# Jaratylysh

## Reader + Trainers Handbook

ОРГАНИКАЛЫК АЙЫЛ ЧАРБА ДЕПАРТАМЕНТИ

KOICA
Korea International Cooperation Agency

KDS Korea Institute for Development Strategy

IFOAM ORGANICS INTERNATIONAL

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# PREFACE

The objective of this Reader + Trainers Handbook is to serve as a source reference for all interested persons and organizations willing to implement agricultural systems, research, extension services, training and capacity development programs to develop Organic Agriculture in its full potential with a holistic understanding.

The mission of IFOAM - Organics International is ''Leading change, organically''. IFOAM - Organics International's vision is a broad adoption of truly sustainable agriculture, value chains and consumption in line with the principles of organic agriculture.

**IFOAM – Organics International's work contributes to an increased:**
Uptake of organic agriculture and similar approaches, transforming agricultural systems that are becoming more sustainable and integrating organic principles and methods.
Supply and demand of organic food, certified and non-certified
Number of organic operations that move from good practice towards best practices

With this textbook, developed in the context of the project **"KOICA Organic Agriculture Policy-Implementation Support and Capacity Building Project in the Kyrgyz Republic",** it is facilitated information to start any initiative with an organic approach. This is because it is funded by the Korean Development Agency (KDS), developed by the participants of the Training of Team of Trainers (ToToT) Program, and contextualized for the Kyrgyz Republic.

We would like to thank our in-country partner Bioservice Public Foundation (BSPF), especially Gulzada Kudaiberdieva, who have supported IFOAM – Organics international in the implementation of the trainings and the exceptional work done on this handbook.

**Happy reading and fruitful ideas to facilitate your work.**

Louise Luttikholt

# We would like to thank

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# Address

The government of the Kyrgyz Republic is in support of a new economic model focused on organic agriculture and clean energy, which strengthens its geopolitics position as a member country of the Eurasian Economic Union (EEU). The EEU is a big market with a population of 180 million people and a GDP of 1,600 billion USD. The potential of organic agriculture and economic growth based on sustainability principles, targeted by the State Government, is already addressing positive changes in the Kyrgyz Republic

However, Kyrgyz agriculture is challenged by climate change, soil degradation, deforestation, biodiversity loss, low technology in organic cash crops and little access to organic markets. In order to improve the Kyrgyz agricultural systems with organic agriculture, KOICA's project 'The Organic Agriculture Policy-Implementation Support and Capacity Building Project in the Kyrgyz Republic' is being implemented between 2019-2022.

In 2021, in the framework of this project, Training of Trainers (ToT) was implemented by IFOAM - Organics International with local national organic experts, including public officers of the Kyrgyzstan Department of Organic Agriculture Development (DOAD).

Through the training that ensued over a six months period, the participants developed this textbook as a supporting tool for organic agriculture development in the Kyrgyz Republic. The textbook will be used as a key resource to facilitate the training of new ToTs in 2022, involving other national organic experts and cooperative's farmer leaders.

The participants of the upcoming ToT 2022 will develop additional and complementary technical tools and organic knowledge for the Kyrgyz organic sector. It is expected that the ToT program will be extended, multiplied and disseminated with this textbook as a strategic resource tool providing recommendations, technical solutions and deep understanding within this productive program.

In Kyrgyzstan, organic agriculture is an effective strategy for the Green New Deal and a sustainable pathway for aiming agrifood systems addressing climate change.

**Minho Lee**
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Кыргызстан жаратылыш ресурстарына бай, жагымдуу климаты жана жашыл экономиканы өнүктүрүү үчүн бардык шарттары бар б. Буга байланыштуу айыл чарба министрлиги агро-өнөр жай комплексин туруктуу өнүктүрүү үчүн 6 маанилүү багытты аныктап, анын бири органикалык айыл чарбаны өнүктүрүү болуп саналат.
Акыркы он жылдыкта дүйнөнүн бир катар өлкөлөрү экономикалык жыргалчылыкка жетишүү максатында экосистеманы бузууга алып келген жаратылыш ресурстарын физикалык, финансылык жана адамдык капиталдын тездик менен топтолушуна түрткү берген экономикалык өнүгүүнүн эски моделинен баш тарта башташты.

Соңку жылдары дүйнөдө органикалык азыктарга суроо-талап тынымсыз өсүп жатат. Кыргыз Республикасы табигый биологиялык ар түрдүүлүк жана экологиялык абалы бузулбаган жана экологиялык жактан таза органикалык продукцияны өндүрүү боюнча артыкчылыкка ээ өлкө.
Ошол эле учурда, республикада өзгөчө даам сапаттарына ээ болгон органикалык айыл чарба продукциялары менен жакынкы жана алыскы чет өлкөлөрдүн базарларына чыгууга бардык шарттары, мүмкүнчүлүктөрү бар.

Быйыл биз органикалык өндүрүштүн башталганынын 10 жылдыгын белгилеп жатабыз жана органиканы өнүктүрүүдөгү активисттердин бири катары бул окуяны белгилеп жатканыма кубанычтамын. Бүгүнкү күндө 32 миң га органикалык жер катталган, бул бардык айыл чарба жерлеринин 2% га жакынын түзөт. Биз ченемдик укуктук актыларды өркүндөтүп жатабыз, кабыл алынган өнүктүрүү программаларынын алкагында органикалык субъекттерди колдоо боюнча активдүү иш алып баруудабыз.

Бул колдонмо Кыргызстанда органикалык жерлерди жана өндүрүштү көбөйтүүгө фермерлерди тартуунун бир булагы болуп кызмат кылат, органикалык продукцияны экспорттоодо экономикалык көрсөткүчтөрдүн өсүшүнө түрткү болот.

Кыргызстан органикалык өндүрүштүн өлкөсүнө айланат, бул дыйкандардын жыргалчылыгын жогорулатууга, социалдык адилеттүүлүккө, республиканын экономикалык көрсөткүчтөрүнүн жогорулашына алып келет деп ишенем.

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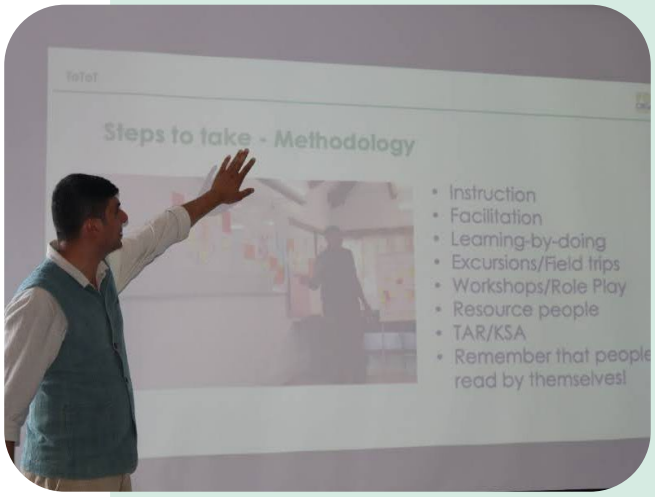
Steps to take - Methodology
Instruction
Facilitation
Learning-by-doing
Excursions/Field trips
Workshops/Role Play
Resource people
TAR/KSA
Remember that people
read by themselves!


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# **Knowing the context** in Kyrgyzstan

In recent years, depletion of natural resources and attempts to move towards sustainable development have been one of the main directions of development. The rainforest regions are of particular concern, which contain most of the Earth's natural biodiversity - irreplaceable genetic natural capital. Conservation of natural resources is a major focus of natural capitalism, environmentalists, environmental movements and green politics. Some believe that the depletion of natural resources is the main source of social tension and conflict in developing countries.

# **Analysis of existing policies, institutional frameworks and activities** for natural resource management

In Kyrgyzstan, a legal framework has been developed that ensures the current management of natural resources and regulates the legal relationship between users of nature and the state. The current legislation regulates the protection and use of all types of resources: land, water, air, biodiversity, mineral resources. It also provides procedures and mechanisms for their management, such as: basic rules and regulations for the use of resources, including rules and regulations for the collection of payments for natural resource use and for environmental pollution, environmental monitoring, impact assessment, environmental standards, environmental expertise, etc.
Legislation analysis shows that: - most legislative acts are of a framework nature, which makes it necessary to specify the procedures and mechanisms for their implementation in bylaws. It can be noted that the latter, in turn, are poorly developed, their content in a significant part of the norms often contradicts legislative norms. In particular, they lack: - specific mechanisms for accounting and control of greenhouse gas emissions, unified methodologies for determining the composition and amount of greenhouse gases; - norms governing the procedure for calculating standards for harmful effects on flora and fauna; - indicators of maximum permissible concentrations of pollutants in natural water bodies of various categories of purpose, complying with international standards in composition; - mechanisms for regulating the use of genetically modified additives in food, etc. - a significant part of the legislation still provides approaches and methods of management that correspond to the centralized command-and-control management of the economy and the sphere of public activity. They do not take into account the new conditions for the transition to a market economy and the requirements of international standards, but rather the implementation and enforcement of obligations in the management of natural resources and the environment.

**As a result, in the current legislation:**

- there are duplicate and contradictory regulations formed on the basis of various principles of law, a large number of reference norms and gaps;
- distortion, and sometimes mutual exclusion of legal norms at a lower level;
- many laws (draft laws) contain intradepartmental, narrow-branch or corporate interests that directly contradict state policy;
- there are many cross-references between different laws, which put their users in a difficult position;
- the principles of decentralization of management in the environmental sphere and the transfer of part of the powers of state bodies to local self-government bodies are not sufficiently regulated;
- there are no effective procedures for informing and mechanisms for participation of the public, representatives of NGOs and the private sector in decision-making processes in the field of environmental protection.

# Approaches and Recommendations

## for Sustainable Natural Resource Management

- there are no balanced mechanisms for regulating price, tariff and tax policies that promote the introduction of resource-saving technologies and toughen economic sanctions against legal entities and individuals for irrational use of natural resources and environmental degradation;
- no clear mechanisms for transferring land to the fund of specially protected natural areas have been determined;
- the norms of legal liability of owners and tenants of land fund objects, bodies regulating the use of water bodies, for damaging the state of lands and biodiversity in the respective territories are not sufficiently specified.

The noted deficiencies in legislation are to a certain extent explained by the procedures adopted in the country for the development and approval of legal acts. As a rule, the preparation of bills is carried out by the republican ministries and departments that are most interested in their adoption. Often at the same time pursuing their own (corporate) interests. Therefore, the norms of a number of laws in the field of environmental protection on the vesting of functions and powers of certain administrative bodies often do not have sufficient financial, organizational and technological support and, as a rule, do not provide for specific mechanisms for interacting with other stakeholders.

**Habitat conservation** is a land-use practice that aims to conserve, protect and restore the habitats of wild plants and animals, especially dependent species, in order to prevent their extinction, fragmentation or reduction in their range of distribution. This is one of the priorities of many groups, which cannot be characterized in terms of any one ideology. Most of the extinction of species in 1000 - 2000 AD occurred as a result of human activities, in particular, the destruction of habitats of plants and animals. The increasing rate of extinction is caused by human consumption of organic resources, in particular those associated with the destruction of tropical forests. While most of the species that go extinct are not food species, their biomass is converted to human food when their habitat is converted to grassland, arable land, and orchards.

# Water use

Water resources management is the planning, development, distribution and optimal use of water resources under a specific water policy and regulation. The protection of water resources includes the reduction of water use and the disposal of wastewater for various purposes, for example, cleaning, manufacturing, agriculture, etc. Kyrgyzstan is the only country in Central Asia whose water resources are almost completely formed on its own territory, and this is its hydrological feature and advantages. The republic has significant water and hydropower resources and this is one of its main treasures. The natural total average annual surface runoff of rivers that forms on the territory of Kyrgyzstan is 44.5 cubic kilometers. Taking into account the age waters, the operational flow reaches 47.4 cubic km, including 35 cubic km during the growing season (74%). On the territory of Kyrgyzstan, 34 fresh groundwater deposits have been explored and documented, the exploitable reserves of which in all categories amount to 3.5 billion cubic meters. m. The republic's potential annual resources are estimated at 13.7 billion cubic meters. m. Increase in summer water discharge in rivers due to active melting of glaciers caused by general climate warming after 1972. It is observed in almost all rivers of Kyrgyzstan.

