



EU4Youth



EU4Youth:

School Garden for Development of Agricultural Entrepreneurship  
International Technical Assistance Project

# **Guidelines**

## on the Programme of the Training for Pupils

### **“Organic Agriculture”**

*(Pilot version)*

Author-compiler

**Vladimir Nikolaevich Pustoshilo**, a specialist in educational programmes, a teacher of the 1<sup>st</sup> qualification category, a consultant for the sustainable development, an author of 6 educational programmes on organic farming for pupils.

**This publication has been produced with the support of the European Union and Green Cross International. Responsibility for the content of the publication rests with “Green Cross Belarus”, and can in no way be taken to reflect the views of the European Union and Green Cross International.**

## **Introduction**

These guidelines have been developed within the framework of the EU4Youth International Technical Assistance Project “School Garden for the Development of Agricultural Entrepreneurship”, funded by the European Union and co-financed by Green Cross International. The Project is aimed at creating a network of training and production incubators for the development of modern agricultural entrepreneurship, professional and social growth of young people in poor rural areas.

The Guidelines are designed for school teachers, trainers of industrial incubators “School Garden”, rural youth and everyone interested in this topic.

The Guidelines are focused on providing trainings for rural pupils and have an average level of complexity.

The Guidelines consist of modules divided into sections. A section contains main topics necessary for mastering a module as a whole. Each topic includes development of trainings and recommendations for conducting individual exercises.

# Content

## Organic Agriculture

<b>Explanatory note</b>	<b>6</b>
<b>Section 1. Introduction to organic agriculture</b>	<b>9</b>
<b>Training 1.</b> What food do people choose? Can products be not only delicious but also beneficial? Why is the organic production considered to be a promising niche in the market?	<b>9</b>
<b>Training 2.</b> The beginning of all beginnings... Soil is the foundation of organic farming	<b>14</b>
<b>Training 3.</b> Chemical or organic – it's your choice. Comparative analysis of organic and traditional farming	<b>21</b>
<b>Section 2. Agricultural techniques of organic farming</b>	<b>28</b>
<b>Training 4.</b> To plow or not to plow? Basic principles and agricultural techniques of organic farming	<b>28</b>
<b>Training 5.</b> Features of the application of basic technologies in organic farming: crop rotation, mulching, EM technologies, green manure and mixed planting	<b>36</b>
<b>Training 6.</b> To poison or not to poison? Protection of crops from pests, diseases and weeds using organic methods	<b>40</b>
<b>Training 7.</b> Many efforts or a great many of efforts? Features of growing the main agricultural crops using organic methods	<b>46</b>
<b>Training 8.</b> Large fields start with a small bed. Creating a system of organic beds	<b>52</b>
<b>Section 3. System of guarantees in organic agriculture. Certification</b>	<b>58</b>
<b>Training 9.</b> They know you, they trust you and they buy your production. Certification: a guarantee of a high price, trust between the producer and buyers of agricultural products	<b>58</b>
<b>Section 4. Laying out an organic site. Growing products based on the principles of organic farming</b>	<b>64</b>
<b>Training 10.</b> Features of the development and design of the site based on the principles of organic farming. Carrying out experiments in the beds	<b>64</b>
<b>Training 11.</b> From theory to practice. Growing agricultural products according to the principles of organic farming	<b>68</b>

<b>Training 12. Planning the launch of organic production</b>	<b>70</b>
<b>Analysis of the course</b>	<b>72</b>
<b>Appendix</b>	<b>74</b>
<b>Appendix 1. Exercises on getting acquainted</b>	<b>74</b>
<b>Appendix 2. Exercises to warm up the group at the training</b>	<b>80</b>
<b>Appendix 3. Reflection exercises</b>	<b>84</b>
<b>Appendix 4. Ideas for carrying out experiments in the school garden</b>	<b>91</b>
<b>Appendix 5. Options for experiments in the school garden</b>	<b>96</b>
<b>Appendix 6. Development of experiments for the school garden based on the experience of the demonstration site of the NGO “Green Cross Belarus”</b>	<b>100</b>
<b>List of additional literature</b>	<b>121</b>

## **EXPLANATORY NOTE**

One of the main tasks of rural areas is the production of agricultural products. Current agricultural production is based on intensive technologies.

Intensive farming methods contribute to the production of large quantities of agricultural products, which makes it possible to feed an increasing number of the population. At the same time, the drawbacks of these farming methods are also recognised, which has led to depletion and erosion of soils, general chemicalisation, human interference in the natural cycle, dependence of the crop on mineral fertilizers, pollution of water and soil with pesticides and herbicides. All the mentioned drawbacks have an adverse effect on human and animal health as well as the environment.

Organic farming is an alternative to intensive technologies. Its supporters use farming methods that correspond to the laws of nature and try to simulate natural processes in their farms. Therefore, this type of farming allows restoring the soil and maintain its fertility, makes it possible to grow an ecologically clean and safe crop without harming the environment, and requires less water for irrigation.

While the study of traditional farming methods is not difficult, there are far fewer opportunities to become familiar with organic farming methods and their development, especially in practice and in rural areas.

At the same time, the organic market is one of the fastest growing markets in the world. According to the study by Grand View Research, Inc. Observes, the organic food and beverage market was growing at an average annual rate of 15.5% during 2016-2020. The number of people constantly consuming organic products in the world has grown at least fivefold over 15 years and amounted to about 700 million people. It is planned that by 2025 the market volume can be up to 20% of the world market of all agricultural products. According to the International Federation of Organic Agriculture Movement (IFOAM), organic farming is practiced in 172 countries, 82 of which have their own laws in this area.

Thus, the development of organic farming is one of the promising areas for the sustainable development of rural regions and self-employment of the population. Taking into consideration a significant difference between the cost of organic products and products grown by intensive methods, an income from a personal plot can increase significantly, and as a result, the standard of living of the local population will increase naturally, and young people will have promising options for earning money, self-employment and further living in rural areas.

The training programme is designed specifically for pupils and young people so that they can familiarize with the basics of organic farming and their development. Moreover, it

gives them an opportunity to analyze various types of farming by themselves, to draw conclusions about appropriateness of using one or another method.

**Objective:** to promote the expansion of opportunities for self-employment of pupils and young people living in rural areas through the development of their knowledge, skills, competencies in the field of organic agriculture.

**Tasks:**

- Familiarize with intensive and organic directions of farming;
- Recognise the prospects of organic agriculture;
- Form the culture of farming, skills on an attentive attitude toward the land.

**Basing on the results of the training, the pupils will...**

**know:**

- Mechanisms of soil formations;
- Basic principles and features of organic farming;
- Basic principles and features of intensive farming;
- Agricultural techniques of organic farming.

**understand:**

- Difference between traditional and organic farming;
- Pros and cons of various types of farming.

**be able to:**

- Plan an organic vegetable garden;
- Form various types of seedbeds;
- Grow production taking into account the principles of organic farming.

## How to use these guidelines?

These guidelines contain training programmes on organic farming. **Training** is a method of active learning aimed at developing knowledge, skills and abilities, as well as social attitudes. The term “training” is used to refer to a variety of training sessions, but one of its main features is that all participants are actively involved in it. The training has a specific structure. There’s a “warm-up” at the beginning of each lesson. The "warm-up" of a group is carried out to activate interaction of all participants and create a friendly atmosphere. This stage is very important because it determines the effectiveness of the work during the training. The appendix to these guidelines contain some of the most popular forms for conducting a group “warm-up”. Facilitators and coaches are free to choose any necessary exercises for themselves, based on their experience and preferences.

In the main part of the training, various forms of work alternate. It is very important to maintain a good work ambience and to change activities in a timely manner. Depending on the interest of the participants and dynamics of the classes, a facilitator (a coach) can alternate and rearrange various exercises at their own discretion. If necessary, it’s possible to include active physical minutes and warm-up games (so-called “energizers”).

At the end of the training, it is obligatory to analyze and reflect. Various forms of analysis and reflection are given in the appendix or directly in the training description.

In these guidelines, the main emphasis is placed on the methodology for mastering the basics of organic farming, but all features of conducting trainings are not disclosed. It is assumed that facilitators or coaches are already experienced in teaching pupils or young people. If there’s lack of such experience, it is advisable to study the specifics of conducting trainings in more detail using other guidelines and manuals.

These guidelines have a holistic structure and a certain logic of material presentation, but this does not exclude a possibility of using trainings separately.

The guidelines have been developed for rural pupils and have an average level of complexity. If desired, you can simplify or complicate the level of the material.



## Section 1

**Training 1. What food do people choose? Can products be not only delicious but also beneficial? Why is the organic production considered to be a promising niche in the market?**

**Tasks:**

- Introduce the participants of the training to each other.
- Analyze a list of food products that are used in the participants' families.
- Show the prospects and availability of organic agricultural business in rural areas.

**Questions to consider:**

Where do food products come from? How do people choose products? How do food products differ? Are all of them beneficial? Is the organic farming a promising niche in the market?

**Expected results:**

There's understanding of the quality of food products, their origin and the prospects of organic agriculture.

**Materials for conducting the training:** markers, A4 paper, a blackboard, a chalk, a flipchart, a scotch tape, printed handouts.

### **STRUCTURE AND PROCESS OF THE TRAINING**

#### **Introduction. Acquaintance**

*Recommendations for coaches and facilitators.* In this part of the training it is necessary to let the participants get acquainted with each other (even if they do not meet for the first time). Particular attention should be paid to creating a friendly working atmosphere, identifying leaders and "difficult participants". Acquaintance can be carried out in different ways. Some ways of getting acquainted are given in Appendix 1.

#### **Main part**

**Block 1. Group work on the topic "Food Products: Their Origin, Quality, Benefits and Harm"**

**What food products do your families use? (10 minutes)**

The training participants are divided into groups of 3-4 people and make a list of food products that are used in their families (write down in a column on an A4 sheet). If there are any difficulties in compiling this list, you can invite participants to analyze the dishes that are prepared in the school cafeteria, highlighting their components.

### **Are all of the food products beneficial?**

Members of the groups highlight in red the 3 most harmful products in their lists, in their opinion, and in green – the 3 most beneficial ones. Then a representative of each mini-group justifies the collective choice.

### **Where do food products come from?**

On dividing a sheet of paper into three columns by vertical lines, the participants should write in front of each position where these food products are produced and how they get to their houses (are they grown, or bought in a store or in the market, from friends? etc.):

Food products	Where do they come from?	How do they get to your house?

The participants analyze the origin of food and how it gets to consumers.

### **Physical activity break or pause**

Recommendations for coaches and facilitators: it's possible to change members of the groups for further work.

### **How and why do people choose food products?**

It is necessary to prepare several samples of food, vegetables or fruits of different varieties and ask several participants in the training to make a choice and justify it. Then, each group presents its own algorithm for choosing products. As a result, a general algorithm for choosing food products is drawn up. If the groups have any difficulties, then a printed sample of the algorithm can be provided to them, which they can modify or supplement if necessary.

### **Sample of the algorithm for choosing food products**

#### **HOW TO CHOOSE PRODUCTS CORRECTLY – UNSPOKEN BUYER CODE**

The current variety of products on the shelves of shops gives buyers unlimited freedom to choose what they like for their table. However, the same diversity sometimes confuses consumers, since there are a lot of manufacturers and names of products, and there is little understanding which of them to prefer.

The answer to the main question “How to choose high-quality and inexpensive products?” is often obvious; you just need to take a closer look at the products themselves and the information indicated on them.

By adhering to a simple algorithm of actions, you can easily choose for yourself those products that will be not only tasty, but also beneficial, and not the most expensive at the same time.

## **Rules for choosing good-quality products**

### **1. Study the title carefully.**

In most cases, a standard product name is a synonym for the national standard quality. It means that "Sour cream" is appropriate (not "Nice Sour Cream" or "Smetanovna"), only "Condensed milk" is appropriate (not "A milk product with sugar"), etc.

### **2. Choose only those products that have an indication of the compliance with GOST.**

GOST (All-Union State Standard) – is a set of product quality requirements established by the state. Compliance with these requirements means that the product is safe for use and manufactured in compliance with all the necessary standards. Knowing what GOST a particular product should correspond to and finding its mention on the label, you will definitely protect yourself from outright fakes.

In most cases, manufacturers who declare the compliance of their products with GOST do not risk including ingredients that are not provided for by standards in the composition of sour cream or sausages.

Another thing is TC (technical conditions) indicated on a package. The standards for such conditions can be prescribed by the manufacturing plants themselves, which means they can include whatever they wish in their products, including harmful components not provided for by GOST.

### **3. Good-quality product cannot be the cheapest one.**

It goes without saying, if you buy products at the lowest price, you shouldn't hope for good quality, despite sweet promises on the label. Such a manufacturer will primarily save on raw materials by using the cheapest and most harmful ingredients. However, nobody can guarantee that the most expensive goods contain only ideal ingredients. We often overpay for the brand and name and get the food with the most ordinary properties for our dinner table.

When deciding on the choice of food products, it is best to opt for the middle-priced goods. Taking into account a great competition, their manufacturers strive to conquer buyers precisely by the quality of their products.

### **4. Choose products by well-known large manufacturers.**

This point of the algorithm for choosing products in a shop is closely related to the previous one. Large manufacturers of goods with good reputation that count on great demand, will not risk their good name for the sake of a moment's benefit. In most cases, their products can be trusted with rare exceptions.

### **5. Always look at the appearance of the product.**

If you see wrinkled packaging on the counter, deformed cans, old smudges, or smell stench, just walk by. All of these are the signs of improper storage, violations of transportation conditions and expiration dates. The food that we choose for our table should delight not only our stomachs, but our eyes as well.

### **6. Check out the expiration date.**

Every food product has its own expiration date after which it cannot be used. The shorter the overall shelf life of a product, the fewer preservatives and stabilizers are in its composition.

If you see there are a lot of different numbers on the packaging, the product was already stale but packed regardless. If you have chosen and brought home an expired product, you have every right to return it back. The shop is obliged to accept the damaged goods and return the money to the buyer.

### **7. Examine the composition of the product on the label.**

Information on the packaging is printed for a reason. There you can find all E-supplements (harmful and not), all substitutes for natural ingredients, the content of proteins, fats and vitamins, and even calorie content. Therefore, without trying, you can in advance exclude from your diet those products that seem hazardous and choose the most appropriate ones that correspond to your ideas about wholesome food.

*Source: <https://sostavproduktov.ru/kak-vybirat-produkty>.*

Generalization of the work in this block can be carried out by using a method of collective voting and combining it with a physical activity break. To do this, cards are printed and placed in different places in the classroom. The facilitator reads out a statement. The participants look for it and go to it, explaining whether they agree and at the same time briefly support their opinion.

People will stop eating, and food production will not be in demand.

People have always eaten and will continue to eat, so food production is promising.

People prefer eating tasty and healthy food but more expensive.

People prefer healthy food rather than tasty food.

There's a sufficient amount of food products in shops.

## **Block 2. Organic production is a promising niche in the market**

Each participant is given a piece of paper with the text below. The participant reads the information and underlines with a red marker those phrases that surprised them or made them think.

### **ORGANIC FARMING: PROSPECTS AND REALITY**

The organic market is one of the fastest growing markets in the world. Over the past decade, it has grown more than fivefold (from \$20 billion to \$90 billion). Thus, organic production has become no less profitable than the export of weapons.

According to the forecasts by Grand View Research, in 2018–2020, the organic market will continue to grow at a rate of 15-16% per year and will reach about \$212 billion in 2020-2022. It is planned that the volume of the market of organic products can be up to 20% of the global market for all agricultural products by 2025.

Currently, with 43% of the market, the USA is the leader in terms of the market volume of organic products. The EU countries and China lag behind the leader significantly.

Nevertheless, in terms of the amount of products consumed per capita, European countries are significantly ahead of all in the world. The number of people in the world who constantly consume organic products has increased at least fivefold over 15 years and amounted to about 700 million people. The main consumers of organic products are people with high or medium incomes living in prosperous developed countries.

In 2016, European countries recognized that the market of the consumption of organic products in the EU is growing faster than their production. Currently, Europe and the United States have begun to rely on emerging markets as the most promising in terms of ensuring consumption.

Probably, it means that the largest number of organic producers are in India, Uganda, Ethiopia and Mexico. Totally, more than 2.7 million producers and more than 58 million hectares of land under organic farming are certified in the world. In terms of the number of certified lands, Australia is the absolute leader - the country has 27 million hectares of land.

At the same time, almost 70% of the certified lands in the world are pastures. The certification of pastures is simpler, and financial investments in maintaining them in an organic state are minimal. However, the amount of land under organic crop production is more important today; there are no more than 15% of all arable land on the planet.

Source: <http://rosorganic.ru/news/organic-farming-prospects-and-reali.html>

Then the participants share their views.

Task: to assess on a 10-point scale the following statements and justify the assessment.

Statement	Points	Justification
Organic farming is promising in the world		
Organic farming is promising in my country		
Organic farming is promising for me		
I would like to do organic farming		

**Recommendations for coaches and facilitators:** in case of low activity in the group and in the presence of "difficult" participants, it is necessary to ask open leading questions and stimulate mental activity.

### Reflection

**Recommendations for coaches and facilitators:** it is necessary to carry out reflection in one of the ways (Appendix 3). Analyze the interest of the participants in mastering the basics of organic farming in order to adjust subsequent trainings.

## **Training 2. The beginning of all beginnings... Soil is the foundation of organic farming**

### **Tasks:**

- Show the importance of soil for agricultural production.
- Familiarize with the process of soil cover formation.
- Form a careful attitude to the soil.

### **Questions to consider:**

How is the soil formed? Is the soil necessary for growing plants? Why is the process of growing plants called “farming”?

### **Expected results:**

There’s understanding of the soil formation process, its significance for the agricultural production using organic methods.

**Materials for conducting the training:** markers, A4 paper, a blackboard, a chalk, a flip chart, printed handouts, a soil cut or a pot with plants, soil samples.

## **STRUCTURE AND PROCESS OF THE TRAINING**

### **Introduction. Group warm-up**

Recommendations for coaches and facilitators: in this part of the training, it is necessary to conduct an exercise to warm up the group with the aim of team building, and create a friendly working atmosphere. Some methods and exercises are given in Appendix 2.

### **Main part**

#### **Block 1. What is soil?**

The participants of the training are invited to write down an answer to the question: "What is soil?" The answer options are discussed and summarized:

Soil is one of the main concepts in agriculture. There are many definitions of soil but let's settle on one of the simplest and most understandable:

*Soil is the fertile upper thin layer of the earth's crust covered with vegetation.*

#### **Block 2. How is the soil formed?**

Recommendations for coaches and facilitators: In this training, the topic of soil formation will not be considered in detail as in the course of biology. It is important to focus on the practical aspect related to agriculture.

