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ORGANIC FARMING IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

The article analyzes the role and place of organic farming in achievement of the main goals within the sustainable development concept. It discusses ecological, social, and economic advantages of introduction of organic farming and provides information about its expansion in EU countries. The article contains data on experience and problems pertinent to introduction of organic farming in Ukraine and suggests the plan of actions for the near future aimed at further ecologization of agricultural production.

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SUSTAINABLE DEVELOPMENT CONCEPT AND AGROSPHERE

From the very beginning of its existence, humankind has been tackling the food provision problem. People's purposeful actions during many generations resulted in the actual formation of the biosphere's new component – agrosphere. According to the definition of academician O. Sozionov, the agrosphere includes all types of agrolandscapes, agrobiocenoses, and agroecosystems. Agrosphere is not only the main source of provision of the population with foodstuffs and raw materials for industrial production, but it is a human environment for a substantial part of the population as well [1]. Thus, the agrosphere exhibits a special pattern of its internal development, which is a result of interaction of various natural, social and economic factors. The agrosphere, which was created by the human mind and activity, is both a natural and social category. At the beginning of the development process, humankind used the agrosphere's resources for production growth and obtaining of raw materials for industry only. This approach led to a constant growth of the quantity of energy required for making of one unit of produce, exhaustion of the natural potential, and environmental pollution. Humankind has finally understood that further destruction of the agrosphere poses a threat to its existence and has realized that it needs a new philosophy of interrelations with the agrosphere. Historically, state policy aimed at protection of the agrosphere began to be formed in economically developed countries. However, the fact that the various programs launched by these countries did not take into account social and economic features peculiar to this part of the biosphere was their serious drawback.

The 1992 **World Summit** in Rio-de-Janeiro issued a Declaration, which approved a new strategy based on the sustainable development paradigm and envisaged a combination of economic growth, social development, and environmental protection as interdependent and complementary elements of long-term development. The Declaration interprets sustainable development as the model of the population's activity that is not only oriented at satisfaction of the present and future generations' main life necessities but also at achievement of a balance between nature and society. Parity of relations within the triad "human – economy – nature" is the basis for sustainable development. Sustainable development generalizes the process of survival and reproduction of the nation's genetic fund, protection of the natural environment, formation of conditions for reproduction of the biosphere and its local ecosystems, orientation at reduced antropogenic impact on the natural environment, and harmonization of humans' development within the nature.

The Summit delegates stated that transition to stable development was possible only on the condition that a number of principles such as the following ones were implemented in practice:

- priority of humanistic moral values, as opposite to the consumer model with wasteful disposal of natural goods and resources;
- social partnership and involvement of citizens in making of ecologically significant and other decisions with a simultaneous growth of importance of social structures within the

decentralized information society;

- integration of economic, social, and ecological programs;
- formation of sustainable development institutes, which should be aimed at strategic management during carrying-out of preventive and precautionary measures;
- intersectional cooperation in the society, which should make a synergy effect contributing to a multifold growth of results, due to improved interaction among economic, social, and economic spheres and coordination of plans and programs on different levels;
- making use of advanced experience and introduction of up-to-date technologies;
- equal and fair access to natural resources, financial capital markets, and modern technology and knowledge;
- adaptation of social life-supporting and territory-managing systems to the existing natural structures (landscape systems, water shed basins, etc.).

It is well-known that in 1970-80s, Ukraine widely introduced industrial methods in agriculture, which led to a significant growth in agricultural production. However, such industrialization of agricultural production was accompanied by increased anthropogenic pressure on the environment and exhaustion of natural resources. In particular, it resulted in a reduction of soil fertility, disappearance of small rivers, and pollution of the environment with toxic substances. The list of problems expanded owing to the Chernobyl' tragedy and urbanization processes. The aggregate of all the factors led to an ecological crisis in many of the country's regions. Ukraine became independent in 1991 and faced large-scale tasks on construction of a political system and lawful state and launch of social and economic reform within a short time period and under economic, ecological, and subsequent psychological crises. Notwithstanding a reduction of anthropogenic pressure on the agrosphere in the 1990-s, the ecological situation in Ukraine did not improve. On the contrary, it worsened, especially, in water amelioration zones and within rural settlement zones. It became obvious that transition to sustainable development principles was the only way out of the system crisis for the Ukrainian agrosphere.

The first steps towards the official adoption of the global sustainable development strategy on the national level were made in Ukraine in 1997-1998. This included establishment of the **National Sustainable Development Commission of the Cabinet of Ministers of Ukraine** and approval of “**the Main Directions for the state policy in the spheres of environmental protection, disposal of natural resources, and provision of ecological safety**” by Verkhovna Rada (*Supreme Council*) of Ukraine. This document legislatively determined the priorities and strategy of harmonious development of the state's productive and natural-resource potential. The economic and social strategies of transition to sustainable development are determined by a set of official documents, among which the basic ones are the address of the President of Ukraine to Verkhovna Rada of Ukraine “**Ukraine: Advance to the XXI Century. Strategy of economic and social policy for the years 2000-2004**”, Decrees of the President of Ukraine “**On the main directions of social policy for the period up to 2004**”, “**On the strategy of overcoming poverty**”, “**On the Concept of development of the Ukrainian**

population's health protection", "On the main directions of the land reform", and a number of others [2].

