

## ORGANIC FARMING AND ENVIRONMENT

### ORGANSKA PROIZVODNJA I OKRUŽENJE

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**Abstract:** *Since pollution has become disturbing in all parts of the world, it is important to identify all aspects of pollution and what affects it, in order to regulate and amend the problem. Continuous technological and technical progress, development of chemistry, plant breeding using chemicals and fertilizers, animal breeding using large amounts of physiological waste, liquid and solid manure, are all significant causes of pollution. Therefore, many companies make programs for ecological and sustainable agriculture. This paper aims at identifying the conditions that are important for organic production, but it also discusses natural resources and new agricultural techniques used in order to reduce pollution. It analyses the conditions for controlled production and identifies the measures necessary for sustainable development of high quality food, protection of the eco-system and soil quality.*

**Abstract:** *Како је загађење животне средине достигло забрињавајуће одлике широм света, важно је идентификовати све аспекте загађења, утицаја на њега, како би се оно регулисало и учинило бољим. Континуирани технолошки и технички прогрес, развој хемије, биљна производња применом хемијских средстава и минералних ђубрива, сточарска производња са производњом великих количина физиолошког отпада, чврсти и течни стајњак, условљавају занчајно загађење животне средине. Због тога многе компаније праве програме за еколошку и одрживу пољопривредну производњу. Овај рад наводи да укаже на услове који су значајни за органску производњу али и разматра природне ресурсе и нове пољопривредне технике за смањење загађења, анализирајући услове контролисана производње и идентификује мере за одрживи развој високо квалитетне хране, и заштиту еко-система, квалитета земљишта.*

**Key words:** *organic production, pollution factors, environment protection*

**Кључне речи:** *органска производња, фактори загађења, заштита животне средине*

### INTRODUCTION

Continuous population growth on Earth signals the problem of food supply. Through new findings and activities, man has succeeded in creating weed killers and pesticides, fertilizers to increase the return in plant breeding, machinery for quicker and more efficient execution of agro-technical activities as well as irrigation systems for more intensive production.

All these activities of man have positive effects on the raise of agricultural yield. However, they also have negative effects on the environment. Thus, for example, weed killers, pesticides and fertilizers affect agro eco-system, environment and biosphere, mechanized agriculture affects soil contraction, causing lower absorption of rainfall. The leftover water, which flows over the contracted soil, carries particles of harmful matters and chemicals, which directly pollute the environment, and it also affects the irrigation system which, then, causes changes in hydro-thermal and soil conditions, which, in turn, causes significant flow of nutrients into deeper layers and increases the amount of harmful biological agents.

The terms 'organic', 'ecological', or 'biological' agriculture describe the systems of agriculture where the dominant economical principles are in keeping with the ecological requirements. [1]

## **MATERIAL AND METHOD**

*1. Organic agriculture* - Sustainable development is a new, generally accepted, concept of the development of the human society, which is based on controlled development without any growth that would exceed the capacity of the environment and nature as a whole. Sustainability means life in reasonable comfort within the natural boundaries, it means living with nature without leaving great traces behind. [2]

There are many programs and ways to reach this system of sustainability in all segments of humanity. One of them is in food production and it is called sustainable agriculture. By introducing ecological principles into food production, we make the transition from traditional (conventional) agriculture into alternative or sustainable one, which is much more acceptable for the environment.

The interest in organic agriculture has risen in the past few years, as a reaction to the increasing ecological degradation, lower food quality and ever-increasing health issues for the human population. The consumers buy this kind of food mostly for health reasons or because it tastes better.

In order for a certain food product to be declared as organic, it must meet certain conditions. Therefore, it is not so easy to obtain a certificate of organically produced food. An international organization IFOM (International Federation of Organic Movements) has adopted the regulations for organic production and processing of agricultural products. According to these regulations, organic agriculture is a wholesome system of production that also includes, to a reasonable level regarding the environment (health of the environment, biological diversity, biological cycle), the economical aspect of food production and processing. It includes the implementation of the agronomical, biological and mechanical methods, and declines the implementation of harmful synthetic materials and natural supplements known to be harmful for humans.