The participants are given sheets of A4-paper divided into two parts with a vertical line. There’s a list of seasons and plant growth phases on the left. The participants

have to draw a schematic drawing opposite each position that depict any cultivated plant (of their choice) in a specific growth phase or period:

Winter	
Seed planting	
First roots and cotyledonous leaves	
Spring	
Summer	
Autumn	
Winter	

If necessary, the facilitator or coach will help with leading questions. The exercise will enable the participants to better understand how the natural cycle of plant growth and development are related to the process of soil formation.

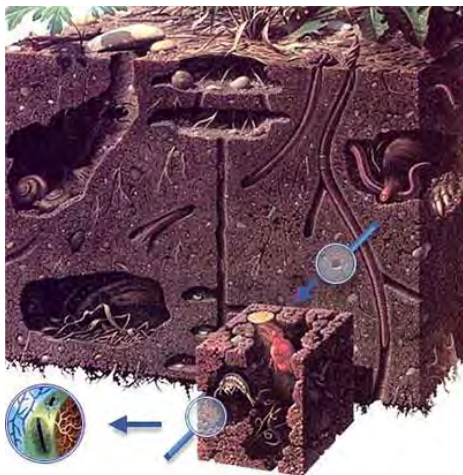
It is recommended to prepare a soil cut sample or a pot of green vegetation that can be used to demonstrate the soil formation process. If this is not possible, you can use a drawing or a photograph of a plant with roots.



While demonstrating the soil cut, the facilitator or coach tells how the soil is formed:

*The originally solid surface of the Earth was bare rocks devoid of life. The sun, air and water gradually changed the rocks; they crumbled, turned into pebbles, rubble, sand, clay, silt, which microorganisms gradually settled in. Microorganisms released substances that destroyed rocks and altered their chemical composition. On dying off, these microorganisms became food for other microorganisms. This process was cyclical and closed. Therefore, the soils were gradually formed. Thus, the soil consists of a mineral part, which serves as its frame, and an organic part, i.e. an alive part that fills this frame. There are complex and diverse processes of transformation of substance.*



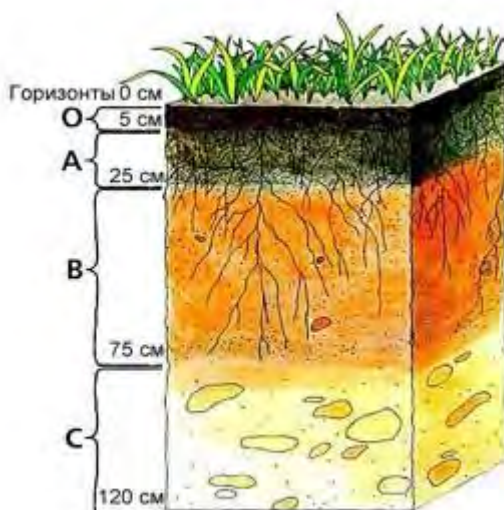


The soil is the habitat of various living organisms. If you make a cut in the soil, it will be porous. Pores and channels are formed as a result of rotting plant roots, processing of organic residues by microorganisms, worms, as well as decomposition of living organisms themselves. Pores and cavities are very important. Thanks to them, oxygen is supplied to the roots and excess moisture is removed from the soil, which prevents root decay. Carbon dioxide descends through the channels which mixes with water and forms a carbonic acid that dissolves soil minerals. Plants feed on this solution.

(The image is taken from the website: <http://prirodnoezemledelie.com>)

**Recommendations for coaches and facilitators:** In parallel with the story, you can show the process of soil formation using the example of a soil cut or a pot with a plant.

The soil structure looks like this:



О-горизонт - верхний почвенный горизонт, состоящий из листьев и веток.  
 А-горизонт - гумусная подстилка.  
 В-горизонт - слой, насыщенный разлагающимися органическими веществами, пихотный слой и подпочва.  
 С-горизонт - обломки горных пород.

© ООО "Юрилла и Мефодий"

Therefore, soil formation is a self-regulating system that functions in a closed natural cycle.

**Physical activity break or pause**

### Block 3. Farming

**Farming** is one of the main branches of agricultural production based on the use of land for the cultivation of crops as well as the corresponding section of agronomy.

The participants are asked to answer the question: *“Why do you think the cultivation of agricultural crops is called “farming”?* They should justify their answers and discuss them together.



## Block 4. Characteristics of the soil in terms of growing cultivated plants

### Is any soil suitable for growing plants?



The participants are given several samples: clay, sand, sod soil, humus, black soil (samples can be replaced with printed pictures). Then the participants determine which soil is more suitable for growing plants, and give reasons for their choice.

### Soil fertility

Fertility is understood as an ability of the soil to meet the needs of plants for nutrients, water, air and heat for normal growth and development.

Participants are invited to answer the question: “*What does soil fertility depend on?*” The answers are written on the blackboard and discussed.

- Presense of humus
- Porosity and structure
- Moisture
- Air

Soil fertility depends on the number of bacteria living in it and other beneficial microorganisms.

Then the participants are invited to fill in a table: to write down the operations that are carried out with the soil in their area and answer why these operations are performed and how they affect the soil cover

Spring	Summer	Autumn	Winter

## Block 5. The main methods of improving soil fertility

The participants are given a task to think over methods and techniques to increase soil fertility using pictures-tips.

## 1. Humus



## 2. Water



### 3. Air



The results of the work are recorded in a table.

Soil fertility factors	Methods for improving the soil fertility	Activities
Humus	Introduction of organic substances that feed the soil biota	Introduction of organic residues including to the topsoil.  Starting the composting process directly on the soil surface.
Water	Conserving and improving the structure of the soil, increasing its porosity.	Surface loosening, non-moldboard plowing, covering the soil surface, spot irrigation.
Air	Conserving and improving the structure of the soil, increasing its porosity.	Surface loosening, weed pruning, subsoiling.

**Conclusion:**

Soil is a living organism. Its fertility depends on the number of bacteria and other beneficial microorganisms living in it. The task of farming is to maintain soil fertility.

**Reflection**

*Recommendations for coaches and facilitators:* It is necessary to carry out reflection in one of the ways (Appendix 3).

### **Training 3. Chemical or organic – it's your choice. Comparative analysis of organic and traditional farming**

#### **Tasks:**

- To familiarize the participants of the training with features of organic and traditional farming and their differences.
- To teach to distinguish between these types of farming.

#### **Questions to consider:**

What is typical for an intensive farming system? What is typical for an organic farming system? How to distinguish between different farming methods?

#### **Expected results:**

There's understanding of various farming systems, their features and differences.

**Materials for conducting the training:** markers, A4-paper, a blackboard, a chalk, a flipchart, printed handouts.

### **STRUCTURE AND PROCESS OF THE TRAINING**

#### **Introduction. Group warm-up**

Recommendations for coaches and facilitators: in this part of the training, it is necessary to conduct an exercise to warm up the group with the aim of team building, and create a friendly working atmosphere. Some methods and exercises are given in Appendix 2.

#### **Main part**

#### **Block 1. Technology for growing agricultural products. Development of a technological map**

The participants are asked to choose one of the most popular crops that are grown in their private gardens or in leading agricultural enterprises, and describe all the actions that need to be taken to grow this crop.

Recommendations for coaches and facilitators: You can offer the participants a choice of cards depicting the most popular crops: potatoes, carrots, onions, etc. You can encourage the groups to work and help the participants describe the process.

The participants are then asked to answer whether the crop cultivation process they described is organic and why.

#### **Block 2. Comparative analysis of intensive and organic farming**

Participants are divided into two groups:

Group 1 – organic farming

Group 2 – intensive farming

The groups are given a short description of one of the farming methods:

**Traditional (intensive) farming method** dates back to 1840 when the work “Chemistry Applied to Agriculture” by Justus von Liebig, the German scientist, one of the founders of agrochemistry and the creators of the chemical education system, was published. Liebig proved that plants need only mineral elements for nutrition which they take from the soil. He substantiated the theory of soil depletion due to the removal of nutrients by plants and showed the need to return these substances in the form of mineral fertilizers.

Liebig's “Chemistry” was reprinted every three years for the next 25 years and was translated into all European languages.

Liebig's theory seemed irrefutable. It has become an axiom that a plant can develop quite normally without adding organic nutrients, i.e. consisting of plant and animal residues.

Liebig's theory determined the development of agriculture throughout the world for many years. Intensive chemicalisation of agriculture and the development of related land cultivation technologies began.

Currently, a system of farming has developed based on deep plowing, application of mineral fertilizers, the principles of monoculture, use of pesticides for pest control, herbicides for weed control, etc. Sets of mechanisms and machines for soil cultivation have been developed.

It began to be considered that the soil is a set of chemical elements; in order to maintain its fertility, it is enough to apply the required amount of certain mineral fertilizers. Accordingly, the amount of applied organic substances has decreased.

Traditional farming methods have helped to increase the amount of agricultural products and have made it possible to feed an increasing number of the population. At the same time, negative trends were outlined: depletion and erosion of soils, chemicalisation, human intervention in the natural cycle, dependence of the crop on mineral fertilizers, contamination of the environment with pesticides and herbicides and, as a result, adverse effects on human and animal health and the environment.

**Another approach is organic (natural, environmental).** Its main idea is not only to obtain healthy food but also to conserve the environment.

Proponents of this farming method try to follow the laws of nature, and simulate natural processes in their beds and fields.

The environmental approach is based on the desire to preserve a living and healthy soil by maintaining a high level of activity of its microflora. The soil is considered to be a living organism, the habitat for various microorganisms that need organic substances for their vital activity. Proponents of this approach refuse to deep plowing (digging) that disrupts the structure of the soil. Instead, the top layer is loosened to a depth of no more than 5 cm, and then mulching, crop rotation, only organic, natural components are used. It is not plants that are fertilized, but the soil in which favorable conditions are created for the development of soil organisms. Their vital activity allows getting healthy plants.

In organic farming, mixed planting is used for symbiosis and protection of plants from pests. Moreover, people doing the organic farming refuse to apply pesticides. Microorganisms, microbiological preparations and materials of plant, animal and mineral origin are used, but not



synthesized chemicals. Fields are constantly occupied by vegetation; crop residues are embedded in the topsoil.

An environmental household is considered as a single organism in which there is a cycle and cyclicity of nutrients.

Organic farming methods allow restoring the soil and maintaining its fertility without harming people and nature since no chemicals are used and the products have a natural taste and smell and are stored better.

Despite the obvious advantages, organic farming also has its disadvantages. These are a lower productivity and, accordingly, a higher price of products, seasonality and predominance of manual labour (since there are no serial machines and units).

Each group examines the information and summarizes it for the other group.

### Physical activity break or pause

#### Lotto “Comparative analysis of intensive and organic farming”

On the basis of the table below, cards are prepared with a description of the agricultural activity (on one side) and the corresponding processes, as well as their consequences (on the back). Each group is given cards related to one of the types of farming - intensive and organic farming.

Then Group 1 lays out one of their cards, and Group 2 looks for a match to it from among their own cards explaining their choice. Then the Groups take turns.

In intensive farming	Processes and their consequences	In organic farming	Processes and their consequences
Deep plowing (digging) of the soil	<p>1. The natural structure of the soil is destroyed (channels from rotted plant roots, worms' passages). As a result, the soil quickly becomes compacted.</p> <p>2. Some types of soil organisms can live and</p>	Shallow (up to 5 cm) loosening the soil	<p>1. The natural structure of the soil remains pristine. Atmospheric moisture condensing in the channels feeds the plants.</p> <p>2. The soil microflora quickly processes organic substances thus releasing nutrients for plant growth.</p> <p>3. Loosening is carried out with light flat cutters or cultivators.</p>

	<p>develop only in the upper layers of the soil, others - in the lower ones. They die during digging, and since they loosen the earth, process organic substances and make it available for plant nutrition. Therefore, in their absence, crops starve from lack of food. Consequently, a need for the introduction of mineral fertilizers appears.</p> <p>3. Deep plowing (digging) requires large physical and material costs.</p>		
<p>Application of the monoculture principle (only one plant type is cultivated on one site)</p>	<ol style="list-style-type: none"> <li>1. Diseases are quickly transferred from infected plants to healthy ones.</li> <li>2. It is much easier for pests to find fields on</li> </ol>	<p>Mixed planting of plants (several types of plants are cultivated simultaneously on one site)</p>	<ol style="list-style-type: none"> <li>1. Thanks to their secretions, companion plants protect each other from diseases and pests.</li> <li>2. Plants having a positive effect on each other are selected.</li> </ol>



	which one crop grows.		
Dense planting of crops	<p>1. Densely planted plants receive less light and have less space to grow.</p> <p>2. In the process of caring for plantings, the soil around the plants is compacted, and small roots are cut off.</p>	Separating into beds, separate areas with wide paths	<p>1. Plants in beds receive more light, space for growth and development, and the yield increases.</p> <p>2. The soil around the plants is not compacted, the roots do not break.</p> <p>3. Due to the presence of paths, it is convenient to care for plants.</p>
Use of toxic chemicals (pesticides)	<p>Accumulating in plants and then getting into the human body, pesticides negatively affect the human organism. They also lead to the death of animals, birds and beneficial insects that destroy pests. Since pests also tend to adapt to poisons, their population is growing.</p>	The use of natural drugs (based on fungi or bacteria)	<p>Biological products decay in nature and do not accumulate in plants and soil.</p> <p>They act in a very selective way.</p>
Application of herbicides	Herbicides are	Mulching, cultivation, catch crops	Mulch shelters the soil from the sun, conserves moisture, prevents weeds

<p>(weed control chemicals)</p>	<p>accumulated in the soil and kill all the surrounding fauna including animals, birds and beneficial insects that destroy pests. As a result, the number of pests increases.</p>		<p>from growing, and reduces temperature fluctuations in the soil. Intensive planting suppresses weeds and reduces their number.</p>	
<p>Application of mineral fertilizers</p>	<p>Mineral fertilizers kill living soil fauna making the land dead. They improperly stimulate plant growth, making them vulnerable to disease and pests. In addition, the quality of the crops grown in this way deteriorates.</p>	<p>Introduction of organic substances. Growing green manure</p>	<p>Organic substances are food for soil organisms. As a result of their vital activity, soil fertility increases. Moreover, in the processed organic substances, all micro- and macroelements are contained in the ratios optimal for plant growth. Green manure is plants that are specially grown to increase soil fertility and are used as green fertilizer for incorporation into the soil.</p>	

### Block 3. Problem book on determining the type of farming

To consolidate the material covered, the participants are offered to determine the type of farming system (intensive or organic) from the pictures and justify their answer.



Recommendations for coaches and facilitators: the participants should identify the distinguishing features of organic or intensive farming for each picture as shown in the table above. It is advisable to conduct several excursions to private household plots, fields of agricultural enterprises, etc. to consolidate the skills of determining the types of farming.

#### Conclusion:

Organic farming focuses primarily on soil health while intensive farming focuses on plant care.
---

#### Reflection

Recommendations for coaches and facilitators: it is necessary to carry out reflection in one of the ways (Appendix 3).

## Section 2

### **Training 4. To plow or not to plow? Basic principles and agricultural techniques of organic farming**

#### **Task:**

To familiarize the participants with the basic principles and agricultural techniques of organic farming.

#### **Questions to consider:**

What techniques are used in organic farming? What is different between minimal tillage and digging? What are the pros and cons of using different agricultural techniques?

#### **Expected results:**

There's understanding of basic agricultural techniques of organic farming, their features and application methods.

**Materials for conducting the training:** markers, A4 paper, a blackboard, a chalk, a flipchart, printed handouts, jars with soil and vegetation samples (a soil cut model).

### **STRUCTURE AND PROCESS OF THE TRAINING**

#### **Introduction. Group warm-up**

Recommendations for coaches and facilitators: in this part of the training, it is necessary to conduct an exercise to warm up the group with the aim of team building, and create a friendly working atmosphere. Some methods and exercises are given in Appendix 2.

#### **Main part**

##### **Block 1. Updating the knowledge about organic farming**

Each participant is asked to write their associations with the phrase "organic farming" on a piece of paper. Then the participants in groups of three exchange the written options updating the previously acquired knowledge on this topic.

##### **Block 2. To dig or not to dig?**

##### **Brainstorming "Why do people dig the soil?"**

The coach (facilitator) asks the participants this question and writes all the mentioned options on the blackboard or flipchart.

Recommendations for coaches and facilitators: There's every opportunity that there will not be many options, e.g. to get rid of weeds, make the soil loose, freeze pests, according to traditions, etc. In this task, it is important not to get the right answers but to motivate the participants to understand the principles of organic farming.

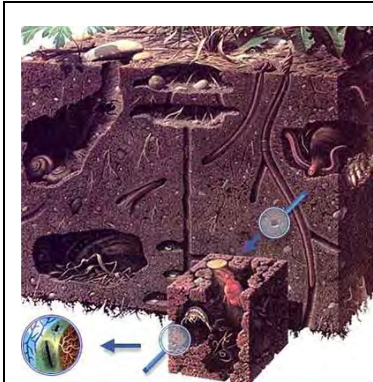
Then a pop-quiz is conducted: "Who thinks that the earth needs to be dug? Who thinks that there is no need to dig? "

**Experience in studying the effect of digging on the soil**

For this experiment, you will need 2 transparent jars with the following layers: sand, various types of soil, any vegetation (a soil section is modeled).



Next comes the review of the topic "What is soil?".



*The soil is the habitat of various living organisms. If you make a cut in the soil, it will be porous. Pores and channels are formed as a result of rotting plant roots, processing of organic residues by microorganisms, worms, as well as decomposition of living organisms themselves. Pores and cavities are very important. Thanks to them, oxygen is supplied to the roots and excess moisture is removed from the soil, which prevents root decay. Carbon dioxide descends through the channels which mixes with water and forms a carbonic acid that dissolves soil minerals. Plants feed on this solution. (Image is taken from <http://prirodnomezemledelie.com>)*

The first jar which demonstrates the processes occurring in the soil during digging is turned upside down.

The second can which demonstrates minimal tillage is slightly loosened or the top layer of vegetation is trimmed off.

The participants are asked to explain what processes have taken place in both jars taking into account that the soil is a living system.

**Recommendations for coaches and facilitators:** The coach or facilitator should draw the participants' attention to the fact that when the jar is turned over, the soil structure is destroyed, its porosity is disturbed, anaerobic and aerobic microorganisms change places, which leads to their death. As a result, the soil is damaged as a living organism.

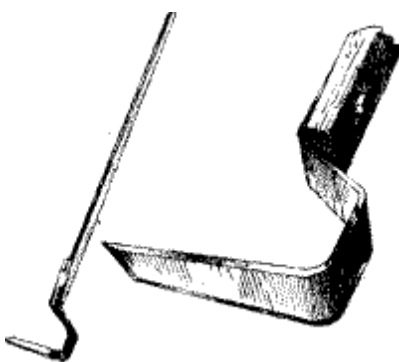
In the second jar, only the top layer is processed. Therefore, the structure of the soil is preserved, the access of oxygen to the upper layer is improved, a layer of organic matter appears on the surface which is food for bacteria, other microorganisms, worms, as a result of whose vital activity the soil becomes looser and enriched with nutrients.