Transformational changes in the economy and society had both positive and negative consequences. Considerable curtailment of resource-consuming production and structural changes in the economy contributed to a reduction of technological environmental impact but had simultaneous negative social and demographic effects, such as expansion of the poverty scale and depopulation of the country. It became obvious that the agricultural sector of the economy needed a number of macroeconomic changes, aimed at [3]:

- a permanent growth of production of high-quality foodstuffs, qualitative changes in the structure of the population's nutrition, and higher calorie content in foodstuffs;
- social and economic transformations in rural areas, reconstruction of land and property relations, and creation of a mixed economy;
- formation of an economic balance in agricultural production in the regions, taking into account their natural-resource potential, making rational use of natural and economic advantages, and adherence to the ecological safety rules during the processes of reformation of structural complexes and allocation of new productions;
- speeding-up of development and modernization of the processing sector and reduction of product losses;
- introduction of ecologically progressive technologies, which should be adapted to the local conditions, and carrying-out of the measures aimed at the increase of soil's fertility.

ORGANIC FARMING AND ITS WORLDWIDE EXPANSION

Realization of the growing ecological threat caused by high farming led to development of alternative farming models, which would better suit the society's life necessities. Japanese philosopher Mokishi Okada (1882-1955) was among the founders of the new ideology of farming forms. He maintained that agriculture should solve the following tasks:

- to offer foodstuffs, which not only support vital functions but also improve people's health;
- to be economically profitable for producers and consumers;
- to make produce in the quantity sufficient for satisfaction of the growing population's needs;
- not to disturb the biological balance in nature and be ecologically safe;
- to use rather simple, stable, and accessible methods and means of farming.

The following methods can be referred to as alternative farming techniques: Biointensive Mini-Farming, Biodynamic Agriculture, Effective Microorganism Technologies, **LISA** - Low Input Sustainable Agriculture, and a number of others. These models are based on deep understanding of the natural processes. They are aimed at improvement of the soil's structure and reproduction of their natural fertility and are called to facilitate formation of

ecologically stable agrolandscapes. Organic Farming is among these agricultural production systems.

For most people, the term “organic farming” means agricultural practice that does not use synthetic pesticides and fertilizers. However, this is a specific feature rather than a definition of this agricultural production system. **The Organic Farming Research Group of the United States Department of Agriculture (USDA)** suggested the following definition in 1980:

Organic farming is a system of agricultural production, which prohibits or considerably limits input of compound synthetic fertilizers, pesticides, growth regulators, and food additives to animal feeds. This system is based, as much as possible, on crop rotation, utilization of plant residues, humus, composts, legumes, plant manures, organic production wastes, and mineral raw materials, minimum cultivation, and biological methods of pest control with the purpose of increasing fertility and improving the structure of soils, provision of valuable plant nutrition, and combating weeds and various pests [4].

Later, in April 1995, the **USDA National Organic Standard Board** suggested a somewhat different definition of the term:

Organic farming is a system of ecological management of agricultural production, which supports and improves the biological diversity, biological cycles, and biological activity of soils. It is based on the minimal usage of artificial raw materials and agrotechnical methods, which regenerate, support, and improve ecological harmony [5].

According to this definition, the key principle of organic farming is usage of materials and technologies that support the ecological balance in natural systems and facilitate formation of stable and well balanced agroecosystems. It is noteworthy that the main goal is optimization of “health” and productivity of the soil fauna, plant and animal world, and human society.

According to a definition proposed by the International Federation of Organic Agriculture Movements (**IFOAM**):

organic agriculture unites all agricultural systems that maintain ecologically, socially and economically advisable agricultural production. These systems make use of the natural potential of plants, animals, and landscapes and are aimed at the agricultural practice’s harmonization with the environment. Organic farming significantly reduces the input of external production factors (resources) by putting a limit to usage of the chemically-obtained fertilizers, pesticides, and pharmaceutical preparations. Instead, in order to increase the yield and protect crops, organic farming employs other agrotechnical methods and various natural factors. Organic agriculture adheres to the principles that have been formulated by the specific local social, economic, climatic, historical, and cultural features [6].

According to the official standpoint of **IFOAM** [7], production and processing of organic produce is based on many principles, among which it is impossible to single out the priority ones, because all of them are equally important. They are as follows:

- production of high-quality foodstuffs, raw materials, and other goods in sufficient quantities;
- harmonization of the work to be performed within a production system with the soil's natural cycles and live systems and plant and animal worlds;
- acknowledgement of a wider social and ecological impact beyond and within the organic production and processing system;
- preservation and improvement of soils' fertility and biological activity with the assistance of local cultural, biological, and mechanical methods, instead of employment of external production factors (resources);
- preservation of agricultural and biological diversity at farms and the surrounding areas through introduction of a stable production system and wild-life protection;
- facilitation of proper use and preservation of water resources with all their live organisms;
- usage of renewable resources in the production and processing systems to the maximal extent and prevention of their losses and pollution;
- facilitation of local and regional production and movement of goods to consumers;
- achievement of a harmonious balance between crop production and animal production;
- ensuring of conditions in animal husbandry under which domestic animals exhibit natural behavior;
- usage of packaging materials that are subject to recycling or can decompose in a biological way;
- making sure that each person engaged in organic farming and processing enjoys the living conditions that satisfy the requirements of a healthy and safe environment;
- creation of a socially-oriented chain "production – processing – sale", which would comply with the ecological requirements;
- recognition of the fact that it is important and necessary to study the local experience and traditional forms of farming.

