

такі як: «Premier Palace Hotel» (Київ), «TSUNAMI HOTEL FITNESS& SPA» (Діпро), «HOTEL & SPA NEMO» (Харків), «ШишкіNN» (Чернігів) тощо. Однак, ніша безпосередньо аква концептуальних готелів на сьогодні є не лише соціально затребуваною, що обумовлює потребу наукового обґрунтування розробки і впровадження подібних закладів туристичної сфери у столиці та регіонах України. У діяльності цих закладів, на нашу думку, має органічно поєднуватися рекреаційна функція із соціально відповідальною місією.

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THE DEVELOPMENT PROSPECTS OF ECOLOGICAL FARMING IN THE SOUTH OF UKRAINE

Abstract: The paper examines the results of the scientific research on the issues of the development prospects of ecological farming in the South of Ukraine. It has been established that the area of farmlands in Ukraine is constantly decreasing. Over the

past years the area of farmlands in Ukraine has decreased by almost 500 thousand hectares. Ukraine takes the 18th place among the countries which produce environmentally friendly crops. According to the data of the International Statistics the area under biological farming makes 164.5 thousand hectares.

Key words: ecological farming, the South of Ukraine, biodynamic farming, organic and biological farming, ecological system, the system of ANOG, plants, soil, water, soil cultivation, fertilizers, pesticides.

Introduction. The history of the world agriculture is the history of improving different technological elements, technical equipment, which allowed developing the systems of agriculture, taking into account a variety of soil and climatic conditions of this or that terrain. A systematic approach allows agricultural producers to achieve maximum productivity of the agro-ecosystem. On the other hand, the more intensively it occurs, the more energy expenditures are necessary to sustain phytocoenosis in a productive state. Converted energies of fuels, fertilizers, labor forces serve as a source of additional energy. For the sake of obtaining desirable yields a commodity producer deliberately reduces the variety of the species grown, even to the utmost degree – mono-crops, and the sustainability of the ecosystem decreases. Crop varieties and hybrids are subject to artificial, and not natural selection, therefore they are not stable and energy wasting. Annually all the factors increase the intensity of the symptoms of erosion processes, reduce soil fertility and cause the pollution of territories.

Since the ancient times agriculture has been meant to store solar energy in plant organic substances. But if it is based on the intensive use of the agro-ecosystem, it gradually converts into an energy consumer and can compete with industry by this index. Instead of being the means of maintaining life, such an agro-ecosystem becomes a source of the intensive resource leakage. The prospects of losing fertile soil – the main means of

production in agriculture – make more and more people, engaged in this area of activity, search for the variants of changing the existing situation, paying attention not only to particular techniques of nature protecting cultivation, but also to conceptually new farming systems based on considering the circulation of substances. These farming systems are aimed at conserving soil as an alive system, natural regeneration of water and air, growing environmentally friendly crops, saving expenditures of energy and material resources.

Biological farming in its present understanding of this term appeared in the 20-30th years of the 20th century, when its conceptual statements and principles of technology were mainly developed. And only at the beginning of the 90th virtually at the same time in Western Europe and North America the so-called “organic boom” started.

Biological farming has been widely introduced in the developed countries such as the USA, England, Germany, France, Italy, Sweden, Switzerland.

In 1972 the International Federation of manufacturing environmentally friendly products with the representatives of 50 countries was founded. Biological farming systems are being used by more and more farms. There are 11 thousand of them in France, 16 thousand – in Germany, 19 thousand – in Austria, 44 thousand – in Italy. However, it constitutes to 10% of the total number of farms.

The characteristic feature of the development prospects of biological farming is the amount of selling environmentally friendly products. The share of biologically safe products in the general food market (in spite of the increasing demand) is not considerable 1–3%, making \$34 billion in 2002. According to the forecasts the world sales volumes reached \$80 billion in 2008. Annually European countries spend \$12 billion on environmentally friendly products.

Ukraine takes the 18th position among the countries producing environmentally friendly crops. According to the data of the International Statistics the area under biological farming makes 164.5 thousand hectares.

Problem statement. Alternative farming systems are the methods of growing agricultural products without applying crop protection chemicals and mineral fertilizers. The products in the area of alternative farming existing in the world science could be conventionally divided into three main classes, differentiating in the degree of “biologization” of the suggested technologies.

I. Biodynamic farming unites the followers of the studies represented by Rudolph Steiner in his books “Agriculture course” and “Humanitarian foundations of prosperity in agriculture”. His biodynamic system has rather spiritual than experimental foundations, forcing to consider it mostly as philosophy, and not as a scientifically substantiated system of recommendations. Unlike other trends of agriculture, he proposed that agricultural crops should be considered on a global scale as the elements of the single system of biosphere, connected immediately with the surrounding cosmos. Taking it into account he suggested taking different agricultural measures considering the placement of celestial bodies, the Moon in particular.