Slight tillage can be done with different tools. One of the most universal is Fokin's subsurface cultivator.

### **Fokin's subsurface cultivator**

This is a unique device for manual soil cultivation developed and patented by a Russian craftsman V.V. Fokin. One of the most popular manual tools for subsurface soil tillage.

#### **What is Fokin's subsurface cultivator?**



The disassembled subsurface cultivator consists of a handle, a blade, two bolts and a bracket. Assembling the tool is very simple: the blade is attached to a flat wooden handle with bolts and a bracket in a specific position depending on your height and how you plan to cultivate the land.

If necessary, the subsurface cultivator has to be sharpened 1-2 mm from the edge. When sharpening on the machine, overheating should be avoided as this reduces the strength of the blade.



Vladimir Vasilyevich Fokin, the inventor of the tool, claimed that 20 types of gardening work could be performed with this subsurface cultivator. In this case, the tool changeover is not required; you only need to hold it in a certain way and perform certain operations. A manual flat cutter is easier and more convenient to work with than a shovel, a hoe or a mattock.

### **Practical use of Fokin's subsurface cultivator**

You can do subsurface tillage using this device, i.e. cultivate the land without turning over its layers. This type of processing does not violate the natural structure of the fertile soil layer, creates favorable conditions for plant nutrition, soil life. As a result, the soil becomes softer, more hygroscopic and fertile over time. Processing the soil using Fokin's subsurface cultivator allows increasing the crop yield without replowing.

### **Possible questions:**

*Why is the yield good after digging the soil in the first year?*

This is due to the fact that when digging, oxygen enters the deep layers of the soil and the process of mineralization is accelerated. In addition, the structure and porosity of the soil is not yet completely disturbed. In subsequent years, the yield decreases sharply without fertilization.

*What happens to weeds when digging the soil?*

When deep digging the weeds that were on the surface move into deeper layers of the soil. Therefore, the growth of weed vegetation delays. At the same time, a large number of seeds are brought to the surface which germinate soon. Thus, digging leads to an increase in the number of weeds.

### **Physical activity break or pause**

### **Block 3. Group work on learning the basic agricultural techniques of organic farming**

*Recommendations for coaches and facilitators:* this block is developed to introduce the basic techniques. A group can be divided into several subgroups. Each subgroup studies the handout and highlights key phrases with markers. Then each group briefly presents its topic to the other groups.

#### **Crop rotation**

Crop rotation is the main part of the organic farming system. It is a scientifically based crop and fallow rotation that improves the soil cover and yields afterwards. When cultivating an agricultural crop on a plot, certain nutrients are removed from the soil. Different crops consume different amounts of certain elements. Therefore, when one crop is grown in one place for several years, the soil is greatly depleted and the number of pests and diseases increases. It can be avoided with proper crop rotation.

The main tasks of crop rotation are: 1) increasing soil fertility and rational use of its nutrients; 2) increasing yields and improving the quality of plant products; 3) reduction of contamination of crops, their susceptibility to diseases and pests; 4) reduction of wind and water erosion of soil. The crop

rotation is expressed by the crop rotation pattern. A crop rotation scheme is a list of crop groups and fallows in the order of rotation in the crop rotation.

### **Mixed planting**

Mixed planting is the cultivation of several vegetable or berry crops in a limited area at the same time in a mixed manner or according to a scheme for the rational use of the area. Plants provide diverse assistance to each other if they are correctly combined.

For instance, flowers planted next to vegetables and blooming at the same time attract pollinating insects. Some spicy plants release substances that repel pests from vegetables or flowers. Others synthesize substances by the roots that stimulate the development of roots of vegetable and fruit plants.

### **Mulching**

Mulching is the soil cover under fruit trees or vegetable plants with a protective layer (the mulch). The name of this technique comes from the English word *mulch* that means “covering the soil”.

In nature, a layer of an organic substance is always formed under trees and shrubs consisting of fallen leaves, dead plant residues and needles. This layer protects the soil from erosion, drying out and eolation. Mulching has a similar effect.

We can try to create similar conditions in our plot: to cover the soil with an organic material.

As mulch, you can use peat, plant residues, weeds that have not reached the flowering stage, compost, eggshell, straw, hay, manure, fallen leaves, husk of cereal plants, crushed bark and sawdust. Various synthetic materials are also used for mulching.

Benefits of covering the soil with mulch:

- Reducing the intensity growth of weeds;
- Smoothing daily temperature fluctuations;
- Increasing the soil temperature;
- Stabilization of the water regime due to the reduction of moisture evaporation from the surface of the mulched soil;
- Preventing the formation of the crust on the surface which can impede the penetration of air to the plant roots;
- Creating optimal conditions for the life of microorganisms and worms;
- Additional food after processing the organic mulch.



### **Preparation and use of compost**

**Compost** (German - *Kompost*, Italian - *composta*, Lat. *compositus* – “compound”) is an organic fertilizer obtained as a result of the processing of organic substances by microorganisms. It enriches the soil with nutrients, improves its structure, increases air permeability and helps to ensure an optimal moisture regime.

**Components of compost.** Most of the natural ingredients can be used for composting: straw, cut grass, fruit and vegetable leftovers, weeds, leaves, other plant parts, animal biowaste (excrements, manure), wood ashes, feathers, cotton fabrics, pieces of leather or paper and soil. Do not use leftovers of cooked food, large pieces of wood, metal, rubber, plastic or other synthetic materials for composting.

**Preparation of compost.** Start the compost pile with the branches to ensure good drainage. Then add grass, leaves, debris, other plant materials, droppings, manure and soil. Mix dry and wet, brown and green leaves. Very large parts of plants (large leaves, stems, pieces of bark, etc.) must be cut or broken into smaller pieces. Use soil as a finishing layer, leave a small hole in the middle for air to enter. Water the pile and cover it with grass or a cloth to maintain moisture. In six weeks, mix the compost pile or transfer it. Check the results in three months. If the compost is dark, homogeneous, crumbly and moist, then it is ready for use.

**Use of compost.** Use the compost as soon as it's ready. Fertilize the soil with it before planting and place it around the growing plants every two weeks.

### **EM technologies**

Currently, the so-called EM technology (EM - effective microorganisms) is widely used. It was developed by a Japanese microbiologist and professor at the University of Agriculture in Okinawa Prefecture Teruo Higa. Professor T. Higa had been engaged in the selection of microorganisms that improve the condition of soil and plants for many years. In 1980, he developed the concept of effective microorganisms. He identified those microorganisms that most contributed to the improvement of the soil condition, suppression of pathogenic microbes and increased plant resistance to diseases and pests. He cultivated and tested a group of 80 microorganisms belonging to 5 families (primarily photosynthetic bacteria and lactic acid bacteria). Nowadays, Russian analogues have been developed and are widely used.

The essence of EM technology is the use of drugs containing effective dormant microorganisms. Solutions of EM preparations are introduced into the soil, organic substances or sprayed onto plants. Being growth centers for the rapid reproduction of beneficial microflora, they contribute to enhanced plant growth, soil regeneration and faster decomposition of organic matter.

### **Green manure**

Green manure are plants grown for the purpose of their subsequent incorporation into the soil.

As a green manure, you can use any annual crops with a powerful aboveground part and a branched root system: mustard, oil radish, lupine, phacelia, rye, vetch, rape, melilot, etc. As soon as the plants

rise, develop the root system and accumulate green mass, they are embedded in the soil entirely or mowed. The cuttings can be used for mulching or for laying in a compost pile.

In the soil, the roots and aboveground mass of plants decompose being processed by microorganisms and enrich the soil with an organic substance (humus) and also improve the structure of the soil and increase its porosity.

A crop grown for green manure does not produce any production per year of cultivation but heals the soil for 5-6 years. Green manure is grown before, after or in between main crops. This allows protecting the soil from erosion, reducing leaching of nutrients into deeper layers and keep them in the fertile upper layer.

Green manure has an important sanitary function. It suppresses the growth of weeds, helps cleanse the soil from pests and diseases.

### **Problem book on determining agricultural techniques of organic farming**

To consolidate the material covered, the participants are offered to determine from the pictures which agricultural techniques were applied and explain what they are used for:





## Reflection

Recommendations for coaches and facilitators: it is necessary to carry out reflection in one of the ways (Appendix 3).

## **Training 5. Features of the application of basic technologies in organic farming: crop rotation, mulching, EM technologies, green manure and mixed planting**

### **Task:**

To teach the participants of the training to plan the application of the basic agricultural techniques of organic farming.

### **Questions to consider:**

How to draw up a crop rotation scheme? What materials can be used for mulching? What does mixed planting give? How to use green manure? What are the benefits of using EM preparations?

### **Expected results:**

There's understanding of basic agricultural techniques of organic farming, their features and methods of application.

**Materials for conducting the training:** markers, A4 paper, a blackboard, a chalk, a flipchart, printed handouts.

## **STRUCTURE AND PROCESS OF THE TRAINING**

### **Introduction. Group warm-up**

Recommendations for coaches and facilitators: in this part of the training, it is necessary to conduct an exercise to warm up the group with the aim of team building, and create a friendly working atmosphere. Some methods and exercises are given in Appendix 2.

### **Main part**

#### **Block 1. Basic agricultural techniques of organic farming: updating the knowledge**

The participants are asked to list the main techniques of organic farming and briefly describe them. The materials of Training 4 are used if necessary.

#### **Block 2. Practical work: drawing up a crop rotation scheme taking into account predecessors and applying mixed planting**

The participants of the training are offered to draft a crop rotation scheme. It can be made for a school plot, a personal vegetable garden or a training plot can be simulated describing the crops that you plan to grow. If necessary, the participants can use training guides or Internet resources.

#### **Block 3. Practical work: planning the use of mulch throughout the growing season of cultivated plants**



**Mulching** means covering the ground surface around the plants with any materials that regulate the water and air regimes in the upper layers of the soil.

## TYPES OF MULCH

### Inorganic mulch:

- Black film
- Agricultural fabric
- Non-woven fabrics (black spunbond, etc.)
- Pebbles, gravel, macadam
- Expanded clay



The disadvantage of inorganic mulching materials is that they do not provide additional nutrition to the soil.

### Organic mulch:

- Cut grass and weeds weeded out (preferably without seeds);
- Undercut green manure;
- Straw;
- Fallen leaves;
- Pine needles;
- Sawdust, fine wood particles;
- Bark or chip;
- Mature compost and humus;
- Peat;
- Cardboard and paper;
- Turf formation.

### What are the benefits of mulching?

- The top layer of soil is protected from drying, evaporation and freezing.
- Moisture is better retained under the mulch; therefore, it's possible to reduce significantly the amount of watering.
- Mulch allows retaining heat in the soil; plant roots are protected from sudden temperature fluctuations.
- Mulch restrains the growth of weeds and their spread.
- Berries and vegetables do not rot when contacting a wet.
- The air permeability of the soil increases, its structure improves since no crust forms on the surface.
- Favorable conditions are created under the mulch for the active life of earthworms.
- When rotting, organic mulch fertilizes the soil.

The participants are given a task for practical work in groups: to develop a scheme for using various types of mulching for cucumbers, strawberries, cabbage, garlic and onions. You can ask them to show schematically the stages of plant growth and to plan for each stage covering the soil with some organic and inorganic materials.

#### **Block 4. Practical work: drafting a scheme for the use of green manure**

Task for the participants of the training: think over the ways of using green manure in school garden or personal vegetable garden.

**Green manure** (siderata) are the plants grown for the purpose of their subsequent incorporation into the soil to improve its structure, enrich it with nitrogen and suppress the growth of weeds.

The most popular green manure:

- Legumes (annual lupine, beans, esparcet, soybeans, lentil, serradella, peas, chickpea, lucerne, melilot, spring vetch, clover)
- Waterleaves (phacelia)
- Crucifers (mustard, winter cress, oil radish, rapeseed)
- Cereals (oat, barley, corn, wheat)
- Buckwheat

**Technology of using green manure use:**

##### **In spring**

Green manure is grown on those beds where it's more than three weeks before the main plantings (they will not have time to grow if it's a shorter period of time). Seedlings can be planted in these areas without cutting off the green manure: they are planted in holes filled with compost. Growing green manure will protect the seedlings from freezing. In 5-14 days, green manure is cut leaving it in beds as a mulch if desired.

##### **In summer**

Every year, it is preferable to restore the porous structure of deep soil layers in several beds. To do this, green manure plants with a developed root system (for example, lupine) are grown on them throughout the summer.

##### **In autumn**

After harvesting, green manure is sown throughout the territory. In autumn, it is optimal to use winter rye as green manure which goes under the snow and grows in spring. As a rule, most of the crop plantings are done early in spring, and green manure does not have time to grow in such fields. Therefore, it is possible to restore the soil on these beds only by planting winter varieties of green manure in autumn (rye, oat).

#### **Block 5. Learning EM-preparations**

Effective microorganisms (EM) are mixed cultures of beneficial microorganisms that are introduced to the soil in order to increase the diversity of bacteria living in soil.

## The difference between EM preparations and mineral fertilizers

The participants are asked to use cards to draw up a table according to the lotto principle.

EM preparations	Mineral fertilizers
EM-preparations are “alive”; therefore, nutrients must be present in the form of organic residues so that EM-preparations can act after application to the soil.	Most of the mineral fertilizers are synthesized chemically. They do not require any special components in the soil to work.
Their application is aimed at improving the soil. Healthy soil improves plant nutrition.	Their use is directly aimed at plant nutrition.
They have a long-term effect.	They have a quick but short-term effect.
Promote the reproduction of soil microorganisms and health of the soil	Suppress soil microorganisms.
Expensive enough	Cheap

### Additional tasks:

- Find available EM-preparations and learn their application technology;
- Find recipes for preparing homemade EM-preparations and test them in the school garden.

### Analogues of EM-preparations

In addition to industrial EM-preparations, homemade ones are also used.

- Infusions of green grass
- Infusions of manure
- Infusions of compost
- Infusions of rotted leaves

### Reflection

Recommendation for coaches and facilitators: it is necessary to carry out reflection in one of the ways (Appendix 3).

## **Training 6. To poison or not to poison? Protection of crops from pests, diseases and weeds using organic methods**

### **Task:**

To familiarize the participants of the training with the basic methods of protecting crops from pests and preventing diseases in organic farming.

### **Questions to consider:**

What techniques are used in organic farming for pest control and disease prevention? What are the negative consequences of using plant protection chemicals?

### **Expected results:**

There's understanding of methods of protection against pests and disease prevention in organic farming.

**Materials for conducting the training:** markers, A4 paper, a blackboard, a chalk, a flipchart, printed handouts.

## **STRUCTURE AND PROCESS OF THE TRAINING**

### **Introduction. Group warm-up**

Recommendations for coaches and facilitators: in this part of the training, it is necessary to conduct an exercise to warm up the group with the aim of team building, and create a friendly working atmosphere. Some methods and exercises are given in Appendix 2.

### **Main part**

#### **Block 1. Pest Control and Prevention of Crop Diseases in Intensive Agriculture**

The participants are asked to answer the following question: "How do you control pests and prevent diseases of agricultural crops in your area or in the family garden?" Working in groups, the participants recollect and write down what pests and diseases are found in their area, how and what different crops are treated with.

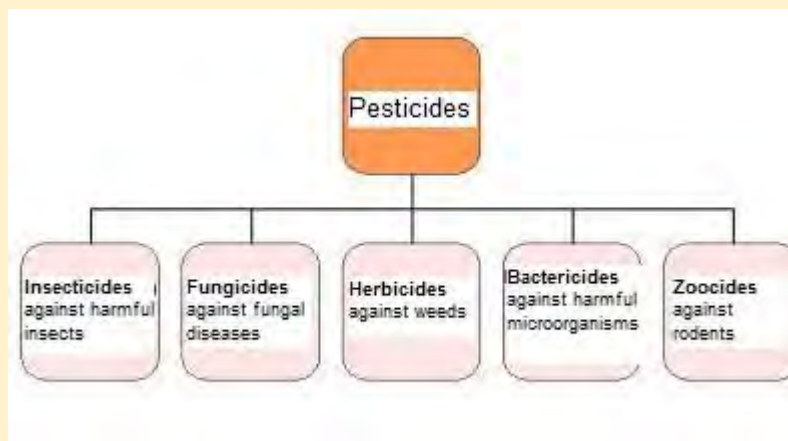
It is preferable to prepare in advance the cards with names (images) of traditional crops: Желательно заранее подготовить карточки с названиями (изображениями) традиционных культур: potato, cabbage, tomato, apple, etc.

Then the next question is considered "How do the applied technologies affect the nature and the person?", for instance, when poisoning the Colorado potato beetle on potatoes, treating cabbage from caterpillars, etc.

Recommendations for coaches and facilitators: it is necessary to draw the participants' attention to the fact that intensive farming is based on the use of various pesticides.



Pesticides are a collective term that covers chemical compounds of various classes that are used to control pests in such fields as agriculture, health care, industry, shipping, oil production and many others.



The operating principle of pesticides is based on the fact that they inhibit the action of biological catalysts (enzymes). As a result, some of the biological reactions stop proceeding, which allows controlling diseases (antibiotics), preserving food for longer periods of time (preservatives), destroying insects (insecticides) and destroying weeds (herbicides).

