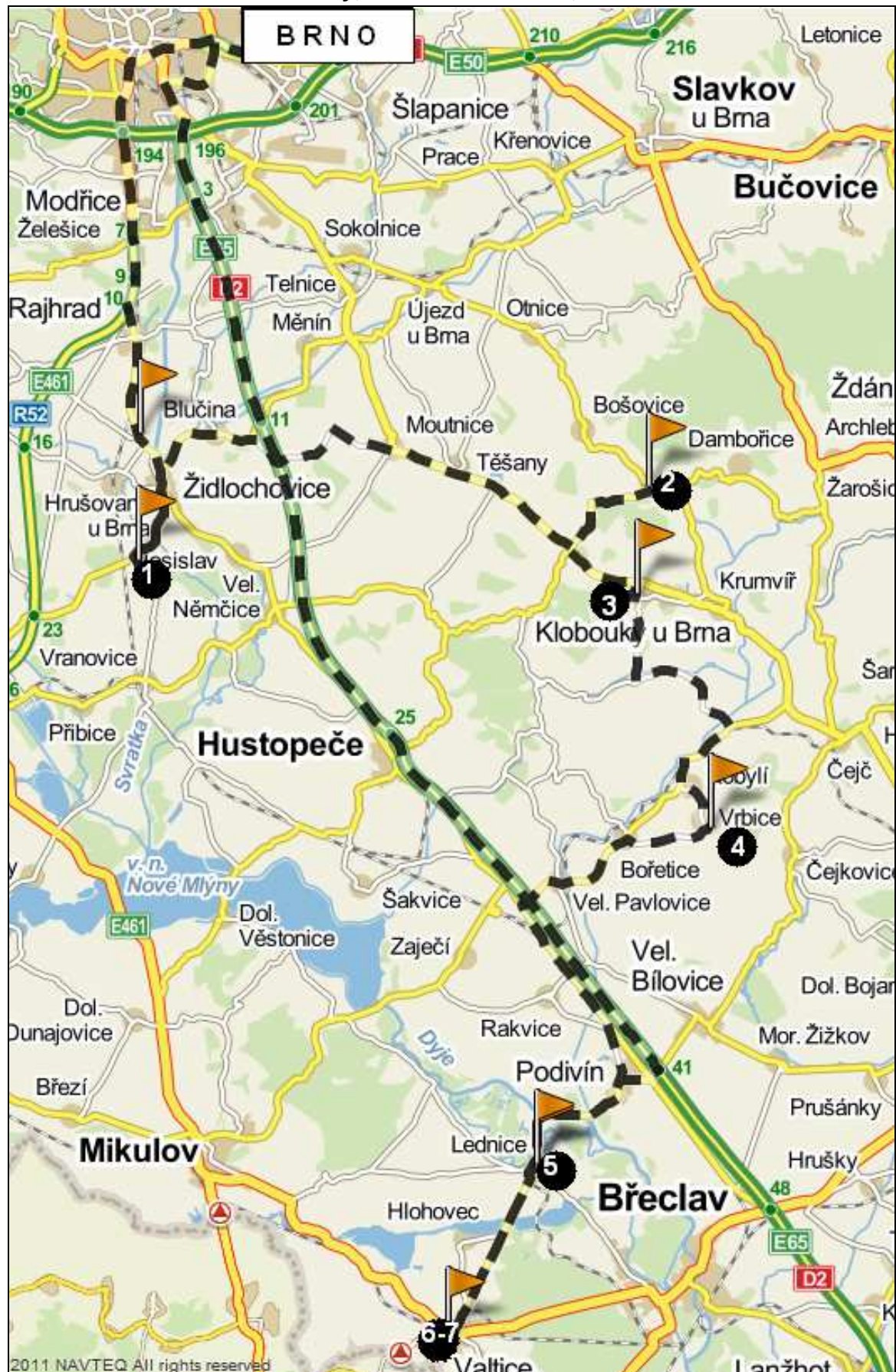
It will be possible to ask about problems of applied research and consultancy in plant production.