Regardless of present difficulties, organic agriculture is moving in the direction of harmonizing the development with the market needs and environment protection, as well as reducing quantity at the expense of quality of food, favouring those agricultural techniques which best use the natural resources (recycled bio-masses and energy) and minimize waste.

In order to start organic agriculture in one area, it must comply with the precisely defined conditions. Those are: isolation of the plots, cattle farms and processing capacities from possible sources of pollution, satisfactory quality of the irrigation water, and harmonized development of plant and animal production, together with trained experts and producers in the area of organic agriculture who are obligated to constantly update their knowledge. [2]

*2. Environment protection* - Matters used in organic agriculture must not be harmful or have negative impact on the environment. The material must not increase unacceptable pollution of the surface or underground water, air or soil. All the stages in its production must be checked and the relevant characteristics to be taken into account are as follows: degradability, acute toxic effect on other (non-target) organisms, long-term chronic toxic effect, chemically synthesized products and heavy metals.

All the used matters must be degradable to the level of CO<sub>2</sub>, H<sub>2</sub>O and/or their mineral forms. Matters with high toxic effect on other organisms must have half-life period of five days. Natural substances not marked as toxic do not need to be degradable in a limited period.

When a material is relatively highly toxic for non-target organisms, a limited usage is necessary. Measures taken must provide survival of such organisms. Maximal dosages must be determined. If there is no possibility to apply adequate measures, such material must not be allowed.

Matters that accumulate in organisms or systems of organism and those that have, or are suspected to have, mutating or cancerous characteristics must not be used.

Matters must not include harmful amount of artificial chemicals. Chemically synthesized products can be accepted only if they are the same as natural.

3. *Analysis of the conditions of the basic elements in environment* - Identification and quantitative mark for the matters that have considerable toxic emissions can be established for each category of data or category of level of influence. To label a matter as toxic for air, water, soil or humans, it is necessary to conduct more elaborate tests of influence of input and output of all unit processes.

*Air quality* - Major sources of pollution are:

- power plants;
- heating objects (during heating season);
- transport and vehicles that have motors with internal combustion;
- utilities;
- waste disposal sites, and
- various activities (gases and aerosols due to: smoking agricultural areas, dusting, spraying, cleaning, smoking);
- industrial and port facilities, rivers and sewers.

*Drinking water quality* - Intensive urbanization throughout the last century could not be followed by the appropriate infrastructure in a town or village, due to high costs of development, exploitation and maintenance of the infrastructure network and installations. This inevitably produced negative consequences for the environment.

In the facilities that purify well water, we have the following production processes: aeration, introduction of ozone, filtering through filters and introduction of chlorine, which are based on the parameters characteristic for the quality of underground water. This requires considerable amount of money, which lacked in those days.

Physical and chemical tests of water samples from village water supplies often show that this water is deficient, mainly because it has matters of geological origin such as manganese and iron.

According to *The Rule Book on the Quality of Drinking Water*, the quality of drinking water does not comply with legal norms in the majority of suburban and rural areas, due to higher levels of iron, manganese and ammoniac. The conclusion is that water supply systems do not satisfy the needs of the residents either with respect to the quality or to the quantities they provide, which, then, leads to diseases.

The diseases caused by some agents from water can occur as a result of inadequate preparation of the drinking water, uncontrolled disposal of waste, contamination during distribution etc. Water is a potential cause of a whole set of diseases. The most common ones are intestinal diseases: enteritis, intestinal typhus, par-typhus, bacillary and amoebic dysentery, and hepatitis. Infection also occurs because of the consumption of the products contaminated by water.