Unfortunately, in recent years, there are no special studies confirming a statistically significant increase in summer expenses due to active melting of glaciers. Glaciers occupy 4.1% of the country's territory; the water supply in the glaciers is estimated at 650 cubic km. There are 923 lakes in the country. Only about 7% of lakes are located at altitudes up to 2000m above sea level - where the bulk of the country's population lives. 87% of lakes are located at altitudes of over 3000m. The water supply in the lakes is estimated at 1738 cubic meters. km. in this number, the volume of the Issyk-Kul Salt Lake is 1738 cubic km. Thus, the supply of fresh water in the lakes is 7 cubic km. Moreover, they are all inaccessible for use by the population. The total value of natural resources of fresh groundwater in artesian basins exceeds 350 cubic m / s (13 cubic km per year) Explored in industrial categories, operational reserves of fresh groundwater in 44 deposits are 2.2 cubic km. / year. Of these, 38%. The hydropower potential of the rivers is about 174 billion kWh., and the capacity is 19.8 million kW. Huge volumes of water resources are concentrated in 6580 glaciers, the reserves of which are about 760 billion cubic meters. m. In the water balance, the excess of the volume of water resources formed in the republic over the volume of their consumption in the territory of the Kyrgyz Republic prevails. Therefore, they are of interstate importance. The structure of water use in the republic is presented as follows: about 90% of the volume of water consumption is spent on the needs of irrigated agriculture, about 6% on the needs of industry, less than 3% on water supply to the population. The total volume of water consumed in the republic is estimated at 10-12 billion cubic meters. in year.

Water losses during transportation in riverbeds, canals, irrigation facilities reach 1.7-2.3 billion cubic meters. Due to the natural (mainly relief) conditions of the republic, in the provision of water to irrigated lands, mainly small rivers are involved, under which about 800 thousand hectares or 76% of all irrigated lands are plowed. The runoff of mountain springs is insignificantly regulated, only 80 thousand hectares (11%) of land are irrigated with live runoff. In the Kyrgyz Republic, there are more than 2000 rivers with a length of over 10 km, and their total length is almost 35 thousand km. Lakes, reservoirs and ponds are of great importance in the development and functioning of the national economic complex, building up water and energy resources, protecting the environment, and forming an effective water balance. A significant amount of water is concentrated in lakes, shallow ponds, and reservoirs. Their total area is 6836 sq. km. Most of the lakes are located in the highlands - 3-4 thousand meters above sea level. On the balance sheet of the Department of Water Resources and Land Reclamation is the state irrigation fund, which is the inter-farm irrigation fund, which consists

of inter-farm canals with a length of 5786.7 km, hydraulic structures - 7659 units, gauging stations - 3236 units, pumping stations - 111 units, collector-drainage networks with a length of 1187.1 km, reservoirs - 33 units with a total capacity of 1617.3 million cubic meters, daily regulation basins (BSR) - 50 units, ten-day regulation basins (BDR) - 10 units.

# Agriculture

For crop irrigation, optimal water efficiency means minimizing losses through evaporation or runoff. Evaporators can be used to determine how much water is required to irrigate land. Flood irrigation is the oldest and most common type and often causes very uneven distribution, as part of the field may receive excess water in order to deliver sufficient quantity to other parts. Sprinkler irrigation using pivot or lateral moving sprinklers gives a much more even and controlled distribution, but in extremely dry conditions, most of the water can evaporate before it reaches the ground. Drip irrigation is the most expensive and least used type, but offers the best results in delivering water to the plant roots with minimal waste.

**Water conservation** can be defined as performing a function, task, process with the minimum possible amount of water, or indicators of the relationship between the amount of water required for a specific purpose and the amount of water used. 1. Any useful reductions in water loss, use or waste; 2. Reducing water use is carried out by the implementation of water conservation and measures to improve water use efficiency; or, 3. Improving water management practices that reduce or increase the beneficial use of water. A measure of water conservation is the action, change in behavior, device, technology, or improved design or process implemented to reduce water loss, waste, or use.

**Land resources**. Land ownership of the Kyrgyz Republic. In accordance with the Constitution of the Kyrgyz Republic, land is in state, communal, private and other forms of ownership. According to the State Registration Service of the Kyrgyz Republic, the area of land as of 01.01.2020, which is in state ownership is 18,626.84 thousand hectares - 93.2%, in the municipal - 112, 15 thousand hectares - 0.56% and in private ownership is 1255, 93 thousand hectares - 6, 28%.

**Land resources, land holdings of the republic are distributed as follows:**

- economic land (arable land, pastures, and forests) 75.5
- sands, rocks, talus, other inconveniences 11.9%
- glaciers and snowflakes 3.6%
- lakes and rivers 3.7%
- roads, buildings, industrial lands, settlements 5.3%.

The loss of biological productivity of lands is promoted by deforestation, waterlogging, salinization, shale formation and erosion processes. Water erosion is especially dangerous. During one irrigation in the irrigated zone, from 10 to 20 tons of fine earth particles are washed off from each hectare. On dry land, the washout of such a layer with atmospheric precipitation reaches 70 tons. Stony lands occupy an area of 4021.2 thousand hectares, of which 196.1 thousand hectares of them are arable land. The main share of the soil cover of the country's arable lands is made up of low-carbonate gray soils with low humus content. In the foothills and mountainous regions, chestnut and black earth soils are widespread, ending in meadow soils of the subalpine and alpine belts. The biological productivity of arable land is much lower than virgin analogs (the humus content in them is 20-45% lower). The country is experiencing a reduction in the area of arable land due to their alienation

and transfer to other categories. The transfer of land to private ownership and poverty of the population have led to the fact that in recent years about 30% of arable land is not cultivated. They almost everywhere begin to overgrow with reeds, which practically bears an irrecoverable loss. Land resources include lands that are systematically used or suitable for use for economic purposes and differ in their natural and historical characteristics. The concept of "land" covers, first of all, the relief of a given area, which, from the point of view of human development, can be convenient, inconvenient and unsuitable. Convenient land is a flat area favorable for cultivation, irrigation, construction of roads, canals, dwellings, etc. The relief of the land can be mountainous, inconvenient for irrigation, the use of agricultural machinery, difficult to cultivate for agriculture due to the height, dissection and slope of the terrain ... Finally, the land can be completely unusable, extremely difficultly dissected by ravines, ruts, which is a rocky hill, salt marshes, swamps, etc.

**The second important quality of the land** is its fertility, that is, the presence of a good soil cover, the ability to reproduce the natural resources of the earth; in order to preserve these qualities of the land, it is necessary to protect, first of all, the relief itself from destruction, erosion, etc. Soil is the greatest gift of nature, the basis of the life and well-being of the people, the source of our society and the bulk of land resources. As in the distant past, so at the present time, a person receives from the soil everything he needs to maintain life. Therefore, it is necessary to always take care of it and do everything to leave it unchanged or improved for future generations. Land resources in Kyrgyzstan are limited. Of the total 146 thousand sq. km. of land fund - in agriculture used 93 thousand sq. km. including arable land in the processing of more than 1.3 million hectares. The main part of agricultural land for 2020 is natural pastures with an area of 9 million 89 thousand hectares. This indicator on average in the world is 0.44 hectares, and in Kyrgyzstan 0.75 hectares. Further, the size of arable land per resident over the past 20 years has decreased from 0.41 to 0.3 hectares, including irrigated - from 0.27 to 0.195 hectares. By 2030, 0.18 and 0.1 hectares are forecasted, respectively.

# Land management

In recent years, as a result of land reform in agriculture, land redistribution has been mainly addressed. More productive agricultural land becomes less productive. The area of arable land decreases and the area of perennial plantations decreases, while fallow lands, hayfields, and pastures increase. Climatic features dictate the development of agricultural industries and agriculture with high cultural irrigation. The landscapes of low semi-enclosed valleys - Fergana, Chuiskaya, Talas - are almost completely transformed into cultural landscapes. Viticulture, horticulture, melon growing and vegetable growing are developed here, all cotton, tobacco, rice plantations and the main tracts of grain and industrial crops are concentrated. Rainfed and semi-rainfed agriculture is associated with a high risk due to climate instability, which is the reason for the instability of the region's economy. The solution to the problem of sustainable economic development is to increase the share of irrigated agriculture and the non-agricultural sector. The main problems of contamination of land resources in Kyrgyzstan are a decrease in soil fertility due to progressive salinization and dusting, waterlogging and swamping of lands, wind and water erosion, littering with stones, degradation of pasture lands. As a result of the removal by erosion and the absence of the necessary doses of organic fertilizers, the removal of humus by plants from the arable horizon amounted to 20 to 45%, and its content in the soil currently does not exceed 2.5%. Under these conditions, the yield of agricultural crops directly depends on the amount of applied mineral fertilizers.

# The quality of land resources in Kyrgyzstan

The total area of land subject to erosion is 6435 thousand hectares. Of these, arable land - 770 thousand hectares, pastures - 4546.7 thousand hectares, hayfields - about 87 thousand hectares. Water erosion, which also leads to the pollution of water sources, covered 54 thousand hectares of arable land. Soil salinization caused by improper and irrational irrigation has taken 80 thousand hectares of agricultural land out of use. According to the data of the land cadaster, on the territory of the republic, saline lands of varying degrees are counted with a total area of 1,170.4 thousand hectares. The area of alkaline soils is 469 thousand hectares. Stony soils occupy 3,808 thousand hectares, including highly stony soils - 836 thousand hectares. The overloading of pastures with livestock, which has been practiced in the last 25-30 years, has led to a drop in their yield by an average of 4 times, to their overgrowth with weeds and poisonous vegetation, to downsizing and other types of erosion. The anthropogenic impact on pastures is aggravated by the same natural factors that affect the soil cover. The total area of land within the administrative borders of the republic is 19,994.5 thousand hectares. Of these: - the total area of the soil cover - 15 087.65 thousand hectares - sands, rocks, talus, placers, outcrops of bedrock - 2374.94 thousand hectares; - glaciers and snowfields - 722.24 thousand hectares; - lakes and rivers - 730.79 thousand hectares; - the rest - roads, buildings, etc. The total area of agricultural land in the republic is 10 797.2 thousand hectares, arable land - 1237.2 thousand hectares, or 12.8% of the total area of agricultural land. Pastures occupy 9188 thousand hectares (or 85.1% of the total agricultural area). Perennial plantations occupy 10 797.2 thousand hectares, or slightly more than 0.04%.

