



**Vasko ZLATKOVSKI, MSc**

# **ORGANIC FARMING**

ORGANIZATION,  
CROP ROTATION AND CERTIFICATION

**March, 2017**

**Publisher:**

Goce Delcev University - Stip, Faculty of Agriculture

**Title:**

**ORGANIC FARMING  
ORGANIZATION, CROP ROTATION AND CERTIFICATION**

**Autor:**

M. Sci. Vasko Zlatkovski

**Language editor:**

Vesna Petrova

**Technical editor:**

Slave Dimitrov

**Supported by:**

Erasmus+, Project number 2015-1-MK01-KA202-002855

**Project title:**

„Developing OER and Blended Modules for Agriculture and Rural Development”

CIP - Каталогизација во публикација  
Национална и универзитетска библиотека “Св. Климент Охридски”, Скопје

631.147(035)

ZLATKOVSKI, Vasko

Organic farming [Електронски извор] : organization, crop rotation and certification / Vasko Zlatkovski. - Stip : Goce Delcev University - Stip, Faculty of agriculture, 2018

Начин на пристап (URL): <https://e-lib.ugd.edu.mk/en-681>. - Текст во PDF формат, содржи 23 стр., илустр. - Наслов преземен од екранот. - Опис на изворот на ден 16.01.2018. - Публикацијата е во рамки на проектот: “Open educational resources for agriculture and rural development”. - Библиографија: стр. 23

ISBN 978-608-244-482-6

а) Органско земјоделско производство - Прирачници  
COBISS.MK-ID 105805578

## Contents

ORGANIC FARMING PRINCIPLES .....	3
Biodiversity .....	4
Integrity .....	4
Sustainability .....	4
Nutrition .....	5
Natural pest/weeds control .....	6
ORGANIC FARMING .....	7
Integrity .....	7
Crop rotation planning.....	7
Green manure and cover crops.....	10
Manure and composting .....	11
Biological pest control.....	13
Inter cropping and associated cropping .....	16
Hygiene.....	17
Soil tillage.....	17
Mulching .....	18
CERTIFICATION PROCESS.....	19
Origin of the certification body.....	19
Selection of certification body .....	20
Filing an application for inspection .....	20
Inspection .....	20
Preparation of pesticides of plant origin .....	22
Literature .....	23

## ORGANIC FARMING PRINCIPLES

The best way to understand organic farming principle is to give an effort to forget all your previous understandings related to agriculture. To “open” your mind for new information and techniques that will be presented to you:

- To accept that in organic farming it is not the amount of yield we are aiming at, but the quality of the product;
- The motive to turn organic would not be just the profit itself, but the production of healthy food;
- The production of any crop must in harmony with the environment (to avoid destruction of other living organisms – plants, insects, animals etc., just to gain benefit of growing crops);
- To understand that losses due to damages by pests are acceptable;
- To understand that when we irrigate, we do not do that in order to gain higher yields, but to provide optimal living conditions for soil organisms (macro & micro);
- Soil tilling operations must be performed when conditions are right, not when it suits us;
- To keep immaculate records about all farm operations and activities;
- And, finally, to collaborate with experts from whom you will seek for an advice in order to obtain optimal results.

Still, the most important decision you need to make, what to grow must be depended on the natural conditions present in your area since not every crop is suitable for growing anywhere. Therefore, organic farming is the art of techniques that apply in agriculture as it includes collaboration and dependence of various disciplines (chemistry, soil science, meteorology, phytopathology, physiology etc.).

Various principles characterize organic farming and among most important the following are to be considered: biodiversity, integrity (harmony with nature), sustainability, maintaining soil fertility, natural control over pest population and integrity.

## **Biodiversity**

Carefully looking over at different living systems, it is easy to conclude that the systems in which multiple living beings are present have bigger chances of survival rather than systems in which only few living beings occupy the territory. Therefore, farms which grow more crops create better living conditions for beneficial organisms that have significant role in pollination, control of population of harmful pests etc. The diversity we are talking about is as important for beneath and for the living beings above the soil, since it is of utmost importance to have optimal living conditions for the beneficial microflora, which operates constantly providing better circulation of nutrients, transfer of organic matter in form acceptable for plants, reduces conditions for diseases, nitrogen fixation etc.

## **Integrity**

Harmonization of agricultural activity is one of the priorities to be achieved if successful farm operation is to be expected. The harmonization process does not consider only adjusting agricultural activities to the natural conditions, but integration of several multiple activities into one. Putted into "ordinary" words, the farm needs to apply activities based on the GAP (Good Agricultural Practice), through growing intercrops, cover crops, growing plants on which beneficial pests will nest and shelter, crop rotation etc. The result of following these techniques will result in reduced amount of expenses for pest & disease control, as well as in reduced costs for maintaining soil fertility. For instance, on a typical organic farm plant production takes place as well as animal husbandry. Animal necessities (fodder, grains) already require application of various growing crops and techniques. The legumes do nitrogen fixation out of the atmosphere, needed for optimal cereal growth while the manure is considered as nutrient source, which are returned to the soil by complex system natural recycle procedure.