Proceeding from the above-mentioned, in the author's opinion, it would be most adequate to define the core of organic farming as:

a system of agricultural management of agroecosystems, which is based on the maximal usage of biological factors contributing to an increase of soil's fertility, agrotechnological methods of plant protection, and a set of other measures that provide ecologically, socially and economically expedient production of agricultural products and raw materials.

As we can see, preservation and improvement of soil fertility is the key issue during introduction of organic farming technology. The following measures facilitate achievement of this goal:

- optimization of agricultural crop location within each farm;
- efficient use of available organic fertilizing resources (humus, turf, turf-and-humus composts, putrid mud, organic wastes of agricultural production, and others);
- taking the advantages of biologization of farming due to increased areas under perennial grasses, application of bacterial substances, and expansion of areas under green fodder;
- recommencement of planned chemical land reclamation, which would make use of local deposits of limestone, chalk, and marl;
- usage of local raw material resources for improvement of soil's fertility (sapropels, phosphorites, zeolites, glauconites, phosphate slag, defecate, and others);
- cessation of unadvised expansion of areas under sunflower crops, which can further deteriorate the phytosanitary state of the soil, and simultaneous promotion of alternative oil crops, such as soybeans, rapeseeds, mustard, oil-bearing flax, hemp and others;
- overall introduction of minimal-tillage regimes, wide-cut tillage methods, and direct sowing technology;
- application of contour structural arrangement of the territory in land use, which presumes optimization of the natural environment's state within the territory of watersheds or ravine and gully systems;
- optimization of water-protecting and field-protecting woodiness;
- overall restoration and support of a uniform system of field-protecting forest belts, as the most important method for stabilization of agrolandscapes and fixation of field boundaries (for maintenance of ecological balance and improvement of productive capacities of agricultural lands).

In different countries, there are some terminological differences in defining of the notion of organic farming, which often lead to misunderstandings. For example, term "Organic Farming" is officially accepted in English-speaking EU countries. "Biological Farming" is the equivalent term used in France, Italy, Portugal, and Benelux countries, whereas Denmark, Germany, and Spanish speaking countries use the term "Ecological Farming". Organic farming technologies are rapidly spreading all over the world. For example, in EU countries only, the number of the so-called "organic" farms has skyrocketed over 20 times in the past 15 years (Figure 1).

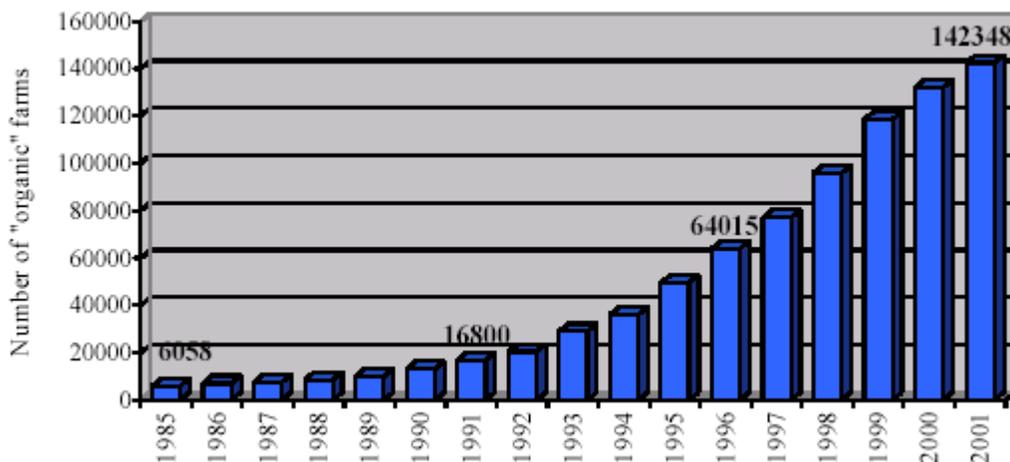


Figure 1. Growth dynamics of the number of “organic” farms in the EU countries [8]

It is expected that before 2010, Europe will be using up to 30% of its agricultural lands for organic farming. Table 1 contains the most recent available statistical data on development of organic farming in EU countries and the countries that are acceding to the EU on 1 May 2004.