# Recommendations

The use of natural resources largely depends on the actions of the person himself, the process of resource management by wide stratum of society. In this case, we should not forget that the reserves of natural resources on Earth are not infinite, that is, they are limited, which in turn means the need for rational resource use and preservation of the natural properties of nature. At present, there are quite large problems in the use of land resources, the main ones of which are the following: - land degradation, due to the gradual loss of soil fertility as a result of weathering, improper watering, disturbance of agrochemical methods of land cultivation; - withdrawal from the use of some lands due to various known and unknown to us today reasons (20% of irrigated land and about 40% of pastures); - problems associated with management, understanding the purpose of land, the fund for the redistribution of agricultural land. The problems, in particular, are mainly associated with such phenomena as corruption in local self-government bodies, where 25% of the land is concentrated. The population of the Kyrgyz Republic is mainly engaged in agriculture (about 60%), more than 35% of GDP is created by agrarians, and agricultural exports are 17-19%. The arable land of the republic is approximately 1.3 million hectares. But this does not mean that all these lands are used fertilely and productively, since their productivity in most cases depends on effective irrigation, which is not always carried out in practice. The main criterion for land use is the preservation and improvement of soil fertility, its protection from degradation. Land degradation in agriculture can have the most negative consequences for society as a whole. In practice, we have developed the opposite - the annual degradation of land resources across the country is increasing. It is necessary at the state level to adopt a separate state program to combat land degradation. In addition, we must

not forget that the fight against land degradation and its restoration will require some financial investment. In addition to theoretical substantiations, it is necessary to calculate the cost of developing new lands on the basis of the standard base to compensate for the lost land. When implementing the above program, it is necessary to take into account a number of necessary measures that affect the effectiveness of the implementation of the tasks set: - state benefits in the agricultural sector of the economy, taking into account its characteristics; - government loans (provision at minimum and reduced interest rates); - taxes (tax credits, tax amnesties and tax exemptions) - other: stipulated by the legislation of the Kyrgyz Republic. The next point that you need to pay attention to is the result obtained, that is, the yield and quality of the grown product from each hectare of land. In the context of a rapidly developing trend of improving land quality and increasing soil fertility, increased productivity is achieved through the use of intensive and artificial land use methods, that is, through the use of pesticides, mineral fertilizers, heavy machinery, etc. But, on the other hand, an increase in soil fertility is not always accompanied by the preservation and protective soil fertility and compliance with agricultural standards. In the Kyrgyz Republic, the rural population is more than 60%, which is proof that most of the country's citizens are directly dependent on land and water resources. The reason for land degradation is also its continuous use, as well as widespread grazing.

Recently, the above negative phenomena have been achieved by such troubles as:

- chronically low growth rates of agricultural production;
- backwardness of the social sphere, that is, low protection of the rural population from the social point of view;
- environmental disadvantage of the industry (pollution, salinization, waterlogging, drought, etc.); The most important ways to improve the use of land resources include: - improving the land fund in agriculture (erosion control, use of organic fertilizers, land reclamation, biological agents);
- the use of energy-saving and soil-protecting soil cultivation technologies in combination with environmentally sustainable varieties and hybrids of agricultural crops;
- searches for the use of vacant land, suitable in an agrarian sense;
- crushing the practice of withdrawing land from agricultural use;
- rationalization of the use of the land fund allocated for agricultural purposes.

Thus, agriculture refers to those few branches of production resources acting as a set of natural factors - land with fertility, water, solar energy, etc. These resources are not only not replaceable, but also little changeable. Therefore, the content of the work of the farmer always acts as a process of adaptation to these resources.

# 1 Organic Agriculture

**This chapter introduces the main concepts, the reasons behind a need for systemic change in our food systems, the benefits of this transformation and the multidimensional impact of organic agriculture in several spheres of society.**

## Defining Organic Agriculture

While we can find a wide range of concepts of organic agriculture in different movements, organizations, resource and countries; it is recognized that the concept is context and culture-specific, while also embracing a common vision and set of values. Following a broad global consultation, IFOAM - Organics International believes: "Organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved."

Adopted by the IFOAM - Organics International General Assembly, 2008.

See the translations in 27 languages of the Definition of Organic Agriculture **here**.

# The Four Principles of Organic Agriculture Systems

At its General Assembly in 2005, IFOAM - Organics International adopted a document that formulates The **Four Principles of Organic Agriculture**:

The Principle of **Health**

The Principle of **Ecology**

The Principle of **Fairness**

The Principle of **Care**

These Principles inspire action and help the movement to align and assess the impact of its interventions and strategies.

### 1.2 Why Organic Agriculture?

Organic agriculture can be a pathway to addressing multiple issues, ranging from hunger and malnutrition, to poverty, water usage, climate change, and unsustainable production and consumption. Thus, it can be applied as a solution to the multi-crisis – energy, climate, environment, economic, and lately, sanitary - that the planet is facing nowadays.

# We are in a Crisis in Many Ways

According to an **FAO report** on the state of biodiversity 2019, more than 800 million people go hungry and about two billion are malnourished. About 30 percent of the global adult population is overweight or obese, and around 30 percent of food produced worldwide is lost or wasted.
Nature is declining globally at rates unprecedented in human history. Up to one million species are threatened with extinction, many within decades.
Land degradation has reduced the productivity of 23% of the global land surfaces and up to $577 billion in annual global crops are at risk from pollinator loss.
According to the same report, of the thousands of plant species cultivated for food, fewer than 200 contribute substantially to global food output and only nine account for 66% of total crop production.

# Unsustainable Agriculture is Part of the Problem

Unsustainable agriculture is the largest driver of biodiversity loss. It is contributing to global warming, contaminating soil, threatening rural livelihoods as well as food and nutrition security.
The 2016 Intergovernmental Panel on Climate Change (IPCC) report showed that our food systems are estimated to cause up to 29% of global anthropogenic greenhouse gas emissions.
Chemical fertilizers used to grow food are responsible for the majority of nitrous oxide released into the atmosphere.
There are estimates that agriculture is directly responsible for 80% of deforestation worldwide.
Farmers often bear the consequences of our unsustainable economies and lifestyles. They are some of the world's poorest and most food insecure people, most severely hit by climate change.

# We Need Systemic Change

The negative impacts of input-intensive (or industrial) agriculture on the environment and people's health, its inefficacy to provide a decent income for farmers, its high reliance on fossil fuels and high vulnerability to climate change, all point towards a need for reform.
Many of our policies only exacerbate the issues. According to a recent analysis, only one percent of the $700 billion a year given to farmers is used to benefit the environment.
It should be evident to us all that nourishing the world sustainably requires protecting the ecological resources essential for producing food now and in the future.

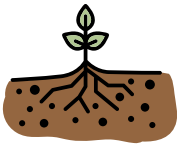
# Organic Agriculture Offers a Solution

The good news is that agriculture can also bring us solutions. About 30% of global crop production and global food supply is provided by family farmers, less than two hectares, using around 25% of agricultural land, and in a way that usually maintains rich agrobiodiversity.
Done right, agriculture based on the Principles of Organic Agriculture can be a transition pathway to the solutions needed for sustainable food systems and climate resilience.
Organic agriculture is an accessible, affordable and empowering system for most smallholders. It is largely based on traditional and indigenous knowledge systems, biodiversity conservation status and local resources, thus incurring little external costs – particularly important for subsistence farmers.

# Farming for the Future

The major problems of our time — energy, the environment, climate change, food security, financial security — cannot be understood in isolation. We need to create policies for food and agriculture, taking all major concerns for humankind into consideration.
Such policies and policy tools that are conducive to sustainable farming are crucial for supporting organic farmers, who are contributing to the common good and producing nourishing food for all.
Changing food systems also means changing the conditions for farmers and food workers by placing greater emphasis on equity, social justice, and inclusivity. Changing our diets and choosing locally grown, seasonal, organic produce plays an important role as well.

# Benefits of Organic Agriculture



## Greater biodiversity

Biodiversity is essential for sustaining our food systems. However, decades of intensive land-use have degraded ecosystems and therefore reduced the habitats and safe havens for wildlife. Unsustainable agriculture has expanded at the expense of ecosystems and has had a detrimental effect on wildlife and carbon storage.
Habitat loss has now been identified as the main threat to 85 - 90% of all species described by the IUCN as 'threatened' or 'endangered'. It is the most commonly recorded reason for species extinction over the last 20 years. The climate crisis and an increasing population worldwide further exacerbate this issue.

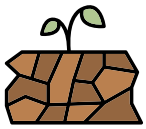
**Organic agriculture can help support biodiversity by:**

**Providing**
food and shelter for wild species found on farms, thus increasing them in number and variety.

**Supporting**
high levels of agro-biodiversity and maintaining healthy soils and soil life.

**Reducing**
the risk of water pollution and sustaining pollination and ecosystem services.

**Hear what farmers have to say about their work!**
Meet Floris Niu, an organic cacao producer from Samoa **here**
#WeUnite | Meet Carlo Horn & Hanna Erz, organic farmers from Germany **here**



# Climate change

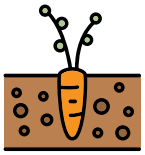
We are in a climate crisis. Farmers often bear the brunt of climate change with their crops and livelihoods at risk. Together, we campaign for organic to be included in policies tackling climate change e.g., as an active member of the farmers constituency within the United Nations Framework Convention on Climate Change (UNFCCC). Agroecology and organic agriculture can be a transition pathway to solutions needed for climate-friendly, sustainable food systems.

**Organic agriculture can help with climate change by:**

**Reducing greenhouse gases,**
especially nitrous oxide, as no chemical nitrogen fertilizers are used and nutrient losses are minimized.

**Putting carbon back into soils**
by keeping them covered with plants, increasing crop diversity, composting and carefully planned grazing.

**Minimizing energy consumption**
by 30-70% per unit of land by eliminating the energy required to manufacture synthetic fertilizers and by using internal farm inputs.



# Food & Nutrition Security

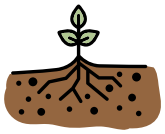
For the past few years, hunger has been on the rise again. The absolute number of undernourished people, i.e., those facing chronic food deprivation, has increased from around 804 million in 2016, to nearly 821 million in 2018. This figure represents almost 11% of the global population. Although it may appear to be a paradox, food insecurity (unreliable access to food) can also contribute to being overweight and obesity. Nutritious, fresh foods can often be inaccessible in many ways. In addition, many of the farmers who grow our food are themselves food insecure.

**Organic agriculture can help achieve food and nutrition security by:**

**Improving traditional agricultural yields**
without forcing producers into dependence on synthetic inputs, thus outputs per area of marginal land increase and stabilize, thanks to higher resilience.

**Ensuring resilience**
to climate change, safeguarding ecosystem services and biodiversity crucial for food and agriculture.

**Alleviating poverty**
by reducing debt, for example from the purchase of expensive synthetic inputs, and increasing returns on labor investment.



# Gender equity

In many parts of the world, rural women account for nearly half of the agricultural workforce and they commonly face discrimination at both societal levels and within their own households, which has profound effects on their Right to Food. Women farmers play a fundamental role in ensuring food security, particularly in rural societies, but lack of training, impaired access to resources, and exclusion from decision making power often result in yields up to 30% lower than those of male farmers. The percentage of female heads of rural households is also increasing due to migration of men seeking better paid jobs in urban areas or other sectors such as mining. Although women are responsible for about half of the world's food production, female nutrition indicators, across all age groups, are worse than those of their male counterparts. As a consequence, women farmers adjust to reduced food purchasing power by shifting to cheaper, less diverse diets. Due to the nature of their role in farming, women farmers are often more exposed to the health hazards of harmful agricultural inputs than men.

**Organic agriculture can support by:**

**Ensuring**
that women, who have a central role in caring for the diet of the household in most cultures, can have access to healthier, diversified and nutritious food.

**Providing**
sustainable agricultural practices that avoid the use of chemical inputs, such as pesticides, which negatively impact women farmers' health.

**Promoting**
knowledge-intensive practices, through technical information and training while also providing nutritional education, empowers women to act autonomously and independently.

# Health

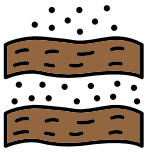
Organic agriculture does not use harmful synthetic pesticides and herbicides, but they are used in large quantities in industrial agriculture, causing widespread environmental pollution. Human exposure to these substances and food contamination are also cause for concern. In addition to harming our ecosystems, pesticides are also linked to a number of human health issues. Moreover, low animal welfare standards in the global industrial livestock sector are driving systematic overuse of antibiotics in human and animal medicine, undermining their ability to cure life-threatening infections in people by creating dangerous microorganisms, which are resistant to antibiotics.

**Organic agriculture supports by:**

**Managing pests and diseases**
using a holistic approach that combines techniques such as crop rotation, biological control and adoption of organic inputs of very low toxicological concern.

**Forbidding the routine use of antibiotics**
and addressing the primary causes of infections and diseases in livestock production, in this way organic farming counteracts the insurgence of antibiotic-resistant bacteria.