## **Sustainability**

In addition to the greater economic stability organic farms are achieving, it is to be pointed that these farms are making additional income by using various governmental funds for environmental protection. On the other hand, knowing that the yields in organic farming, in certain occasions are lower than those obtained in farms applying IPM, the subsidies organic farms are receiving cannot be considered as source of profit. Adding that the number of organic farms worldwide is on the rise while subsidies funds are depleting it should not be understood as too pessimistic if said that subsidies for certain crops will continue to be on the down side and for some of them will cease to exist. Therefore, organic farmers must follow market trends and to respond in order to the customers' demands by producing what they want to buy. Of course, with "acceptable price".

This kind of entrepreneurship makes organic farmers always a step ahead in adopting new production techniques compared to farms producing following IPM techniques (conventional).

Numerous research point to the fact that while trying to adopt production techniques that lead to achieving the ultimate goal (reduced production expenses, obtaining higher percentage of I class production, maintaining soil fertility), farmers that follow organic principles are applying GAP principles much faster as compared to the farms that apply IPM protocol.

## Nutrition

If looked a bit more carefully on the way living organisms are assimilating nutrients needed for their development, we'll notice the quite number of similarities but large number of differences as well. Plants, for instance, have the ability through a process known as photosynthesis to synthesize sugars which in different synthetic process are used for production of proteins. Animals, on the other hand, do not possess such possibility so providing energy sources is obtained by consuming plants or other forms of animals.

But, what is common for both living forms (plants and animals) is the necessity for another forms of materials – the minerals. They obtain these materials alongside with sugars and proteins through extraction from the food they receive from the outer world. Plants, through a process of absorption also receive minerals, accompanied with whole bunch of different materials (vitamins, proteins, antibiotics etc.). Still, the absorption system in plants and animals (also known as digestive system) differs a lot. The plants are directly depending on so called “external absorption process of the soil system”, which happens in the vicinity of the plant’s root system (also known as rhizosphere). This means that plants depend on the processes in which matter is processed in the root zone area with assistance of soil’s microflora (which actually transforms the matter in usable form). Animals, on the other hand have their system integrated in their body. This means that they can travel big distances in a search for source of energy, while the plants cannot. And the whole organic nutrition philosophy lays exactly in this. In providing optimal growth conditions for the microbial systems in the soil which are processing different minerals and organic forms in a format usable by the plants. This approach has best results if avoiding to use toxic materials and avoiding to apply bad practices in soil tillage (both are harmful to the soil microbial system).

On the other side of this “organic approach” (the soil systems processing different type of materials and turn them into usable nutritional forms for plants) in the conventional farming system there is a practice to neglect the soil’s absorption ability, and to provide the plants with accessible (usable) forms of nutrients directly.

From the aspect of organic farming this approach creates several problems:

- Incorporating huge amounts of fertilizer (soluble nutrient forms once, twice or several times a year) can lead to their concentration around plant’s root system, which on the other hand can cause blocking plant’s ability to absorb other nutrients, which, ultimately, will lead to imbalanced plant nutrition making it more disease susceptible, vulnerable to pest attack or to reduce the quality of the fruits;

- Absence of activities that contribute to the creation of conditions for development of soil microflora, leads to its reduced number in population. As a result to this plants will have reduced access to vitamins and other forms and materials created by these microorganisms. Furthermore, organic matter content will continue to fall and soil will become dependent on adding synthetic inputs (fertilizers);
- Providing nutrients in conventional fertilization practice in many cases is limited in adding small number of microelements (most often N, P and K), as a contrast to the scientifically proven soil fertility necessity for at least 13 elements; and
- Adding high quantities of soluble nutrient forms (fertilizers) imminently leads to increased cases of weed problems.

## Natural pest/weeds control

Regardless of the growing principle (conventional or organic) farmers will always face the problem of controlling pests/weeds. Still, the appearance of weds/pests is not considered as a kind of problem issue. These indicators (pests/weeds) are used to understand the damage level of the eco system in which agricultural production takes place. As frequent and bigger is the weds/pest presence the bigger to the eco system is in place. For instance, part of the weds become dominant if pH value changes, some are emerging as a problem due to soil's structure change and creation of anaerobic conditions, then, others are appearing due to fertilizer overdose etc. There is a belief that insects are attracted by weaker plants, plants that are in poor condition which is a result of an imbalanced nutrition.

Massive numbers of a certain pest, in normal conditions are quite rare. And even it would occur, it is going to be of a short time period, due to the constant presence of their predators which in reasonable time frame are bringing the pest population in normal figures. In damaged systems, in which natural control mechanisms (predators etc.) are not functioning pest problems are frequent and what is worse, they become more intensified and cause great damage.

Today, it is considered that uncontrolled use of pesticide is one of the cause for losing natural balance in the eco-system.