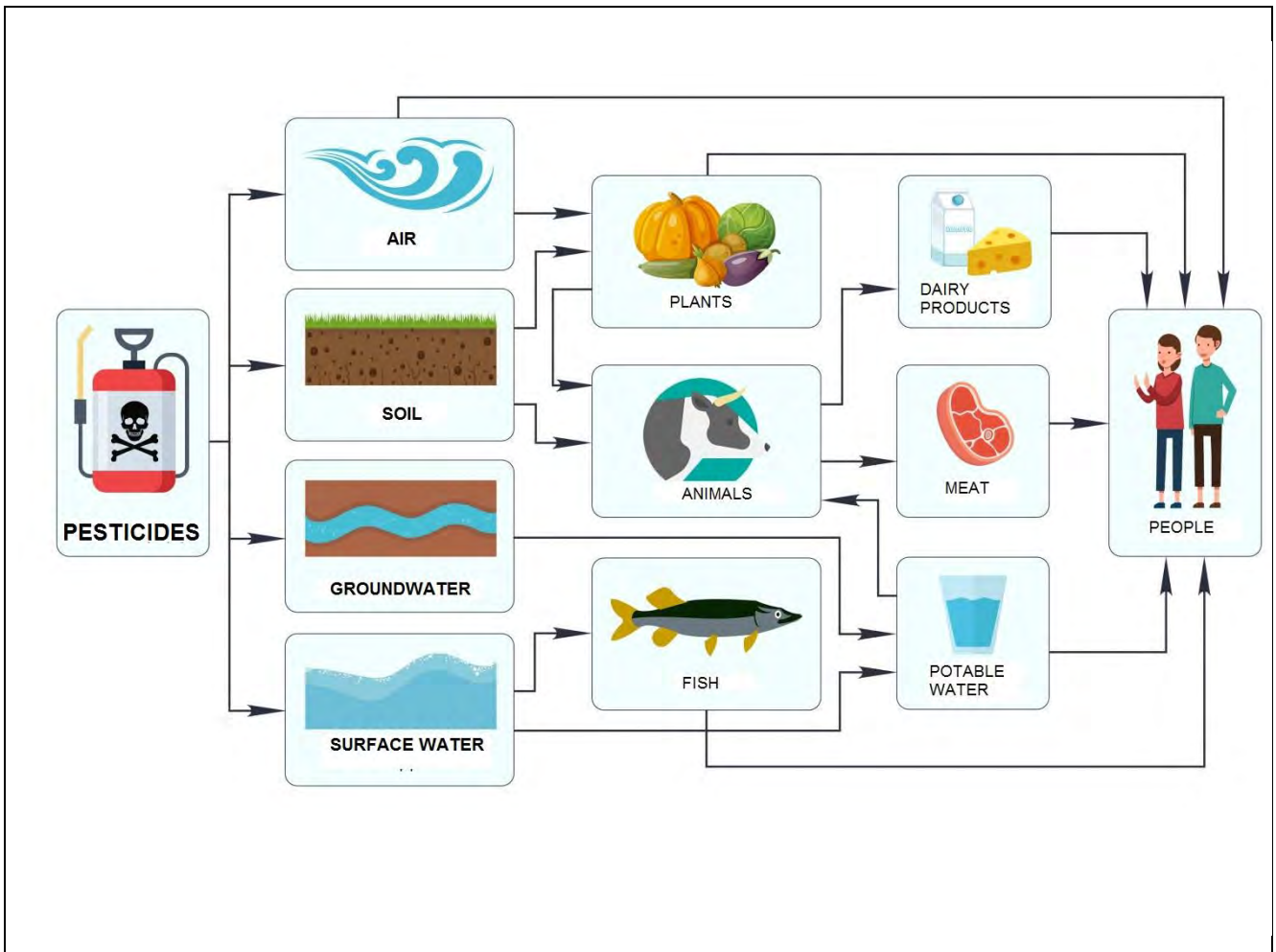
Traditionally, pesticides are widely used in agriculture. They help increase productivity and reduce losses when cultivating agricultural fields. Pesticides are used to combat weeds, harmful insects and microorganisms that inhibit agricultural crops. Pesticides are also used to accelerate the ripening of crops, to facilitate harvesting and to extend the shelf life of food supplies. Preparations affecting the processes of plant growth and development are actively used. Another important area of application of pesticides is their use for the destruction of animal parasites in animal husbandry.

Pesticides have an adverse effect on both human health and environment.

### **Impact of pesticides on human health**

The main route of pesticides entering a human body is through the gastrointestinal tract. Pesticides persistent in the environment in 95% of cases enter the body with food, in 47% with water, and only 0.3% with an atmospheric air through the respiratory tract and very slightly through the skin (see the image).

The harmful effects of pesticides on human health can be different.



**Task for the participants:** examine the impact of pesticides on human health using the image.

### Impact of pesticides on the environment

Application of pesticides allows obtaining stable yields and limiting the spread of infections transmitted by animal vectors. However, the ill-considered application of pesticides also has negative consequences. Pesticides affect various components of natural ecosystems: they reduce the biological productivity of phytocenoses, species diversity of the animal world and reduce the number of beneficial insects and birds.

**Intensive agriculture never goes without the use of pesticides.**

Then the participants are asked to answer the question: “What do you feel when seeing the following images?” The participants share their viewpoints and discuss the answers.



### Physical activity break or pause

### Block 2. Disease Prevention and Pest Control in Organic Agriculture

The main principle of plant protection in organic farming is up-to-date prevention.

Ask the participants: “What is the difference between disease/pest control and prevention in organic agriculture?”

Pest, disease and weed control is a short-term measure aimed at eliminating pests and diseases.

Prevention aims to protect crops from pests and diseases. Its main goal is to prevent an increase in the number of already present pest populations and the spread of diseases.

The general principle of organic farming is to eliminate the causes of the problem but not its display. This principle is also applied to protecting crops from pests and diseases.

### Drafting a scheme for disease prevention and pest control in organic farming

A set of cards with various prevention methods is prepared. A participant or a group of participants take cards and explain the essence of a method.

Recommendations for coaches and facilitators: it is possible to help the participants and guide them by explaining various methods basing on the principles of organic farming.

### **Agrotechnical methods of protecting plants from diseases and pests**

- Use of varieties and hybrids resistant to diseases and pests
- Soil cultivation system
- Compliance with the optimal timing of sowing, harvesting and seeding rates
- Crop rotation
- Mulching
- Use of organic fertilizers

### **Biological methods of protecting plants from diseases and pests**

- Attraction of wild and parasitic insects
- Attraction of birds
- Use of biological products, phytopathogenic fungi, bacteria, viruses, nematodes, etc.
- Application of biologically active substances (repellents, pheromones, etc.)

**On summarizing the information, it is possible to compile a comprehensive scheme for protecting plants from diseases and pests:**

1. Maintaining soil health
2. Use of appropriate varieties
3. Maintaining plant health
4. Application of biological products
5. Active use of natural enemies of pests
6. Continuous monitoring of the state of crops

Task for the participants: choose a photo depicting how weed control is being carried out in their area. Write down advantages and disadvantages of chemical and manual methods of weed control.



### **Work with the table “Weed control methods in organic farming”**

The table can be cut into cards. The participants can be asked to select justification for each method.

<b>Weed control methods in organic farming</b>	<b>Justification</b>
Refusal from plowing and digging	When digging or plowing, weed seeds lying at a depth rise to the surface of the soil and grow.
Application of only rotted manure	In this type of manure, germination ability of the majority of weeds is lost
Introduction of green manures and catch crops to crop rotation	These plants shade the soil and inhibit weeds.
Mulching of soil	The soil is constantly under a mulch layer which inhibits the growth of weeds. Mulch can be either organic or inorganic.
Selection of optimal planting dates and taking into account the vegetation periods of plants	Cultivated plants will gain an advantage in growth with the right timing of planting.
Mechanical or machine weeding	The use of devices that help mechanize weeding can reduce labor costs.
Compliance with weeding deadlines	Compliance with the optimal weeding time reduces labor costs. Weeding plants in the “white thread” stage will require less effort than removing rooted weeds.
Organization of spot irrigation	If water is applied directly to the roots of cultivated plants, weeds do not get moisture, which inhibits their growth.

## **Reflection**

*Recommendations for coaches and facilitators:* it is necessary to carry out reflection in one of the ways (Appendix 3).

## **Training 7. Many efforts or a great many of efforts? Features of growing the main agricultural crops using organic methods**

### **Task:**

To familiarize the participants of the training with the technology of growing agricultural crops in organic farming.

### **Questions to consider:**

What are the step-by-step techniques used in organic farming to grow plants?

### **Expected results:**

There's understanding of the technology of growing vegetable plants in small areas in organic farming.

**Materials for conducting the training:** markers, A4 paper, a blackboard, a chalk, a flipchart, printed handouts.

## **STRUCTURE AND PROCESS OF THE TRAINING**

### **Introduction. Group warm-up**

Recommendations for coaches and facilitators: in this part of the training, it is necessary to conduct an exercise to warm up the group with the aim of team building, and create a friendly working atmosphere. Some methods and exercises are given in Appendix 2.

### **Main part**

**Updating the knowledge. Brainstorming: "Basic principles and methods of organic farming".**

#### **Basic principles and methods of organic farming**

Minimum soil cultivation

Introduction of organic substances to the soil (humus, compost, organic residues, etc)

Use of appropriate methods and techniques to increase the number of beneficial microorganisms, worms and fungi in the soil

Mulching, use of green manure, catch crops

Mixed planting

Use of only environmentally friendly natural methods and biopreparations in order to protect plants against diseases and pests

Crop rotation

### **Step-by-step technology for growing vegetable crops in the beds**

#### **Spring**



1. If there is a mulching layer on the bed, it's necessary to remove the mulch to warm the soil.



If the bed does not have a mulching layer, you have to loosen or prune with a subsurface cultivator.





2. Sow seeds or plant seedlings. After that, immediately mulch the soil to retain moisture and suppress weeds. A mulch can be both organic (agrotechnical, spunbond, etc.).



You can later increase the mulch layer if necessary.



## Summer

1. Complex feeding with biopreparations or infusions of green fertilizers.



2. Prevention of diseases and controlling pathogens by organic methods.
3. Organisation of irrigation.

## Autumn



Harvesting followed by mulching the soil or planting green manure.

### Physical activity break or pause

### Practical work on drafting a technological map in organic farming

The participants are divided into several groups of 3-4 people and choose a particular crop (you can offer them prepared cards with the names of crops). Each group develops a technological plan for the cultivation of the selected crop.

### Check list on drafting a technological map for growing agricultural crops in organic farming

#### Spring

- Soil preparation (minimal cultivation, loosening, disking, pruning)
- Drafting a planting scheme taking into consideration crop rotation and compatibility of crops

- Introduction of organic substances (compost, humus, organic residues, etc.)
- Mulching (preparation of the mulching material, freeing the soil from mulch for warming)
- Cultivating the soil using biopreparations (industrial, homemade)
- Sowing, planting, pre-sowing treatment of the planting material

### Summer

- Development of the weed control system (a mulching system, weeding)
- Development of a feeding system (biopreparations, infusions of green manure, etc.)
- Organisation of irrigation
- Development of a protection system against pests using biological methods

### Autumn

- Post-harvest work for the preparation to the next season (planting green manure, loosening, mulching, etc.)

### Winter

- Measures to retain moisture in the soil

**Analysis of the results of the work carried out, correction of the technological map for the next season**

**Table for drafting a technological map**

Deadline	Works	Expected results	Necessary equipment, preparations	Notes
<b>Spring</b>				
<ul style="list-style-type: none"> <li>• Soil preparation</li> <li>• Drafting a planting scheme taking into consideration crop rotation and compatibility of crops</li> <li>• Introduction of organic substances</li> <li>• Mulching</li> </ul>				

<ul style="list-style-type: none"> <li>• Cultivating the soil using biopreparations (industrial, homemade)</li> <li>• Sowing, planting, pre-sowing treatment of the planting material</li> </ul>				
<b>Summer</b> <ul style="list-style-type: none"> <li>• Development of the weed control system</li> <li>• Mulching</li> <li>• Development of a feeding system</li> <li>• Organisation of irrigation</li> <li>• Development of a protection system against pests using biological methods</li> </ul>				
<b>Autumn</b> <ul style="list-style-type: none"> <li>• Harvest work</li> <li>• Post-harvest work for the preparation to the next season</li> </ul>				
<b>Winter</b> <ul style="list-style-type: none"> <li>• Measures to retain moisture in the soil</li> </ul>				

### Discussion and analysis of technological maps

In this exercise, it is important not to analyze the correctness of a particular map but to assess general understanding of organic farming technologies.

### Reflection

Recommendations for coaches and facilitators: It is necessary to carry out reflection in one of the ways (Appendix 3).

## **Training 8. Large fields start with a small bed. Creating a system of organic beds**

### **Task:**

To familiarize the participants of the training with various types of beds.

### **Questions to consider:**

What types of beds do exist? How to make a warm bed? How to make Rozum's bed? What is the advantage of growing plants in beds?

### **Expected results:**

Main types of beds are studied. There's understanding of features of making warm beds and Rozum's beds.

**Materials for conducting the training:** markers, A4 paper, a blackboard, a chalk, a flipchart, printed handouts.

## **STRUCTURE AND PROCESS OF THE TRAINING**

### **Introduction. Group warm-up**

Recommendations for coaches and facilitators: in this part of the training, it is necessary to conduct an exercise to warm up the group with the aim of team building, and create a friendly working atmosphere. Some methods and exercises are given in Appendix 2.

### **Main part**

The first experiments on the introduction of organic farming methods and techniques are best carried out in small areas or beds. After testing and mastering the technology, you can move to larger areas.



## Brainstorming “What is the difference between the beds in the photos?”



The participants express their opinions (the beds differ in shape, levels, fencing, width of paths, types of cultivation).

## Brainstorming “Why are beds necessary?”

The participants of the training are asked to write down all the answers to this question and discuss them.

**The main principle for choosing a type of beds: in dry areas, it's necessary to lower beds into the ground; in flooded areas, it's necessary to raise them above the soil surface.**

## Main features of organic beds

- Their location does not change. They are usually fenced off
- They are of small width (up to 1 m) for comfortable cultivation.
- There's no need in digging.

- Replenishment of nutrient reserves occurs due to the decomposition of organic residues.
- When planning plantings, the crop rotation scheme is taken into account.
- Different planting systems can be used including mixed ones.
- They are permanently covered with a mulching layer.

### **Arranging the simplest beds on the sod**

Beds can be arranged directly on the sod without digging and removing weeds. There are several ways to do it.

The participants are divided into mini-groups. Each of them is given instructions on how to arrange beds on the sod. The task is to analyze the labour inputs of each method and assess their pros and cons.

#### **Method 1**

1. A location is chosen for the bed.
2. The future bed is laid out.
3. The grass is trampled or cleared at the place of the bed.
4. Optionally, solutions of microbiological fertilizers, an infusion of manure or liquid green fertilizers are introduced to the space allocated for the bed.
5. Then this area is covered with an opaque material (a black spunbond, an agricultural material, slate, a thick layer of straw, etc.)
6. In about 6 months, the mulching layer is removed, the top layer of the bed is loosened. Then you can sow seeds or plant seedlings. If you plan to plant seedlings, you may not remove the mulch (a spunbond, agricultural material, straw) but make holes there to plant the seedlings.

#### **Method 2**

1. A location is chosen for the bed.
2. The future bed is laid out.
3. A box is made from available materials.
4. Manure or compost and half-rotted organic residues can be put directly on the grass inside the box.
5. Optionally, solutions of microbiological fertilizers, an infusion of manure or liquid green fertilizers are introduced to the space allocated for the bed.
6. A thick layer of cardboard is laid on top (you can put paper in several layers) to remove the weeds.
7. Place a layer of humus or compost of about 10-15 cm on top of the cardboard.
8. The bed will be ready in 2 weeks. You can plant seedlings or seeds of large-fruit plants in the first year.



## Physical activity break or pause

### Arranging the warm beds

The participants of the training are asked to write down their associations with the phrase “warm beds” and then discuss them.

**A warm bed** is essentially an improved compost heap. The bed consists of several layers of plant residues (weeds, fallen leaves, plant stems, branches, etc.). When they

decompose, heat is released, which helps the plant roots to tolerate the fluctuations in spring temperature. Moreover, rotted plant residues are an excellent organic fertilizer.



A warm bed has a number of advantages over a traditional bed:

- they can contain all organic residues (fallen leaves, weeds, plant stems, branches, etc.);
- this bed does not need to be dug and weeded; weeds practically do not grow on it;
- it is not required to fertilize the bed for 4 years - the decomposing organic substances provide the plants with all nutrients;
- carbon dioxide released during the decay of waste improves the

photosynthesis of plants in the bed;

- sowing seeds and planting seedlings can be done at an earlier date since the bed warms up better due to the heat released during the decomposition of organic substances;
- plants in a warm bed are not afraid of recurrent frost.

**The only disadvantage of warm beds is that their arrangement requires quite a large investment of time and effort.**

### Scheme for laying out a warm bed

Warm beds can be deep, high and mixed.

The participants of the training are divided into several mini-groups. Each group gets pictures-hints. The task is to develop a technology for laying out a warm bed.

**Hints for Group 1 (deep warm bed):**



**Hints for Group 2 (high warm bed):**



**Hints for Group 3 (mixed warm bed; there's a deepening and a box):**



Recommendations for coaches and facilitators: you can you not every picture-hint but the most appropriate ones.

### **Crop rotation in warm beds**

1<sup>st</sup> year – zucchini, pumpkin, cucumber.

In the first year, the soil contains a large amount of nutrients and the intensive decomposition of organic substances gives a lot of heat.

2<sup>nd</sup> year – cucumber, zucchini, tomato, cabbage.

There are still a lot of nutrients in the soil. This soil condition is necessary for these crops for rapid and full development.

3<sup>rd</sup> year – cabbage, pepper, tomato, beans, beet, lettuce, potato, carrot.

There are fewer reserves of nutrients in the soil but they are sufficient for certain varieties and types of the listed vegetables.

4<sup>th</sup> year – greens, peas.

In the 4<sup>th</sup> year, the reserves of nutrients are significantly depleted. Therefore, if you do not do additional feeding, then you can grow extremely unpretentious crops.

It is necessary to relay out the warm bed if you plan to use it further.

### **Additional task**

Participants are asked to study layout of other types of beds using various sources:

- **Rozum's beds**
- **"Key hole" beds**
- **Vertical beds**

### **Practical work**

The task for the participants is to develop a model of their bed and justify the choice of its type and technological features.

### **Reflection**

*Recommendations for coaches and facilitators:* It is necessary to carry out reflection in one of the ways (Appendix 3).

## Section 3

**Training 9. They know you, they trust you and they buy your production. Certification: a guarantee of a high price, trust between the producer and buyers of agricultural products**

**Tasks:**

- To familiarize the participants with the basics of organic certification.
- Show the idea of the procedure for certification of organic products.

**Questions to consider:**

Why is the certification necessary? What is the procedure for certification? What are the types of standards and certificates? How are organic products graphically labeled?

**Expected results:**

Participants have learnt about the stages of certification, types of standards, graphic labelling of organic products according to different standards.

**Materials for conducting the training:** markers, A4 paper, a blackboard, a chalk, a flipchart, printed handouts.

### **STRUCTURE AND PROCESS OF THE TRAINING**

**Introduction. Group warm-up**

*Recommendations for coaches and facilitators:* in this part of the training, it is necessary to conduct an exercise to warm up the group with the aim of team building, and create a friendly working atmosphere. Some methods and exercises are given in Appendix 2.

**Main part**

**Business game**

Participants are divided into several mini-groups. Samples of vegetable products are given to each group. The task is to develop advertisements for these vegetables. If there's lack of natural samples, you can print pictures. Each group gives its advertisements to other groups.

Each participant chooses a product. The results are recorded on a blackboard or flipchart.

**Questions:**

Why did you choose this product?

What parameters did you pay attention to?

Why did you prefer this one when advertising the same product?

What influenced your choice?

Did the advertisement contain a guarantee of the declared properties?