**Providing safe food for all persons,**
and specially for pregnant and breastfeeding women.



# Soil

Soils are a non-renewable resource on which 95% of our food supply depends. Chemical fertilizer applications in industrial farming are depleting soils at an alarming rate. Pesticide residues from industrial and conventional agriculture are also causing more soil contamination, which is an issue of increasing concern because of their toxicity to non-target species. Unsustainable agricultural practices are also a major cause of desertification, a global problem directly affecting over 250 million people and a third of the earth's land surface. It is especially concentrated in developing countries, and leads to food insecurity, climate change, poverty, and human displacement.

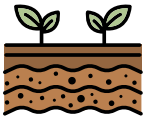
**Organic agriculture sustains healthy soils by:**

**Improving soil fertility through maintaining**
and building a fertile living soil with the application of organic matter inputs in the form of green manures, compost and farmyard manure.

**Adopting cover crops**
and crop rotations and intercropping implementing low soil disturbance tillage.

**Integrating crops and animals,**
reducing overgrazing and facilitating nutrient recycling on the farm.

**Improving water infiltration and retention capacity**
through high levels of organic matter and permanent soil cover, such as cover crops or mulch, which substantially reduce the amount of water needed for irrigation.



# Strengthening livelihoods

Population growth, agricultural productivity and intensified competition for natural resources has led to the overexploitation and unsustainable use of ecosystems. This has made it harder for farmers, foresters and fisherfolk to improve their livelihoods and escape poverty. Expensive and short-term solutions proposed by conventional agriculture can worsen both the social and economic problems of smallholder farmers. Resource-intensive farming systems have pushed many farmers into a poverty trap, forcing them to purchase expensive inputs, often resulting in a never-ending debt cycle. Industrial agriculture has also caused massive deforestation, land degradation and water scarcities, hampering sustainable food and agricultural production and subjecting people to poverty, hunger and forced migration to urban areas.

**Organic agriculture can help to strengthen livelihoods by:**

**Providing the most appropriate way**
to achieve ecological, agronomic, and socio-economic intensification of family farming and smallholder agriculture by emphasizing participation and bottom-up approaches, which strengthen the solidarity of rural communities.

**Enhancing soil fertility and resilience**
to food production in light of the uncertainties of climate change.

**Making diversified diets available to vulnerable communities** and groups, such as women and indigenous peoples, and improving income sources, e.g., better price markets and public food procurement programs.

**Reducing food production costs and contributing**
to higher farm incomes, thus motivating farmers to invest in their future e.g., in capacity-building, production, processing.

**Sustaining rural employment as organic agriculture**
is more labor-intensive than conventional agriculture.

# Sustainable development

Global agriculture and food systems have reached a crossroads. Although our current food systems have boosted agricultural productivity over the past decades, it has also had a detrimental effect on the environment and on society. Soil degradation, biodiversity loss, water pollution, climate change and ocean dead zones are just a few of the challenges that we are confronted with today. To combat these and other major issues, in 2015, the global community came together and launched the 2030 Agenda for Sustainable Development; a plan of action based on 17 Sustainable Development Goals (SDGs), which are becoming increasingly important in driving the earth sustainability agenda.

**Investing in organic agriculture can help us in achieving the SDGs by:**

- Increasing and stabilizing yields, improving resistance to pests and diseases and battling poverty through reducing debt incurred by the purchase of expensive chemical inputs. (GOAL #2: Zero Hunger).
- Supporting farmers in applying holistic practices that prevent the use of polluting synthetic inputs, which means a significant contribution to reducing their harmful effects on people and the planet and contributing to wellbeing for all. (GOAL #3: Good Health and well-being).
- Creating virtuous value chains and fostering the local economy, for instance through short organic value chains, public food procurement, and Participatory Guarantee Systems. (GOAL # 12: Responsible production and Consumption).

### Food security of Kyrgyz Republic

Food security is one of the main directions of ensuring the national security of the country, a factor in preserving its statehood and food independence. The Law of the Kyrgyz Republic (dated August 4, 2008 No. 183) "On food security" establishes the main directions in the field of ensuring food security of the Kyrgyz Republic.

**Food security of the Kyrgyz Republic** (hereinafter referred to as food security) is the state of the economy of the Kyrgyz Republic, in which the food independence of the republic is ensured and the physical and economic availability of food for the population is guaranteed in accordance with the established minimum standards of food consumption.

### Ensuring food security

1. The purpose of ensuring food security is to create conditions for local communities to access the necessary amount of food in accordance with the minimum standards of food consumption, which are based on their availability, accessibility and safety.

2. Food security is ensured through the adoption and implementation of national and sectoral programs to achieve food security by:
    - ensuring the safety of human health and the quality of food and food raw

materials produced, imported and sold in the Kyrgyz Republic in accordance with the requirements of technical regulations, standards and regulatory legal acts functional before the entry into force of technical regulations;
- determining the procedure for the prompt purchase, delivery and distribution of basic foodstuffs for the population, and primarily for its socially vulnerable households, in the event of a food crisis or the threat of its occurrence;
- approval of the list of basic food products, which is being developed by authorized state bodies in the field of healthcare of the Kyrgyz Republic;
- implementation of state control over the production, storage and sale of food products in all organizations, regardless of organizational and legal forms and forms of ownership in accordance with the legislation of the Kyrgyz Republic.

3. In the event of a food crisis or its threat, the Government, on the recommendation of the Food Security Council, establishes a special regime for ensuring food security for a certain period.
4. The availability of food products is determined by a combination of stocks of the state material reserve, imports, food aid and own production.
5. Food products should be accessible both in terms of their physical availability and in terms of purchasing power.

### The main directions of state support for food production

1. The achievement of food security is ensured by the development of the agro-industrial complex of the Kyrgyz Republic. The strategic goal of the development of the agro-industrial complex of the Kyrgyz Republic is to meet the needs of the population of the Kyrgyz Republic with basic foodstuffs due to their production by domestic economic entities.
2. The main directions of state support are:
   - guarantees for payment of food products delivered by agricultural producers at pre-announced prices;
   - subsidies for the production of basic foodstuffs;
   - development of leasing activities aimed at strengthening the material and technical base of rural producers;
   - financing of research programs for the development of seed production and breeding of agricultural plants and animals, breeding, improvement of production technologies, processing, storage and rational use of food products.

### Measures for crisis situations related to food security

In the event of a food crisis or its threat:
- establishes the normative distribution of basic foodstuffs for a certain period for socially vulnerable segments of the population;
- sets guaranteed prices for raw materials and promptly buys them directly from agricultural producers in the state material reserve;
- introduces state regulation on certain types of goods (works, services) by setting a marginal level of profitability or a marginal level of trade allowances;
- establishes a list of regulated goods (works, services);
- regulates export and import supplies of basic foodstuffs by establishing seasonal duties in accordance with the legislation of the Kyrgyz Republic;
- organizes the delivery and distribution of basic foodstuffs at affordable prices for socially vulnerable segments of the population.

### Information, monitoring and analysis in the field of food security

1. Information in the field of food security, monitoring and analysis of the state of agro-food complex should include the following:
    - the balance of the necessary and actual levels of food production in the Kyrgyz Republic, which is the basis of the system for calculating the level of food security and food independence of the Kyrgyz Republic, as well as the basis for planning the production of basic foodstuffs and is compiled annually by the Government;
    - the state of food production, the volume of food and agricultural products, the national and regional balance of necessary and actual level of food production;
    - the state of development of agro-industrial complex;
    - information on the volumes of produced and imported food, its movement, price, quality, as well as the dynamics of consumption during the calendar year;
    - the state and trend of development of the domestic market of agricultural raw materials and food;
    - availability and volume of the state product reserve;
    - availability and condition of storage facilities for the storage of the state product reserve;
    - wholesale trade in food, agricultural products and related goods;
    - purchasing power of population groups;
    - implementation of state and target programs, contracts, agreements and implementation of measures to ensure food security;
    - availability of technical regulations, international, interstate and national standards, norms and rules in force in the Kyrgyz Republic, as well as regulatory legal acts in force before the entry into force of the relevant technical regulations.
2. The procedure for providing information on food security is established by the Cabinet of Ministers.
3. Responsibility for the collection, monitoring and analysis of information on food security is assigned to the authorized state body in the sphere of agriculture.

### Achieving food security

The food security of the Kyrgyz Republic is considered to be secured:

- if the level of reserves of the state products reserve covers at least 90-day needs of socially vulnerable segments of the population in basic foodstuffs;
- if the state budget of the republic has the ability to finance the supply of basic foodstuffs;
- if the quality, caloric content and safety of food products that meet the regulatory requirements in force in the Kyrgyz Republic are ensured.

# 2 Biodiversity

## – Basic elements to take into account

For more information on how Organic Agriculture relates to biodiversity and landscapes, read:
**IFOAM - Organics International Guide to Biodiversity & Landscape Quality in OA**

# Biodiversity

Agriculture can be diversified in many different ways, and much depends on the local climate, the available natural resources, and social and cultural factors. The size and condition of the farm, general labour, buildings, machinery and the market situation are other variables that influence the planning of the farm system. All the different components are a jigsaw puzzle that makes every farm unique and the farmer him- or herself the expert.
Crop rotation, intercropping, and agroforestry are examples of diversification of production. The diversity provides balanced nutrition for plants and animals and natural crop protection. It also makes the total production less vulnerable to falling prices or reduced yields due to extreme weather conditions or pest occurrence. It also provides the farmer with a less risky economy.

## Soil Fertility

Soil fertility is not just about nutrients. Soil structure and water retention are determining factors as well. Organic matter management and healthy soil life are crucial for all three factors (nutrient availability, physical form, and water holding capacity).
When adding manure or compost, one returns nutrients to the soil, provides carbon and build humus, which improves the physical soil structure, increases the water holding capacity and improves bacteria, earthworms, and other soil living organisms. Designing a rotation in terms of shallow and deeper rooting crops, in descending or ascending soil fertility, are also aspects of fertility management.
The basic principle for supplying plant nutrients is recirculation of organic matter and efficient use of available nutrients, e.g., through composting or mulching. In addition, nitrogen-fixing plants (e.g., Legumes) and efficient root systems that contribute to the uptake and release of minerals. Farmyard manure is stored and distributed to efficiently re-circulate without leaching or polluting the surrounding environment. A specific addition of minerals and lime may sometimes be needed. They are generally in a stone meal or minerals as mined with no further processing other than grinding.

Green manure is for instance used worldwide because of its many positive effects, such as improved soil structure and fertilization, improved water holding capacity, erosion reduction, weed competition, crop protection, and fodder production.

**Why we need to restore and maintain healthy soils to achieve the Sustainable Development?**

Goals » **visit here**

# Weeds

Weed management consists mainly of preventive measures (crop rotation, intercropping, green manure, and the competitiveness of healthy plants). Knowledge about the biology of each weed is essential to take necessary measures at the right moment. Other technological measures include: soil cultivation delayed sowing, weed harrowing, hoeing, brushing, hand-weeding, grazing animals as weed control agents.

# Pest management

Pest management is best done through planning and preventive measures. For each crop, strategies have to be elaborated and built on knowledge about each crop and its pests. Poly-culture and diversity benefit predators. Balanced fertilization, crop rotation, intercropping, resistant varieties, and green manure are essential. Floating mulches (fiber web), mulching, and biological control with plant extracts or living organisms are some direct management measures.

# Animal husbandry

Animals should be kept in a way that grants them life in accordance with their natural needs and behaviors. The well-being of the animal is the basis for good animal health and a good economy.

**Organic husbandry standards usually require the following:**

- animals must have outdoors access
- baby mammals can suckle their mothers
- the number of animals kept on the farm should be balanced with the amount of fodder the farm can produce
- animals should be fed the kind of feed they can naturally digest
- animals are able to exhibit their natural behavior
- Diversity in animal stock is encouraged as it reduces parasites (as in crop diversity) and adds to the well-being of the animals.