# ORGANIC FARMING

## BASIC PRINCIPLES & PRACTICES

Biodiversity	Diversification of activities	Sustainability	Natural plant nutrition	Natural pest management	Integrity
Crop rotation	Crop rotation	Crop rotation	Crop rotation	Crop rotation	Buffer zones
Green manure	Manure	Manure	Manure	Manure	Record keeping
Cover crops	Composting	Composting	Composting	Cover crops	
Manure	Inter cropping	Inter cropping	Natural fertilizers	Composting	
Composting	Farm planning	Biological control	Foliar fertilizers	Inter cropping	
Inter cropping	Mulching	Farm planning		Biological control	
Farm planning		Manure		Farm planning	
Buffer zones		Composting		Hygiene	
		Mulching		Soil tillage	
		Buffer zones		Fire	
				Natural pesticides	

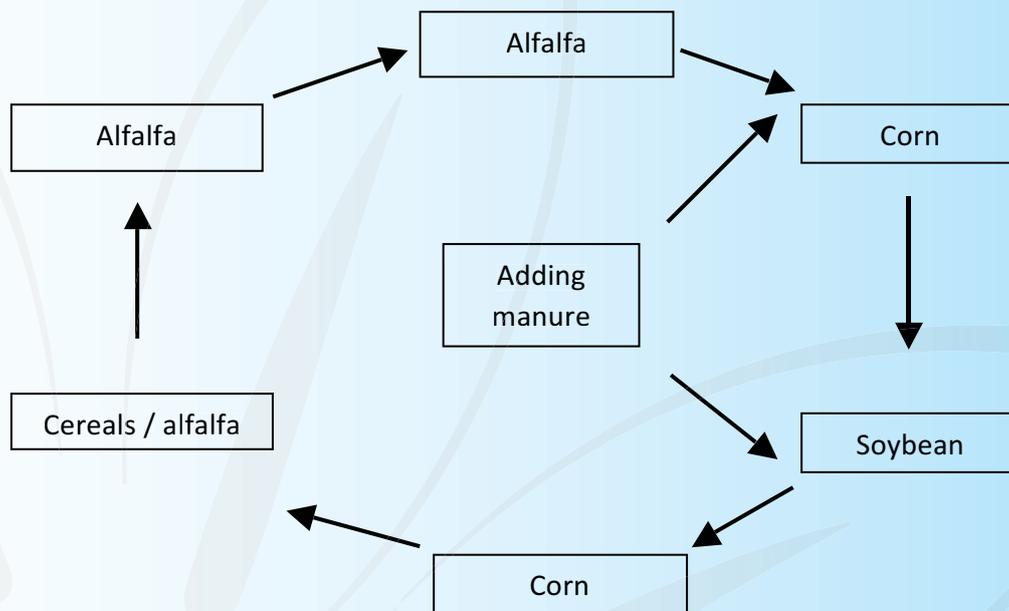
### Integrity

The term integrity relates to the steps that are taken on certain place in order to assure the consumers that they are receiving the kind of quality they are paying for. The consumers have every right to expect that not only the food that is declared as organic responds to that type of agricultural activity, but that they are protected from any other kind of pollution.

Such expectancy is provided by vast number of organic farmers by respecting and following the organic farming principles. Yet, still, there are producers who due to the nature of the production process are required to fulfill additional conditions. In this context, regular bookkeeping is a must in organic farming, yet not welcomed by all of the farmers as they find this activity waste of time. When we talk about additional activities, it is to be known that these activities refer to the possibility of building buffer zones, which need to prevent the penetration of chemical agents applied on the neighboring plots, where conventional farming is in practice.

### Crop rotation planning

This term refers to the change of growing crop on one plot in period of time. The crop rotation is organized to maintain soil fertility and to contribute to the control of pests on a tolerant level. GAP in organic farming is especially related to good rotation scheme, especially to legumes. They provide great nitrogen quantities needed for the future crop (i.e. corn, which needs nitrogen in large quantities). There several kinds of crop rotation, depended on the soil type and weather conditions in certain area.



**Figure 1 - Crop rotation in organic farming adjusted for corn growing**

A close overlook on the scheme can help to understand the philosophy of this type of crop rotation:

- Legumes are fixing nitrogen, needed for future crops, which do not possess such ability;
- There is a breaking up of a development cycle to the specific pests (specially to wire worms, which can cause significant level of damage);
- The development cycle of several diseases is broken up;
- Improved control over perennial weeds (by having cereal crops; while annual weeds through cuttings of alfalfa);
- The manure is applied just before planting of the corn takes place (corn needs large nitrogen quantities);
- Cash crops can be sold on the market or to use on the farm (added value through their use as a feed to the animals, of which wool, meet, milk is expected as main product).