Table 1. Organic farming in EU countries (15+10), as of 1 January 2003 [8]

Country	Area under organic production, hectares	Area under organic production, %	Number of “organic” farms	Average size of one “organic” farm, hectares
EU members				
Italy	1 230 000	7.94	56 440	21.8
Great Britain	679 631	3.96	3 981	170.7
Germany	632 165	3.7	14 703	43.0
Spain	485 079	1.66	15 608	31.1
France	419 750	1.4	10 364	40.5
Austria	285 500	11.3	18 292	15.6
Sweden	193 611	6.3	3 589	53.9
Denmark	174 600	6.51	3 525	49.5
Finland	147 943	6.6	4 983	29.7
Portugal	70 857	1.8	917	77.3

Netherlands	38 000	1.94	1 528	24.9
Greece	31 118	0.6	6 680	4.7
Ireland	30 070	0.68	997	30.2
Belgium	22 410	1.61	694	32.3
Luxembourg	2 141	1.71	48	44.6
Acceding countries				
Czech Republic	218 114	5.09	654	333.5
Hungary	105 000	1.8	1 040	101.0
Slovakia	58 706	2.4	82	715.9
Poland	44 886	0.3	1 787	25.1
Estonia	20 141	2	369	54.6
Latvia	20 000	0.79	225	88.9
Lithuania	6 769	0.19	430	15.7
Slovenia	5 280	0.67	883	6.0
Cyprus	52	0.04	15	3.5
Ukraine	164 449	0.4	31	5 304.8

Markets for organic agricultural produce and foodstuff are already active in many countries worldwide, first of all, in the USA and EU countries, which have established and are successfully operating the corresponding systems of certification, marketing, and sale of organic produce. For example, already almost 40% of US residents consume organic produce. Notably, 37% of these people consume these products more frequently than once a day, 39% consume organic produce at least once a week, and only 24% consume organic produce irregularly [9]. The following reasons form the motivation for consumption of organic produce:

- ecological safety of foodstuffs, high quality and freshness of produce;
- top taste quality of organic produce;
- preservation of the natural environment in the production process;
- absence of genetically modified organisms.

In Ukraine, there also is a category of people (5% of the total, according to some estimates), first of all, in large cities, that have motivation for consumption of organic products and that are ready to pay a 40-50% higher price for them [10]. This group of consumers makes up the initial niche for organic produce in Ukraine and will be the basis for formation of the domestic market for such produce in the future.

The global sales of the organic agricultural produce totaled around USD 23-25 bln. in 2003, whereas this figure is forecast to reach USD 29-31 bln. in 2005. For example, in Great Britain only, during two years (1998-2000) organic produce sales went from USD

300 mln. to USD 1.2 bln., whereas in 2003, this figure reached USD 1.5-1.7 bln. (Table 2).

Table 2. Forecast of development of the global market for organic produce [8]

Country	Retail trade in 2003 (mln. USD/EUR)*	Share in the total foodstuff sales, %	Annual increments in 2003-2005, %	Retail trade in 2005 (mln. USD/EUR)
Germany	2,800-3,100	1.7-2.2	5-10	-
Great Britain	1,550-1,750	1.5-2.0	10-15	-
Italy	1,250-1,400	1.0-1.5	5-15	-
France	1,200-1,300	1.0-1.5	5-10	-
Switzerland	725-775	3.2-3.7	5-15	-
Netherlands	425-475	1.0-1.5	5-10	-
Sweden	350-400	1.5-2.0	10-15	-
Denmark	325-375	2.2-2.7	0-5	-
Austria	325-375	2.0-2.5	5-10	-
Belgium	200-250	1.0-1.5	5-10	-
Ireland	40-50	<0.5	10-20	-
Other European countries**	750-850	-	-	-
Total Europe	10,000-11,000	-	-	-
USA	11,000-13,000	2.0-2.5	15-20	-
Canada	850-1,000	1.5-2.0	10-20	-
Japan	350-450	<0.5	-	-
Oceania	75-100	<0.5	-	-
Total	23,000-25,000	-	-	29,000-31,000

* The following assumption is made: 1 USD = 1 EUR

** Finland, Greece, Portugal, Spain, Norway, Poland, Hungary, the Czech Republic, Estonia, Latvia, Lithuania

EXPERIENCE IN APPLICATION OF ORGANIC FARMING TECHNOLOGIES IN UKRAINE

According to data with **IFOAM** statistical bulletin, as of the beginning of 2003, 31 Ukrainian farms had “organic farm” status. The area under organic production totals 164 449 hectares or 0.4% of the total agricultural land area [8]. During the seminar *Current tendencies in growing and marketing of organic produce* (L’viv, March 2004), the following data was made public: as of the beginning of 2004, there were 69 certified organic farms in Ukraine, whereas the area of agricultural land under organic production totaled 239.5 ths. hectares, which gave Ukraine a rank of 16 among over 100 countries

[9]. Detailed information about territorial location of these farms is now unavailable, but most of them are known to be located in the southern region of Ukraine (Odesa and Kherson oblasts), in western Ukraine (Chernivtsi, Ternopil', and L'viv oblasts), as well as in Poltava oblast.

Two of the most well-known “organic” farms in Ukraine are agricultural joint-stock company (AJSC) **Obriy** and private enterprise **Agroekolohiya** (Poltava oblast, Shyshaky district, Mykhailyki village). These farms specialize in growing of agricultural and technical crops, as well as in dairy and meat production. Since 1976, AJSC **Obriy** has been the basic farm for production testing of soil-protecting technologies in crop growing, methods on expanded reproduction of soil fertility, and production of ecologically clean foodstuffs. Soil-protecting biological farming technologies began to be introduced in **Obriy** since 1979 and organic farming technologies – since 1990. The key specific features of the technology applied in AJSC **Obriy** and private enterprise **Agroekolohiya** are as follows [11]:

- Application of soil-protecting technologies, while the soil is tilled for all crops at the sowing bed depth (up to 5 cm), whereas the soil's surface is mulched with stubble. The technical support of soil-protecting technologies is based on usage of wide-cut heavy disk harrows, wide-cut heavy cultivators, disk-crowfoot rollers, and grain packer drills or sowing machines of direct sowing.
- Soil fertility is reproduced through application of organic fertilizers, such as humus, noncommercial portion of the harvest (grain and leguminous crop chaff, granulated stems of sunflowers, corn, sorghum, tops of root vegetables, stalks, etc.). The enterprises also employ green manure crops after harvesting.
- The standard rate of organic fertilizer input, recalculated for semi-fusty farmyard manure, is equal to no less than 24-26 tonnes per one hectare of area under crop rotation. The farmyard manure recalculation coefficient is equal to 5 for stubble and to 1.5 for green manure.
- Synthetic mineral fertilizers are not used. Take-up of phosphorus and potassium by plants during the first years of application of organic farming technologies was compensated by transfer of inaccessible forms of these chemical elements to the forms accessible for plants. Subsequently, phosphorite flour and sylvinite were applied to the soil. Take-up of nitrogen was compensated by inclusion of 20% of perennial legume grasses in crop rotation system. When the non-commercial portion of the harvest is left on the field, it is necessary to apply 10 kg of nitrogen primary nutrient per tone of stubble. Synthetic nitrogen fertilizers, which are applied to the soil for utilization of the harvest's non-commercial portion, completely convert to organic nitrogen after two weeks of composting with stubble.
- In order to protect crops from weeds, agrotechnical methods are used (such as cultivation, bastard fallow) and cruciferous green manure crops are sown, because they have allelopathic effect on weeds. Preventive agrotechnical and biological methods are used for protection of crops from pests and diseases.
- Land use and crop structure should be optimized.

There is a widespread opinion in scientific literature that if farms refuse to apply chemicals in their agricultural production, the crop yield will go 30-40% down. However, experience of AJSC **Obriy**, for instance, confirms the fact organic farming technology application allows not only to keep productivity at the previous level but it can even increase crop yield (Figure 2). Experience of these farms indicates that application of soil-protecting techniques in organic farming requires, first of all, 3 times less tillage time, 2-3 times less fuel, and 10 times less mineral fertilizers (only nitrogen fertilizers are applied in the quantity of 10 kg per one tone of organic residues) in comparison with conventional farming technologies.

Problems of transition to the organic farming model

In order to be used for organic farming, agricultural land should correspond to certain requirements as for the level of their pollution with harmful substances, such as pesticides, heavy metals, radionuclides, etc. Experts of the **Institute of Agrochemistry and Pedology of the Ukrainian Academy of Agrarian Sciences** have analyzed the ecological and toxicological conditions of Ukrainian arable lands and determined the zones suitable for growing of ecologically clean produce [12]. The research indicated that man-caused pollution of land in Ukraine is local rather general (Figure 3). Apart from that, there still are areas, where pollution levels are considerably lower than they are in West European countries.

According to some data [11], there are four small regions in Ukraine, in which soil pollution indicators are still at safe levels and where it is possible to grow ecologically clean produce, which would comply with world standards:

- **Northern-Poltava region** includes most of Poltava oblast (excluding the regions adjoining the towns of Kremenchuk and Komsomol's'k), north-western part of Kharkiv oblast, north-western part of Sumy oblast, north-eastern part of Chernihiv oblast, and eastern parts of Kyiv and Cherkasy oblasts (the left-bank parts).
- **Vinnitsia-Prykarpaty region** stretches in a belt about 100 km wide from the town of Popil'nia in Zhytomyr oblast to the north of Vinnitsia, Khmel'nits'kiy, and Ternopil' oblasts towards the city of L'viv.
- **Southern-Podil'ya region** includes a small north-western part of Vinnitsia oblast, south-western part of Kirovohrad oblast, the north of Mykolayiv oblast, and the northern part of Odesa oblast.
- **North-Eastern-Luhans'k region** includes Milovs'kyi and Novopskovs'kyi raions of Luhans'k oblast.

