

7th JUNIOR ECO-EXPERT PROJECT Yspertal, Austria 6-10 June 2005

"Soil – base of life"

Höhere Lehr-Anstalt Umwelt u. Wirtschaft, Yspertal, [A] SOŠ pro ochranu a tvorbu žiwotniho prostředi, Veselí nad Lužnicí, [CZ] Ferenc Gimnázium Szakközépiskola és Kollégium, Tokaj, [H] Zespół Szkół Ponadgimnazjalnych nr 1 im. Władysława Szybińskiego, Cieszyn, [PL]

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The aim of international cooperation

The aim of this project is the deepening of knowledge about the ecological problems, environment and finding a fact about the cooperative schools. The important element in this project is to improve the English language ability, which is the official language of the project. Integral part of cooperation is also mutual recognition of culture and regional tradition.



Description of project "Soil – base of life"

The host of the Project in 2005 was Hohere Lehr-Anstalt Umwelt u. Wirtshaft, in Ysper, Lower Austria. The school is situated in the picturesque Yspertal valley known for its striking forest and meadow landscapes . Wood production is the main direction of economic activity. Thanks to the lack of industry the environment is clean and the region is a tourist attraction.



Figure 1: Sampling Areas

In this project an analysis of the soil in municipality Yspertal was made. Therefore four lines in eastwest direction were drawn through this region. The river Ysper divides each line into two pieces so that 8 groups can work on this project – **80 pupils.**

Taking samples

- Samples were collected at 10 -11 different places starting from hill tops and finishing at the banks of the Ysper stream. Each group analysed the samples in chemisry and biology laboratories. Therefore 10 to 20 times a soil drill was pressed into the soil for 30 cm. The soil samples were collected in a bucket. After mixing about half of kilo was put into a nylon bag.
- 2. For determination of the water content the field capacity and the zoological population of each sample point a **block of 10 x 10 x 5 cm** was cut with a spade, put into nylon bag and sealed.
- 3. For determination of the type of soil four times a **block of 25 x 25 x 25 cm** was cut with a spade put into a white PE bag
- 4. Only once the **big soil drill** was knocked into the soil for **90 cm**. It was pulled out and the soil was left in the drill for determination of the soil profile.
- 5. At four sample points the existing plants (or leaves!) were collected, put into a bag and sealed. The frequency of the plants was registered.



Figure 2: Taking samples

Program

Day 1

Leaving Cieszyn. Visiting the battle fields of Slavkov near Brno (Austerlitz)

Day2

Official opening of the project, taking samples, sport competition.

Day 3

Analysis of samples in laboratories. German lesson.

Day 4

Analysis of samples in laboratories. Meeting with sponsors. Visiting Yspertal with guide.

Day 5

Preparing of the presentations, **Ceremonial act oh 7th Junior Eco – Expert project:** presentation the results of researches with the presence of headmasters of all the schools and mayors of partners cities, Student's folk presentations, "Meaning of soil as life base" lecture headmaster's speeches, disco.

Day 6

Visiting Zwelt Monastery. Return journey to Cieszyn.



Humus in soils

The totality of organic compounds in and on the soil is called humus

It is important for life in the soil and for the balance of nitrogen and water.

It is determined by wet combustion with potassium dichromate in sulphuric acid. Organic compounds are oxidized by $K_2Cr_2O_7Cr$. The remaining Cr(VI) was titrated with FeSO₄ solution.

Determining the soil type

In the laboratory the pupils:

- 1. drew a soil profile
- 2. determined the type of soil on the basis of decomposition of soil fraction
- 3. evaluated the physical soil sorption
- 4. examined of constancy of soil structure



Water content and field capacity in soils

- for the water content about 10g soil was put into a weighed beaker. For one hour the beaker was put into the drying stove at 105C. After cooling down it is weighed again and the dry matter and the water content were calculated
- 2. for determination of the field capacity the weight of a tube covered with a nylon tissue was measue/red first. Then about **50g of soil** was put into a plastic tube and the whole weighed again



Looking for names of plants

The students described plants collected at designated places using plant atlases.



Describing of soil fauna

The pupils analysed the soil samples directly or using microscopes. When watching the samples, they were finding microorganisms and learned about the mineral composition of soil. A few of the samples had been previously prepared using the **Tullgren method**.

pH value and lime content in soils

The pH value was measured electronically by a glass electrode. Buffer solutions with pH 4 and pH 7 were used to determine the values.

About 20g of soil was weighed in a 100ml Erlenmeyer flask. 50ml of 0.01M calcium chloridesolution was added. This combination was mixed thoroughly, covered with a watch glass and was allowed to stand for a one hour. After that the glass electrode was dipped into the solution and the pH value was read.

The calcium content was determined by the analysis of all carbonates. Carbonates were destroyed by hydrochloric acid. The volume of the carbon dioxide generated was measured.

About **30g soil** was weighed exactly into a **250 ml Erlenmeyer flask** with a grinded neck. With the help of tweezers a small tube with 10ml 4M hydrochloric acid was put into the flask without loosing a drop of the acid. The Erlenmeyer flask was closed by a stopper with a hole in it. The hole was connected to a 10ml – syringe with a tube.



Determination of potassium and phosphorus

- POTASSIUM. The Atomic Absorption Spectroscopy is a powerful mean for a precise determination of potassium. The potassium atoms absorb light energy at a wavelength of 799,5nm. We prepared 250ml of a potassium standard solution with the concentration of 500mg/L. This solution was diluted in order to get standards with the concentration 1,0mg/L, 2mg/L, 3mg/L and 4mg/L. Then the students measured the absorption of the blank sample the standard solutions and the sample at a wavelength of 799,5nm and a 0,5nm slit. They calculated the concentration of the samples with the help of the Lambert Beershen law.
- 2. **PHOSPHORUS.** We put 2.00g air dried soil in a shaking flask, then added 100mL of extraction solution and shook it 90 minutes automatically. After shaking we filtered the solution through folded filter.

1 ml sample was mixed with 16ml ammonium - heptamolybdate solution, and with 2ml ascorbic acid

solution. The chemical reaction was finished after 15 minutes and the blue complex was stable up to four hours. The measuring wavelength of the UV/VIS – photometer is 660 nm

Heavy metals in soils

Heavy Metals have nowadays become a very interesting component of normal soil because of the environmental pollution. With the help of the food chain they also get into our bodies which may have an affect on our health.



Teachers

For the safety and proper work some teachers were responsible:

- 1. Leopold Mang
- 2. Karin Browa
- 3. Maximilian Hocheneder
- 4. Gunther Gortan
- 5. Martina Schmidthalter
- 6. Peter Trötzmüller
- 7. Christof Zauner
- 8. Thomas Wehofer

Closing Ceremony of Project

After the workshops had ended the ceremony took place where each of the eight groups presented the results of their research.



Summary

- 1. Doing all work together, carrying out interesting researches, analyzing results together and communicating in foreign languages helped in dismissing harmful stereotypes.
- 2. Friendships are tremendously important especially nowadays when borders are disappearing and European integration has become the reality.
- 3. Working close to nature, like taking samples and analysing them in well- equipped laboratories gave our students a chance to learn about nature in a practical way.
- 4. Necessity of using the foreign languages is an enormous motivation for further studies

Thank You to all organizers from the host school from Ysper for the perfectly prepared even

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