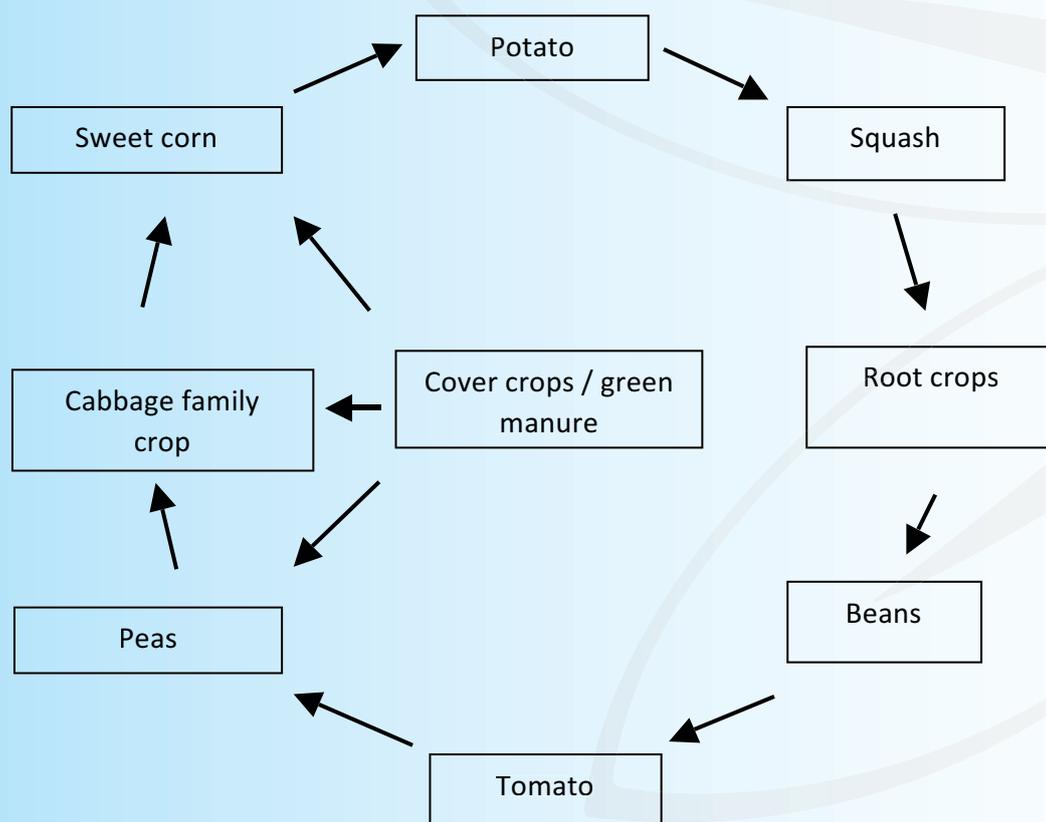
Setting proper crop rotation scheme for vegetables is a different story. Regardless of the fact that these plants are different than the small grains it is also important to consider fixation of the nitrogen from the atmosphere. It is recommended to set 8-year crop rotation cycle. In this scheme:

- Potato, comes after the sweet corn. Research results point to the conclusion that the corn is one of the crops that contribute for the potato to achieve high yields;
- Sweet corn, comes after cabbage family crop, due to the fact that the corn does not tend to have reduced yields when cabbage family crop precedes it. Furthermore,

cabbage family crop can go along with legume crop, which will be used as green manure crop. After this green manure crop is to be inserted in soil next spring, it will be ideal for the development of sweet corn;

- Cabbage family crop, inherit the peas, as this crop leaves the plot quite early, leaving the plot “clean” and with possibility the plot to be used for production of green manure;
- Peas, comes after growing tomato as this crop needs growing in lanes and due to the possibility the tomato to be sown in substrate resistant to low winter temperatures and will not cause problems with emergence and development;
- Beans, comes after root crops as it is not susceptible to their presence (carrot for instance);
- Root crops, can be grown after potato. These crops are considered as good soil cleaners (the area on which they are cultivated can be maintained clean without major problems).

This 8-year cycle for vegetable crops is presented on figure 2.



**Figure 2 – Crop rotation for 8-year crop rotation**

Other than this possibility, there is another crop rotation principle, based upon 4-year exchange of crops: leaf crop → fruit crop → root crop → legumes → repeat of the cycle.

Not less important is the proper selection of pre-crops for vegetable crops. The preview to the scheme of suitable pre-crops is given in the table 1.

**Table 1 – pre-crops preview for vegetables**

Crop	Pepper	Tomato	Cucumber	Carrot	Onion
Pre-crop	Peas, bean	Peas, bean	Tomato	Cucumber	Tomato
	Early tomato	Early tomato	Onion	Potato	Winter cabbage
	Cabbage	Cucumber	Early potato	Cabbage	Early tomato
	Watermelon	Watermelon	Legumes		
		Onion, carrot	Winter cabbage		
		Grass			

### Green manure and cover crops

Green manure is a crop that will be plowed during vegetation season in the top soil layer in order to improve soil characteristics. Unfortunately, this cropping techniques has been abandoned for number of years for the sake of growing crop all season long. However, lately there are incentives for commercial growth of green manure crops as main crop.



*Self-emerged cover crops (legumes)*

Main reason for establishing cover crops is for preserving soil characteristics and nutrients within it. Both techniques (green manure & cover crops) are contemplating quite well, considering that cover crops are mainly used for green manure before main crop takes place.



*Self-emerged cover crops (legumes and grass)*

Main effect is obtained if cover crop takes place out of the main growing season, or along with the main crop, while best performance result will be achieved if the cover crop has nitrogen fixation characteristic.