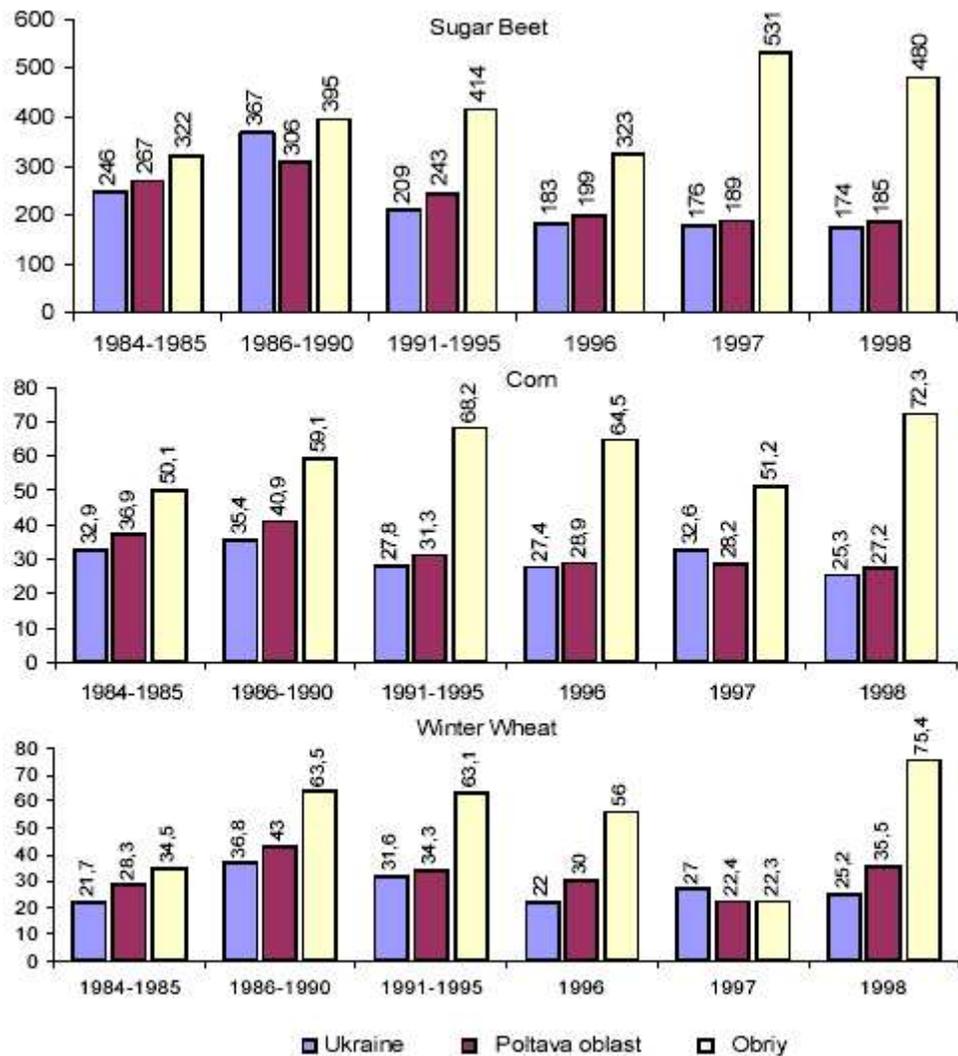


Figure 2. Yields of the main crops reported by AJSC **Obriy**, in comparison with the yields registered in the oblast and in Ukraine, decimal tone/hectare [11]

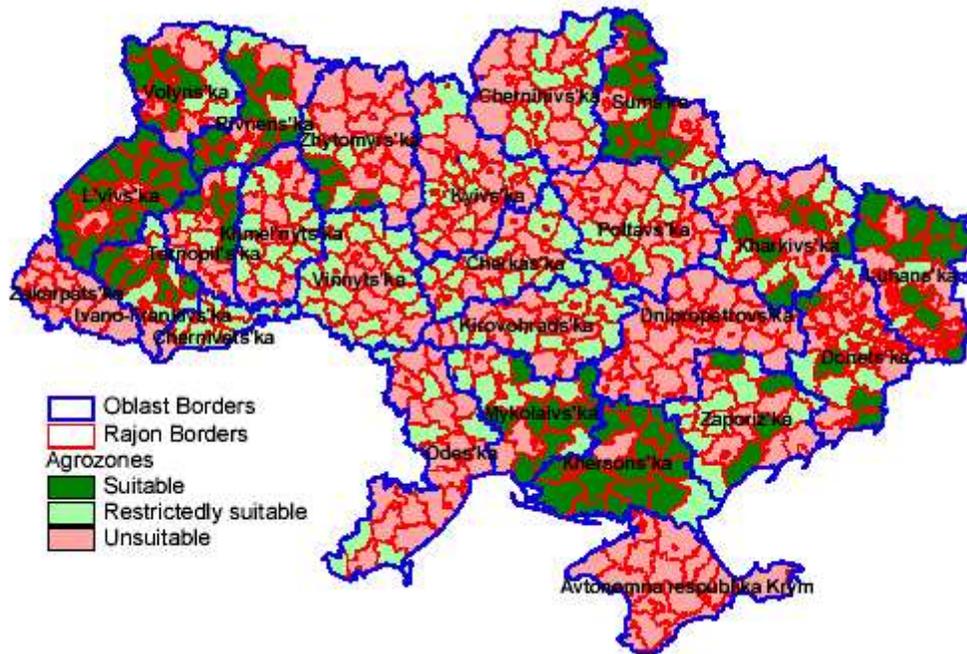
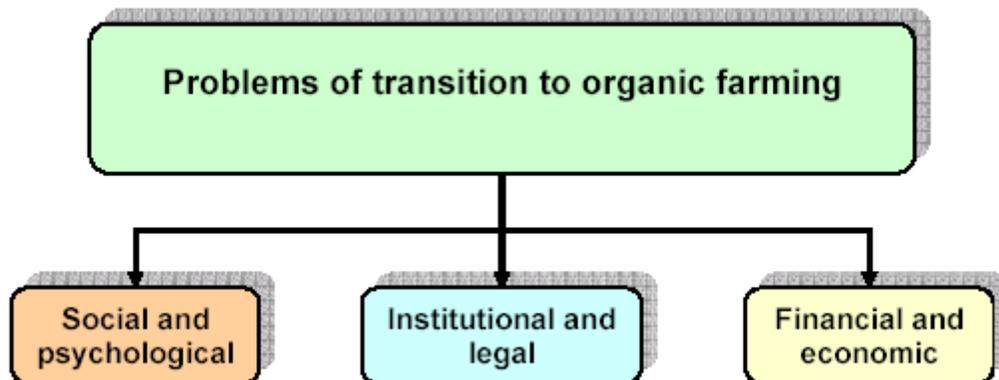