Can you be sure in product safety?

There's a joint discussion based on the received answers.

**In your opinion, are these products equivalent? Why?**

- "Grandma's" product
- Farming product
- Organic product
- Ecological product
- Bioproduct
- Natural product

With the growing demand for organic products, a large number of products have appeared in the market declared as being "organic" but in fact, they are not. Many dishonest manufacturers wishing to attract a buyer place special markers on the packaging ("organic", "eco", "bio", "natural product", etc.). At the same time, they do not worry about the compliance of their product with the requirements for organic products.

**What products can be called organic?**

The following products can be called organic: food products, raw materials for the processing industry, feed and feed additives, medicinal plants as well as industrial crops grown using organic technologies.

Moreover, mushrooms, berries and medicinal plants and other wild products can also be organic (under the collection requirements).

**Organic products must necessarily have an organic certificate of a certain standard issued by an accredited certification body. Products that do not have such a certificate cannot be called organic, even if they are grown using organic technologies.**

## What is certification?

Product certification is a way to confirm the compliance of a product with official requirements that stipulate not only quality but also safety for people and the environment.

### Certification

#### compulsory

#### voluntary



obligatory for manufacturers

does not cancel the compulsory certification

is applied to all the types of production

is done on a voluntary basis in addition to the compulsory certification

checks only the final product

gives additional advantages

### **Organic certification is voluntary and does not replace the compulsory certification for this type of production**

Certification of organic production is a compulsory procedure for monitoring and confirming the production process of organic products for those manufacturers who have declared that they produce organic goods. In general, certification of organic production is voluntary in addition to the country's product quality system.

Certification of organic production implies full control of the enterprise (technological, product movement, financial) and has 2 levels (1<sup>st</sup> level is on-site inspection on the farm; 2<sup>nd</sup> level is an assessment of inspection documents). They are carried out by two different specialists from the certification company. If the certification results are positive, a certificate for the farm is issued with a list of all crops grown according to organic standards.

### **What is the difference between a standard certification procedure and organic production certification?**

As a result of the standard certification procedure, a certificate of compliance is issued based on the study of the final product and its compliance with the maximum permitted standards for certain substances.

In contrast to this approach, the certification system for organic production implies full control of the manufacturing, processing, storage, transportation, packaging and sale processes of products. Particular attention is paid to documenting all production



processes (soil cultivation, sowing, weed, pest and disease control, harvesting and storage of crops, etc.).

### What does organic certification give to a manufacturer and a consumer?

The participants of the training write down answers to these questions in the table. Then the results are summarized and discussed.

To a manufacturer	To a consumer
Identification	Confirmation of the product quality
Marketing. Help in promotion	Counterfeit protection
Support	They are sure that this product is not harmful to their health or the environment
Social aspect	Support for “green” technologies
Care of the health of consumers and the environment	Care of future generations

### Procedure for organic production certification

Every certification body has proven certification schemes. Manufacturers must go through the certification procedure on a regular basis (once a year or even more often) confirming that their products meet certain requirements. It should be noted that the transition period from traditional farming to organic farming can take up to three years.

The participants of the training are asked to draft a certification algorithm. Basing on the sample below, cards are made. Each one has one stage of certification. Then the participants must arrange these cards in the correct order. They justify their algorithm, and the results are discussed.



## Certification of the production

The order of the production certification envisages:

- Submission of an application for the certification;
- Deciding on the application by a certification body, choosing a certification scheme
- Sampling and testing
- Assessment of production and/or quality system (if provided by the certification scheme)
- Analysis of the results and making a decision to issue a certificate (or refuse to issue)
- Issue of the certificate and license for the use of the conformity mark
- Implementation of inspection control over certified products
- Corrective measures if there are any violations
- Information about the results of certification

## Various standards of organic production

*Organic, eco, bio* are markers for products grown and processed in accordance with the approved ecological standards. For instance, the term “*eco*” is used more often in France and Germany, “*organic*” – in English-speaking countries, “*bio*” in Scandinavia

In order to label products, there are various markers used in different countries:



EU



Japan



Sweden



USA



Finland



Germany



Ukraine



France

## Problem book

The participants are asked to determine what markers are used for labelling organic products in different countries using the Internet resources if necessary.

## Certification bodies



The participants are asked to find a certifying company in their country using different sources (the Internet, nearby farmers, etc.) as well as learn about the terms of certification.

### Reflection

Recommendations for coaches and facilitators: It is necessary to carry out reflection in one of the ways (Appendix 3).

## Section 4

### **Training 10. Features of the development and design of the site based on the principles of organic farming. Carrying out experiments in the beds**

#### **Tasks:**

- Review the main differences between organic and intensive farming.
- Familiarize the participants with the methodology of carrying out experiments.
- Develop a plan of an experimental site, a scheme for carrying out experiments in organic farming.

#### **Questions to consider:**

How to conduct experiments in organic farming? How to test the basic elements of organic farming? What should be considered when developing a plan for an organic farming experimental site?

#### **Expected results:**

Basics of carrying out experiments have been learnt. A plan for an organic farming experimental site has been developed.

**Materials for conducting the training:** markers, A4 paper, a blackboard, a chalk, a flipchart, printed handouts.

### **STRUCTURE AND PROCESS OF THE TRAINING**

#### **Introduction. Group warm-up**

Recommendations for coaches and facilitators: in this part of the training, it is necessary to conduct an exercise to warm up the group with the aim of team building, and create a friendly working atmosphere. Some methods and exercises are given in Appendix 2.

#### **Main part**

#### **Block 1. Updating the knowledge: difference between intensive and organic farming**

The participants are divided into groups of 6-7 people. Each group fills in the table:

<b>In intensive farming</b>	<b>Ongoing processes and their consequences</b>	<b>In organic farming</b>	<b>Ongoing processes and their consequences</b>
Deep plowing (digging) of the soil		Shallow (up to 5 cm) loosening of the soil	

Using the monoculture principle (only one type of plant is grown on one site)		Mixed planting of plants (several types of plants are grown on one site at the same time)	
Solid planting of crops		Breakdown into beds, individual areas with wide paths	
Use of toxic chemicals (pesticides)		Use of natural preparations (usually fungi or bacteria)	
Use of herbicides (weed control chemicals)		Mulching, growing green manure, catch crops	
Use of mineral fertilizers		Use of organic substances. Growing green manure	.

Recommendations for coaches and facilitators: you can prepare answer cards (see Training 3) and present them to the participants. In this case, they will fill in the table according to the lotto principle.

### **The basics of experimental activities in the school garden. Study of experiences in organic farming**

The use of any farming system requires awareness. Therefore, it is advisable to start the transition to organic farming with small plots and beds. The best way to test organic farming methods and techniques is through experimentation.

Firstly, it's necessary to familiarize the participants of the training with several experiments carried out (Appendix 6). Tell them about the goals and objectives of the experiment. Then invite them to express their assumptions regarding the results of the experiment and only after that demonstrate what results were obtained.

## Physical activity break or pause

### Carrying out experiments in the school garden

The participants are asked to develop an idea for an experiment after studying the following guidelines:

#### 1. Choose a topic

It is very important to choose the right topic of experience. It should be interesting, have a practical application and a production value. How can you find a topic for experiments? You can ask the Biology teacher, look for it in the media or advertisements, ask an agronomist or a farm manager for advice. You can also write a letter to one of the specialized or research institutions.

#### 2. Collect information about the topic

It is necessary to collect information about the selected topic and to analyze the collected material. In any case, at this stage, it is important to simulate the possible options of the results of the experiment.

#### 3. Plan the experiment and draw up a scheme for its carrying out

At this stage, you need to plan who is responsible for carrying out particular activities. It is better to arrange it in the form of a graph or table with dates and types of work. It is also necessary to add the cyclical nature of observations indicating the responsible person. A thoughtful and clear plan is an essential condition for a successful experiment. If everything is done haphazardly and randomly, there is no need to talk about the accuracy and reliability of the results. A record book should be prepared to record the course of the experiment and its results. It should be mentioned that in the course of the experiment, deviations from the plan can occur even if it is thought out in detail. It might happen since weather conditions and other circumstances can make their own adjustments. All these changes, their causes and consequences must be recorded in the record book.

The results of the experiment are evaluated by comparing the experimental and control options. An option can be called experienced if it implies use of a certain agrotechnical method, certain periods of fertilization, their dosage, seed quality, etc.. An option can be called controlled if this technique is not applied.

When carrying out a field experiment, it is necessary to observe the unity of all conditions in all the options except for the studied one. In order to avoid possible mistakes and to weaken the influence of random factors, it is necessary to provide several repetitions in the experiment scheme. Sufficiently high accuracy of the results is achieved if 3-4 repetitions have been carried out. In addition to increasing the accuracy of the experiment, it makes it possible to carry out mathematical processing of the data, which increases the reliability of the results of the experiment.

Before carrying out the experiment in a specially designated area, it is necessary to study the history of this area at least over the past few years, to find out what crops grew on it and to assess the current state. It is also necessary to determine the nature of the soil, its physical and chemical properties as well as the content of the main elements of mineral nutrition. The site must be uniform in soil terrain and fertility.

All the received data must be entered into the record book.

#### 4. Carry out the experiment

The experiment should be carried out on plots located no closer than 10 m from fences, individual groups of trees and no closer than 50 m from forests, buildings and ravines. In the school garden, plots with an area of at least 10–20 m<sup>2</sup> can be used for experiments. To improve the accuracy of the experiment and to take into account its results correctly, it is necessary to frame the entire area of the plot with a protective strip from 0.5 to 1.5 m wide. It is necessary to allocate three “test plots” to observe the growth and development of plants as well as to prepare samples for laboratory analysis on a plot. It is better to arrange them randomly or diagonally but not in a row, so that data from different parts of the plot can be taken into account. After measuring the test plots, their measurements are fixed with the help of sticks tied with a string, and signs with information about the experiment being carried out are placed.

#### **5. Summarize the results. Document the results**

After the experiment, a comprehensive analysis must be carried out. Compare the received data with the expected ones. Analyze the course of the experiment and deviations from the schedule. Make appropriate conclusions and develop recommendations. It is very important not only to conduct the experiment but to convey the results to stakeholders. Think over where you can post the obtained results (the media or the websites).

*Recommendations for coaches and facilitators:* It is possible to provide the participants with ready-made experiment ideas for animation to choose from (Appendix 4, 5).

### **Practical work on the development of a plan for an experimental site for organic farming on the basis of the school garden**

Each group is given a plan of the school garden or area that can be used to locate the experimental site or beds.

Each group determines plants and the number of them to grow and marks the location in the plan.

Each group presents its project and briefly justifies it.

### **Reflection**

*Recommendations for coaches and facilitators:* It is necessary to carry out reflection in one of the ways (Appendix 3).

## **Training 11. From theory to practice. Growing agricultural products according to the principles of organic farming**

### **Task:**

Practically consolidate the knowledge and skills in growing products using organic methods.

### **Questions to consider:**

What are the features of the technological map when growing organic vegetables? What are the features of growing crops using organic methods?

### **Expected results:**

Practically master the process of growing organic products.

**Materials for conducting the training:** cultivation equipment for the soil, seeds, planting material, irrigation equipment, plant-care equipment.

## **STRUCTURE AND PROCESS OF THE TRAINING**

- 1. Training on safety techniques when working in the school garden.**
- 2. Practical work on growing organic products.**

Within the framework of this training, it is planned to organize work on growing agricultural products using organic methods and/or conducting experiments during the entire growing season. In order to do this, several crops are selected and a technological map is developed.

Technological maps can be developed on the basis of the following publications (you can find them available on the Internet or use the proposed links for viewing and downloading):

### **Elizabeth Ogren, Paulina Johnson “Growing Vegetables in Organic Farming”**

The materials presented in this publication are devoted to the cultivation of the main open field vegetable crops in organic agriculture. It provides practical advice on soil cultivation, nutrition, protection from pests and diseases of vegetable crops. The publication will be useful for teachers responsible for conducting classes and experiments in the school gardens as well as students and teachers of agricultural educational institutions, agronomists, farmers and amateur gardeners.

Links for viewing and downloading the book:

<https://bit.ly/3b7rsEq>, <https://ecoidea.by/ru/download/file/fid/5687>

### **Practical guidelines on “Organic Cultivation of Berry Crops”**

The brochure contains practical information on the cultivation of blueberries and other berry crops. It will be useful not only for farmers who are engaged in the cultivation of organic berry products but also for owners of personal plots as well as teachers conducting classes and experiments with the participation of pupils in the school gardens.

Links for viewing and downloading the book: <https://bit.ly/3b2Gco9>, <https://bit.ly/3cis9w0>



The participants can reproduce the experiments from Appendix 6 or use interesting ideas from Appendices 4 or 5.

The experimental work can be supported in various ways. We suggest you use the guidelines developed by the educational institution “Gomel State Regional Ecological and Biological Center for Children and Youth”:

**Methodological recommendations for organizing and conducting experimental work with pupils**  
(Compiled by S.F.Timofeev, S.V.Zhadko, A.N. Kusenkov, L.M. Gorovtsova)

The practical guide contains basic terms and concepts as well as a classification of agricultural and flower-ornamental plants, the methodology for organizing, conducting field experiments, topics of experimental work with field and vegetable crops and experiments with agricultural, fruit-berry and flower-ornamental crops and animals.

You can view and download the text of the guide on the institution's website in the section “Methodological Recommendations”: [http://eco.m5.by/методические\\_рекомендации](http://eco.m5.by/методические_рекомендации)

### **Analysis of the work carried out. Presentation of the results**

It is necessary to analyze the work carried out and the volume of grown crops. Conduct a comparative analysis of various farming methods and certain agricultural practices.

It is very important to summarize the obtained results. They can be used for writing research papers and presenting to interested participants.

## **Training 12. Planning the launch of organic production**

### **Task:**

To familiarize the participants with the stage of launching organic production.

### **Questions to consider:**

What should be considered before starting organic production? Where can I find information about organic farming?

### **Expected results:**

The stages of launching organic production have been learnt. There's understanding of the risks of organic production.

**Materials for conducting the training:** markers, A4 paper, a blackboard, a chalk, a flipchart, printed handouts.

## **STRUCTURE AND PROCESS OF THE TRAINING**

### **Introduction. Group warm-up**

*Recommendations for coaches and facilitators:* in this part of the training, it is necessary to conduct an exercise to warm up the group with the aim of team building, and create a friendly working atmosphere. Some methods and exercises are given in Appendix 2.

### **Main part**

#### **Block 1. Do you agree with these statements? Justify your answers.**

- Organic production is easy.
- Organic production is profitable.
- Organic production is irrelevant.
- Organic production is prestigious.
- Organic production is trendy.
- Organic production has no prospects.

#### **2. What should be done before launching organic production?**

Before launching organic production, you need to work through the following steps:

Step 1. Decide what you need organic production for. Do you plan to grow products only for personal consumption or for the sale of surplus?

Step 2. Collect information on organic farming practices from various sources.

Step 3. Test the most promising methods of organic production on selected plots or fields.

Step 4. Study the market and analyze the demand for organic products.

Step 5. Realistically assess the necessary resources and capabilities.

Step 6. Apply only organic production procedures on the site. The help of an experienced counselor or farmer who can provide guidance on the process will be very helpful.

Step 7. Constantly analyze and correct your actions!

### 3. Masterminding an idea for launching organic production

The participants of the training generate ideas for launching organic production. Briefly describe what and how they will produce, whom they will sell their products to and how to promote their products.

### 4. Practical work “Development of a Business Model for the Launch of Organic Production”

Participants are divided into groups of 3-4 people and work out a few realistic ideas. If desired, one of the participants can work individually.

In order to help them, you can give them a template for a business plan on one page (Lean Canvas) which allows comprehensively evaluating the idea and, if necessary, elaborating it.

Recommendations for coaches and facilitators: recommendations on filling in the template can be found on the Internet.

ISSUE	DECISION	UNIQUE VALUE OF THE PROPOSAL	NON-MARKET COMPETITIVE ADVANTAGE	CLIENT (CONSUMER) SEGMENTS
2	4	3	9	1
	KEY METRICS		CHANNELS	
	8		5	
STRUCTURE OF EXPENDITURES		FLOWS OF REVENUES		
7		6		

## Analysis of the course

The following questions can be used to summarize and analyze the course:

*What are the prospects of organic farming in your country and in the world?*

*What knowledge was useful to you?*

*How can you use the knowledge gained?*

*What was missing in the course?*

It is recommended to carry out a self-control test:

### Self-control test

#### Are these products equivalent? Why?

- “Grandma’s” product
- Farming product
- Organic product
- Ecological product
- Bioproduct
- Natural product

Organic farming is ....

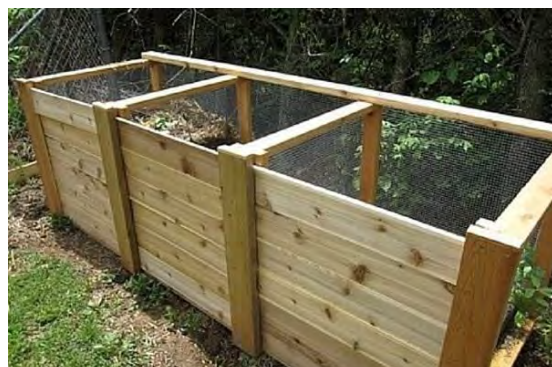
Advantages of organic farming: ...

Disadvantages of organic farming: ...

Choose agricultural practices of organic farming:

- Mulching
- Digging
- Mixed planting
- Application of toxic chemicals
- Minimal loosening of the soil
- Application of mineral fertilizers
- Application of organic fertilizers
- Use of EM-preparations

Determine which agricultural techniques and methods are applied:



- 1:
- 2:
- 3:
- 4:

## Appendix 1

### Exercises on getting acquainted

Based on the materials from the resource <https://www.kem.by/teachers/uprajnenia-znakomstva-uchastnikov/>

#### “Name – Movement”

**Objective:** to introduce the participants to each other, to relieve anxiety.

**Duration:** 5 minutes.

**Facilitator:** *“Let's stand in a circle. Now everyone takes turns taking a step forward and say their name in the way they like (for example, accompanying with a gesture or movement). Then after my signal, everyone will also take a step towards the center and repeat the name and movement of the speaker. At the same time, the participant does not move and observes silently.”*

#### “Polina – Pizza - Prague”

**Objective:** to introduce the participants to each other, to relieve anxiety.

**Duration:** 5-10 minutes.

**Facilitator:** *“Each participant takes turns in calling their own name, and then names the dish and the city (favorite or any other) that begin in the same first letter as their name. The next participant names all three words of all previous participants, and then their own”.*

#### “Adjective Beginning in the First Letter of the Name”

**Objective:** to introduce the participants to each other, to relieve anxiety.

**Duration:** 5-10 minutes.

**Facilitator:** *“Each participant says their name and thinks about an adjective beginning in the same first letter as their name. The adjective should characterize the personality of the speaker and reflect some features of their character. For example: “My name is Marina. I’m mature”.*

#### “My Name Is... I Do This...”

**Objective:** to introduce the participants to each other, to relieve anxiety.

**Duration:** 10 minutes.

**Facilitator:** *“The exercise can be done when sitting or standing. Each participant in a circle calls their name and shows any movement with the words: “I do this...” Each next participant first repeats all the names and movements of the previous ones, and then calls their own name and shows their movement. The last participant must repeat the names and movements of all members of the group.”*



## **“Didn’t You Know That I...”**

**Objective:** to introduce the participants of the training to each other.

**Duration:** 10 minutes.

**Facilitator:** *“Now I will give a ball to one of the participants. The chosen participant will start the game with the words “Didn’t You Know That I...”, and tell a fact about themselves. Then the participant will throw the ball to the person they are interested in, address the person by name and ask the question that interests them. The player who has been asked a question must answer it and tell a fact about themselves. Then the player must throw the ball to the other player”*

This exercise is good for using in groups where the participants are already familiar.