# 3 Soil

## 3.1 What is soil?

**Soil is** the thinnest layer of the earth's crust, which has the necessary conditions for plant growth. It consists of small mineral substances formed by the weathering of rocks, of the water on the surface of these mineral particles, of living organisms and their remnants.

**Soil fertility is** the ability of the soil to meet the needs of plants for nutrients, water, to provide their root systems with a sufficient amount of air, heat and a favorable physicochemical environment for normal activities. With the correct use of the soil, its fertility increases. Soil fertility is determined by the amount of minerals dissolved in it - nutrients necessary for the life of plants. Mineral-rich fields are a great advantage for farmers, but macro and micronutrients need to be constantly replenished to avoid depleting the land. On the other hand, if you know what soil fertility is and what it depends on, you can get a good harvest even from fields poor in minerals. One of the factors that help increase soil fertility is beneficial bacteria, which convert nutrients into forms that are easily digestible for plants. Earthworms provide breathability, which is beneficial for crop development. Considering what affects soil fertility, farmers can maximize the productivity of their fields for a long time.

# What is soil fertility and what is its significance?

Fertile land is rich in nutrients that are essential for the development of crops. These substances do not serve as food for plants - green organisms receive it in the process of photosynthesis, transforming the energy of the sun's rays into the energy of chemical reactions. Minerals are the kind of "vitamins" or "dietary supplements" that make crops stronger. Thanks to macro-and microelements, plants grow faster, bear fruit better, and cope more effectively with pests and pathogens. So, what is soil fertility? This property can be defined as the ability of the land to meet the needs of crops and give a good harvest. How important is soil fertility? Nutrient-rich fields allow you to get consistently high results in growing crops. An important part of the soil is humus or a dark-colored substance formed from the muck. What determines soil fertility? The main factors affecting soil fertility are humus content, moisture saturation, air permeability, soil temperature, acidity and microflora.

# 3.2 Soil fertility management strategies

Soil management is essential for all of the activities and measures on the farm. Healthy soil is full of living organisms. It is by feeding these soil organisms enough organic matter, providing them with air and water, and protecting them from sun, among others. Careful soil cultivation, cover crops or living mulch, and the supply of organic matter through green manure, mulching, and compost application are essential measures for soil fertility micro-life and buildup.

**Our work on soil:**
**here**

**Meet our Members:**
Soil & Health Association of New Zealand
**here**

## The mineral balance

Each time a crop is harvested, nutrients are removed. Agriculture by nature means the extraction of nutrients. One can reduce the amount deducted by recycling nutrients as much as possible. In southern Mali, in cotton, maize and sorghum rotation, the stalks of these three crops constitute up to 20% of the nutrients taken up by the plant. Mixing these into the field, instead of piling them up around the area or burning them, lightens the farmer's workload and reduces the cost by rendering outside nutritional sources unnecessary.

Besides retaining 20% of the plant nutrient uptake in the field, this practice will also help in reducing soil erosion. Prevention of soil erosion could mean saving further nutrient loss from the field.

### Nutrient cycles

A good example of nutrient cycling on the farm is the Oothu tea estate in southern India. Rainfall is high there. Nutrients lost through erosion/surface water run-off and/ or leaching are recycled back to the fields by planting Guatemala grass in the water bodies to which the fields drain. Every couple of months, the grass is harvested and used for making compost. This compost is then used as a fertilizer.
*Source: Agroeco*

# Composting

Composting is a technique to make a balanced and ready fertilizer from all kinds of materials. During the composting process, the volume decreases, strong odors are eliminated, and if it is done well, pathogens and weed seeds are killed. Typical ingredients are manure, urine, straw, and crop residues. Others are wood ash, oil cakes, and raw phosphate. Organic materials from agro-industries should be carefully considered to prevent non desired contamination. There should be a good balance between easily decomposable materials and woodier, carbon-rich materials. Branches may be added to provide a structure for aeration. The materials can be either mixed or layered. It is more difficult to maintain a good balance between air and humidity in a pile in the tropics. In dry periods one may have to water the pile. In the rainy season, one should make the heap round with a straw 'thatching'. To help start decomposition, it is good to add some old compost as inoculants.

Composting can go very fast. First, the heap will heat up to approximately 60-70ºC as the decomposition process progresses before cooling down. Time depends on the weather and climate conditions. This can take place in four weeks. The heap is usually turned once to provide air and avoid anaerobic fermentation processes from taking over. After flipping it, the compost will heat up again. After it has cooled down, the heap will be colonized by earthworms and other soil organisms (unless in a closed container). After a month or two, it should have the typical smell of humus, precisely what most of it is.

# Green manure, soil covers, mulches

These are usually leguminous plants, but it is encouraged to apply the principle of diversity to prepare a "cocktail" green manure that includes a diversity of plants that delivers great results. Legumes can fix nitrogen through Rhizobium bacteria in their roots. The plant itself uses part of that nitrogen; part of it remains in the soil, together with the root system. These are crops explicitly planted to fix nitrogen and produce biomass that can be worked into the soil. They also help control weeds, and Sesbania can contribute to firewood production and provide fodder for goats. Farmers can also grow leguminous food crops like beans, peas, or groundnuts in the rotation. Some leguminous plants are grown in hedges, e.g., Crotalaria or Tephrosia. The biomass can be used for composting, and in some cases, it is slashed and used as mulch or incorporated into the soil.

# Mycorrhiza in agriculture

Mycorrhiza, which means "fungus-root" in Greek, is a symbiosis between plant roots and various species of fungi in the soil. Mycorrhizal fungi are naturally occurring in soil. Several species from fruit bodies above ground are: various edible mushrooms like chanterelles and matsutake, as well as the famous truffle that grows beneath the ground. The most common kind of mycorrhiza is the arbuscular mycorrhiza which develops in at least 80% of all herbs and grasses globally, including agri- and horticultural species. When the fungal hyphea (the "roots" of the fungus) colonize the roots of plants, structures are formed inside the plant root. The fungus then produces an extensive mycelium of fine hyphea around the root. Unlike the plant roots, the hyphea can penetrate the micropores in the soil. The mycelium thus increases the assimilation surface substantially.

The formation of mycorrhiza makes the plant less sensitive to drought and pathogens. The most important effect, however, is that the nutrient uptake increases. This is partly due to the increased surface of the mycelium compared to uncolonized plant roots, but also because of the improved uptake ability of less accessible nutrients, especially phosphorus, of the mycorrhizal hyphea. The main "reason" for why mycorrhiza forms seem to be that the fungus provides nutrients to the plant and gets energy (carbon) in return.

Well-developed mycorrhizal systems are highly desirable in agriculture. Organic agriculture usually has a higher rate of mycorrhiza, as the addition of chemical fertilizers and pesticides (especially fungicides) are the main factors reducing mycorrhizal formation. Crop rotation also has a significant impact as certain crops, like cabbages, do not form mycorrhiza. Adding compost to the soil has positive effects on mycorrhiza. Tillage practices also influence the fungi, and non-tillage practices should be the best from a mycorrhizal point of view. It is also possible to inoculate seed with mycorrhizal fungi.

# Soil amendments

In some cases (for more intensive crops), it may be beneficial to add soil amendments to correct imbalances, like dolomite or rock phosphate. Although these materials can be applied directly, applying them through a compost heap is usually recommended. The amendments are added to the heap. The acidity in a heap, for example, helps to dissolve rock phosphate.

# Soil acidity

A particular word about soil acidity: unprotected soils, especially in areas with heavy rainfall, very quickly acidify. This has often been assisted through the use of acidifying commercial fertilisers like ammonium nitrate. When pH levels go under 5, nutrients are fixed in the soil and are not released for plant nutrition. Applications of lime to maintain the pH value may not seem to be a good investment, but they often save by avoiding extra expenditure on nutrients later on.

## The content of humus

Soil fertility depends on the amount of humus in it - after all, it contains nutrients, in particular nitrogen and phosphorus. Soils rich in humus have an optimal microclimate for the development of crops - with a favorable temperature, sufficient moisture and air.

## Soil temperature

Soil fertility depends on its temperature. In particular, the dissolution of nutrients and their assimilation by crops, as well as the activity of bacteria that increase soil fertility, slow down at low temperatures. Soil temperatures above the maximum permissible for plants are also undesirable: crops die, and pests and pathogens multiply faster. How to increase soil fertility by regulating temperature? Depending on the situation, the temperature is adjusted by agricultural practices. For example, weed control and mulching with black agrofibre or peat can help raise soil temperatures. On the contrary, loosening, watering, mulching with straw, sawdust and white agrofibre reduces the temperature of the soil.

## Acidity

The fertility of the earth is also affected by its acidity. Acidic and alkaline soils are detrimental to plant development and are not suitable for beneficial bacteria. In addition, in acidic soils, the absorption of phosphorus is difficult. What is the optimal acidity index for plants and how to restore soil fertility with increased acidity? The optimal pH is 5.5, and liming helps to restore soil fertility during acidification. Heavy metals are retained.

## Micro flora

The soil biota is very diverse: viruses, bacteria, fungi, lichens live in it. Microbes in the ground are not just plant pathogens. For example, soil fertility depends on the presence of microorganisms in the soil, which facilitate the assimilation of mineral compounds. What microorganisms create soil fertility? In particular, soil fungi and bacteria are involved in the decomposition of organic matter, but the role of microflora in increasing fertility is not limited to this. What bacteria increases soil fertility? Soil bacteria are divided into several types, depending on their functions: They break down nitrogen compounds to nitrates and nitrites assimilated by plants (nitrogen-fixing bacteria Azotobacter, Rhizobium). Suppress phytopathogenic microorganisms (saprotrophic bacteria Pseudomonas fluorescens, Pseudomonas putida, Pseudomonas aureofaciens). They synthesize phytohormones of growth (auxin-producing bacteria, including Pseudomonas protegens).

## How to determine soil fertility?

To find out the quality of the land and assess its productivity, it is necessary to analyze it. As a result of soil fertility analysis, the farmer will receive data on the composition of the soil and its type, the content of minerals (for example, nitrogen, potassium, and phosphorus), the pH level and other indicators. This information will allow you to understand how to increase soil fertility, since it will be known what exactly is missing in it. It should also be remembered that in different types of soil, the balance of trace elements is different. At the same time, each crop has its own requirements for micronutrients. Matching the micronutrient content of a particular field with the needs of the crops helps determine how fertile the land is for a particular crop. How can soil fertility be improved? Even fertile land is depleted over time, so fertility must not only be maintained, but also improved. Agricultural practices such as crop rotation, fertilization, mixed planting, green manure sowing, mulching, fallow, etc. help to increase soil fertility. Also, do not underestimate the effect of living organisms on soil fertility: they improve the structure of the soil and its moisture retention capacity, and also promote mineralization.

# What living creatures improve soil fertility?

First of all, earthworms, beneficial fungi, bacteria, the simplest unicellular organisms that are in the ground and recycle organic residues or parasitize on phytopathogenic microorganisms have a positive effect on the soil. Natural enemies of pests, such as birds that kill insect larvae or weed seeds, also indirectly increase soil fertility.

# The role of soil in human life

Soil also plays an important role in the natural environment of human. First of all, because the soil is the main means of agricultural production, it belongs to the category of non-renewable natural resources. In relation to the environment and humans, the soil plays another important role - a protective one. Possessing the ability to absorb and retain in itself various pollutants, including radionuclides, binding them by chemical and physical means, the soil thereby serves as a kind of filter preventing the entry of these compounds into natural waters, plants and further along the food chains into animal organisms and humans. However, the possibilities of the soil in this regard are not unlimited, and the level of technogenic pressure is increasing, therefore, more and more cases of dangerous soil pollution and subsequent poisoning of people are observed.

# How does mineralization affect soil fertility?

For successful development, plants need three main chemical elements that are found in the earth and increase its fertility. These elements are nitrogen, phosphorus and potassium. Each of them is useful for crops in its own way: Nitrogen (N) stimulates the formation of chlorophyll in the leaves and is important for the overall development of crops; phosphorus (P) is needed for the growth of the root system, the appearance of buds and seeds; potassium (K) is important for metabolism and increases plant resistance to pathogens.