Figure 3. Suitability of Ukraine’s territory for growing of ecologically clean produces [12]

However, it is not sufficient only to have territories that are potentially suitable for organic farming. It must be made clear that transition from traditional (high-farming) agricultural production technologies to organic farming (the so-called conversion period) takes rather long time (2-5 years, according to some sources) and is accompanied by certain risks and the necessity to resolve a set of problems. As a result of analysis of the factors that impede widespread introduction of organic farming technologies, it is possible to divide them into three large groups:



Social and psychological problems connected with introduction of organic farming technologies in Ukraine, first of all, include the population’s and producers’ low

awareness of organic farming (understanding of these technologies' main features and peculiarities, their advantages, and possible problems during the implementation process).

A second important problem is the population's low ecological consciousness (first of all, among the rural population) and poor technological culture of agricultural production at all levels, from personal farms to large agricultural associations. This group of problems also includes absence of corresponding courses on organic farming theory and practice at educational institutions of different accreditation levels. Apart from the lack of education and ecological consciousness, it should be noted that people are not willing to change their firm stereotypes, which were formed during the long-lasting intensification period in agriculture, whereas innovation activity among managers and state authorities is low. Also the rural population is exhibiting a difficult demographic situation (de-population, age structure) and poor living conditions. Being in the situation when they have to survive, people take in anything new with distrust and caution and are not willing to put what they have at risk.

Institutional and legal problems connected with introduction of organic farming in Ukraine include the following ones:

- There is no corresponding legal and normative basis in the country. First of all, there is no basic law on organic farming and certification of organic produce, which would comply with the international legislative requirements.
- The country does not have an efficient national system for certification and control over organic farms' activities and quality of produce made by them.
- There is no respective internal infrastructure (associations/unions/centers for organic produce growers).
- It is necessary for Ukraine to integrate with international structures (EU, **IFOAM**) and get access to external markets for organic produce.
- There is a need in corresponding informational support (popularization of organic farming technologies, ecological education among the population and agricultural commodity producers, extension services to producers, special training for farm managers and workers).

Apart from the above-mentioned problems, there also are issues deal with carrying-out of the land reform and parceling of the land fund. It is necessary to keep the farms that have large land territory as they are, because it is unacceptable to mix arable crop rotation and soil-protecting crop rotations or fragmentation the last ones. Land parceling should be carried out on the territories where land in advance has been specifically structured in accordance with the safe drainage scheme. Parceling must be planned ahead, in compliance with such structuring schemes. Agricultural land redistribution or allocation should be made on the basis of schemes of agrolandscape soil-protecting planning and taking into account the existing soil-protecting and ameliorative systems.

Financial and economic problems connected with introduction of organic farming are as follows:

- No research has been conducted on markets for organic produce.
- There are risks connected with possible changes of the situation on the market for organic produce during the rather long conversion period (2-4 years).
- Temporary decrease of overall production may cause financial losses (this problem especially concerns the entities currently engaged in high farming).
- Extra financial expenditures are needed for purchase of special-purpose machinery and equipment (for example, stubble seeding machines, or combined tilling machine KA-4,2 “Agroekolohiya-01”, which simultaneously performs five operations: it cuts and pulls up weeds, crushes earth, planes the field surface, crumbles up lumps, and compacts earth to the optimal state).
- There is no operational mechanism for risk insurance in agricultural production.
- The state provides no financial support during the conversion period. Neither does it introduce incentives or grant subsidies for organic agricultural production.

In order to induce farmers to introduce new forms of agricultural production and support them during the conversion period, when financial losses are possible, governments of many countries provide them with corresponding financial assistance. For example, in 2001, Polish “organic” farms were granted subsidies in the amount of USD 108 per each 100 hectares of arable land, USD 38 per one hectare of pastures (grasslands) and around USD 150 per each hectare of perennial plantations. In addition, the state also partially refunded expenses on certification of “organic” farms. In Ireland, farms sized less than 3 hectares get a grant of EUR/hectare 242 from the state during the conversion period and EUR/hectare 121 after they have been given the “organic farm” status. This support is respectively equal to EUR/hectare 181 and 91 for farms that have land areas from 3 hectares to 40 hectares.

PLAN OF ACTION AIMED AT INTRODUCTION OF ORGANIC FARMING TECHNOLOGIES IN UKRAINE

Transition economies have no alternative to sustainable development. The earlier the public and government make their choice in favor of this concept, the lower the probability for development of system crisis will be, as well as risks of man-caused catastrophes and irreversible destructive processes in the natural environment. Taking into account high anthropogenization of the Ukrainian territory, its weighty industrial potential, high density of population (80 to 150 persons per 1 square km), the highest agricultural employment in Europe (18% of the population capable of working), a high portion of eroded lands (58% of the total agricultural land area), the highest percentage of tilled soil in Europe (79%), a low percentage of forest land, and a number of objective factors, it is necessary to make the ecological factor one of the priorities of the state policy on all levels. In order to gradually form a stable (well-balanced) agrosphere, it is advisable to work out and practically implement a national program on ecologization of agricultural production. Organic farming can become the cornerstone for such program.