## **“Three Names”**

**Objective:** to introduce the participants of the training to each other.

**Duration:** 10 minutes.

**Facilitator:** *“I will give three cards to each participant. On the cards, you need to write three versions of your name (for example, what your parents, classmates and close friends call you). After that, each member of the group introduces themselves using these names, and describe the feature of their character that corresponds to this name or explains the reason for its occurrence.”*

## **“A Ball of Acquaintance”**

**Objective:** to introduce the participants of the training to each other.

**Duration:** 10 minutes.

**Facilitator:** *“I will give balloons (not blown up) to all the participants. While the first participant blows up the balloon, the neighbour on the right says their own name and talks a little about themselves. When the story ends, the neighbour hands them a balloon blown up, and this process is reproduced in a circle. At the end of the exercise, all participants will get a balloon.”*

After completing the exercise, offer to decorate the room with these balls.

## **“My Name”**

**Objective:** to get acquainted, to enhance interaction of the group members.

**Duration:** 10-15 minutes.

**Facilitator:** *“I suggest you find your namesakes and unite in groups by name. Those with rare names are united in the “Assorti” group.”*

Each group gets a task on creatively presenting their name. The idea can be different. For example, it can be a presentation “Your Name Is Your Talisman”. The participants have to analyze what their names mean. Moreover, the participants can draw their own name emblems. After that, the emblems can be

attached to the stand “Our Names” and speculate which one is the most original. Furthermore, you can invite the participants to sing a song in which their names sound.

### **“Acquaintance Through a Thing”**

**Objective:** to introduce the participants of the training to each other.

**Duration:** 10-15 minutes.

**Facilitator:** *“Each participant takes any item belonging to them and, on behalf of this item, tells about its owner. Other items can ask them any questions about its owner.”*

When a person talks about themselves in the third person, on behalf of an inanimate item, this allows them to be more relaxed and share intimate things.

### **“A Majestic Name”**

**Objective:** to introduce the participants of the training to each other.

**Duration:** 15 minutes.

**Facilitator:** *“Since birth, each of us has a constant companion – our name. Like the moonlight, it wraps everyone in mystery. The power of our name is mysterious and inexplicable. In love, we repeat the beloved name and appeal to the beloved via their name. People might pray and curse via saying the name. There are no boundaries for the life of a name; there is no measure for its power. The forces inherent in a person's name help overcoming difficulties and recognizing the sources of joy, inspiration and wisdom. These forces are the engine of human growth.*

*The name can also be a source of danger because every sound of the name hides forces that, with an inattentive attitude, can destroy the creative start. However, the acceptance of these forces and close attention allow acquiring special strength.*

*One eastern prince was called Dzhamber. In an effort to understand the hidden meaning of his name, he thought over the meaning of the first sound “D”. He realized that he was driven through life by good deeds, daring and duty. And disrespectfulness and dumb actions require special attention and inner work.*

*Let's also think over the hidden meaning of our names. First of all, let's reveal the secret of the first sound of our name. For example, when I think of Mikhail, maturity and moxie come to my mind. I believe that meanness and mildness can hurt him. Irina means integrity and irony, but at the same time, - inactivity and impulsiveness.*

*Please take time to understand the meaning behind the first letter of your name. Three minutes are allocated for this task. Then everyone will tell about their findings.”*

### **“Classic Acquaintance”**

**Objective:** to introduce the participants of the training to each other.

**Duration:** 10 minutes.

Classic acquaintance is carried out by the method of circular survey. A scheme is written on the blackboard thanks to which the participants will be able to tell about themselves:

1. *My name is...*
2. *I study/work at...*
3. *Any responses to the question "Who am I?"*

Brief creative additions are also possible. For example: "When I have free time, I prefer....", "You will not believe that I...", "I think that I am...", "Others think that I am...", "In fact, I am..." and so on.

The participants get prepared in several minutes (write down their answers), and then the facilitator asks each one to read their answers aloud in turn.

### **"Who Am I?"**

**Objective:** to introduce the participants of the training to each other.

**Duration:** 15 minutes.

**Facilitator:** *"I will give a pencil and paper to each member of the group. Write in a column the numbers from one to ten and answer ten times in writing to the question "Who am I?" These can be your character, hobbies, interests and feelings. Begin each phrase with the pronoun "I". On making this list, pin a piece of paper to your chest. Then start walking slowly around the room, approach the other members of the group and carefully read what is written on each piece of paper. Feel free to comment on the lists of other group members. Alternatively, each member of the group can read their list to the others."*

The exercise is especially suitable for the first session and is a good way to break the ice and quickly introduce participants to each other.

### **"Business Card"**

**Objective:** to introduce the participants of the training to each other.

**Duration:** 10-15 minutes.

**Facilitator:** *"I suggest you create a "Personal Business Card" project on A4 sheet. The business card should include your name, hobby and your characteristics. Moreover, you can write a profession, position, address and phone number (they can be fictitious), e-mail, links to your pages on social media, etc. You also need to come up with your motto and draw a personal logo. "*

Then each participant comes out and presents their "Personal Business Card" project. The exercise is suitable for small groups (up to 15 people).

### **"Mutual Presentations"**

**Objective:** to introduce the participants of the training to each other.

**Duration:** 10-15 minutes.

**Facilitator:** *“One of the members of a pair sits on a chair, the other one stands behind the partner putting their hands on their partner’s shoulders. The standing person speaks on behalf of the sitting person calling themselves the name of their partner. The standing person speaks for one minute playing the role of their sitting partner. After that, any member of the group can ask questions addressed to the sitting person but they will be answered by the standing person.*

Ask participants to ask questions based on the topic of the training. Questions can be the following:

*“What qualities do you value in people?”*

*What do you think is the most unpleasant quality in people?*

*Is there anyone who has made a strong impact on your life?*

*Tell us about your cherished desire.*

*What would you like to achieve in life?”*

Finish the exercise by discussing the feelings and thoughts of the participants. It is important to pay attention to three aspects:

The ability to take time into account when presenting;

the ability to correctly and concisely convey the information received;

the ability to “feel” another person enough to guess the missing information. .

*“Talk to the sitting partner. Ask them:*

*How did you feel when your partner spoke on your behalf?*

*Did your partner manage to correctly present information about you?*

*Did he manage to become your twin?*

*Did your partner answer the questions correctly on your behalf?”*

## **“Interview”**

**Objective:** to introduce the participants of the training to each other.

**Duration:** 15-20 minutes.

The facilitator asks the participants to split into pair.

*“Your task is to get to know each other taking turns in playing the role of an interviewer. You can ask each other about what you think is possible, interesting and necessary for getting acquainted.*

*One person takes the interview for 7-10 minutes, then the participants switch roles. After the conversation, introduce each other to all the other participants.”*

A model list of questions could be as follows:

*What’s your name?*

*What's your favourite colour?*

*What's your favourite season of the year?*

*What's your favourite name (for men and women)?*

*What do you value / don't value most in other people?*

*What are you afraid of most?*

*Is it easy to upset you?*

*What is the easiest way to make you happy?*

*What do you like doing when you are alone?*

## **"Names, Names"**

**Objective:** to introduce the participants of the training to each other.

**Duration:** 5-10 minutes.

**Facilitator:** *"All the participants walk freely around the room. Shake hands with every member of the group that comes your way. Each time you shake hands, you should introduce yourself and exchange some fact about yourself (in short form). Your task is to memorize as many names as possible."*

*Then the participants return to their seats and, within two minutes, write down the names they can remember. They mark the first three names and think over the following questions:*

*Why exactly these three names came to my mind first?*

*How do I usually remember a person's name?*

*What feelings and associations help me keep people's names in my memory?*

*Do I know any special tricks to help me remember names?"*

## Appendix 2

### Exercises to warm up the group at the training

*Based on the materials of the website: <https://lib.sale/lichnostnyiy-rost-uchebnik/nachalnaya-stadiya-treninga-36130.html>.*

Warm-up exercises are performed at the beginning of each session for 10-15 minutes. The purpose of the warm-up is to create a good mood, a positive emotional background, an atmosphere of sincerity and trust in the classroom.

The warm-up promotes self-disclosure of the group members and facilitates communication between them. It is desirable to perform it at a fast pace. A discussion after the warm-up exercises is possible but not necessary.

At the same time, it is useful to explain to the group members that their participation in the exercise is a wish and the principle of activity does not impose any rigid obligations on them. They can participate in the exercises of their choice. This relieves tension, allows participants to relax and fosters a desire to express themselves along with other members of the group.

If there are difficulties in communication at the beginning of the training, the warm-up can take quite a long time in the first lesson. It may cover the whole lesson.

In addition to warm-up exercises, you should remind about the rules of group work at the beginning of each lesson.

Unlike other exercises, warm-ups can be reproduced from session to session. Moreover, sometimes special rituals are developed for the beginning of each lesson.

#### **“Example of a Possible Ritual for Starting Lessons”** (V.V.Makarov, 2005, A.S. Prutchenkov, 1991)

The leader addresses the group with the following text: *“Close your eyes ... Now take your neighbour's hand with your right hand ... Hold it in yours. Try to keep your eyes closed and focus on the sounds around you. Let anyone focus only on what they hear, let them listen for a while and recognize the sounds that come to them (1 minute)..”*

*Without opening your eyes, concentrate your attention on the palms of the neighbours to the right and left that you touch. Try to determine which palm is warmer, which is colder, whether it was a neighbour's palm on the right side or on the left side (30 sec). With your eyes closed, open your arms and focus on your breathing, feel how the air enters and exits through the nostrils and lips, how the chest moves with each inhalation and exhalation (1 minute). Try to count each exhalation, and on the fifth exhalation you should open your eyes ...”*

#### **“Hello”** (B.R.Matveev, 2005)

One of the participants in the lesson starts. By addressing the neighbour on the left side with a feeling of joy from the meeting, the participant says *“Hello...”* and expresses their attitude towards others with a voice, a gesture and a smile.



**“You know, I...”** (A.S. Prutchenkov, 1991)

Group members greet each other with this phrase describing any interesting and funny incident that occurred while communicating with a person in the period between the previous and this lesson.

**“Greetings”** (V.Romek, 2005)

Facilitator: *“Our task now will be to greet as many members of the group as possible within a minute. You can greet one participant several times. ”*

Discussion:

*“How did you feel during this exercise?”*

*Which group member do you remember your contacting with?*

*What do you think has led to this?”*

**“Greeting without Words”** (V.Romek, 2005; the following exercise can also be used to train the understanding of non-verbal signals).

Facilitator: *“Now we will try to greet as many members of the group as possible for three minutes but without words. We can only use the capabilities of our body, eyes, facial expressions and gestures. You can greet one participant several times. Try as many different ways of greeting as possible. Don't forget about smiling.”*

Discussion:

*“What greetings did you like most?”*

*How many non-verbal greetings did you use?*

*How does a partner respond to a greeting accompanied by friendly non-verbal behavior?*

*How did your partner react to touch or distance reduction?”*

The exercise is best done being accompanied with rhythmic music.

**“Associations”** (the following exercise can also be used to train memory capacity)

*“Recollect a personal quality that begins with the same letter as your name, e.g. “Olga is out-of-this-world”, “Vladimir is vehement”. Then each of you pronounces your name and adds an invented quality to it. Moreover, each next participant repeats everything that was said before them”*

**“Gift”** (the following exercise can also be used to form “Me-image”)

All participants in a circle say what they would like to give to the person who sits next. The participants tell about something that could truly please a person. The one, who was “presented” with a gift, thanks and explains whether they would be happy with such a gift and why.

**“Motto”** (*the following exercise can also be used to form “Me-image”*)

*“Now all the participants in a circle, one by one, will say which T-shirt and with a slogan-motto they would buy themselves if there was such an opportunity. Try to think over the answer which wouldn’t be accidental so that the inscription will reflect your life credo, basic life principles (like a motto on a knight’s shield), and the colour will match your character. ”*

**“Broken Phone” with associations** (*Labyrinths of Psychology, 1996*)

One person thinks about a word and –by whispering – says this word to the neighbour on the right so that the other participants do not hear it. The listener does not repeat the word they heard but tells their neighbour the first association with this word (again by whispering). Then, everyone says their associations in a circle.

Discussion: it is interesting to match the first word with the last, and then ask each of them to say aloud the words they have named in a circle. Associations fall into one channel very often and are repeated several times per circle.

**“Catching Glances”** (*I.V.Vachkov, 1999*)

The exercise can be used to train social awareness skills.

Option 1. All the participants stand in a circle with their heads down. At the command of the leader, they simultaneously raise their heads. Their task is to catch someone’s glance. The pair of players who succeeded leave the circle.

Option 2. The opposite task is not to catch anyone’s glance.

**“Six”** (*I.V.Vachkov, 1999*)

The exercise can be used to train attention.

All the players stand in a circle. Each member of the group takes turns in calling the numbers of the natural series in order: one, two, three ... If the player got a number ending in 6 or a multiple of 6 (6, 12, 16, 18, 24, 26, etc.), instead of naming him, they should silently jump up and clap their hands. The one who made a mistake is eliminated from the game. You can play up to three remaining most attentive players. Other numbers can also be used instead of six.

**“Everyone’s Attention”** (*Labyrinths of Psychology, 1996*)

The exercise can also be used to develop communication skills.

The participants are free to move around the audience. All the participants in the game are invited to complete the following task: by any means, without physical influence and extreme means, try to attract the attention of others. The task is complicated by the fact that all the participants in the game are trying to complete it at the same time.

Discussion: the participants share their opinions on who was better and faster to attract attention and which techniques they used.

### **“Forbidden Movement”** (*Labyrinths of Psychology, 1996*)

This game is to train attention. The facilitator explains that all the participants in the game must repeat the movements that the facilitator will show them except for the “forbidden” one. For example, wrapping the arms around the head. The facilitator makes various movements with their arms, legs, head and body. At some moment, the facilitator shows the “forbidden” movement. Anyone who repeats it, or even tries to repeat it, is considered to have violated the rules of the game and must leave the game. First, the facilitator conducts the game at a slow pace making it possible to learn the main rule.

### **“Warm-up” (animals)** (*Labyrinths of Psychology, 1996*)

Everyone stands in a circle. The facilitator whispers everyone in the ear what animal the participant will play (for example, a cat, a white bull, etc.). Moreover, the facilitator says the names of different animals to just a few participants, and all the rest participants (the majority) hear the names of the same animal (for example, a chipmunk). All the “animals” tightly hold each other’s arms bent at the elbows. Then the facilitator loudly pronounces the name of an animal. The task of the named “animal” is to sit down, and the task for all the rest is to prevent it from doing it. The game begins. First, the facilitator tells the names of different animals. All the players concentrate on the task of not letting the next “animal” sit down. And at some moment, the facilitator says “chipmunk” - and all the “chipmunks” suddenly sit down. This exercise gives a strong emotional discharge, causes a positive charge of emotions and laughter.

### **“Reflection. Discussion of the previous lesson”**

Before the start of the main part of the lesson, the group sits in a circle, and everyone who wants express their opinions of the previous lesson in turn. What did you like? What is not acceptable? What would you like to do differently today? What are the claims to the group, to whom specifically, to the facilitator? There is no need to force anyone to speak; everyone speaks only if they want. A similar discussion can be held at the end of each session.

## Appendix 3

### Reflection exercises

*Based on the materials of the website: <https://infourok.ru/psihologicheskie-igri-na-zavershenie-2935829.html>.*

#### “What was the training?”

The exercise helps the participants to recollect what happened at the training, to combine their impressions of it and the information received into a single memory. The exercise also helps to make the completion of the training active and memorable.

**Required materials:** chart boards, A4 paper, pencils.

**Duration:** 15 minutes.

**Group size:** 6-20 people.

All the participants are divided into mini-groups of 3-4 people. Each group receives a piece of paper and a chart board and, in 5 minutes, has to come up with a maximum of adjectives-definitions that characterize the training completed. For example, it was active, informative, etc.

After that, the representatives of each group read out their list of adjectives.

Discussion is optional. Groups can be asked to comment on the most interesting definitions from their lists.

Option: you can ask the groups to list key concepts and terms related to the topic of the training instead of adjectives.

#### “Summing up”

The exercise is used to complete the training. It makes it possible to recollect what was learned, to think about how the knowledge gained will be applied in real life.

**Required materials:** A3 paper, pencils, markers.

**Duration:** 20 minutes.

**Group size:** 6-20 people.

All the participants are divided into 3 groups. Each group receives a piece of paper and their task.

The task for the first group is to prepare a presentation in which the main points discussed at the training will be named. The second group should tell about a set of measures in their presentation that can be taken in real life (in the workplace) in order to use the received information effectively. The third group is given a task to think over what obstacles may arise when applying the information received in real life and how to overcome these obstacles.

The groups are given 10 minutes to think about ideas and the way how to present them to the others. A3 paper can be used to display the main points on them, make schematic drawings, etc.

After that, one representative from each group will present the results of their team's work.

Discussion: can the group add something to what has been said? Which ideas do the participants agree with and which they don't?

## **“Changes”**

The exercise is used to summarize the results of the training. The mutual control of the participants increases the likelihood that they will use the gained knowledge in practice in their activities.

**Required materials:** cards made of thick paper of the business card size, pencils.

**Duration:** 10 minutes.

**Group size:** 6-30 people.

All the participants in the training receive a card. Then the facilitator gives them the following instructions: *“During the training, we received a lot of knowledge and skills the use of which will increase the productivity of our work. Unfortunately, the skills gained during the training can be lost if they are not used in real life conditions. In order to think about what and how you will put the skills into practice in the near future, we suggest that you write on your card three changes that everyone will make at their workplace in the next week after the training.”*

After completing the task, each participant writes their name and phone number on the card. The participants in pairs exchange cards and agree that they will call each other in a week to find out how the other is doing and whether their goals have been achieved.