Agricultural Research institute in Kroměříž



Foto: www.vukrom.cz

Thursday, SEPTEMBER 12th, 2013



**Excursion to the farms on Thursday,
September 12th, 2013**

8:00 – departure from the hotel Velká Klajdovka

8:30 – 9:30 **1. Field Experimental Station in Žabčice**

10:30 – 12:15 **2. VH Agroton Velké Hostěrádky**

12:30-13:30 3. lunch time

14:00 – 15:30 **4. AGRA Vrbice, Ltd.**

16:15 – 17:00 **5. Castle Lednice**

18:00 – 19:00 6. dinner in Valtice

19:00 – 21:30 **7. wine degustation – Valtice Wine Cellars**

22:30 – arrival to Brno

1. Mendel University Field experimental station and Training Farm Žabčice

Immediately after the establishing of University of Agriculture in Brno, the teachers concentrated on Brno's environs wanted to find a suitable object for a training farm. The Žabčice farm with an acreage of 600 ha of arable land fell to the ownership of the state as a confiscated property of a sovereign family. It was rented to the university on 1st July 1925 and was thereafter gradually refurbished for a pilot and demonstration farm.

In December 2000 it merged with university training farm in Lednice. The origin of the Lednice university farm is dated back to 1st April 1951, when the university took over confiscated property of the Lichtenstein family into their custody from the National Cultural Commission.

Today the university farm in Žabčice has an acreage of 2658 ha (arable land, vineyards, orchards and permanent grassland).

The Experimental Field Station in Žabčice is a part of the University Training Farm Žabčice. It is focused on field plant production. This place has functioned as an experimental centre of plant production for more than eighty years. Numerous experiments such as variety tests, breeding and plant protection experiments and also long term experiments (the oldest is a monoculture of barley from the 1970) take place there.

Meteorological measurements have been carried out at the climatological station continuously since the end of the 1920'.

The farm is located in the South Moravian region with typical dry continental climate with average annual precipitation of 450-550 mm and an average annual temperature of 9.3 °C. Dryness of the climate is even increased by the winds that cause large evaporation of soil moisture and the rain shadow. Rainfall during the growing season is distributed very unevenly.

Geological structure, on which the farm is located, is represented by Quaternary gravels and partly alluvial silt. The soil is neutral to slightly acidic with a lack of humus. Soils are of various texture, ranging from sandy soils, which prevail, to clayey soils. The most frequent genetic soil type is chernozem, slightly podzolic regosols and alluvial gley soil. Terrain is mostly of flat character with an average altitude of 185 m a.s.l.

Experimental Field Station in Žabčice



Foto: www.mendelu.cz

Field day „MendelAgro“ in UTF Žabčice visited by 300-400 people from praxis and students every year.



Foto: Mendelu, department of Agrosystems and Bioclimatology

2. VH Agroton Velké Hostěrádky

The farm VH Agroton in Velke Hostěrádky is an organic farm set up in 2008 as a successor of former conventional farm. The foundation of the organic farm was supported by the Pro-bio, Ltd., one of the first and most important processors of organic products in the Czech Republic. At the beginning was the acreage about 400 ha of arable land. Today cultivates this farm 370 ha and it has 6 employees. Of the total area ca 60 ha are owned by the enterprise and 40 ha more are owned by people cooperating with the farm.

It is possible to discuss problems of organic agriculture and transformation to this way of management here.

The farm is situated in the sugar beet production area with average annual precipitation of 550-700 mm occurring mostly in spring and only rarely in summer. Average annual temperature is 7-9 °C. Altitude is from 200 to 350 m a.s.l. and slopes are of medium to high steepness which means medium to high erosion risk and consequences in corresponding limitations in cropping practices.

Soils are mainly chernozems on loess and luvisols with loam and sandy loam texture without or slight gravel content.

