TARGET FUNCTIONS OF ENVIRONMENTAL EDUCATION AND UPBRINGING

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Abstract. The article proves that environmental education and upbringing form the system of scientific knowledge, views, and beliefs that provide people's responsible attitude to the environment in all spheres of their activity. In relation to the functions of the agricultural universities environmental education is focused on compliance with the principles and requirements of environmental imperative, according to which all anti-environmental technologies should be excluded from the practice of agricultural specialists.

Keywords: biosphere, environmental education, global environmental crisis, anti-environmental technologies, ecological footprint, agro-ecosystem, agrosphere, biodiversity, organic farming, ecological imperative.

DOI: http://dx.doi.org/10.23856/1912

Introduction

Environmental education and upbringing are aimed at formation of scientific knowledge, views, and beliefs that provide people's responsible attitude to the environment in all spheres of their activity. In relation to the functions of the agricultural universities environmental education is focused on compliance with the principles and requirements of environmental imperative, according to which all anti-environmental technologies should be excluded from the practice of agricultural specialists. Environmental education is meant to form the socio-ecological worldview, the legal position, the complex of scientific knowledge, the ability to translate knowledge into practice, to cooperate with each other; to raise the level of human culture and society, improve people's moral qualities.

Compliance with the ecological imperative to agricultural technologies that ruin the regenerative processes in agro-ecosystems

In order to implement the goals of environmental education the transition from a primitive market economy agriculture, which is aimed only at profit to the ecologization of the economy and production, post-industrial ecologically oriented civilization, which leads to the formation of a system of knowledge built on a common theoretical basis and which exceeds the traditional boundaries of differentiated Natural Sciences is required. The requirements of such an ideology are more complex than the task of environmental protection and reduction of pollution stream. A new system of environmental knowledge should help current and future professionals to organize human activity in the conditions of rigid environmental imperative.

For Ukraine the aim of the environmental education and implementation of the ecological imperative in the production in everyday life has not been solved yet. As V. O. Serhiienko wrote: "Environmental moods in Ukraine are weak and fragmented.

Environmental threats are not recognized by society to the full, they take secondary position in relation to other everyday vital interests" (Serhienko, 2014).

The most relevant and priority issues that must be addressed in the agricultural production of Ukraine on the basis of its ecological safety increase are:

1. Compliance with the ecological imperative to agricultural technologies that ruin the regenerative processes in agro-ecosystems.

2. Expansion of lands under organic farming systems or similar options.

3. Preservation of biodiversity due to ecological optimization of landscape and agrosphere.

According to V. Pidlisnyuk's calculation, based on the use of codes UN FAO (Food and Agriculture Organization, UN) in Ukraine in 2010 agricultural production by 35–40 % determined the overall degradation of the natural environment. Over the past 25 years there has been a simplification of crop rotations and increas of the area under leguminous crops (Pidlisnyuk, Stefanovska, 2010).

At the same time there was a nearly 10 times decrease in the number of cattle, which created a shortage of the best organic fertilizers – manure. The shortage of organic fertilizers and exclusion of fields with significant amounts of biomass, in particular straw, dramatically increased the processes of dehumification of arable soils. Only black soils of the forest-steppe zone of some Ukrainian regions under rainfed conditions lost 25 %, in irrigation conditions – up to 60 % of humus – the most valuable component of the soil cover. And in the whole in Ukraine from 2000 to 2015 humus content in soils of agricultural use decreased from 3.36 to 3.14 % (Pysarenko, 2008).

Progress in crop growing is closely associated with livestock raising development. With continuous use of the same fields, orchards and gardens, getting from them sustainable high yields it is necessary to carry out measures to maintain soil fertility. Soils are enriched with fertilizers, of which the most valuable for maintaining soil fertility is manure. At the same time, crop growing is a key factor in the development of livestock raising, as phythomass of fields (gardens, meadows, etc.) is used to feed farm animals. Thus, at the optimal ratio of crops and livestock there will be an increase in production of grain, vegetables, roots and tubers, fruits, meat, milk, eggs, wool and other agricultural products.

According to the State statistics service of Ukraine the use of organic fertilizers from 1990 to 2014 decreased from 260726 thousand tons per year to catastrophically low value of about 9963–9652 thousand tons, which is approximately 25 times.