## **“Q&A”**

The exercise is carried out at the end of the training or one of its parts in order to recollect the material covered.

**Required materials:** chart boards, stickers.

**Duration:** 20 minutes.

**Group size:** 6-20 people.

All the participants are divided into groups of 3-4 people, each group receives a chart board and a set of stickers.

Within 5 minutes, each group has to come up with a maximum of questions on the topic of the training, write each question understandably on a separate sticker and stick it on the chart board.

After that, the groups change their chart boards and must answer the questions received.

The groups are given 10 minutes for preparation. Then, a representative from each group answers the questions received.

During the discussion, the trainer can supplement the given answers.

## **“How to Use?”**

The exercise is conducted at the end of the training and allows the participants to take stock and reflect on how they are going to apply the knowledge gained in their practice.

**Required materials:** paper, pens.

**Duration:** 15 minutes.

**Group size:** 7-20 people.

All the participants are divided into mini-groups of 3-4 people. The facilitator gives the groups the following instruction: *“During the training, we received a lot of knowledge and skills the use of which will help us in our work. However, it is you yourselves who can decide what exactly to use in your practice and what changes to make. After thinking about ideas, one person from each team will have to speak and tell everyone what you came up with.”* The participants work in groups, write down their ideas on paper after which each team presents the results of their work.

## **“Free Advice”**

The exercise is carried out at the end of the training and allows each participant to receive individual recommendations on the application of the knowledge gained.

**Required materials:** A4 paper, pencils.

**Duration:** 10-30 minutes (depending on the group size).

**Group size:** 6-20 people.

The participants sit in a circle. Each participant writes their name at the top of a sheet of paper and passes it to the neighbour on the right. Within one minute, the participants write recommendations that they could give to the person whose sheet of paper they received.

After the command of the trainer, all the sheets are given to the next participant sitting on the right who adds their recommendations.

The exercise continues until everyone has received their own piece of paper with recommendations written on it from each member of the group.

Option: after each participant has written down their recommendations, they can wrap the sheet (moving it away from themselves) so that the person whom they give the sheet to does not see their notes. In this case, the participants should write their names at the bottom of the sheet.

## **“Tree of Terms”**

The exercise provides an opportunity for the participants to integrate everything that has been learned into a single thing.

**Required materials:** A3 sheets of Whatman paper.

**Duration:** 20-30 minutes.

**Group size:** 6-20 people.



All the participants are divided into mini-groups of 3-4 people. The trainer explains that one of the ways to integrate any new concepts into a system is to organize them through reinforcement-weakening. For example, if we are talking about tables, then we can recall the details (table legs, table top) or more general concepts (furniture, household items). At the same time, each of these concepts can be further divided into more particular ones (the table top is varnish, wood, etc.) or combined into more general ones (furniture is what the industry produces, or what makes our life easier, etc.).

The trainer offers each group to build a similar tree of terms to display the key concepts of this training (teamwork, effective sales, etc.). The trunk of the tree will be the central topic of the training and the branches are more specific concepts. There is no need to draw images that correspond to these concepts; it is enough to depict a tree and denote the topic and terms with words.

Each group receives a sheet of Whatman paper that they must draw a tree on in 10 minutes. On doing that, one person from each group presents the result of the group work to everyone.

Options. A similar task can be used for other purposes. For example, you might ask the groups to prepare a tree of changes the trunk of which will be the implementation of the knowledge gained as a result of the training in the workplace and the branches will be the specific steps that will be taken to do this.

### **“Applause in a Circle”**

*“We did a good job today, and I would like to suggest you playing a game with which we can express our gratitude and admiration to each other.”*

The facilitator starts clapping their hands, looking at one of the participants and coming up to them. Later, the chosen participant chooses the next participants whom they applaud to together. The third one chooses the fourth participant, etc. The last participant is already applauded by the whole group.

### **“I Wish that I”**

**Objective:** finishing the training.

**Group size:** 6-14 people.

**Duration:** 15 minutes.

Training participants stand in a circle. The facilitator joins them.

*“We have finished the training. I hope that it was useful to you and you saw some points of professional growth in yourselves. Here's an exercise to help you consolidate these findings.*

*I have a ball in my hands. We will pass it on to each other. The participant who has the ball loudly pronounces their name and says: “I wish that my professional life ...” - and says what they wish for themselves. This is quite an important point in the training, and I ask you to support the aspirations of our colleagues with applause.”*

### **“Suitcase”**

**Objective:** to provide feedback from the participants of the training upon completion of the work.

*“Our work is coming to an end. However, let's pack our suitcases before we leave. We have worked together so we will pack a suitcase for everyone together. The content of the suitcases will be special. There we will put those qualities that each of us has shown during the training: those that help us in communication and those that prevent. Now each of you will take turns in placing this chair in front of you (the trainer puts the chair in the center of the circle). All members of the group in any order will come up to you, sit on a chair and name one quality that, in their opinion, helps you in communication and one that prevents. At the same time, everyone must remember that the names should be those qualities that manifested themselves in the course of the group's work and only those that can be corrected. After everyone has expressed their opinion, it means that your suitcase is packed; the next participant takes this chair, puts it in front of them and the exercise is repeated. ”*

Option: *“Each of us has the opportunity to address to two group members and ask them to name one quality that helps you in communication and the one that prevent. The participants who are asked a question think for a while, and then take turns in expressing their opinions.”*

## **“Gift”**

**Objective:** positive completion of the training, reflection.

**Duration:** 3-5 minutes.

*“Let's think about what we could give your group to make the interaction in it even more effective, and the relationship in it more cohesive. Let's say what each of us gives to the group. For example, I give you optimism and mutual trust.”*

Further, each of the participants expresses what they would like to give the group.

*“Let's reward ourselves for a successful swim with a round of applause!”*

## **“I Am Grateful to You For...”**

The facilitator invites the participants to take turns in approaching each of the members of their group with the words “I am grateful to you for...” Everyone says words of gratitude to everyone, and this will be a positive end to the communication of the participants of the training. To accompany the process, you can turn on meditative or solemn music.

## **“Lantern”**

The participants sit in a circle. The facilitator gives a flashlight to one of the participants, turns on the music. The lantern is handed in clockwise. Without looking at the group, the presenter stops the music in a few seconds. The participant who has a flashlight in their hands speaks about the training for 30 seconds. After 30 seconds, the music starts again.

If the lantern is in the hands of a participant who has already performed at the moment when the music stops, the lantern is handed in to the next participant. They will have less time to perform since the countdown starts from the moment the music stops.

The game continues until all the participants in the training have performed.

## **“Impressions and Memories”**

The facilitator places a pile of sticky notes or small pieces of paper in the center of the room and asks the participants to write down their impressions and memories of the training on them (or draw them). The participants complete the assignment and place the sheets on the wall or board. Then they all come up together and look at the “memories” and “impressions”.

The exercise is carried out at the end of multi-day trainings (more than 4 days). It will be a very emotional end to the training for people who have worked together for several days. It is good if the participants can talk to each other at the end of the exercise.

## **“Wishes”**

The facilitator invites the participants to write a positive wish for each member of the group. To do this, the facilitator distributes a sufficient number of cards (thick sheets of small format) to the participants. On one side of them, the participants write the name of the addressee (for whom the wish is written) and the name of the sender (their own), on the other side – the wish itself. When all the cards are filled in, they are handed over to the addressees.

## **“Do You Respect Me?”**

The participants are divided into two equal groups. They stand in two circles (one inside the other), and turn so that they face each other. Everyone standing in the outer circle asks the one opposite: “Why do you respect me?” Those in the inner circle answer and ask the same question. After the responses are received, the inner circle moves one person clockwise. The exercise is repeated until the inner circle completes a full rotation.

## **“Mess”**

The following exercise is good to use at the end of a training session to make its conclusion and results positive and memorable. The participants actively interact with each other, which also makes it possible to use it for team building.

**Duration:** 10-15 minutes.

All the team members stand in a circle and stretch their arms forward. After that, at the command of the facilitator, everyone must grab the hand of the other participant. At the same time, you cannot take your neighbour with your hand or take the same person with your both hands.

After everyone has joined hands, the group should disentangle. Without unclenching their hands, make it so that everyone would again stand in a circle.

Possible questions for the group discussion:

*What was easy and what was hard?*

*Who was active and who was waiting for everyone around them to disentangle?*

*Who took on the leadership role in helping others to disentangle?*

*Was there a lack or overabundance of leadership on the team?*

Discussion can be omitted if the exercise is used as a warm-up.

## **“What I’ve learnt”**

**Duration:** 5 minutes.

The facilitator: *“I suggest you to think about what you have learnt while working in a group. Please select any of the phrases presented on the poster and complete it:*

*I’ve learnt...*

*I’ve found out that...*

*I’ve found confirmation that...*

*I’ve recognized that...*

*I was amazed by the fact that...*

*I like that...*

*I was disappointed by the fact that...*

*The most important thing for me was...”*

## Appendix 4

### Ideas for carrying out experiments in the school garden

#### Laying out the garden made of plant sprigs is as easy as pie!

Rooting is natural: plants are adapted to various disasters, and their survival capacity is simply colossal. The old masters felt it very well; plants rooted and revived literally everything.

In almost all plants, from March to September, both lignified and green growing cuttings take root without any problems. Even conifers take root. Any plant that has a cambium, a layer of cells between bark and wood that divides to create both wood and bark, can be rooted.

Cambium is a building layer. It covers the whole plant with a stocking, from the trunk to the tips of the branches. It is slippery and transparent that is exposed when the bark is removed.

From the cells that are completely identical at the beginning, wood appears in the first instance inside, then bark appears outside, and the – all the variety of organs including fruits. A stroke of cambium cells was placed under the bark of another tree, and a sprig grew. It was a grafting!

Depending on the external conditions, the cambium can mould itself both a sprout and roots. The cambium on the roots is also universal: it can easily create a sprout. Many crops “germinate” with root sprigs.

What does make cambium work? There are two things. Firstly, it's the warmth. More precisely, it's non-drying warmth. Undoubtedly, the sprig will simply dry out on a radiator. However, if you put it in a damp cloth and in a bag and place on the closet, the cambium begins to work intensively. In a week later, white callus (a tissue filling the wounds) are visible from the sections.

The roots are formed from the callus. Secondly, the work of the cambium can be accelerated by stimulants. There are many of them now: silk, humates, auxins, etc. In a solution of stimulants, the cuttings are kept from 2 hours to a day.

It is important for us to make the cambium create roots.

There are three conditions:

1. Gravity: shoots are formed above and roots – below.
2. Light stimulates the sprout's growth; darkness stimulates the growth of roots.
3. Root development is stimulated by the proximity of moisture.

Having read hundreds of times about cuttings, all gardeners run to the market in spring. Why? Because the described methods are often either impracticable (a greenhouse with a fogging installation) or unreliable and troublesome (spray 4-5 times a day, and after two weeks – 2 times a day).

For rooting all types of cuttings, we suggest you use a regular plastic bottle cut into three parts.

A piece of glass wool is inserted into the neck of the bottle, and a light, loose and skinny soil is poured above: a peat, a mixture of rotten sawdust with sand, forest cover, etc. This neck is inserted into a jar of water, and a sprig is planted in it.

The water itself is absorbed into the soil from below, and the soil moisture is always optimal. From above, the middle of the bottle is inserted into the neck, which is covered with a cut-off bottom. Therefore, the air humidity is also always at its maximum.

Such constancy of both moisture content is a decisive factor in rooting. Even coniferous sprigs root in bottles, which are quite difficult to root in other ways. Of course, bottles cannot be kept in direct sunlight.

### *Rooting green sprigs*

If the winter sprig uses its reserves, then the summer one uses basically what produces the green leaf. There is a difficulty here. The leaf needs more light to produce its glucose. Nevertheless, at the same time, it must evaporate water, and there is still no water at all; the roots have not grown.

It will not evaporate water if you create one hundred percent humidity. That means we need a film. However, in summer, everything burns out in an hour under the film. The solution to the problem is in the exact selection of a place for the greenhouse. There should be almost no direct sun at all. Well, maybe until eight in the morning and after eight in the evening, and individual sunbeams are not prohibited.

However, there should be a maximum of the free sky. Normally, it may be placed under the northern wall. There shouldn't be any trees and houses nearby. Moreover, it may be placed under the crown of a large tree around which there is a lighted space.

The green sprig can be cut when the shoot begins to lignify at the base (from the end of May to the end of August). All growth shoots are suitable. Do not take thin fruit twigs that have stopped growing. It is necessary to take those sprouts that still continue to grow.

Usually the middle part of the sprout for sprigs. It is more convenient to cut the sprigs into three sprouts. If there's lack of sprigs, you can cut the sprigs into 1-2 sprouts. Time matters: it is better to cut early in the morning. There is more moisture in the cuttings. Day and evening cuttings should be kept in water for about an hour before planting, updating the cut with a sharp knife.

We leave the leaf only on the upper sprout, and if there are two of them, we halve each one with scissors so that they do not require a lot of moisture. If the leaves are already old, it is better to find shoots with young leaves.

Green sprigs are not kept dry at all. In a damp bag, they can be kept for half a day, and they must not be pressed. Having put them in water, they can be stored for a couple of days, but the leaves should not get into the water, and it is better to put a bag made of a transparent film on a jar to increase the humidity of the air.

The preparation of the sprigs is simple: make two grooves in the lower third of the soil to form the roots. We plant the sprigs as soon as possible. We deepen them symbolically: semi-lignified - in the lower third, herbaceous (mint, lemon balm, etc.) - in two centimeters.

*"Garden of the 21<sup>st</sup> Century. Gardener's Practice School"*

### **How to harvest 5 buckets of potatoes from one bush**

If you don't have a vegetable garden, don't be upset; you can grow a lot of potatoes in just one square meter of the land.

Take a large potato tuber and cut it across 40-45 days before planting so that a small bridge of 1 cm thick remains. Keep the tuber in the light until it germinates.

In a pit of 50 cm deep, 75 cm long and 75 cm wide, put a shovel of well-rotted manure, a handful of ash and 30-50 g of superphosphate.

Mix all this; and the "bed" is ready. Now plant the tuber 8 cm deep. When the stems are 10 cm above the ground, cover them 15 cm with loose soil.

The stems will stretch out of the ground again, but as soon as the tops have sprouted another 20 cm, fill them in again. Repeat the same actions several times until the sprouts have risen above the pit.

Now hill up the "potato field". Do not forget to feed the plant with manure, ash and superphosphate during each filling in with the soil. Water the potato bush during the summer and cut off the flowers in the buds.



In the north, such a garden can be arranged in a barrel. First, keep it in the room, and with the onset of warm weather, take it outside.

In autumn, we will dig out the harvest of 5 buckets from a bush. Between the bushes of potatoes, garlic and marigolds grow beautifully which the Colorado potato beetle is very afraid of.

*“Technology of ultralight vegetable gardening. Comfort and ecology”*

### **How to harvest 20-25 cucumbers from one bush**

Gardener Rudenko found a method of growing 20-25 cucumbers on average from every bush. The yield using this method is 6 times higher. Of the 11 tested varieties, the best was the “Maisky” variety. In addition to “Maisky”, he tested “Competitor”, “Nezhinsky”, “VIR 505”, “Donetsk”. Some of them were not inferior in yield to “Maisky”.

At the bottom of the boxes, where the seeds will be sown, you need to pour sand (for filtration) and add soil on top (50% and another 50% of humus). Fill the boxes to half of their height by 3-4 cm, plant the seeds every 3-4 cm to a depth of 1-2 cm. Cover the boxes with glass and put them in a warm place for 3-4 days. You do not need to germinate seeds; otherwise, the sprouts will be yellow and frail.

When shoots appear, the glass must be removed and the boxes placed on a sunny window. As the seedlings grow, add soil until the boxes are completely full. **This will be the first increase in the root system by adding soil!**

Take a closer look at the stem of the cucumbers. You will see many pimples on it: these are the future roots. They will germinate when the earth is added and will give additional roots, increasing the system of the entire plant and the power of the entire plant almost twice.

The next operation is transplanting seedlings into pots (or milk bags). This is done when 1-2 leaves grow on the plants. You need to cut the plant along with the soil and put it in a pot (bag).

The pots, like the boxes, are only partially filled with soil. As the plant grows, the soil is poured until the pot is completely filled. **This will be the second increase in the root system.**

Then transplant the seedlings into the ground under a film fence. Inside the fence, dig a trench on both sides of the size of a full shovel spit. Pour 5-7 cm of humus at the bottom of the trench. Before planting the seedlings, the soil should warm up under the film (for a week). Planting seedlings: a package is cut, and a ball of soil with seedlings is put to the bottom of the trench (on the humus).

Look at this ball: it is literally riddled with roots; this is the main thing in this method where the root system is quadrupled (twice in a box and twice in a bag). When the plant is lowered into the trench, you need to sprinkle it with soil mixed with superphosphate (30-40 g per plant).

After that, fill the trench with straw and last year's weeds with a layer of 8-10 cm and cover it on top with soil and water. This layer of straw will provide warmth and food to the plants during the rotting period and will release carbon dioxide. **This will be the third vertical increase in the root system.**

Cucumbers must be tied up. To do this you need to make a high transverse trellis. They are less affected by powdery mildew and less yellow.

The advantages of this method: a fairly high yield – 112 cucumbers per m<sup>2</sup>, a long growing season – 165 days against the usual 95 days.

When watering, there's a very low water consumption. In a film fence and a trench, moisture lasts for a long time. There's also a low consumption of the mulching material because a narrow trench is easier to protect from evaporation. The main advantage is the small planting area: 18-20 plants per 4m<sup>2</sup>.

*“Technology of ultralight vegetable gardening. Comfort and ecology”*

## Weeds and soils

The composition of the weeds that prevail in your area can tell a lot about the condition of the soil, its acidity and chemical composition.

The presence of such plants as horsetail (*Equisetum arvense*), poplar (*Leucanthemum vulgare*) widely known as a chamomile, field buttercup (*Ranunculus acris*), as well as the presence of blue flowers of the base vervain (*Veronica chamaedrys*) that bloom in spring and early summer with blue flowers indicate an increased acidity of the soil.

This is also confirmed by the growing on your site such plants as the small sorrel (*Rumex acetosella*), blue cowwheat (*Melampyrum nemorosum*), field mint (*Mentha arvensis*), creeping buttercup (*Ranunculus repens*).

Growth of such plants as the coltsfoot (*Tussilago farfara*), meadow clover (*Trifolium pratense*) and creeping clover (*Trifolium repens*), odorless chamomile (*Matricaria inodora*) and odorous chamomile (*Matricaria matricarioides*), field bindweed (*Convolvulus arvensis*) means that the reaction of these soils is slightly acidic or neutral.