The worldwide experience indicates that development of organic farming is accompanied by creation of additional work places in rural areas, new opportunities for small farms, improvement of rural societies' viability, and other social advantages, which are highly important for Ukraine [13]. In the long run, organic farming will enable the country to agree and harmonize economic, ecological, and social goals in the agricultural sphere. Common benefits from introduction of organic farming are as follows:

- agriculture's independence from industrial chemicals, reduced energy consumption in agricultural production, substantially curtailed production expenditures and dependence on external financing;
- ecological advantages – minimization of negative influence on the environment through prevention of soil degradation (erosion, high acidity, salinity), preservation and reproduction of their natural fertility, cessation of pollution of water basins and underground water, cleaning of drinking water sources from toxic elements, reduced emission of greenhouse gases to the atmosphere, and carbon fixation;
- protection of biodiversity and the genetic bank of plants and animals, refusal from single-crop domination, and keeping animals in natural conditions;
- development of local, national, and international markets for organic produce, and fair international trade;
- an increased number of work places in rural areas, new outlooks for small-sized farms and rural societies, in particular, in overcoming of poverty;
- agricultural producers' independence in and greater responsibility for taking managerial decisions, inducement of innovation research in agriculture, more active usage of local experience and initiatives;
- availability of healthy, ecologically-clean, and full-value foodstuffs.

Proceeding from the above-mentioned, it is possible to state organic farming in agricultural production is a practical implementation of the basic principles of the sustainable development concept.

In order to make up and carry out a plan of actions aimed at introduction of organic farming technologies in Ukraine, it is necessary to create good conditions for wide partnership with the purpose of balancing the interests and needs of all the parties concerned and to get the following entities to take part in active cooperation: agricultural producers and their associations, state authorities and administrations, private consulting companies and certification institutions, consumers' organizations, scientific and educational institutions, and non-governmental organizations, which are engaged in resolving of ecological problems, institutional development issues, consulting services, and development of rural areas.

In October 2003, with the assistance of the **Swiss Cooperation Bureau**, a seminar was conducted in Kyiv, the capital of Ukraine. The following issues were discussed:

- Global tendencies in development of organic farming and markets for organic produce.
- Problems and prospects for making of organic produce in Ukraine.
- Certification of organic produce and its development in Ukraine.

As a result, a plan of action for the near future was worked out during the seminar. The plan contained the following key directions:

- popularization of organic farming and improvement of ecological awareness among Ukrainian agricultural producers through description of its advantages in the mass media, holding of special seminars and conferences, as well as through a network of existing consulting services;
- facilitation of creation of associations and unions of farmers engaged in growing of organic produce, establishment of ties with international organic movement organizations and western growers of organic produce, and studying of their experience;
- conducting of marketing research in respect of potential export markets for Ukrainian organic produce and development of the domestic market for these commodities;
- creation of the national system for certification of organic farms and produce, which would comply as much as possible with the world standards.

Informatization in a wide sense is an important factor, which contributes to development of agricultural production as the basis for the stable agricultural sphere. The task of establishment of a wide informational system for support of the country's agroindustrial complex is very urgent at the moment. Information technologies are developing extraordinarily rapidly. Hence, in order to achieve a high and stable production of competitive goods, one should have a possibility to take long-term and immediate decisions based on information about the processes developing on regional and global markets. Apart from that, producers should be able to alter their agrotechnology based on data on the current state of crops and agrometeorological conditions during the vegetation period. It should be possible to obtain such information from satellite observations of agrolandscapes and analyze them by using geographical information systems (GIS).

Working-out of a corresponding legislative and normative basis, which is maximally harmonized with the EU and **IFOAM** rules and standards, has been acknowledged as the most urgent task for introduction of organic farming in Ukraine. In order to achieve this goal, a working group on preparation of a corresponding draft law has been established with the active participation and support of the **Swiss Cooperation Bureau**. The working group includes representatives of the **Ministry of Agrarian Policy of Ukraine**, **Verkhovna Rada Committee on Agrarian Policy and Land Relations**, and **Agrarian Policy Coordination Council of the Cabinet of Ministers of Ukraine**.

Ukraine should not be standing aside ecologically-oriented processes during transformation of the agricultural production system. There is no more time for thinking. The world's markets for organic produce are being formed very actively, and in order to occupy its "niche" and become an official exporter of organic produce to the EU countries and to world markets, Ukraine should not delay resolving of the priority issues. Experience of the countries that are Ukraine's closest neighbors indicates that formation of corresponding legislation only may take years. For example, working-out of the Law on Organic Farming in Poland, which contains 33 articles and regulates production, processing, marking, and trade in organic agricultural produce and sets the rules for

certification and inspections, took approximately 3 years (beginning – 1998, entered into force in 2001).

In this context, experience and tools, which the International Federation on Organic Agriculture Movements (**IFOAM**), the European Union, as well as countries leading in introduction of organic technologies, in particular, Switzerland, can share with Ukraine, are highly valuable and useful.

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