Today we lack the state control over the degradation of soils. The degradation of the natural environment on the territory of Ukraine is uneven and depends on the nodes of concentration of industrial and agricultural production. In the industrial regions near large settlements the process of degradation of arable soils is complicated by their contamination by various anthropogenic toxicants.

According to the analysis conducted by E. A. Zin, the area in Ukraine is extremely contaminated, which reaches 61 thousand km^2. Therefore, the soil contamination by 1.5-8.5 times exceeds the permissible level; highly polluted area covers 116,7 thousand km^2; polluted – 121,2 thousand km^2; moderately polluted territory is equal to 144.8 thousand km^2 and relatively clean – 49.1 thousand km^2 (Zin, 2007).

Consumer approach to soils and ruthless exploitation of natural fertility continue to dominate in Ukraine. The crop rotations are violated, acreage of sunflower is increased, and the number of monocultures is growing. The state control over the degradation of soils today is not sufficient. The set of all negative processes that lead to soil fertility decrease, some

scholars have rightly called the "silent crisis". In our opinion there is only one way to overcome the state which is developing in the "quiet crisis" agriculture and the growing process of expansion of the contaminated areas – to train a new generation of agronomists and specialists in animal husbandry who would be able to withstand the pressure of market psychology and to target agriculture in an environmentally safe production technologies. This generation of environmental professionals with appropriate training can and should achieve a radical restructuring of agricultural production with the total ban of anti-environmental technologies that destroy the very basis of agriculture – the soil fertility.

Expansion of lands under organic farming systems or similar options.

Another possibility on the path to agriculture ecologization in Ukraine is to maximize the extension of crops cultivation according to organic farming systems. The relevance of this issue is discussed by many Ukrainian agricultural specialists (Harmashov, Fomichova, 2010; Pysarenko, 2008; Sokalskyi, 2010).

Several variants of organic farming have been developed:

a) private organic farming, which partly excludes the use of mineral fertilizers and pesticides;

b) biological farming, developed in 1964 by the Lemaire-Boucher. It prohibits chemical fertilizers and pesticides and allows using only organic fertilizers, for pest control you can use only herbal products;

c) biodynamic farming of R. Steiner recommends to take into account the natural cycles of the moon, position of stars, etc. Even organic fertilizers in this system should be procured at certain terms;

d) organic farming is the best option for achieving environmentally friendly products. It provides for mandatory crop rotation with the inclusion of perennial grasses and legume crops, minimizes tillage and significantly restricts the use of fertilizers and pesticides, and also eliminates the cultivation of GMO varieties.

Last option – organic farming – is essential for wide use for the purpose of preserving the fertility of the soil, natural ecosystems in general, and for obtaining ecologically pure food products. This option is supported by the IFOAM – International Federation of Organic Agriculture Movements. It defines organic farming as a production system that maintains the health of soils, ecosystems and people. In this variant the emphasis is made on ecological processes, natural cycles, and preservation of biological diversity, which is habitual to local conditions. The technology focuses on avoiding the use of harmful resources that cause adverse effects both for humans and agro-ecosystems.

These harmful resources according to IFOAM include genetically modified varieties of cultivated plants. The specialists rely on the fact that in 2000 an open letter was published in which 828 scientists from 84 countries warned all governments about the dangers of genetically modified products for the future generations. On 29 January 2000 the international community signed the Cartagena agreement, which established the rules for the use, distribution and transportation of products containing GMOs. In this document genetically modified organisms are recognized as potentially dangerous. Ukraine acceded to this Protocol on 12 September 2002.

It should be emphasized that in organic farming systems in unity with environmentally safe systems, livestock growing at their distribution over the large areas of the agrosphere, the principle of minimizing the consumption of material resources and energy is supported.

Ukraine has unlimited potential in the development of production of organic and environmentally friendly natural products. This direction could be that Golden road map for

our entrepreneurs, which will bring Ukraine to the leaders in the field of eco products cultivation, not only at European but also at world markets (Varlamova, 2014). But today this achievement in this direction is substantially less than in the countries of the European Union.