*Peas as cover crop in vineyard*

## Manure and composting

Manure and compost traditionally represent most applied forms of organic fertilizers. Ideally, on a typical farm both plant and animal production takes place, so taking manure to the field can be considered as a part of the closed cycle of nutrient recycling. On the other hand, in reality, farms that grow plants are not usually associated with animal husbandry activity, hence the manure needs to be brought from elsewhere.

Such practice raises concern with inspectors and producers as large quantities of manure are produced only on large farms. And on those farms not every production element is under strict control (kind of feed given to the animals, possibility for heavy metal pollution, antibiotics, pesticides, etc.). Hence, use of manure from large farms is not allowed in organic farming.

Another issue that is raised quite frequent is food safety. In situation when concern over microbiological food safety is on the rise, so is the use of unfermented/raw manure (primarily in the USA and EU countries).



*Machine for compost mixing*

One of the best principles for manure application is by applying it composted. This procedure stabilizes the nutrients, creates favorable conditions for microbial growth and finally, has positive effect over the soil and growing crops. Perhaps, one of the most positive things is the fact that the composting can be performed on the farm itself. The by-products (compost tea) have special application in organic farming. The preparation for composting starts by collecting materials rich with nitrogen (so called "green part"). Collected material needs to be chopped to 3-5 cm length. After this procedure is performed the mixture is mixed and water is added to the optimal capacity. The fermentation takes 3-6 months for which time the microorganisms will digest the organic matter, the pile warms-up itself thus achieving "low temperature Pasteurization". By this, the largest number of harmful microflora is destroyed. The composting mixture should not be compressed as for the proper fermentation oxygen is needed. The place where fermentation takes place should not be exposed to direct sunlight. If the fermentation process is uninterrupted or in any case without development of undesired processes, the composted organic material is with fine odor, has tiny structure, slightly acid pH, has lots of macro and micro elements, vitamins etc. Due to its porous structure the composted material has light specific weight, which reduces transport costs. As comparison, if not composted manure is used, necessary amount of manure that needs to be applied is almost 30 t/ha, while if composted manure is used, the total amount does not exceed 10 t/ha.

The preview to the main characteristics of different kind of manure is given in table 2.

**Table 2** – Characteristics of different type of manure

Kind of animal	Ratio solid : liquid part	Humidity	Manure		
		H <sub>2</sub> O	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
Cattle	80 : 20	85	5,0	1,3	3,7
Pigs	60 : 40	85	6,4	3,0	5,4
Sheep & goat	67 : 33	66	11,0	3,5	10,8
Poultry	100 : 0	62	14,9	7,0	3,5
Horse	80 : 20	66	7,4	2,2	6,5

Source: Brady, The nature and properties of soils (1974)

The approximate content of composting mixture is given in table 3.

**Table 3** – Approximate content of composting mixture

Organic matter	N	P	K	Ca + Mg	pH	Ratio C:N
30 - 70	0,3 – 1,0	0,2	0,8	2,5 – 3,5	7,5 – 8,0	<12:1

Source: Sarapatka, Urban et al. (2009)

The preview to the most frequent materials used for composting and C:N ratio are given in table 4.

**Table 4** – Most frequently used composting materials

Green component	Ratio C:N	Brown component	Ratio C:N
Fresh manure (with straw)	30:1	Straw	70-100:1
Fermented manure	15-20:1	Corn stalks	60:1
Cut grass and green leaves	15:1	Dry leaves	50:1
Garden/lawn weeds	20:1	Saw, wood, paper	200-750:1
Food residues	15:1	Bark (hard wood)	100-400:1
Fruits remains	25-40:1	Bark (soft wood)	100-1000:1
Alfalfa hay	12:1	Moss	58:1
Clover leaves	18:1	Branches	200-400:1
Urine (cattle, sheep)	4:1	Rice hull	110-130:1
Blood meal	3:1	Newspaper paper	400-850:1
Coffee dry	20:1	Pine leaves	80:1

## Biological pest control

Organic farming is directly related to the presence of: beneficial insects (predators & parasites), vectors for disease spreading, birds that feed on other organisms and with organisms that have their role in controlling pest population. If these organisms can be considered as control tool it is to be stated that this tool is often used along with other agricultural techniques and methods that keep the pest number under control. There are even cases in which due to strict follow-up of the bio-control procedures, farmers do not undertake any other additional activity for pest control.

Of course, there are opinions which define successful biological control in organic farming as direct benefit from undertaken activities aimed for maintaining or improving soil fertility. The exchange of crops grown in one area, use of cover crops as well as other practices for soil tillage, contribute to the achievement of the permanent control over pest presence in certain area. It should be remembered that absence of use of pesticide has positive effect on biocontrol.

Lately, farmers are beginning to purchase and later to release organisms used in bio-control (lady beetle, wasps of Trichogramma family, and in certain cases domestic animal are used: geese, ducks, chicken, sheep) in controlling weeds.