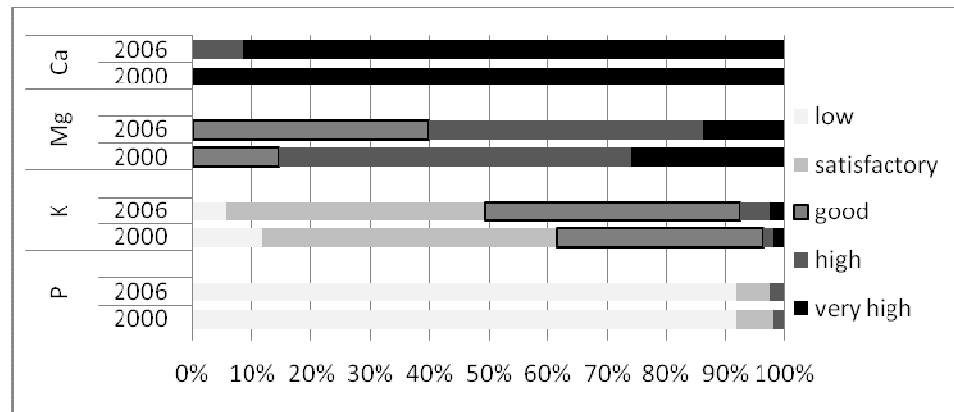
Basic information on main grown crops

	Share in crop structure	Average yield
buckwheat	23%	0,1-1,9 t/ha
spelt	16%	0,5-3,2 t/ha
wheat	10%	0,2-5,72 t/ha
pea	10%	1,3 t/ha
soy bean	5%	0,3-0,6 t/ha

Although there is no cattle on the farm, 10-15% of acreage is sown by alfalfa and clovergrass. About 200 pigs are fatten up every year but in conventional management.

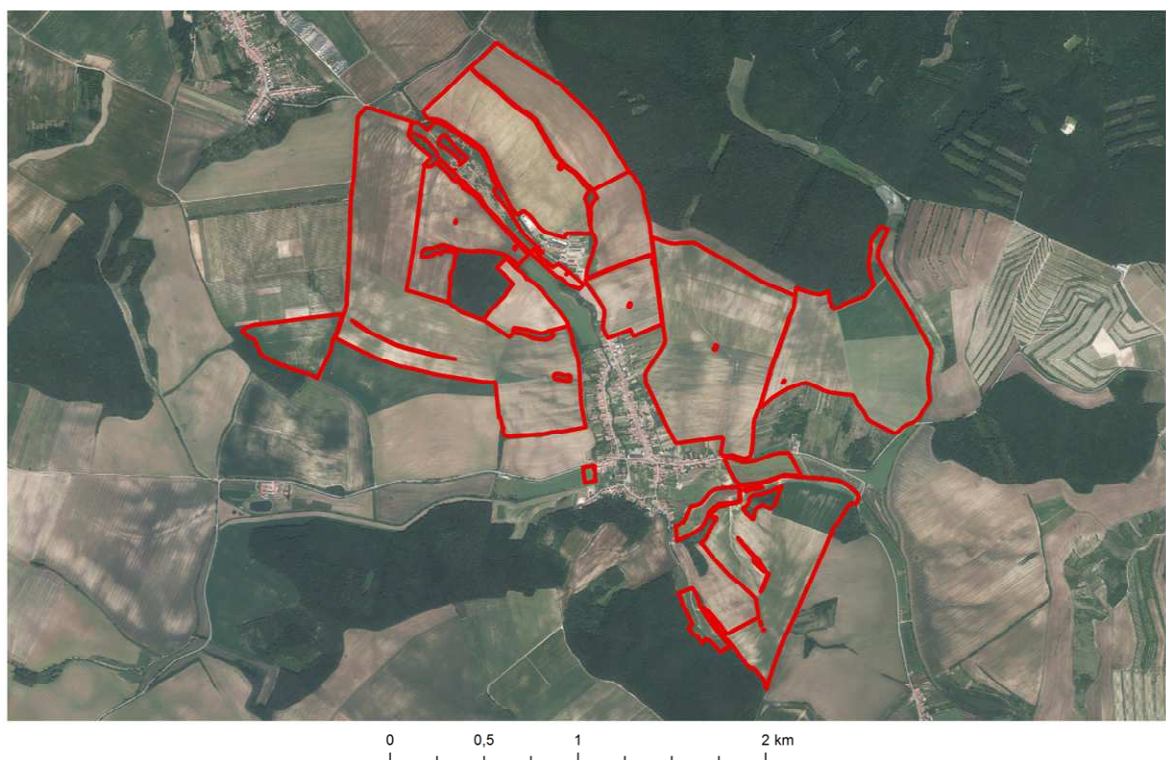
The only fertilizer used in the fields are the byproducts of crops and biomass of intercrops. Farmyard manure is used rarely and in low amounts. Therefore calculated balance of all the nutrients is negative while balance of organic matter is slightly positive (ca 40 kg C_{ox}/ha).

Development of the content of available nutrients in soil



Traditional system with ploughing is used on the whole area with additional twice loosening and 3 to 5 harrowing during vegetation as weed regulation treatments. The basis of the system is crop rotation, which is still in development and testing. The aim is to have alfalfa, wheat, breaking crop (grain legumes, buckwheat), spelt and oats with alfalfa in underseed in regular rotation.