*Wastewater* - Considering the fact that sewerage infrastructure does not satisfy the needs of the town and the industrial zone, wastewater is let unpurified into water streams, melioration canals, not watertight septic pits and soak-aways, which leads to soil pollution, as well as surface and underground water.

If it is considered that subterranean water is used as water supply, it is obvious that uncontrolled exhaust of wastewater causes pollution of unprotected spring zones as well as the possible transport of polluting substances to the basic water complex.

Also, a small number of industrial objects from the city centre has connection to the sewage system, in which the technological wastewater is exhausted without being previously treated. Because of that a substantial quantity of Nitrogen, Mercury, Methylmercury and petrol derivatives is registered in wastewater and mud of most canals. /3/

*The quality of soil* - Waste management in municipalities is based only on activities of collection, transport and deposit, which is not compliant to contemporary experience and practice in dealing with municipal waste. The collection of waste in appropriate containers is performed only in 20% of households in suburbs and villages. In some residential areas the collection of waste is not organized at all.

Waste is deposited in waste disposal site and mainly without applying environment

standards. Waste disposal sites cover substantial area in the vicinity of residential areas. The process of spreading and flattening as well as covering with inertial material, is performed very rarely in waste disposal site. Selection and collection of secondary raw material from individual waste are not organized where the waste is produced, whereas in waste disposal site its selection is conducted in a primitive and unhygienic way. Municipality resolutions of cities define the way of dealing with waste, but, due to the lack of funds, it is not conducted properly. Waste is of different origin: communal, industrial, medical and agricultural.

*Medical waste*, produced in medical organizations, almost always is a mixture of common communal rubbish, infective, pathological and laboratory waste, pharmaceutical waste, organic substances, packaging, medicines, disinfection substances, and, sometimes, low radioactive and dangerous chemical waste. This type of waste includes disposed medical instruments and pressurized vessels. In medical organizations the medical waste management is mainly conducted in a wrong way, opposite to regulations, and due to that, there is a risk of causing infection. The transport of medical waste from a medical organization to a waste disposal site is inappropriate and is not performed on a regular basis.

*Pharmaceutical waste* includes: waste from production and preparation of medications, medications with expired date, medical supplements and medicines.

Agricultural waste that mostly contains pesticides and biocides is mainly deposited in municipal waste disposal site.

In the territories of most municipalities there are not especially designed areas for dangerous waste. However, such waste is deposited in municipal waste disposal sites and in the area of certain production organizations.

*4. Protection of environment* - In Serbia the choice regarding the strategy of protecting and promoting environment, is presented through implementation of environmental standards. The most recent approach to resolving environmental issues is represented by industrial ecology i.e. industrial ecosystems, which are designed to imitate the natural chain of nutrition. It means that the waste from one production entity is used as raw material in another production entity. An industrial system could be presented by a group of companies linked to the main manufacturer of raw material, secondary raw material manufacturer, semi-products and finished products producer, including the companies for treatment and recycle of waste. So, applying the most modern accomplishments of ecological engineering and industrial ecology concept would provide environment management. In the future, the efficient protection of environment will not be possible if it is based on traditional technological solutions and if it is only the concern of companies' environmental agencies.

*Effort to ensure clean air* - The strategy's general objectives include: preventing the additional air pollution caused by new emitters, limitation of the existing air pollution to the allowed level, constant improvement of air quality.

*Drinking water management* - The basic objectives for protection of water resources, quality of water aquatic systems are: maintaining integrity of water ecosystems and its efficient protection, people health protection through provision of quality drinking water supplies and the control of contagious diseases in water environment as well as trained labour for building capacities and maintaining water quality.

Water resources management in Serbia should be developed within the frame of adopted local authorities policy regarding people's health, production of quality food, its preservation and hygienic distribution according to regulations, lessening the effects of natural disasters, protection of environment and preservation of natural springs base.