Lately, farmers do have a practice to build temporary or permanent shelters where beneficial insects, spiders and other beneficial organisms can develop their population without disturbance. Such practice is known as **farmscaping**.



*Predators' natural habitat*

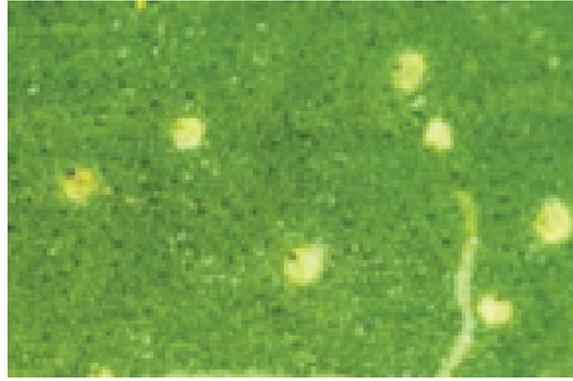
Irrelevant to the applied growing technique (conventional, IPM or organic) farmers will always face pest problem, for which they lose time and money. Still, in organic farming the presence of diseases and pests are not considered as a kind of punishment (loss).

They are understood as indicators of the level of disturbance in which certain eco-system is.



*Predator (P. persimilis)  
attacks pest (T. urticae)*

The bigger and larger their presence is, the bigger disturbance in the eco-system. For example, part of the weeds are becoming dominant if soil's pH factor changes, others are becoming problem if disturbance of soil structure and appearance of anaerobic conditions occur, yet others appear due to excessive use of fertilizers. There is a belief that, in fact, insects are attracted by plants in poor condition, which occurs due to poor nutrition.



*Miner eggs*

In normal conditions, pest outbreak occur very rarely and short in time. This is due to the presence of their natural disease and enemies which in case of their drastic growth in population, bring their numbers back to normal. In the systems which irreversibly break-up these mechanisms, problems with the insects are frequent and what is of a concern they cause great damages.

Uncontrolled use of pesticides is considered to be the main reason for loss of balance in the nature, for which only use of natural pesticides is allowed. And only in case of emergency.



*Lady beetle as predator*

## Inter cropping and associated cropping

Growing two or more crops side by side is one of the strategies used to increase biodiversity.



*Associated cropping of beans, flower and lettuce*

In case this principle is applied on large plots of land, with use of highly mechanized equipment it is called inter cropping. If in case this principle is applied on small plots it is called associated cropping. Typical example is when we grow beans and corn. In this system beans contributes to the fixation of nitrogen, while the corn serves and support to the beans.



*Cover crop in orchard*

## Hygiene

Can be presented in various forms i.e.:

- Removing, burning or deep covering of plant residues which might be infected with disease or hold pest eggs;
- Destroy grass cover used for breeding of harmful insects;
- Cleaning the equipment of weed seed before entering on a new plot;
- Sterilization of pruning equipment.

Fully respecting mentioned forms can significantly reduce problem presence on a long run. However, which action will be implemented should be carefully chosen as implementing one method, even in best intention might cause problem in other form. For instance, maintaining the soil “clean” (no plant cover) can lead to erosion, loss of biodiversity etc. Well prepared and educated farmers can recognize this jeopardy and will use mentioned forms only in a case of emergency, rather than applying them on a daily base.

## Soil tillage

If properly implemented, this technique can contribute to the achievement of many positive outcomes: weed control, proper management of plant residues, soil aeration, keeping manure and other forms of natural fertilizers.

While conventional farmers are using chemicals regularly if to achieve above mentioned, organic farmers are acting in accordance to the organic principles and orient themselves to improved soil tillage. Recommendations about improved tillage are in relation to keeping plant residues and applied amount of fertilizers in top soil layer (bio active soil layer), rather than inserting them in deeper soil layers where anaerobic conditions are unfavorable for proper organic matter conversion. Therefore, it is not too hard to conclude that soil tillage in organic farming is equal to an art. Farmers that grow arable crops use wide number of practices: shallow cultivation – applied from sowing ‘till plants reach several centimeters and contribute to the delay of weeds’ development, thus enabling the plants to “claim” the area. If conditions are favorable and cause weed emergence another set of machinery is to be used (chisels, robots etc.) who have the ability to operate close to the plant.

Determining when the machinery is to be used is real art in managing organic farm, since each use of the machinery to bring in order things that out of control means additional costs. Therefore, knowing plants biology (when they emerge, favorable growing conditions) for experienced farmer can mean significant cut in costs. Also, too frequent use of the machinery reduces the content of soil’s organic matter since too frequent tillage leads to the higher oxygen level, which provides conditions for quick decomposition of the organic matter in deeper layers, which if conditions were normal, would happen on a longer run. Excessive use of machinery lead to reduced number of worms and destroying their tunnels made by their movement through the soil.

## Mulching

Quite frequent applied technique in organic farming. Large quantities of organic matter (straw, old hay, saw) are spread between the rows. By mulching we are regulating the soil's temperature and humidity, reducing favorable conditions growth and development of weeds and we're adding organic matter to the soil.

Other form of mulching is laying plastic foil, but it needs to be removed after growing season is over. Its use provides control over the spreading of the weeds over large area.