The first Ukrainian certification body of organic products "Organic standard" was established only in 2007. But only in 2013 in Ukraine was adopted the law No. 0979 "On production and turnover of organic agricultural products and raw materials". Before that, the production of organic products in Ukraine has not been regulated.

The document states that companies or individuals who received a certificate and included in the database of the registry by the executive authorities have the right to produce organic products. The goods or materials of these companies must be marked with "Organic product" and the corresponding graphic image.

Currently in Ukraine there are about 200 producers of organic products, covering an area of about 278,8 thousand hectares certified in accordance with international standards of organic production. The proportion of certified organic acreage in the total agricultural land of Ukraine is only 0.7 %.

Still in Ukraine the ecologically safe systems of farming are introduced not by the large-scale agricultural companies but small producers and amateur gardeners. Thus, in Ukraine there is a club of supporters of organic farming: "Organic farming in Ukraine", its website address: https://vk.com/club16542938. There is a branch of this club in Sumy which also has its own website: https://vk.com/club_organic_sumy. Sumy branch, as the main one, is aimed at: a) restoring people's understanding of organic farming; b) growing organic crops with minimal effort. The club has branches in almost all regional centers of Ukraine.

The efforts of Ukraine for the development of agricultural production based on the basis of environmentally friendly technologies are supported by the EU. For farms and agricultural firms wishing to produce natural, environmentally friendly organic food products, the Swiss government organized a program of financing Ukrainian production of natural, ecologically clean and organic food products. Support is given in the frames of the Swiss-Ukrainian project "Organic market development in Ukraine".

In the decisions adopted by the UN Conference "Organic agriculture and food security" (2007) transition to organic technology is formulated as a necessary central direction to ensure the food security of the mankind, as these technologies allow to obtain 4,381 kcal per person per day, while the currently mainstream technology – only 2,786 kcal.

Taking into account the above mentioned, training of students in agricultural universities of Ukraine should be redirected from intensive technologies that undermine the future of agriculture in our country, to the environmentally safe technologies.

Preservation of biodiversity due to ecological optimization of landscape and agrosphere.

Agrosphere is a global system that unites the entire territory of the Earth converted to agricultural activities of man. The share of agrosphere accounts for approximately 30 % of the land, including about 10 % of arable land and the rest constitute natural feeding lands. This ratio varies in different parts of the world. Resources of agrosphere can be destroyed, if the land use is carried out without compliance with environmental requirements.

Agrosphere consists of ecological systems of the lower-level – agrarian landscapes that, in their turn, represent a set of field, pasture and biogeocenosis farms. In agricultural landscapes the flow of energy is changed. They, along with solar energy use additional energy resources (energy subsidies). Energy subsidy is a supporting flow of energy spent on tillage, irrigation, fertilizing, soil, pest control, etc.

Increase in the additional energy investments in agriculture is regulated by the law on decrease of energy efficiency of natural resources. At the initial stage of crop production per 1 kJ of the human muscular energy, expended on tillage, the farmer received from 5 to 15 kJ of plant foods. At present, the situation has changed radically – for the production of 1 kJ of food the person spends from 10 to 20 kJ of energy. In the United States from 1900 to 1970 the amount of energy expended for 1 kJ of food produced on arable land increased 10 times, while yields have increased only 2 times. The overall energy efficiency of agricultural production (the ratio of put and get with the finished product energy) is reduced in all countries of the world. It becomes obvious that further increase of the energy investment in agriculture is fraught with even more dangerous consequences: pollution of the atmosphere, hydrosphere, biosphere, environment, and, consequently, deterioration of living conditions, the risk of diseases.

The complex of these issues should be thoroughly studied in the courses of agricultural universities, especially in the core academic disciplines, such as chemistry, agriculture, crop production.

The biosphere in general and agrosphere as its part are under the influence of processes taking place on the planet. One of them is global warming. According to the climate models by 2100 global temperatures will increase by 1.45 to 5.8°C (Dmitrenko, 2001; Climate change, 2003). For some agricultural regions, climate change will present real danger, while for others, it might be useful.