## Minerals of minor importance are:

Magnesium (Mg) is a component of chlorophyll; therefore, it is necessary for photosynthesis; Calcium (Ca) is a building material for cells and a neutralizer of toxins; Sulfur (S) - part of proteins and enzymes. In addition, plants require small amounts of copper (Cu), boron (B), manganese (Mn), zinc (Zn), chlorine (Cl), iron (Fe) and silicium (Si).

# 3.3 Soil analysis

A is a set of operations performed to determine the composition, physical and mechanical, physicochemical, chemical, agrochemical and biological properties of the soil. Mechanical (granulometric), chemical, mineralogical and microbiological analyzes are carried out. The results of the analyzes are used to draw up soil maps, including agrochemical cartograms, as well as to calculate the doses of mineral nutrition of agricultural crops. Mechanical (granulometric) analysis is a quantitative determination of the content of particles of different diameters in the soil. It is carried out using sieves and pipetting (using the relationship between the size of the particles and the rate of their settling in standing water). Depending on the content of physical clay (particles <0.01 mm) and physical sand (> 0.01 mm), the soil according to its granulometric (mechanical) composition is classified as one or another type (for example, medium loam, sandy loam).

Chemical analysis determines the chemical composition and properties of the soil. **Its main sections:** gross, or elemental, analysis - allows you to find out the total content of C, N, Si, Al, Fe, Ca, Mg, P, S, K, Na, Mn, Ti and other elements in the soil; analysis of the water extract (the basis for the study of saline soils) - gives an idea of the content of water-soluble substances in the soil (sulfates, chlorides and carbonates of calcium, magnesium, sodium, etc.); determination of the absorptive capacity of the soil; identification of soil nutrient supply - the amount of readily soluble (mobile) compounds of nitrogen, phosphorus, potassium, etc. assimilation by plants is established, according to the analysis data, the need for fertilizers is determined. Much attention is also paid to the study of the fractional composition of soil organic substances, forms of compounds of the main soil components, including microelements. Distinguish between field, expeditionary and laboratory chemical analyzes. Field analyzes are carried out by simplified methods, laboratory analyzes are more often instrumental (spectroscopy, flame photometry, atomic adsorption, etc.).

Determine the content of primary and secondary minerals in the soil in order to study its genesis and physicochemical properties. The distribution of minerals along the soil profile is investigated by the method of thin sections, and their quantitative ratio and change in the process of soil formation - by the immersion method. The muddy and colloidal fractions are examined by thermal, X-ray, electron diffraction, and other methods. To clarify the composition of clay minerals, they appeal to chemical methods: they do a gross analysis and determine the absorption capacity by microbiological analysis - they establish the composition of the soil microflora to characterize its biochemical properties and biological activity. Determine the number (in thousands per 1 g of dry soil) of representatives of the main groups of soil microorganisms; bacteria (separately azotobacter, nitrifying and denitrifying, ammonifiers), actinomycetes, fungi, as well as the content of soil algae, the main representatives of protozoa (amoeba and ciliates). Taking a sample in the field (in the most typical location) and storing it correctly (in an air-dry state) is critical to obtaining reliable results. Samples for studying the genesis of soil can be taken from each horizon and below the horizon of the soil profile or from several points of the field, the average sample from which, after mixing, is used to study the agrochemical properties of the study of agrochemical properties.

**Soil test site** is a representative part of the study area, intended for sampling and detailed study of the soil.
**Single soil sample** is a sample of a certain volume, taken once from the soil horizon, layer.
**A combined soil sample** (the synonym term "mixed soil sample" is inadmissible) is a soil sample consisting of a specified number of single samples.
**Absolutely dry soil sample** - a soil sample dried to constant weight at a temperature of 105 ° C.
**Air-dry soil sample** - a soil sample dried to constant weight at the temperature and humidity of the laboratory room.
**Soil extract** is an extract obtained after processing the soil with a solution of a given composition, affecting the soil for a certain time at a certain ratio, soil - solution.
**Soil cartography** (the synonym term Mapping is inadmissible for use) is the compilation of soil maps or schematic maps of their individual properties.
**Soil passport** is a document containing a fixed set of data about the soil, necessary for the purposes of its rational use and protection.
**Soil bonitization** is a comparative assessment in points of soil quality by natural properties.

Agrochemical analysis of the soil is carried out according to 8 main indicators: moisture, organic matter, hydrolytic acidity, pH of the salt extract (for the agrochemical characteristics of the soil); nitrate nitrogen, ammonium nitrogen, mobile forms of phosphorus and potassium (to determine the content of macronutrients). Based on the analysis, a conclusion is given on the state of the soil, recommendations for its use are given, and the doses of ameliorator, mineral and organic fertilizers for the planned harvest are calculated.

## WHAT SHOULD BE ANALYZED?

Most of the work and cost of soil testing involves taking and transporting samples for analysis to the laboratory. Once the sample has arrived, an analysis is performed to obtain detailed information about the sample.

# Analysis of nutrients

Soil testing provides an inventory of the nutrients available to crops and the basis for making a fertilizer management plan. Basic soil analysis (P, K, Mg and pH) is a legal requirement in many countries around the world, but this research method only provides part of the picture as other nutrients and factors can limit crop growth. To get the most out of your soil sample, it is important to analyze all nutrients with the help of the SGS Caspian expert team, which includes analysis of secondary nutrients such as sulfur and micro elements.

# Chemical and physical analysis

Before making any soil, management decisions or planning a nutrient application strategy, the physical and chemical characteristics of the soil must be considered. PH, cation exchange capacity, organic matter, and soil texture all these affect how soil and yield should be managed.

# Biological analysis

An active population of soil organisms is necessary for its effective use. They contribute to the nutrition of crops by circulating nutrients from humus, organic matter and soil particles, as well as influencing its structure. Together with the study of organic matter, biological analysis provides a comprehensive picture of the general condition of the soil, its response to management practices and the potential for high-yielding and quality crops.

# How to determine the acidity of the soil at home?

Plants need a certain acidity of the soil. Some crops are suitable for slightly acidic soil, others grow better in a neutral, and still others prefer a slightly alkaline environment. For example, blueberries, lingo berries, cranberries grow exclusively on acidic soil, and hawthorns give birth well on alkaline soils. If you want to have a good harvest of cucumbers - Why should you measure the acidity of the soil? If the acidity of the soil does not meet certain requirements, the normal process of digestion of nutrients is disrupted in plants, vegetative development slows down and resistance to disease decreases. Determining the acidity of the soil will show if your soil is within optimal limits or if you need to take agronomic measures to adjust the pH level. Lime or dolomite is usually used to improve acidic soils. Lime contains mainly calcium carbonate, while dolomite contains calcium carbonate and magnesium carbonate. An increase in soil acidity is a rather rare occurrence, but if such a need arises, it is easier to add acidic swampy peat to the soil.

**There are different ways to determine the acidity of the soil:** both with the use of special devices and reagents, and independently by home methods. Checking with vinegar and baking soda. This method requires a small amount of soil, vinegar and baking soda. The vinegar must be mixed with the selected earth. If the soil is alkaline, a carbon dioxide reaction will occur - the sample will fizzle and bubble. If during the experiment there was no reaction, you need to thoroughly mix a new soil sample with water and cover it with baking soda. Bubbles and hiss will appear on acidic soil. If both experiments did not lead to a chemical reaction, most likely the land on the site is neutral. Checking with black currant leaves. A few leaves of black currant must be poured with a glass of boiling water. It is important to cool the tincture to room temperature. Add a selected soil sample to the resulting liquid and observe the reaction. The red color of the solution indicates strongly acidic soil, pink - medium acidic, green - neutral, blue - alkaline.

# Checking with purple cabbage

Another popular method, the principle of which is the same as when using currant leaves. Boil finely chopped cabbage for 10 minutes and place a soil sample in the resulting chilled purple solution. If the liquid does not change color, you have a neutral soil. Pink means acidic environment, blue or green - alkaline.

# Determination of soil quality by the appearance of plants.

The mixture of organic matter and mineral particles is called soil, or ground. From it, plants receive water and nutrients necessary for development. If there are enough of these substances in water and soil, the plant develops correctly, grows quickly, blooms and bear's fruit. With a lack of one or several necessary substances a lag in growth, a change in the shape of the plant are noted, and reproduction stops. Sometimes there is an excess of certain minerals, which can also cause disturbances.

**nitrogen** - pale green color of the lower leaves, the leaves are small, the stem is thin, fragile, yellowing and pallor of the leaf begins with the veins and adjacent areas. On a leaf that has turned yellow from a lack of nitrogen delivery, there are no green veins.

**phosphorus** - dark green, bluish color of the leaves, growth slows down, leaf death increases, flowering and ripening are delayed, with strong starvation, brown or red-brown spots appear, turning into holes.

**potassium** - yellowing, browning of the tips of the leaf, curling of the edges of the leaves to the bottom, brown spotting develops, especially along the edge of the leaf, the veins seem to be immersed in the leaf tissue.

# Study of the chemical composition of soils in Kyrgyzstan.

The soil contains macronutrients (nitrogen, phosphorus, potassium, calcium, sulfur, iron, etc.), which plants consume in limited quantities. Their ratio determines the chemical composition of the soil. The composition and properties of the soil are constantly changing under the influence of the vital activity of microorganisms, climate, and human activities. When fertilizing, the soil is enriched with nutrients for plants, changes its physical properties. Kyrgyzstan is an agrarian country with a significant share in the economy of agriculture and animal husbandry. Therefore, it was of interest to study the chemical composition of soils in Kyrgyzstan. At the same time, special attention was paid to the content of heavy

metal ions in the soil: Pb, Cd, Zn, Cu, Co, etc. To study the chemical composition of soils, soil samples were taken and prepared from five regions of Kyrgyzstan - Chui, Talas, Issyk-Kul, Jalal-Abad and Batken. Preliminary methods of qualitative analysis established the presence of heavy metal ions (Fe, Cd, Cu, Zn, Cr, Co, Ni, Ba, Sn, Pb Mo, W) in the soils of all regions of Kyrgyzstan, with the exception of the Issyk-Kul region.

# Fertility of soil for plants. Which land is ideal?

There is no definite answer to this question, since many factors are decisive. The most suitable soil will be that which the farmer can adapt as much as possible to his needs. At the same time, it is necessary to remember how to improve soil fertility by applying fertilizers correctly. The principle "the more the better" in this case is not effective, so it is necessary to choose other strategies. The amount of fertilizer applied should be optimally balanced - this will help to avoid undesirable consequences. For example, excessive nitrogen concentration accelerates plant growth but delays fruiting. In addition, chemical fertilizers in large quantities can not only "burn" crops, but also pollute the environment.
In the fight against land depletion, an integrated approach is important, which covers:

- fertilization;
- increasing the moisture holding capacity of soils;
- improvement of the structure;
- prevention of erosion;
- crop rotation and other practices for increasing fertility.

# Vermiculture Influence of earthworms on soil fertility

The availability of nutrients does not mean that the soil is fertile for plants. The supply of the necessary chemical elements to the roots of crops can be difficult due to the over consolidation of the soil, therefore, fertility also depends on the number of earthworms. They loosen the ground, digest organic debris and multiply quite quickly. Thanks to earthworms, the structure of the soil improves, the supply of oxygen increases and bio humus is formed.

# Mulching

Covering the soil with mulch prevents the growth of weeds, retains soil moisture, and regulates the temperature. Black or white Agro fiber, fallen leaves, hay, straw, peat, sawdust is used as mulch. The advantage of organic mulch is that it promotes the mineralization of the earth after the organic matter has rotted.