The second distinctive feature of this system is the recommendation to apply special biodynamic preparations meant to intensify soil life and agricultural crops. “Humus” preparations are made of horns and manure; “silicium” – of horns and ground quartz, “compost” – mainly of medicinal plants mixed with manure. It is recommended that these preparations should be stored in the containers of natural origin (skulls, intestines, animal bladders), mixed without touching metal things. The biodynamic system implies a wide use of different decoctions (horsetail and others), plant extracts,

products of their fermentation to stimulate plant growth processes, nutrition and pest control.

II. Organic and biological farming combines several similar trends developing in different countries of the world. Their common idea is the refusal to use chemical plant protection in favor of agro-technical measures, the refusal to apply mineral fertilizers in favor of organic ones. Unlike biodynamic farming, it does not require following astrologers' recommendations, using special plant preparations and allows applying agricultural machines in production processes. The best known among them are the following.

1. *Organic system*. In the USA regulations there are requirements under such a title, the fulfillment of them enables farmers to earn additional income, selling their products as environmentally friendly ones.

2. *Biological system* (Lemaire-Boucher's system) unites the adherents of alternative farming techniques from France.

3. *Organic and biological system*. It is spread in Switzerland, Sweden and a number of other countries. According to the plan of its founder – the Swiss scientist K.Muller – organic and biological farming should be developed by the laws of the activity of natural ecosystems, considering the balance and circulation of nutrients. The basis of its work is the activity of soil biocoenosis, and all the farming measures should be aimed at its support.

III. Ecological system, the system ANOG is closer to traditional agronomy, than the organic and biological trend. It prohibits the use of plant protection chemicals and allows replenishing the lack of nutrition elements at the expense of water-soluble forms of mineral fertilizers taking into account granulometric soil composition.

ANOG (The Committee on growing fruits and vegetables with natural quality) is the system implemented mainly in Austria and Switzerland. As in organic and biological farming,

the followers of ANOG are recommended to reduce the intensity of mechanical soil cultivation and maintain a high level of soil fertility at the expense of applying organic fertilizers. Pesticides are allowed to be used for plant protection.

The choice of this or that system should be made only after a thorough examination of the ecological situation of a particular territory, the conditions of selling ready-made products, market conjuncture, consultations with specialists in the area of alternative farming. The transition of a farm to biological farming methods is virtually always accompanied by a reduction in the yields, especially during the initial period. The analysis of the literature shows that if the crop yield of traditional farms on the average is 100%, in alternative farms wheat yields are 43–76%, winter rye – 65–75%, spring barley – 45–75%, oats – 65–85%. The loss of profits connected with a reduction in the yields is compensated by an increase in the price of products grown without mineral fertilizers and plant protection chemicals.

Methods. Plant growing can be certified if the standard requirements have been fulfilled for 24 months since the beginning of the production process.

It is necessary to solve the problem of ecological production for it to function in the best way. A farm should harmoniously match the environment. It will increase the possibilities of the ecosystem self-regulation and activate the natural enemies of plant pests. It is necessary to plan proper land use, for instance, to plant hedges and shelter-belts around the fields, where birds could nest, animals could find shelter and insects could reproduce. These measures assist in creating a “healthy” biogenic system and increasing soil fertility. Physically and biologically healthy soil will allow minimizing the use of machines while growing different crops, and as a result, saving considerable material resources and producing environmentally friendly crops. The territory chosen by the commodity producer of biological products should be protected

from the activity of different substances or processes in the doses when they become pollutants for the environment. The lands polluted to a very high degree, that it is impossible to reduce the level of the content of dangerous substances to a safe level within a short period of time, are not suitable for the purposes of biological farming.

The basic methods of producing environmentally friendly crops in the South of Ukraine under present conditions should be:

1. Developing and introducing scientifically substantiated crop rotation. While implementing it properly, the producer can refuse of multiple soil cultivation practices both mechanical and chemical, maximally provide the crops with all the life factors, have a positive impact on all the soil processes, sustaining its fertility etc. Crop rotation allows solving the problem of protecting plants from pests, diseases and weeds, optimizing the relationship in the system “host–parasite»; it provides biological soil loosening, that allows reducing the number and depth of soil tillage. One of the main conditions is including legumes from 30 to 50% in the structure of areas under crops, they are the only and main source of meeting the needs of plants in nitrogen. Growing intermediate crops takes a special place under irrigated conditions, they enrich soil with nutrient residues, under minimal additional soil tillage operations, protects fields from washing out nutrients, efficiently suppressing weeds, stimulates soil biota that increases the productivity of crop rotation by biological means. Cole crops play the role of phytosanitary in intermediate crops. Owing to allelopathic features, they suppress weeds without having a negative impact on the following crop, cleanse soil of some pathogenic bacteria, being bee plants, positively influence useful entomofauna.