*Wastewater management* - According to effective legal regulations for releasing effluent in a natural recipient, it is necessary previously to work out a detailed analysis of waste water

state in particular locations, work out documentation for the purpose of checking the confirmation or modification of existing concepts and directions for building main collectors in a particular location, as well as the technology of waste water improvement in the future.

Also, it is necessary to create the plan for resolving problems of industrial organizations waste waters i.e. create projects for reconstruction and upgrading the existing devices for pre-treatment and common treatment of waste waters.

5. *Overhaul measures of agricultural soil* - One of the main pre-conditions for protection of soil quality is related to provision of financial and technological capacities, which would ensure:

- Inspection of soil pollution on the surfaces where dangerous substances have leaked;
- Inspection of soil pollution in the agricultural areas and river banks;
- Inspection of soil pollution in the closer area of water supply spring;
- Inspection of soil pollution in the locations of traffic zones;
- Inspection of soil pollution in the vicinity of industrial objects;
- Inspection of radioactivity in soil.

*Soil calcification* - Inspection of agricultural soil has shown that in the central part of Serbia more than three quarters of the soil are highly acidic (almost a million hectares), which is an additional difficulty in the process of primary agricultural production. Due to that and for the purpose of creating better conditions for production, it is necessary to apply the appropriate measures to decrease acidity of the agricultural soil.

Agricultural expert agencies have already submitted the list of farmers and land area accompanying the total quantity of ground limestone. The ministry has signed the contracts with the best deliverers of the material for nine locations. /4/

6. *Analysis of soil to apply the appropriate fertilizers* - The proper application of organic and mineral fertilizers can be performed only upon completed soil analysis. Because of that this measure has an exceptional significance in increasing productivity. However, a small number of producers has performed the regular soil analysis and has asked for recommendation to apply fertilizers, due to, either lack of understanding or the costs. Agricultural stations, faculties and colleges are trained to provide such services. This measure's objective is to improve production through proper and timely application of fertilizers and for producers to adopt the habit of soil analysis on a regular basis.

## CONCLUSIONS

The main advantage in organic agriculture is in production of high quality food as well as food that is safe for both human and animal health. It is known that most diseases of a modern man are caused by inappropriate nutrition and consumption of spoiled food. The second advantage is the preservation and protection of environment, which provide clean soil, water and air for the future generations as well. The main postulate in the concept of sustainable development is to preserve the environment for the future generations as well. An important role of the science is accompanied by the protection of environment as one of the basic postulates of the research and its application in practice. According to experience we know that each mistake in application of technical and technological solutions causes serious pollution in the environment. /5/

Regarding agriculture, undeveloped technologies and, due to that, less productivity of such plant production systems are the disadvantages of the food production. Plenty of effort and research is necessary in order to improve organic production and discover all the complex mechanisms in the nature in order to accomplish balance between the mankind need for food and other materials and the nature.

## LITERATURE

- МИРЕЦКИ, Н., *Органска пољопривреда*, Интернет магазин „Пољопривреда“, 2002.
- СРЕДОЛЕВИЋ ЗОРИЦА, *Економски проблеми еколошке пољопривреде*, Пољопривредни факултет, Београд, 2002.
- СУБИЋ, Ј., ЦЕЦИЋ НАТАША, АРСИЋ СЛАВИЦА, *Анализа достигнутог степена загађености животне средине Општине Панчево и мере за њену заштиту*, Научни скуп – Животна средина ка Европи, 2006.
- ЖИВКОВИЋ, В., ПОПОВИЋ, В., СИМОНОВИЋ, З., *Органска пољопривреда као фактор одрживе Пољопривреде и руралног развоја – искуство земаља у транзицији*, Тематски зборник: Пољопривреда у транзицији компаративна искуства и перспективе, Институт за економику пољопривреде, Београд, 2004.
- x x x *Програм расподеле и коришћење средстава субвенција у области пољопривреде, шумарства и водопривреде за 2006. годину*, Министарство пољопривреде, шумарства и водопривреде Републике Србије, Београд, 2006.