**Cultivation** of fields from year to year negatively affect their productivity and leads to degradation, so it is advisable to periodically leave the fields unseeded. In particular, this practice is necessary after the cultivation of sunflowers, maize or rapeseed, which drain the

fields especially intensively. The fallow land is capable of self-healing, which helps to restore its fertility. Fertilization has its own specifics, which is determined by the type of crop and its needs for mineral elements, as well as the results of a preliminary analysis of the soil for fertility. In addition, satellite-based field management applications help calculate the required number of chemical elements based on vegetation indices and productivity maps.

**There is no perfect soi**l - any land is depleted over time. No matter how fertile a field is, sooner or later it will cease to produce high yields if it is exploited from year to year and at the same time does not maintain fertility. It should always be remembered that it is much more difficult and more expensive to restore soil fertility than to maintain it.

# Organic fertilizers

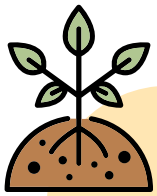
Bio humus - what kind of fertilizer and how to use it correctly. The abundance of mineral fertilizers does not displace natural remedies that can improve the quality and volume of the crop. One of the varieties of popular safe organic matter is bio humus. It contains the elements necessary for plant growth, as well as substances that enrich and improve the structure of the soil. Scientists from the field of agriculture in different countries of the world confirm the benefits of bio humus, or as it is also called, vermicompost. It is organic, in a natural way processed by worms with the participation of special fungi and bacteria. Weeds, chicken droppings and manure, straw and sawdust, fallen leaves, food and other waste are used as organic raw materials. Compared to manure, vermicompost is less harmful and more effective, without an unpleasant odor. Cow dung may contain weed seeds and pathogens, as well as parasite larvae. Composition and benefits of fertilizer. The composition of high-quality organic fertilizer vermicompost includes: - enzymes; - plant hormones; - humates; - amino acids; - natural antibiotics; - macro- and microelements (nitrogen, boron and phosphorus, zinc, potassium and copper, as well as iron, sulfur and manganese); - spores of microorganisms; - humic acids. - Earthworms, digesting organic matter, saturate it with antibiotics, amino acids and enzymes. The resulting vermicompost increases the protection of plants against various diseases. The advantages of using vermicompost are obvious. The process of germination of seed material is accelerated, the root system is strengthened, and heavy metals are neutralized. Thanks to vermicompost, the yield increases, the level of nitrates decreases, and the soil structure improves.

# Features of the production of high-quality bio humus

To prepare bio humus on your own, you will need special worms and organic waste. Algorithm of actions: Prepare a pit where the compost will be mixed. Instead of a pit, you can take a box made of plastic or wood with holes in the bottom. Fill the container with organic waste (silage, droppings, leaves, humus, etc.). Add a little lime and peat (200 g per 1 kg of compost). Mix the ingredients, leave for five days. Pour warm water over the mixture every two days. The initial stage of fermentation is accompanied by heating the mixture to 40-50 ° C. After five days, the temperature will drop to 25 ° C. Buy red Californian worms at the rate of 700-1000 pcs. per 1 cubic meter of organic matter. Release the worms into a container on the seventh day. Cover the mass with a cloth to protect it from sunlight. If using a drawer, place a container underneath to collect the liquid. For several weeks, the worms will actively reproduce, processing compost. When the number of worms increases greatly, the top of the compost should be removed and the bottom sieved and dried. The bottom layer is the finished bio humus. The top layer should be supplemented every ten days with fresh organic matter to keep the worms fed. The process of making bio humus takes up to four months. During this time, 1500 worms will produce two tons of bio humus.

# Instructions for the use of bio humus

Two versions of fertilizer are sold ready-made: liquid bio humus in bottles and granulated in polyethylene bags. The liquid is an effective antimicrobial agent. If you treat seedlings and seeds with a bio humus solution, their resistance to pests and diseases will increase significantly.



## **Advantages** of using bio humus solution:

- **use in any season is allowed;**
- **suitable for all types of soil;**
- **used for the care of plants in pots and outdoors; used for root treatment, spraying and fertilizing, as well as soaking seeds.**

# Rules for use in relation to liquid and granular bio humus

There are proven instructions and rules for the use of dry and liquid bio humus. Granular bio humus as the main fertilizer is used during planting of seedlings under digging. As feeding it is used during the growth of crops.

**Dosage:**

**- for fruit and berry plantations - 150 g per bush;**
**- potatoes - 200 g per hole;**
**- tomatoes - from 100 to 200 g per hole;**
**- for fruit trees - from 5 to 10 kg per seedling;**
**- vegetables and herbs - 500 g per 1 sq. m plot.**

In the form of a solution, bio humus fertilizer for seedlings and home flowers is better suited than dry from a compost heap, since mushroom mosquitoes can breed in the latter, as well as springtails, centipedes, etc. The liquid from the bottle is diluted in the proportion indicated on the package.

**Standard rates for 10 liters of water:**

**- for berry plantations - 60 ml;**
**- garlic, onions and herbs - 200 ml;**
**- vegetable crops - 100 ml;**
**- garden flowers – 150 ml;**
**- citrus fruits and vineyards - 250 ml;**
**- for home plants - 100 ml.**

Fertilizing with bio humus is repeated according to the schedule. Once a week it is enough for berries, vegetables and herbs. Garden flowers, citrus fruits and grapes are fertilized twice a month, and indoor flowers every two months. Liquid bio humus is excellent for seed preparation. The concentrate is diluted with water at the rate of 5 ml per 1 liter and the seeds are soaked in this solution for a certain time: - legumes - 6 hours; - onion seeds, as well as radishes, spinach and garlic - 14 hours; - greens and vegetables, garden ornamental plants and melons - 24 hours; - citrus fruits, pomegranates and grapes - 1 hour;

**Vermicompost for growing indoor plants.** Bio humus solution is more suitable for home flowers. It is easier to dilute and dispense it, determining the desired concentration. But you can also use a granular composition at the rate of 200 g per 1 kg of land. The liquid concentrate is diluted at the rate of 1 tbsp. for 5 liters of water. Before use, the solution is thoroughly mixed and left warm for 24 hours. The frequency of feeding is 1 time in 2-3 months, taking into account the type of plant and its needs.
After applying bio humus, indoor plants grow faster and their flowering period becomes longer. The quality of the soil improves markedly, which has a positive effect on the health of the flowers. If you need adioli, hyacinths, tulips and other decorative flowers - 30 min. If you need to protect indoor flowers from pests and diseases, spraying is carried out. To do this, dilute the concentrate at a dosage of 5 ml per 1 liter of water. It is not required to observe safety precautions when working with bio humus. The natural substance does not contain poisons and toxic substances, it is environmentally friendly. Despite this, it is recommended to take into account a few simple rules: - work with rubber gloves; - at the end of work, wash your hands under running water and soap; - if the substance gets on the mucous membranes, rinse them under the tap; - in case of accidental swallowing, urgently rinse the stomach with - potassium permanganate solution

**Composting is a way of processing organic waste into a soil conditioner.**
Bio humus, or bio humus, is the most natural fertilizer for universal use. It affects crops equally well in greenhouses, outdoors and indoors. After using the product, the positive effect lasts for several years. Compost (German Kompost, Italian composta, from Latin compositus - "compound") is an organic fertilizer obtained as a result of the decomposition of organic waste of plant or animal origin.
Compost is obtained as a result of the process of biodegradation of various organic materials under the influence of the activity of microorganisms, producers and phage detritus. The process is called composting.

**Composting** is a method of preparing fertilizers by neutralizing household, food, agricultural and some industrial waste and waste, based on the decomposition of organic substances under the influence of microorganisms. It is an aerobic process (requiring the presence of air) to decompose organic solid waste. Therefore, raw materials for composting are usually placed in piles and composters (compost boxes, barrels, special structures), and not in compost pits, where it is more difficult to provide oxygen access. In addition to air, composting requires maintaining internal biological heat, high humidity and the presence of microorganisms. For the efficient processing of organic matter, microorganisms require: - Carbon is necessary for energy; during redox reactions involving carbon, heat is released; - Nitrogen is an important element for soil organisms (see nitrogen exchange in soil); - Oxygen is essential for the oxidation of carbon, the decomposition process. - Water - high humidity is necessary for decomposition processes, but aerobic conditions must be maintained. The maturation rate of compost is determined by the ratio of these substances. Aerated compostable material (shoveling, stirring) is required to maintain sufficient oxygen and correct moisture levels. With an optimal ratio of water and air in the compost, the temperature is set to + 50 ... + 70 ° C as long as bacteria are active, then the compost matures at a temperature of + 40 ... + 50 ° C until the materials are processed. Usually, mature compost can be obtained two years after setting, but with modern composting accelerators or compost heap reinforcement, the process is accelerated to one season. When composting in organ-

ic matter, the content of nutrients available to plants (nitrogen, phosphorus, potassium and others) increases, pathogenic microflora and helminth eggs are rendered harmless, the amount of cellulose, hemicellulose and pectin substances decreases (they cause the transition of soluble forms of nitrogen and phosphorus of the soil into organic forms), the fertilizer becomes free-flowing.

**Compost raw materials**
Basic materials for composting: - animal waste - manure and slurry, poultry droppings, unsuitable feed; - crop waste - various garden weeds, mowed lawn grass, substandard fruits; - Waste from the processing of agricultural products - root crop tops, flax and hemp fires, sunflower stalks, corn stubs, etc. - woodworking waste - wood foliage, sawdust, shavings; - household waste - kitchen plant residues (stubs, peels - fruits and vegetables, seed husks, coffee cake), eggshells, feces; - other waste - sewage sludge, tannery waste, others; - peat.

**Biogas** is a gas produced by hydrogen or methane fermentation of biomass. Methane decomposition of biomass occurs under the influence of three types of bacteria. In the food chain, subsequent bacteria feed on the waste products of the previous ones. The first type is hydrolytic bacteria, the second is acid-forming, the third is methane-forming. In the production of biogas, not only bacteria of the class of methane genes are involved, but all three species. One of the varieties of biogas is biohydrogen, where the end product of the vital activity of bacteria is not methane, but hydrogen.

**Composition and quality of biogas** is 50–87% methane, 13–50% CO2, minor impurities of H2 and H2S. After cleaning biogas from CO2, biomethane is obtained. Biomethane is a complete analogue of natural gas, the only difference is in its origin. Since only methane supplies energy from biogas, it is advisable to refer everything to methane, with its standardized indicators, to describe the gas quality, gas yield and gas quantity. The volume of gasses depends on temperature and pressure. High temperatures lead to expansion of the gas and to a decrease in calorific value with the volume and vice versa. In addition, as the humidity rises, the calorific value of the gas also decreases. In order to be able to compare the gas outlets, it is necessary to correlate them with the normal state (temperature 0 ° C, atmospheric pressure 1.01325 bar, relative humidity of the gas 0%). In general, data on gas production are expressed in liters (l) or cubic meters ($m^3$) of methane per 1 kg of organic dry matter (WSS), which is much more accurate and eloquent than data in $m^3$ of biogas per $m^3$ of fresh substrate.