Alkaline soils are preferred by the garden burnet (*Sanguisorba officinalis*), field pennycress (*Thlaspi arvense*) and large peppergrass (*Lepidium ruderales*).

On rich fertile soil, the wood lice (*Stellaria media*), white gauze (*Chenopodium album*) grow in abundance. On poor soil, the wormwood (*Artemisia absinthium*) and common mullein (*Verbascum thapsus*) grow.

With a large amount of nitrogen in the soil, the common orach (*Atriplex patula*) begins to grow; if there's an excess of phosphorus, the portulaca (*Portulaca oleraceae*) and field mustard (*Sinapis arvensis*) grow. Vigorous plants of the meadow clover indicate an excess of potassium against the background of insufficient nitrogen content.

Thus, analyzing the composition of the weeds growing on your site will help you more accurately assess the properties of the soil.

*“Technology of ultralight vegetable gardening. Comfort and ecology”*

## Eternal Youth Elixir

When caring for plants in the garden, sometimes we have to cure the bark and wood of the plants. There are many ways to do this. Today we will talk about an essential tool in a gardener's first aid kit.

Since ancient times all over the world, a mixture consisting of clay, mullein and ash has been used for coating plants for medicinal and preventing measures.

In our old literature, the same composition is often mentioned but without ash. This composition is highly recommended by biodynamists.

Clay is diluted with a mullein approximately in half until it is as thick as sour cream. The mixture is applied with a paint brush to the trunk and branches. Such a mixture is really useful. Clay stays on the tree for a long time, protects the bark from the sun and frost, dry winds, but at the same time it “breathes” perfectly.

Mullein sticks clay together and prevents it from falling off. It also contains a lot of nutrition and bioactive substances. If the clay is raw, the bark is nourished and stimulated; if clay is dried out, it protects the growing bark.

If there is no mullein, any manure will be suitable even humus. If there's no clay, loam is good. However, such mixtures stick badly on the tree, and they need to be wrapped with rags or newspapers. Therefore, such arbitrary cosmetic formulations must be made thicker and used for curing wounds.

If we talk about coating, it is better to use clay. If you need to preserve cambium, heal cancer or rejuvenate the bark, this “cream” is simply irreplaceable. Two buckets of clay and a bucket of mullein will be enough for you all summer.

If you add a little lime and copper or iron sulphate to the mixture, the trees will bloom with beautiful orange-green leaves from spring to spring.

*“Garden of the 21<sup>st</sup> Century. Gardener’s Practice School”*

## Appendix 5

### Options for experiments in the school garden

This section provides examples of experiments that can be done in the school garden. These experiments demonstrate the dependence of the yield and soil fertility on various agricultural practices. In the experiments, the names of specific plants are not given. The crops grown can be selected by yourself taking into account the characteristics of your region, your capabilities and needs.

Topic of the experiment	Work features	Features of observations
Effect of mulching on soil temperature and moisture	Select several plots. Plant vegetables as recommended. Mulch crops after germination with various materials. Leave one plot for control without mulch.	Monitor soil temperature and moisture throughout the growing season. Make conclusions about the importance of mulching for soil temperature and moisture.
Study the most suitable varieties for the area	Plant different varieties in separate rows on the plot.	Carry out comparative observations of plants. In autumn, take into account the harvest and determine the most productive varieties in your conditions.
Using mixed landings	Plant plants on several plots taking into account the compatibility table.	Observe the plants throughout the growing season, monitor the number of pests and diseases. In autumn, harvest and make conclusions.

<p>Influence of local fertilization during planting on the yield</p>	<p>Select several plots. On each plot, apply various fertilizers when planting seedlings or tubers: on the first – a handful of humus, on the second – a spoonful of wood ash, on the third – a spoonful of granular fertilizer, on the fourth – a fertilizer mixture consisting of a handful of rotted manure.</p>	<p>Keep separate observations and records of the yield for each plot. Make a conclusion as to what types of fertilizers are most effective on your soils.</p>
<p>Influence of the timing of seedling thinning on the yield</p>	<p>Select three plots. Plant them. On the first plot, thinning is carried out in the presence of one true leaf, on the second – two true leaves, on the third – three true leaves.</p>	<p>Observe the plants throughout the growing season. Make conclusions about the yield.</p>
<p>Planting plants in different types of beds</p>	<p>For planting plants, use different types of beds: flat, raised, ridged, in-depth.</p>	<p>Observe plants throughout the growing season, monitor humidity. Make conclusions about the yield and the number of irrigations.</p>

<p>Influence of soil loosening on the development of plants</p>	<p>Select two plots. On one plot, keep the soil loose. Do not loosen the other one.</p>	<p>Monitor the condition of plants and record the yield from each plot. Explain the importance of timely loosening of the soil to increase yields.</p>
<p>The effect of growth stimulants (sodium humate, epin, peat oxidate, etc.) on the germination rate and yield</p>	<p>Soak the seeds in a growth stimulator according to the instructions. Sow treated seeds on a test plot; on a control plot, sow seeds soaked in water.</p>	<p>Monitor the condition of plants and record the yield from each plot. Explain how the growth stimulant affected germination and growth.</p>
<p>Influence of planting density on the yield</p>	<p>Select several plots and sow plants at different distances and with different densities.</p>	<p>Observe the plants throughout the growing season. Harvest and make conclusions.</p>

<p>Study of the influence of green manure on soil fertility.</p>	<p>Sow one of the plots with green manure. After the green mass is set, put it into the soil or mow.</p>	<p>Make a conclusion about the fertility, softness, porosity of the soil and the presence of weeds.</p>
--	--	---

## Appendix 6

### Development of experiments for the school garden based on the experience of the demonstration site of the NGO “Green Cross Belarus”

#### Introduction

A part of the field located on the territory of the educational centre “Ecology and Health” in the village of Kryukovshchina was allocated for the laying out of the demonstration and experimental site. This part of the field has not been cultivated for several years; it was used to organize a field camp. The vegetation cover is scarce, and the layer of fertile soil is small.



#### Objectives:

- Promotion of the organic and ecological farming ideas.
- Development and approbation of the organic farming methodologies for further multiplication.

#### Tasks:

- Lay out pilot organic beds.
- Conduct a series of experiments to demonstrate the potential of organic farming.
- Grow environmentally friendly products.
- Conduct pilot lessons with pupils of different ages.

#### The principles which the work was based on:



- Subsurface technology (the soil was neither plowed nor dug; organic methods were used to control weeds).
- Launch of the composting process (the soil improvement process was carried out by natural methods: accelerated composting of organic residues using EM preparations directly on the beds).
- Constant covering the soil, mulching (the soil was constantly covered with a mulching layer made of an organic matter or artificial materials).
- Implementation of the “smart vegetable garden” system (this system implies the planning and organization of work and agricultural technologies in such a way that requires minimal human intervention, which helps to reduce labor costs).
- The control of diseases and pests was carried out by natural methods that allowed strengthening the immunity of plants and using their beneficial influence on each other.
- Popular science character of the experiments.

#### **Indicators:**

- Changes in soil structure and composition
- Amount of used labor
- Yield volume
- Size and rate of the development of plants

#### **Stages of work:**

- Planning
- Organisation of beds
- Planting
- Plant care
- Observations
- Harvesting
- Analysis and processing of results

## Analysis of the stages of work

### Laying out the beds



To lay the garden, 21 boxes were made of 1 m wide and 6 m long. A box is a stationary bed fenced with bumpers made of boards, slate or other material. The height of the beds is 15-20 cm. They are filled with compost or a layer of an organic matter. Narrow beds are one of the most rational and productive forms of beds. They are made no more than 1 m wide. The passages between them are about 1 m. On

each bed along the edges, two rows of vegetables are planted checkerwise according to a thickened pattern. The productivity reserve is in this geometry. The outer plants develop twice better than those in the middle; they have much more light and space to grow. With such a scheme, all plants turn out to be outer. Wide row spacings are needed to give the plants light and space. Moreover, it is convenient to walk along such aisles, cultivating and watering plantings.

At the same time, since the beds had been laid out only in spring, the organic matter did not have time to decompose in the boxes. This type of beds did not have time to demonstrate all its advantages. It was also a mistake to fill the boxes with dry compressed straw. Such straw in large quantities is a difficult material to process into humus especially if it is introduced in spring.



### Plant care

Plant care implied the use of the so-called principle of the “smart beds”. This is a system for laying out beds which is self-sufficient and practically does not require care by a person. The soil that was not dug remained porous, which contributed to the condensation of moisture in the soil channels. Mulching was used to control weeds, which also did not allow the topsoil to dry out. All this in a complex made it possible to minimize the number of irrigations. Proper nutrition of the plants was contributed to by the presence of an organic matter to prevent the upper grass layer from rotting as well as to continue the process of decomposition of organic residues under the mulch in the upper layer.

## Analysis of the carried out experiments



Row A was planned to test various methods and agricultural techniques of organic farming. 7 experiments were laid on this row. For the experiments, available, demonstrative, widespread and regionalized cultures were selected.



### Experiment 1. Growing potatoes under various types of mulch

The bed was divided into three parts. Potato tubers of the same variety were laid on the surface of the ground at the same time. The land was not plowed. The potato tubers of each of the three parts were sprinkled with a layer of a specific mulching material: straw, last year's foliage and sawdust. The bed was not further processed. Watering was natural. No pest and disease treatment was carried out.

### Objectives:

- Master the technology of growing potato under mulch.
- Identify the most suitable type of mulch for potatoes.

Potato sprouts planted under the foliage were the first to appear, the second – potato sprouts under sawdust, and, finally, the third was the one that was covered with straw. Consequently, from the perspective of the rate of seedlings' emergence, the mulch from last year's foliage and sawdust turned out to be the best. The seedlings were amicable in all parts of the beds.

With further vegetation, some features began to appear.



The leaves of potato bushes growing under sawdust began to have a pale green color (this was clearly visible compared to specimens from other parts of the garden), which is a clear sign of a lack of nitrogen. This is because the decomposition of fresh sawdust requires a lot of nitrogen. Moreover, the bushes began to lag behind in growth.

The average height of the bush under sawdust is about 30 cm.

The average height of the bush under the straw is about 40 cm.





Mulch from last year's leaves covered the ground well but it was not an obstacle for weeds which penetrated well and partially took away nutrients from potatoes.

Harvesting showed that there were many ovaries under the foliage mulch but they were small. The tubers could not develop well. The average yield was under sawdust mulch and the highest under straw mulch.

Potatoes grown under sawdust.



Potatoes grown under straw.



Potatoes grown under foliage.



**Main conclusions:**

- This technology is worth being noticed so that it can be used on small sites and almost do not require care. Labour costs are minimal.
- A good organic layer is needed to get a good harvest.
- The optimal mulch is semi-rotten straw.
- This method of cultivating potatoes does not damage the top soil.

## Experiment 2. Dependence of the yield on various types of fertilizing with organic preparations

Zucchini were planted on the experimental bed. The micropreparation “Baikal EM-1” was used for feeding in the control plots according to the scheme 1 time per 15 days as it is prescribed in the instructions. A special agricultural cloth was used to control weeds. Additional watering was not carried out.

**Objective:** to study the influence of fertilizing with a solution of microbiological fertilizer “Baikal EM-1” on the growing season and crop yield.

Differences were already visible at the beginning of the growing season.



Without fertilizers.



With fertilizers.

Later, the differences became more noticeable: the first part of the bed was treated with the fertilizer; the second one was not treated.



The differences were also noticeable in the harvest. On the bushes that were fed, the number of fruits was larger and they were bigger.



With fertilizers.



Without fertilizers.

Conclusions:

- Application of the microbiological fertilizer “Baikal EM-1” effected positively both the growth and development of the plants and the harvest.
- Application a special agricultural cloth allows doing without weeding and reducing the volume of irrigation since the land does not dry out.



### Experiment 3. Growing potatoes with and without fan hilling



In this experiment, potatoes were planted in bed under straw. In the middle of the growing season, the so-called fan hilling was used on the control part of the bed. The potato bush was covered in the middle in the form of a fan. There was no special watering.

**Objective:** to test the technology of fan hilling and analyze the effectiveness of its use.

The experiment showed that fan hilling did not have a significant effect on both the growing season and the yield.

**Conclusion:** the fan hilling of potato bushes does not lead to an increase in yield at least in the case of planting under straw.



#### Experiment 4. Using various natural stimulants to soak seeds before planting



In this experiment, we used zucchini squash planted under a special agricultural cloth. Some of the seeds were soaked before planting in the microbiological preparation “Baikal EM-1” according to the instructions.

**Objective:** to find out the effect of soaking seeds before planting in a microbiological preparation “Baikal EM-1”.

Differences in the development of plants were visible during the growing season.



Treated seeds.



Seeds without treatment.

Moreover, the plants grown from the treated seeds bloomed earlier.





In front of the bed, there are plants grown from seeds treated with a solution. They are larger in size and have bloomed earlier.

Differences were also noticed during the harvest. Those plants grown from the treated seeds had much larger fruits but their number was less. Those plants grown from the untreated seeds had many ovaries but they were small.



**Conclusion:** soaking seeds in a solution of the microbiological preparation “Baikal EM-1” before planting has a beneficial effect on the vegetation of plants and allows getting larger fruits.

## Experiment 5. Use of difference stimulants to soak tubers before planting



Potato tubers were soaked in the microbiological preparation “Baikal EM-1” according to the instructions and planted on a control plot under straw. In the future, the bed was no longer cultivated. It was not specially watered. Pest control was not carried out due to the absence of any pests.

**Objective:** to find out the effect of soaking tubers in a microbiological preparation “Baikal EM-1” before planting.

Potato sprouts, the tubers of which were treated with the preparation, appeared earlier. Their color was more intense. The bushes bloomed earlier.

There was also a small but noticeable difference when harvesting. The potato yield in the experimental plot was larger and better.



Treated



Without treatment

On the plot where the planting material was processed, there were significantly more bushes. The tubers were distinguished by their large size and quantity.



**Conclusion:** the treatment of tubers before planting with the microbiological preparation “Baikal EM-1” has a positive effect on the growing season and potato yield.



## Experiment 6. Use of a special agricultural cloth to curb the growth of weeds



Beans were used in this experiment. Seeds were planted under an agricultural cloth. The seeds sprouted well. The vegetation was successful. No additional treatments and watering were carried out.

**Objective:** to test an agricultural cloth to contain weeds.



The agricultural cloth did its work well. It is good for water and air permeability. Plants, around which the soil is covered with the agricultural cloth, were in comfortable conditions. The soil did not dry out. No weeding required. The yield was good.



**Conclusion:** the agricultural cloth is very effective for covering the soil when growing large plants.

## Experiment 7. Dependence of the pumpkin harvest on the methods of forming the stem



In this experiment, pumpkins were planted under an agricultural cloth. The pumpkin stem was formed in two ways: in one stem and with lateral offshoots. There was practically no watering and no weeding.

**Objective:** to investigate the dependence of the pumpkin harvest on the methods of forming the stem.

When harvesting, there was a significant difference. Where the bush was formed into one stem, there were practically no ovaries, or there were many very small ones. Where the bush was formed with lateral offshoots, there was one fruit but it was rather large.



**Conclusion:** the formation of a pumpkin's stem from the offshoots allows increasing the yield and get larger fruits.



## Row B. Use and demonstration of various types of green manure



Various types of green manure were planted on seven ridges: phacelia, wheat, oats, barley, oil radish, mustard, buckwheat.

### Objectives of the experiment:

1. Demonstrate different types of green manure and compare how they develop on a given type of soil.

2. Investigate the influence of green manure on the soil properties (looseness, porosity, weed infestation, moisture, etc.).

All green manure sprouted well. However, there were some differences in the process of development.



The following plants developed best of all: buckwheat, oats, phacelia, barley.



Wheat developed poorly as well as mustard and oil radish.



To assess whether the cultivation of green manure affected the structure of the soil and its density, a metal square of 35 cm long was taken and pressed into the



soil with the same force. A bed of garlic was chosen as a control (comparative) plot which had been treated by traditional methods without the use of green manure.

On the control bed, the square was pressed into the soil 3.5 centimeters down. The soil is dense, hard, and it cracks.



The best results were obtained on the beds where the green manure grew.



Buckwheat. About 12 cm. The soil is loose and porous.

Oat. About 9 cm. The soil is loose and porous.



### **Conclusions:**

- Depending on the soil type, it's necessary to select proper types of green manure.
- Green manure suffocate weeds.
- Green manure improve the structure of the soil and increase its porosity.

## Row C. Laying out organic beds with the help of various EM-preparations



On this plot, various EM-preparations were used to process organic residues. The experiment involved the following preparations: “Baikal EM-1”, “Siyanije”, “Tamir”, “Kompostin”, an extract of the preparation “Baikal EM-1”, and a homemade EM-preparation. Straw was used as a filler for the boxes. The drugs were applied according to the instructions. The beds were covered with an agricultural cloth.

All preparations processed sod and partly straw. Unfortunately, none of the products processed the straw to the end as promised in the instructions.

The best results were shown by the preparations “Baikal EM-1” and “Siyanije”.



It is significant to highlight that the use of microbiological preparations contributed to the rapid development of soil microflora, which was noticeable with the naked eye, and the remains of straw were partially recycled. Moreover, active grass growth was observed around the beds.



**Conclusion:** microbiological preparations to a certain extent accelerate the process of processing organic residues, but this issue requires a longer and more detailed study.

### List of additional literature:

1. Lecture notes on the discipline “Management of Green Development of the National Economy”:

[http://greenlogic.by/content/files/Dorina E.B. Konspekt lekcij pererabotannyj.doc](http://greenlogic.by/content/files/Dorina_E.B._Konspekt_lekcij_pererabotannyj.doc)

2. K.V. Rudyi [and others]. Financial Diet: Public Finance Reforms in Belarus. – Minsk, 2016.

3. D.V. Ivantsov. Agrotechnics of Natural Farming. – Novosibirsk, 2007.

4. L.S. Litvinova, O.E. Zhirenko. Environmental Education of Pupils. – Moscow, 2005.

5. G.G. Zakharchenko, Educational Tasks for Agricultural Labor: 5-9 grades: Methodological manual – M., 2003

6. Z.A. Klepinina, V.S. Kapralova. Labor and Professional Training: Work in Agriculture – M., 1990.

7. N.M. Zhirmunskaya. Vegetable Garden without Chemicals. – M., 1990.

8. I.E. Ovsinskiy. New System of Farming (reprint of the edition, 1899, Kiev). – Novosibirsk, 2004.

9. Fukuoka Masanabu. The One Straw Revolution. – Rodale Press, 1978.

10. N.I. Kurdyumov. Smart Vegetable Garden in Details. – Rostov-on-Don, 2012.

11. N.I. Kurdyumov. Mastery of Fertility. – Rostov-on-Don, 2004.

12. S.A. Lipina, E.V. Agapova. Green Economy. Global Development. – M., 2016.