2. It is necessary to choose the species and varieties most suitable for a particular territory to grow on biological farms. It

is important to select the varieties which are resistant to diseases and have high stability for being grown in different years by moisture supply. The best varietal material combining stability and high productivity is obtained by the methods of hybrid selection. It is necessary to grow crops from seeds obtained by biological production. If the seed material is forcedly bought from traditional farms, it is necessary to ensure that they are not dipped. The use of transgenic plants is not allowed.

3. The impact of mechanisms and machines on the soil in the process of its tillage must be minimal, and in the best case they should be excluded. Its loosening is carried out by soil biocoenosis, its activity must reinforce different mechanical impacts: the use of disking, tillage, mulching etc.

4. Plants are supplied with nutritional elements mainly at the expense of organic fertilizers, heavily soluble mineral compounds and symbiotic and non-symbiotic nitrogen fixation. Instead of excessive application of easily soluble mineral fertilizers, organic substances should be used: they transform organic substances into humus and nutrients, which are necessary for plants in the amount optimal for ecosystems. It is necessary to use mainly composts or rotten barnyard manure from among organic fertilizers. In the case, if the crop rotation is planned in the way that the removal of nutritional elements with the yield is more than internal farming potentialities of creating a positive balance, purchasing organic fertilizers and their following composting is allowed. Poultry excrement and manure without bedding of traditional farming are prohibited to be used. It is also prohibited to buy the straw of grains for fertilizing, grown in a traditional way. The silt of waste water or non-composted household garbage are not used in farms. Blood, fish, bone meal without chemical supplements are allowed to be used as fertilizers. One can use such slow-acting substances as various stone meal, bentonite meal, phosphorus meal, Thomas slag, potassium-magnesium etc. Dolomite, shell rock and similar

materials are allowed as lime materials. Micro-fertilizers are allowed to be applied only in the case of the lack of this or that element in the soil. Mineral fertilizers cannot substitute fertilizers of biogenic origin and can be used as the supplement to the materials on a carbohydrate basis. Mineral fertilizers should be used only in a natural form (as a raw material), the use of synthetic fertilizers containing nitrogen (ammoniac, carbamide) is prohibited. Faeces should not be used when growing plants, if the sanitary requirements are not fulfilled.

5. The technology of caring for crops should be mainly based on the advantages of the crop rotation, the proper selection of varieties and mechanical soil tillage. Appreciable sanitary effect can be achieved only if the crop rotation does not include the crops of one plant species, sowing winter grain crops after winter crops or spring crops after spring crops is not allowed, if the possibility of pest and infection migration from the adjacent fields is minimized. Bacterial preparations (based on *Bacillus thuringiensis*) of virus, boveryn (fungal conidia *Bouveria bussia*), insect predators (*trichogramma*), traps, pheromones, plant extracts, soap solutions etc are effective for pest control. Plant preparations of onion and garlic, sulphur and copper preparations can be used against fungi diseases. The extracts and tinctures of different herbs (horsetail, nettle), 0.2% water solution of potassium permanganate, seaweed meal etc can assist in caring for crops. The use of synthetic pesticides in ecological farming is prohibited.

6. It is prohibited to treat the harvested yield with inhibitors of germination or radioactive radiation, cleanse in chemical solutions to eliminate surface infection.

7. The technologies of growing environmentally friendly crops should not lead to the accumulation of heavy metals or other substances of technogenic or biological origin in soils. Burning straw and other crop residues is prohibited. The

technology of growing environmentally friendly crops should not be accompanied by soil degradation and erosion.

Conclusions. The area of farmlands is constantly decreasing. Hundreds of thousands of hectares are swallowed up by ravines, many lands intended for construction suffer from technogenic pollution and other harmful processes. Over the past years the area of farmlands in Ukraine has been reduced to 500 thousand hectares. Technogenic transformation of soils is not only equal to the intensity of natural processes of soil formation, but considerably exceeds it. One of the way-outs of this situation is growing environmentally friendly crops. Scientific knowledge and practical experience are necessary to implement this activity.

According to the data of the World Trade Organization, the demand for environmentally friendly agricultural products is increasing by 10–30% annually, the soil and climatic conditions of the South of Ukraine allow producing biologically safe products. Ecological farming and the food market in Ukraine have begun to develop, therefore all the persons interested in it should consider the requirements of the technology of producing this type of crops and certify all the production cycle.

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