In connection with the expected trends in agro-climatic conditions changes in some regions there should be taken the measures of adaptive nature that should be directed at the expansion of the area occupied by winter crops, which are higher yielding than spring crops. There is a need to revise the species and varietal composition of crops with the aim of selecting more late-ripening and more productive species (varieties) for the use of additional thermal resources due to climate warming. For such regions a significant expansion of heat-loving crops cultivation, such as corn and sugar beets is recommended.

The farmers in the EU are actively preparing for the climate warming. The fact that according to the surveys of the European Commission, for this reason the annual loss of agriculture of the 15 largest European countries – producers of agricultural products are estimated at 12.5 billion Euros. Drought particularly affects the agriculture of the Mediterranean countries – Spain, Greece, Italy, and France. For some countries of Central Europe the World Bank has already proposed measures for climate adaptation of the agriculture: so-called system of “climate-smart agriculture”. Otherwise, by 2050 decline in yields in the countries of Central Europe may be 20–50 %.

In the North of Europe there are other problems. In the summer of 2007 in England about 42 thousand hectares of farmland was flooded. Because of the constant flooding of arable land in the lowlands they use them for grazing. Wet and warmer conditions lead to increasing plant pests.

Ukraine belongs to the regions, in which relatively large meridional gradients of temperature changes with a vivid displacement of natural areas are expected.

In Ukraine in conditions of global climate change and projected desertification of the territory of Ukraine with the right choice of farming systems it is possible to neutralize to some extent the effects of these changes for agriculture. Today there are scientifically grounded strategies for adaptation to changes in climate conditions on the planet. In particular, in the new conditions organic farming has many advantages and may act as a strategy of agriculture adaptation to global climate change. Another direction of adapting domestic

agricultural enterprises to global climate change could be the use of non-moldboard soil processing. Non-moldboard soil processing is the technology of agricultural crops growing, which eliminates from the production cycle such mechanical disturbance of the soil, as plowing, disking, cultivation. The sowing is done at evenly distributed crop residues of the culture predecessor (Dmitrenko, 2001; Climate change, 2003).

Another dangerous phenomenon is the destruction of balance between agro-ecosystems and natural forest and meadow ecosystems. In recent decades in Ukraine, in particular, has developed a dangerous trend of increasing deforestation of natural forests, which are vital for the sustainability of the biosphere.

These negative trends can be partially compensated by the work of ecologists and specialists in nature protection to create in Ukraine an ecological network of protected areas that includes cores and corridors.

These negative phenomena are further escalating the problem of ecological education and upbringing in higher education institutions. The condition of agrosphere and its correlation to natural ecosystems is also one of the key problematic issues of ecological education of students in agricultural universities.

Ecologization of agriculture and industry requires a fundamental revision of attitudes in society; it must be regarded as a kind of ecological revolution. Unlike a number of previous agrarian revolutions, which contributed to the rapid growth of population, the goal of ecological revolution is different. It consists of restoring the balance between the needs of the population and natural resources, between socio-economic development and environmental development as well as training people in the basics of communicating with the outside world for harmonizing their lives and the environment.

Accordingly, from our point of view, the important problem is the revolution in the field of environmental education and upbringing in Ukrainian higher school. In production-oriented activities of Ukrainian agricultural universities it is necessary to propose graduate and postgraduate students for the decision the specific production techniques that involve a violation of the requirements of the environmental imperative. This approach completely corresponds to the targets of the Conception of environmental education in Ukraine (Shikul, Ihnatenko, Petrenko, Kopystek, 2001).

Conclusions and suggestions

The analysis of the existing in Ukraine situation on the problems of ecologization of agricultural production shows that work with agricultural specialists and owners of small, medium and large firms is reduced to occasional conferences and meetings. Restructuring of the existing worldview and basic value-orientations in the system of farming in adults (by all visible achievements of andragogy) is not effective. Ecologization of agricultural production is actually possible only through a change of generations, and this makes the problem of ecologization of educational system in the Ukrainian universities especially acute and relevant.

In modern conditions education is changing its traditional meaning. In addition to the narrow application of professional knowledge it needs to form professionals with a broad range of thinking, able to assess their place and the place of humanity in nature, to realize the deep connection in the system “man – biosphere” and to transform on the basis of ecological knowledge existing technologies into ecologically safe.

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