*Use of plastic foil for mulching*

In many cases organic farming is described as a system in which very little as an input arrives from outside of the farm. Of course, this is a false impression as there are farms that are totally dependent on materials provided elsewhere.

For instance, production of strawberries (annual variety), by using plastic foil as a cover, irrigated by drip irrigation system and use of soluble fertilizers. As presented, almost everything needs to be purchased out of the farm since it does not produce any of the necessary input. By the end of the growing season the plastic foil is removed from the soil while organic matter goes through regular treatment. Ideally, if conditions are favorable, second crop included in subsidy system might be introduced which will increase the level of exploitation of the soil. Especially if the subsidy for growing certain crop is higher than the others.

## CERTIFICATION PROCESS

Right from the very beginning a question imposes itself, why the necessity to certificate? Why, despite common expenses related to production, there is a necessity for another one?

The answer to these questions, no matter how simple is, still holds certain level of complexity for it needs to provide an answer to the following: certification process is a necessity for obtaining regular control over the production process and to issue an insurance to the customers that it is safe. The latter is of utmost importance since the buyers want and have the right to know that what they are paying for is exactly the one what they are looking for.

Regardless of the contradictory of the arguments as they may appear, the certification process offers security to the producers as well, since through the follow-up principle, in case of necessity each and every one can see who and at what stage had made a mistake. Finally, the certification process provides security to the trading companies too. Since data related to the production must be kept for 5 years it is easy to determine if and who had made a mistake during production, processing or marketing.

### Origin of the certification body

In accordance to the existing regulations, each country provides a possibility for domestic or foreign certification body to provide services on its territory. It is also important to know that both bodies (domestic or foreign) must follow the international regulations for inspection and certifying and to the domestic legislature for conducting similar control. In accordance to our regulation, every foreign institution which provides inspection and certification, can organize identical activity in the Republic of Macedonia after applies for and receives and accreditation from the Institute for Accreditation of the Republic of Macedonia. And to be granted one, it must be registered for conducting such activity on the territory of the Republic of Macedonia and to have at least one employee.

A basic dilemma rises in front, is there any advantage or disadvantage if there is only domestic or only foreign certification body? Well, both models have its own positive and negative sides.

Firstly, in case there is only domestic certification body. First step this institution must make is to adopt the working methodology and this has to be in accordance with the international guidelines for work of inspection/certification bodies. Then, a request for registration is submitted to the Institute of Accreditation and finally a request for enlisting in the register of companies that provide such services is submitted. By including into the Register of companies this body is given the permission to conduct inspection and certification activities on the territory of the Republic of Macedonia. If the body intends their certificates to be recognizes internationally, the body addresses to the relevant institution in the country in which it wishes its certificates to be valid.

Secondly, there is case when foreign inspection/certification body registers a branch office in the Republic of Macedonia, having at least one employee. In this case, the inspection/certification body submits a request to the relevant authorities to be granted accreditation to work and then to be listed into the Register of companies that provide inspection/certification activities. The certificates that are issued by this organization are valid on the territory of the Republic of Macedonia and in the territories of the countries in which the body has obtained permissions to operate.

## **Selection of certification body**

Which certification body will be selected is up to the customers to decide, based on the marketing decision on which market they wish to sell. Other elements that may make the decision is the price, the number of countries that recognize the certificate etc.

Farmers should thoroughly look for various elements about the certification body before they apply for inspection. This is due to the fact that some farms tend to believe they're suitable to turn organic, but in fact they are not. And once they submit an application for inspection bill will arrive. Therefore, it is best for the farmers to check their compliance to the organic principles once they start feeling they would like to turn to this kind of farming.

It is to be remembered that certification is on annual base. It is renewed each year.

## **Filing an application for inspection**

After the moment of deciding which body will conduct the inspection, the farm submits an application (usually a document downloaded from the body's webpage).

Farmers are obliged to possess all data related to the history of the farm, preview to all of the products for they require certificate, in case processed product is concerned they need to possess full preview to all ingredients that compose the final product, storage rooms etc. There are separate questionnaires meant for special kind of clients (green house producers, animal husbandry farms, distributors...).

## **Inspection**

After filing the application, the body sets reasonable time frame to their inspector to perform inspection. In order to do so, the selected inspector talks to the farm owner and set time and date for the visit. Until that moment farm owner needs to complete all required documentation. In case the owner is not available in the set date and time, he is free to refuse the inspection on the proposed date, but will have to wait on the inspector to set another one.

Once date is set and inspector arrives at the farm, the first step is to check the documentation: records on crop rotation practice, fertilization, soil tillage, soil analysis, etc. After this step is over, the inspection continues on-site.

After having all checked the inspector prepares report in which he explains his views about farm status. This report is submitted to the certification body and forwarded to the certification committee for review. The committee holds meeting upon schedule or on-demand. Based upon the certification body's policy, the decision of the committee can be:

1. Approved;
2. Approved with conditions that must be met prior certificate is to be issued;
3. Approved with conditions that must be met in set time period;
4. Denied. Reasons are noted in the document;
5. Delayed. There is more additional information needed before final decision is to be made.