Situation of the farms fields



4. AGRA Vrbice, Ltd.

AGRA Vrbice, Ltd. is a farm which came out from transformation of local agricultural cooperative Vrbice (original acreage 850 ha) in 1992. AGRA Vrbice, Ltd. manages 550 ha of farmland – 480 ha of arable land and 70 ha of vineyards. Only about 9% of this acreage, mostly vineyards, is owned by the company.

We will see there how the former property of Agricultural cooperative Vrbice is used today. There are nine companies with different subject of business having their seat in the former courtyard of the cooperative.

Discussion topics might be the issues of transformation process of the Czech agriculture after Velvet Revolution in 1989 when the lands of collective farms had to be returned into private hands after almost 50 years when they had been taken away from private ownership by force of communist regime.

The farm is located in the hottest and driest part of the Czech Republic (maize production area). The average annual precipitation is ca 500-600 mm and the average temperature is 9-10 °C. Altitude is from 210 to 280 m a.s.l. Terrain is mostly flat but there are some quite steep slopes which have been recultivated into terraces.

Soil is of good quality, mostly chernozem on loess and fluvisol on alluvial deposits with loam or clay loam texture and alcalic pH.

Almost whole area of the farm belongs to nitrate vulnerable area.

Basic information on main grown crops

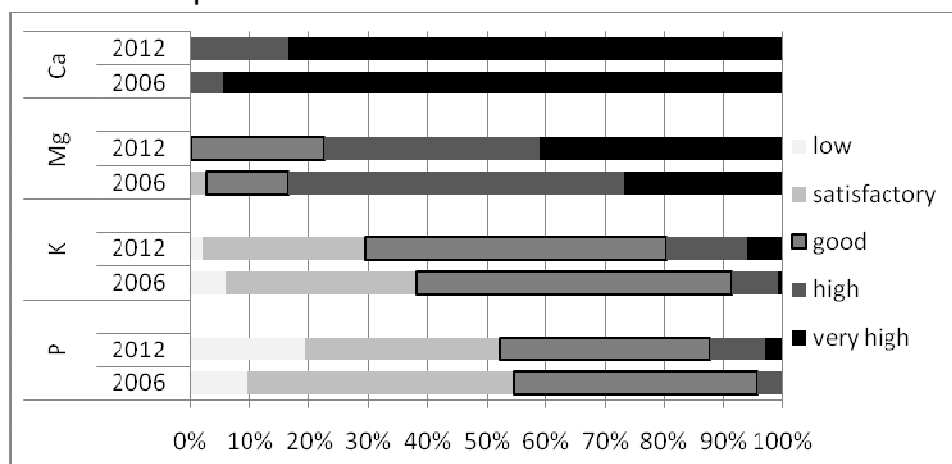
	Share in crop structure	Average yield	Average nutrients doses	
			N	P ₂ O ₅
Winter wheat	25-28%	60 (25-70) t/ha	140 kg/ha	52 kg/ha
Grain maize	22-26%	70-80 (67-90) t/ha	160 kg/ha	100 kg/ha
Malting barley	18%	45-50 t/ha	120 kg/ha	52 kg/ha
Sunflower	13%	30 t/ha	51 kg/ha	104 kg/ha

Besides crops given in the table, the rest of the acreage is sown by summer wheat and pea and alfalfa, sugar beet, potatoes etc. grown for owners of small pieces of land around the village and farmed by the Agra company.

