SUMMARIES OF 3 POSTERS

Joanna Kostecka

Agricultural Academy in Cracow - Department in Rzeszów
Institute of the Natural Basis of the Agricultural Production
ul. Cwiklinskiej 2, 35-959 Rzeszów, Poland
E-mail: jkosteck@ar.rzeszow.pl

Summary 1:
Pro-environmental education on the different age level: promotion of the knowledge about the soil fauna biodiversity

The public knowledge about the soil fauna biodiversity is very poor. How to improve the knowledge about its importance? How to produce the society love for the soil, which will grow as a care for it without degradation activity of the mankind? Author of that poster wants to introduce her wide projects connected with pro-environmental education and didactic work with people in different age: kindergarten, primary- and secondary school pupils, students, farmers, agricultural advisors and teachers. She takes active part in popularising the meaning of protozoan, earthworms, enchytraeids, mites, spiders, soil insects and other soil animals of the food chain to farmers and pupils of local schools.

One of the best known soil creatures are earthworms. They are very handy as an didactic instrument, because they are numerous in all types of the soil, big, easy to find, identify and keep for culture.

Can a teacher use a „scientific story" to make children more sensitive to environmental issues? A better understanding of the role of soil fauna among the youngest will help eliminate the groundless fear of these animals. Making children more aware of their role for the food chain, will help them to respect and like all animals, despite their elongated shape and lack of legs.

A scientific story – "Look Inside the Soil, The Play in Four Acts" by Kostecka (1996) - lets children better understand life that lives underground. The main characters are the soil creatures. In non English speaking countries this story can help to promote two effects: understanding and love for varied soil life and pro-environmental and English education.

Poster will introduce to some checked proposals connected with soil fauna in pro-environmental activities. Between others, will lead to "home vermi-recycling system", where the organic component of waste can be changed to vermicompost right where it is produced. Children and adults, should see worms in demonstration of vermicomposting units. It also can be use at the classroom, because it is the chance to study biodiversity of the creatures involved in vermicomposting and also decrease the amount of organic waste.

Some another animal species could be found in earthworm cultures. These may include snails, centipedes, spiders or small white apterygous insects known as springtails. These animals cooperate with earthworms in the process of the mineralisation of organic matter (they break up particles of organic matter and thus facilitate the work of reducers, present but invisible to the naked eye, but surely present there, like bacteria and fungi). In a natural environment all the animals which constitute the soil fauna are also important.

Teaching objectives of using "classroom vermi-recycling system" are wide: a) to learn about other inhabitants of the soil: snails, centipedes, spiders, springtails and other soil insects, b) to relate them to earthworms in order to view natural ecological relationships, c) to understand mutual relationships between all organisms living in ecosystems.

Summary 2:

Studies on vermicomposting of household and agricultural organic waste: growing plants on vermicompost as a way to produce high quality foods

Production of fruits and vegetables with high qualitative parameters, provides a chance to improve human health, and the environment.

A large concentration of mineral nitrogen and potassium in soil disturbs biological relationships between soil, plants and human health. In many fruits and vegetables the nitrate and heavy metal contents exceed their permissible levels. It is possible to prevent this by replacing mineral fertilisers with vermicompost.

Vermicompost it is an organic fertilizer, which can be produced from different organic waste, using worms at a high population density in cooperation with a lot of other soil animals.

During the period of 1993-2000 experiments were conducted to check features of carrot, cucumber, tomato, leek, celery and potato cultivated on vermicompost and mineral fertilisers.

Vermicompost produced from cattle manure is a universal fertiliser and, being characterised by good physical structure as well as rich biodiversity and diversified composition, what is providing a good soil properties and fully macro- and microelements for plants. Vermicomposts used for experiments contained the following available nutrients: 450 – 665 mg NO_3, 800 – 2230 mg P, 1400 – 5225 mg K, 1000 – 1450 mg Ca, 500 –1500 mg Mg $\cdot kg^{-1}$ of dry mass. Also, 300 mg Na, 4 mg B, 8 mg Cu, 120 mg Mn, 60 mg Zn, 800 mg Fe were present per dm^3 .

Generally all experiments fitted into the established pattern:

The culture bed was always checked first for the content of nutrients needed by definite species of cultivated plant. Then the fertilisation mode was determined to achieve a balance between nutrients contributed in vermicompost, mineral fertilisers and plants requirements. Watering and other cultivation and protective measures were conducted at the same time on all parts of the experiments.

Then samples of plants from vermicompost and mineral fertilisers were compared and contents of nitrates and heavy metals (Pb, Cd, Cu and Zn) in it were determined.

In the experiments described above, it has been shown that plants growing on vermicompost were characterised by lower contents of nitrates and heavy metals, in comparison with plants cultivated on mineral fertiliser. Differences between nitrate contents in plants grown on vermicompost and those on mineral fertiliser varied within: 50% for carrot, 30-50% for cucumbers, 54% for tomato, 63 –70% for leek, 29% for celery and 47% for potato.

Differences between heavy metals levels were (varied) as follows: for carrot: Pb 39%, Cd 40%; for cucumbers: Pb 15 - 40%, Cd 2 - 75%, for tomato: Pb 19%, Cd 8%; for leek: Pb 11- 15%, Cd – 20 - 38%; for celery: Pb 10%, Cd 22%; and for potato: Pb – no difference, Cd 33%.

Vermicompost also had positive effects on crops by improving their processing properties: for instance better shaped carrot roots, better taste (checked by blind- testing group of people), lower foliage of cultivated tomato, therefore faster ripening of fruits and easier harvesting.

Summary 3:
Studies on vermicomposting of household and agricultural organic waste: biodiversity of the soil makrofauna after vermicompost introduction into the soil

Conservation of the biodiversity provides a proper functioning of all environments. One of the most important is the soil. Level of the crop quarantine maintenance of the mankind, between other, depends on the soil fertility, which is also connected to the richness and biodiversity of the soil fauna.

There are a lot of evidence that introduction of vermicompost into the soil is important from the few reasons: it is raising the plant crop, the same as ensure the proper course of physiological and biochemical plant processes. In the process of mineral nourishment of plants, microelements, among others, are safeguarding the ability of selective uptake of optimum levels of other necessary elements. Another important aspect is that macronutrients are available in vermicompost, partly in mineral form (i.e. immediately absorbable) and partly in organic form, from which they are gradually set free (also by the soil edaphon), to the soil solution. It assures that plants are systematically supplied with nutrients, while nutrients are protected against leaching from the soil. That is why vermicompost out competes highly concentrated mineral fertilizer, which is a source of macronutrients, but does not assure the plants sufficient access to many microelements.

How the addition of vermicompost is affecting the soil makrofauna, which is also very important for the proper soil fertility?

The experiment was carried out in the field conditions, since one year now. Vermicompost from the household waste was added into the soil on the plot inside the closed gravel heap. After a year, samples of the soil with vermicompost added and without it, were taken. The quality and the quantity of the soil makrofauna in both types of the soil were indicated using the wet funnel extraction method.

The number of *Enchytraeidae*, *Collembola*, *Acarina*, *Diptera* larvas and other (*Diplopoda*, *Oniscoidea*) was higher in the soil with the vermicompost addition, but the differences were not statistically significant ($p=0.05$).

The experiment will last for the next years (with every year vermicompost addition).