The decision, if a farm is granted a certificate or not is delivered to the inspector that had performed the inspection. In any case, the inspector must not express an interest of the committee's final decision. After committee's decision the applicant receives notification. If there are things that must be met, the applicant signs and obligatory document or an agreement by which he/she accepts the terms and obliges to meet each and every one of them.

The agreement and the contract must be returned to the certification body.

In case conditional agreement is issued, the applicant must meet the requirements. In case these requirements are of significant character, another inspection might be scheduled. In case the application has been denied, the applicant has a right to appeal, following body's procedure.

After certificate is delivered, the operator is entitled to attach organic logo on its products and to market them as organic.

## Preparation of pesticides of plant origin

**Nettle** – (against aphids) 1 kg of fresh collected nettle (or 150 g dry) is put in 10 L pot. The nettle can be in blooming stage but with no seed. The nettle is covered with water. The level needs to be 4-5 cm above the highest plants. It is preferable the water to be collected from rain. The pot is covered and left for 12-24 hours. After that period, strain the liquid and so undiluted use for spraying. Places where aphids are located should be well wet. Spraying is repeated several times. Freshly made preparation there are tiny needles of formic acid which destroy the aphids. This preparation is suitable for smaller presence of aphids. Should their presence be with greater intensity, use of more effective means is recommended.

**Tomato** – (against cabbage moth) Take 100 g of fresh leaves of tomato and cover with 1 L of water and leave to soak for 3 h. After that the water used for spraying. Spray every second day during the laying of eggs of cabbage moth. The smell of tomato rejects the cabbage butterfly moth.

**Tomato** – (insecticide) Use 10 L of water to placed 1 kg of fresh or dry fern 150 g and left for 24 h to stand to soften. After that mass boil for 30 minutes and then strain the liquid and cool. It is used undiluted. Spray in winter during quiet weather. The liquid is stored in wooden or plastic keg.

**Tobacco** – (aphids) From the extraction of tobacco waste from getting dark liquid, 100 L of water is placed 5 L of liquid tobacco and 2 kg potassium soap. Mix well and then use for spraying.

**Onion** – (small spiders) Take 20-50 g onion peels and pour 1 L of water and leave 4-7 days. Then strain the liquid and spray undiluted. Spray against spiders and preventive against: powdery mildew, fire blight and fusarium. Besides plants, it is can be used for spraying on soil.

**Compost** - Made from the plant remaining used against: the compost from rotten fruits attacked by *Monilia* prevents attack of this fungus; Tomato compost made from parts attacked by powdery mildew prevents infection of the new powdery mildew on tomato.

**Chamomile** – If sown with cereals, enhances plant growth. Is believed that one chamomile plant protects 1m<sup>2</sup> area against the white worm.

**Marigold** - Suppresses the white worm with its smell that emits from its root, so worm escapes from the smell. It is especially used in symbiosis with carrots.

**Garlic** – Used as repellent against white worm. Garlic sprinkled among strawberries helps them to be more robust.

**Rennes** - Sprinkled on the edges of the potatoes helps getting healthy tubers and sprinkled besides cherry prevents against *Monilia* and rot.

## Literature

Балкан Биоцерт – сертификациско тело (2016), пристапено на 09.05.2016 <http://www.balkanbiocert.mk/obraci.asp>

*Васко Златковски* Министерство за земјоделство, шумарство и водостопанство - Скопје (2008), Водич за органско производство на Јаболка

*Владимир Гоергиев и Васко Златковски* Министерство за земјоделство, шумарство и водостопанство - Скопје (2008), Водич за органско производство на цреша и вишна

*Ѓоко Данаилов*, Министерство за земјоделство, шумарство и водостопанство - Скопје (2008), Водич за органско производство на Винова лоза

*Chuck A. Ingels, Mark Van Horn, Robert L. Bugg, P.Rick Miller*, University of California Sustainable Agriculture Research & Education Program (2008): Selecting the right cover crop gives multiple benefits

*George Kuepper & Lance Gegner*, National Centre for Appropriate Technology (2004): Organic crop production overview

*IFOAM (International Federation of Organic Agriculture Movements)*, Basic Standards for Organic production and processing, Basel, Switzerland (2000)

*Министерство за земјоделство, шумарство и водостопанство*, Правилник за начинот, постапката и методологијата за вршење стручна контрола во органското земјоделско производство, Скопје (2007)

*M. H. Malais and W. J. Ravensberg* (2004): Main pests of greenhouse crops and their natural enemies

Процерт – сертификациско тело (2016), пристапено на 04.05.2016 <http://www.procert.mk/informacii2.html>

*Ulrich Köpke*, Institute of Organic Agriculture, University of Bonn: Rotation for organic farming: Its aim and implementation



This brochure was prepared under Erasmus+ project “Open Educational Resources for Agriculture and Rural Development”. Project number 2015-1-MK01-KA202-002855

Expressed thoughts in this brochure do not necessarily represent the feelings and opinion by the donor.