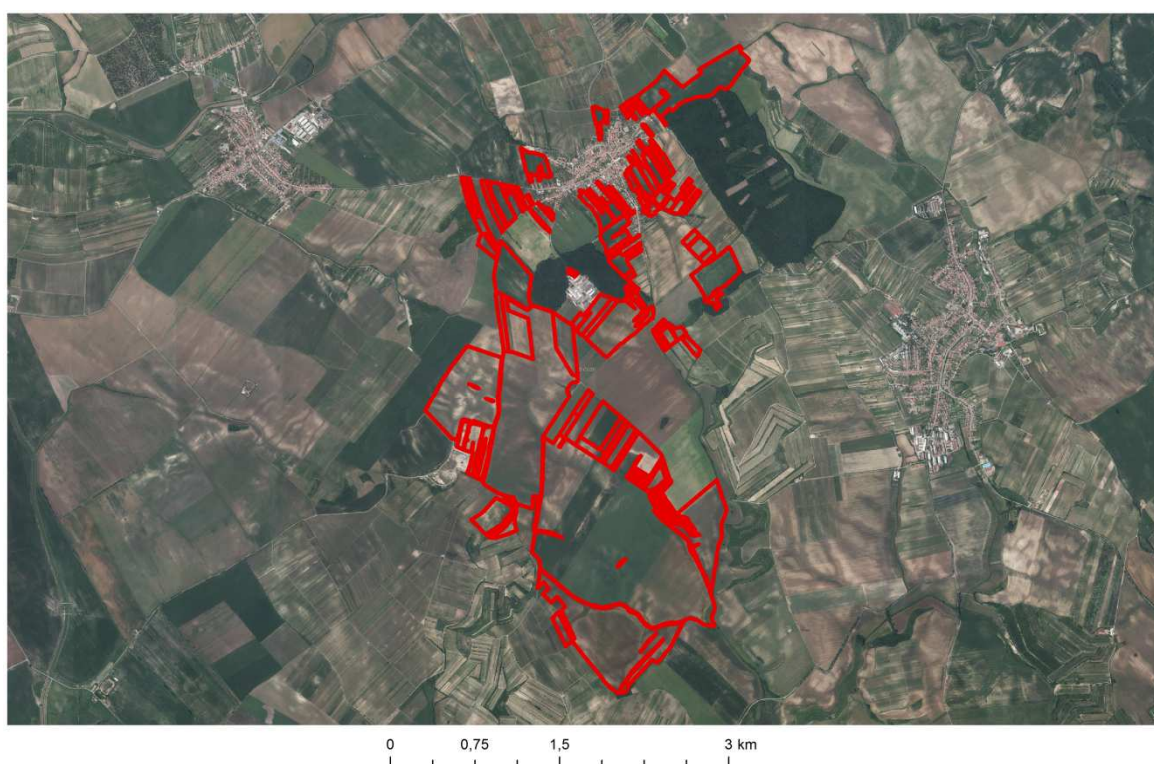
The nutrition consists of mineral fertilizers and crops byproducts. Winter wheat gets 140 kg N and 52 kg P₂O₅ /ha, for maize it is ca 160 kg N and 100 kg P₂O₅ /ha and for barley 120 kg N and 52 kg P₂O₅ /ha. There are no potassium fertilizers applied. Calculated **nutrients** balances are about -20 kg N /ha, +10 kg P₂O₅ /ha and -160 kg K₂O /ha while **organic matter** balance is about +40 kg C_{ox} /ha.

Mostly traditional system of soil tillage is used. Fields for maize and sunflower and 50% of area for cereals are ploughed. The rest is treated by disc loosener.

Development of the content of available nutrients in soil



Situation of the farms fields



5. Castle Lednice in the Lednice–Valtice area (LVA)

There are not many places in the world which have received such care as the elegant area around the spectacular Lednice and Valtice castle. Over the centuries an absolutely unique park has been created here, with many rare tree species, romantic little buildings, fishponds and beautiful little recesses. The Lednice-Valtice Cultural Landscape arose between the 17th and 20th centuries, when the ruling nobles of Liechtenstein transformed their domains in southern Moravia into this striking scene. At 300 km², it is one of the largest artificial landscapes in Europe.

The Ledice-Valtice Cultural Landscape, as one of the treasures of UNESCO's World Cultural Heritage, was inscribed in its list in 1996.

The castle as it looks today dates from 1846–1858, when Prince Alois II decided that Vienna was not suitable for entertaining in the summer and had Lednice rebuilt into a summer palace in the spirit of English Gothic.

Lednice Castle



Foto: internet

7. Valtice wine cellars

In Valtice, place of chateau Valtice, there are many wine cellars, ranging from very small, family run to big, very commercial ones. All are offering high quality wines from a wine region Moravia, subregion Mikulov. We are going to visit a unique labyrinth of renewed parts of historical wine cellars connected together in the total length of 800 m. Origin of the cellar's system is dated back to 1289 when Conventual Franciscans monastery was established in Valtice.

Today the complex of cellars is owned by a wine-making company CHATEAU Lednice.

Historical wine cellar in Valtice



Foto: www.valtickepodzemi.cz