# Raw materials for obtaining

The list of organic waste suitable for biogas production: manure, bird droppings, grain and molasses after alcohol stillage, brewer's grains, beet pulp, fecal sediments, fish and slaughterhouse waste (blood, fat, intestines, horse), grass, household waste, waste from dairies - salty and sweet milk whey, waste from biodiesel production - technical glycerin from the production of biodiesel from rapeseed, waste from juice production - fruit, berry, vegetable, grape pomace, algae, waste from starch and molasses production - pulp and syrup, processing waste potatoes, chips production - peels, skins, rotten tubers, coffee pulp. In addition to waste, biogas can be produced from specially grown energy crops, for example, from silage corn or silphium, as well as algae. Gas output can reach up to 300 $m^3$ from 1 ton. The biogas yield depends on the dry matter content and the type of raw material used. A ton of cattle manure produces 50–65 $m^3$ of biogas with a methane content of 60%, 150–500 $m^3$ of biogas from various plant species with a methane content of up to 70%. The maximum amount of biogas - 1300 $m^3$ with a methane content of up to 87% - can

be obtained from fat. Distinguish between theoretical (physically possible) and technically realizable gas output. In the 1950s-70s, the technically possible gas yield was only 20-30% of the theoretical. Today, the use of enzymes, boosters for artificial degradation of raw materials (for example, ultrasonic or liquid cavitators) and other devices allows increasing the biogas yield in the most common plant from 60% to 95%. In biogas calculations, the concept of dry matter (DM or English TS) or dry residue (CO) is used. The water contained in biomass does not produce gas. In practice, from 1 kg of dry matter, from 300 to 500 liters of biogas are obtained. To calculate the biogas yield from a specific raw material, it is necessary to conduct laboratory tests or look at reference data and determine the content of fats, proteins and carbohydrates. When determining the latter, it is important to know the percentage of rapidly degradable (fructose, sugar, sucrose, starch) and hardly degradable substances (for example, cellulose, hemicellulose, lignin). Having determined the content of substances, you can calculate the gas yield for each substance separately and then add. Earlier, when there was no biogas science and biogas was associated with manure, the concept of "animal unit" was used. Today, when they learned to obtain biogas from arbitrary organic raw materials, this concept has departed and ceased to be used. Landfill gas is a type of biogas. It turns out in landfills from municipal waste.

# 3.4 Safety system

## The principle of operation of the plant

Biomass (waste or green mass) is periodically fed by means of a pumping station or a loader into the reactor. The reactor is a heated and insulated tank equipped with mixers. The building material for an industrial tank is most often reinforced concrete or coated steel. Composite materials are sometimes used in small installations. The reactor is home to beneficial bacteria that feed on biomass. Biogas is a waste product of bacteria. To maintain the life of bacteria, feed supply, heating to 35-38 ° C and periodic stirring are required. The resulting biogas accumulates in a storage facility (gas tank), then passes through a purification system and is supplied to consumers (boiler or electric generator). The reactor operates without air access, is sealed and safe.
For fermentation of some raw materials in their pure form, a special technology is required. For example, alcohol stillage is processed using chemical additives. For acidic molasses stillage, alkali is used. It is possible to process the same substrates using a one-stage technology without chemical additives, but with fermentation (mixing) with other types of raw materials, for example, with manure or silage.

### Factors influencing the fermentation process

- **Temperature**
- **Environment humidity**
- **pH level**
- **C: N: P ratio**
- **Surface area of the raw material particles**
- **Frequency of substrate supply**
- **Retarding agents**
- **Stimulating additives**
- **Temperature**

Methane bacteria show their activity within the temperature range of 0-70ºC. If the temperature is higher, they begin to die, with the exception of a few strains that can live at ambient temperatures up to 90 ° C. At subzero temperatures, they survive, but cease their vital activity. In the literature, 3-4 ° C is indicated as the lower temperature limit.

# The surface area of the raw material particles

It is of fundamental importance that the smaller the substrate particles, the better. The larger the interaction area for bacteria and the more fibrous the substrate, the easier and faster it is for bacteria to degrade the substrate. In addition, it is easier to stir, mix and heat without floating crust or sludge. The crushed raw material has an effect on the amount of gas produced through the length of the fermentation period. The shorter the fermentation period, the better the material needs to be ground. If the fermentation period is long enough, the amount of gas produced will increase again. With the use of crushed grain, this was already achieved after 15 days.

# Applications

Biogas is used as a fuel for the production of electricity, heat or steam, or as a vehicle fuel. Biogas plants can be installed as treatment facilities on farms, poultry farms, distilleries, sugar factories, meat processing plants. A biogas plant can replace a veterinary and sanitary plant, that is, carrion can be utilized in biogas instead of producing meat and bone meal. Among industrialized countries, the leading place in the production and use of biogas in terms of relative indicators belongs to Denmark - biogas occupies up to 18% of its total energy balance. In absolute terms, in terms of the number of medium and large installations, Germany takes the leading place - 8000 installations. In Western Europe, at least half of all poultry farms are heated with biogas.

## Green fertilizers. Planning and agricultural technology for growing crops in organic agriculture

**Siderates - (green fertilizers) -** plants grown for the purpose of subsequent incorporation into the soil to improve its structure, help to increase soil fertility, provide vegetation cover on the field, which protects it from erosion and retains moisture. Siderates enrich the earth with nitrogen, phosphorus, potassium, they contain a lot of starch and protein. Typically, green fertilizer is plowed before or after flowering as a nitrogen-rich green fertilizer. Proteins, starch, sugars, microelements: in this case, compost is formed on the surface, the soil is protected from erosion and blowing. Plant roots improve the mechanical structure of the soil: a system of root canals is created, worms and microbes that accumulate nitrogen feed on dead roots. Siderates quickly develop dense foliage that creates shade and inhibits the growth of weeds. In addition, some types of green fertilizers (cereals) secrete substances that retard seed germination, which also reduces the number of weeds. A well-developed root system of green fertilizer helps to improve the structure and water permeability of the soil: penetrating deep inside, it loosens and enriches heavy clay soils with air, and supports light, sandy soils from crumbling. Green fertilizers roots also deliver nutrients from deeper layers upward, closer to the roots of useful crops, between which "green fertilizers" are grown.

**Siderates** planted among vegetable crops partially distract garden pests to themselves. Some siderates can repel pests, for example, radish suppresses nematodes, mustard - scab. In addition, most have bright and nectar-filled flowers that attract bees and bumblebees, which simultaneously pollinate neighboring plantings, which contributes to higher yields. Siderates of the legume family are in symbiosis with nitrogen-fixing bacteria, which convert atmospheric nitrogen into a bound state, which makes it available for consumption by plants. When using green fertilizers, the amount of nitrogen available for further crops is usually 40-60% of the total nitrogen contained in the green fertilizers.

# 4 Pest and Disease Management

# Tools

## in the practice of organic crop protection and pest management in the tropics

- Analysis of the status of soil fertility and improvement (organic matter, quality of nutrients available, micronutrients) impact on plant health
- Regeneration of the ecological balance through organic and bio-dynamic agriculture
- Cropping and farming systems design, environmental factors for pest control and the stimulation of predator population.
- Pest presence, economic threshold levels, pest - predator balance
- Understanding insect cycles as a basis to establish optimal control measures
- Biological control (Coccinelle, Crysoperla), beneficial micro-organisms (Trichoderma, Bauveria)
- Insect repellents
- Traps and attractants (plant, chemical-pheromone, physical, etc.)
- Botanical pesticides and other locally available resources

# Promotion of natural enemies

All insects have their natural enemies. One can promote the (early) presence of more natural enemies through so-called habitat management. It is a technique that is still in development. For example, it is known that a natural enemy like Chrysopa spp. likes to feed on the flowers of Umbelliferae or Compositae. Thus, when the farmer has sown wild carrots around the fields, these lacewings will be early. The Chinese have been planting poplar trees around maize fields, as it was shown that these are hosts, harbors for a range of natural enemies.

If the pest insect is polyphagous, it is possible to attract it away from the crop you want to protect from its damage. For example, interplanting maize and sorghum attract aphids away from cotton, while okra planted around the field attracts the cotton strainers at the end of the season. When crops are grown together, insect pressure is much lower than in a monoculture. However, this is often only possible with vegetables. Farmers would find it too complicated to grow the different crops side by side. However, the farmer may use other cultural practices to reduce insect infestations, like a rotation of three to four years. One may call these techniques 'cultural control'.

# Biological control

Biological control is usually a more substantial intervention in the natural ecosystem, but it uses natural, biological methods for pest control.

One technique is, for example, the use of sexual confusion pheromones. Pheromones are smells that insects use to communicate with each other. The technology is specially developed for Lepidoptera, butterflies, and moths. When an overdose of this pheromone is

brought into the field, the male moth is no longer able to find the female moth, and as a result, there are fewer caterpillars.

Another method is the release of laboratory-reared natural enemies, for example parasitic wasps like the Trichogramma. The wasps lay eggs in a laboratory. These are stuck onto cartons which are then distributed in the fields. Very soon the eggs hatch, and the larvae start feeding on, for example, the maize stem borer, Spodoptera. In the case of the coffee berry borer, the technique has been simplified and is done by Mexican Campesinos themselves.

There is also the use of entomopathogens, micro-organisms that make the insects ill to stop feeding. Well-known is Bacillus thuringiensis. It is successfully used against the cabbage moth, Plutella for example. Most of these techniques require a relatively high level of know-how. However, they can easily be put to good use in organic farming. Thanks to progress in biological control, there are few insects for which there is no alternative pest control method already developed.

# Allelopathic effects

Apart from regular "biological control" in the use of predators, there is enormous potential for regulating crops, diseases, and weeds through allelopathy. Primary research data is available on the subject. Still, there are not many production systems that have consciously used known allelopathic effects in their design. However, a lot of traditional knowledge and practice can be found to be based on allelopathic results. Lately, farmers in Sweden have started to use mustard seed meal as a weed regulator in cabbage. The meal reduces the germination of weeds.
Similarly, corn flour is used in other countries. A Danish farmer has successfully grown rye and carrots together for a decade. By this strategy, he avoids doing manual weeding in his carrots, which is typically done in 100-200 hours per hectare and year.

# Plants protection from pests and diseases in organic agriculture

**By Kasymova Kyial, Iminbaeva Indira, Tolomushev Tursunaly, Jakshylykova Aijan, Sharshembieva Suiunbala, Karybekov Naryn, Moldoakunova J.**

The main purpose of the application of protection measures is to prevent the growth of pest populations already functioning and diseases further spread.

Compost and herbal infusions can be applied directly on the farm to promote plant health and increase soil fertility, as well as to provide leaves and roots with nutrients, beneficial microorganisms and metabolites.

**Compost extract** - is a fertilizer, but it can also help increase plant resistance. In order to prepare it, mature compost is mixed with water in a ratio from 1:5 to 1:8 (volume / volume: 1 liter of compost for every 5-6 liters of water), mixed well and left to ferment for 3-7 days. One teaspoon of molasses per liter of liquid can be added to the mixture, as it accelerates the development of microorganisms. The fermentation mixture should be stored in a shaded and rain-protected place. At the end of fermentation and before use, the extract is thoroughly mixed, filtered and mixed in a ratio from 1:5 to 1:10.

**Plant extracts** can be obtained from stinging nettle, field horsetail, comfrey, clover, and other plants. To spray foliage or impregnate the soil, the extract is diluted in a ratio of 1:10 or 1:5. As a rule, to prevent the development of diseases and to increase the number of soil microorganisms, compost extract or compost infusion is recommended to be used every 7-10 days.

In addition to plant extracts, there are other natural pesticides approved for use in organic farming. Despite the fact that some of these products have limited selectivity and do not completely decompose naturally, in some cases their use is justified.

- **Liquid soap solutions:** against aphids and other sucking insects.
- **Vegetable ash:** Wood ash can be effectively used against ants, stem grinders, termites and potato moths. The ash should be poured directly onto pest colonies and infected plant parts. The ash will dry out pests with soft bodies. Wood ash is often used to protect grain from stock pests such as weevils. In addition, ash is used against diseases transmitted through the soil.

**Sulfur** is mainly used against plant diseases, such as powdery mildew. The effectiveness of sulfur is explained by the fact that it prevents the germination of spores. It is incompatible with other pesticides. Lime sulfur is obtained by adding lime to sulfur to improve its penetration into plant tissue.

**Bordeaux liquid** (solution of copper sulfate and lime). Unlike sulfur, Bordeaux liquid has both fungicidal and insecticidal properties. Therefore, it can be effectively used against diseases such as leaf spot caused by bacteria or fungi, powdery mildew and various pathogens that cause anthracnose.

It is known that many plant extracts have fungicidal properties. Onions and garlic are effective against various diseases, such as powdery mildew and fungal and bacterial diseases. Marigolds erect and marigolds radiant strengthen the resistance of potato plants,

beans, tomatoes, and peas to such fungal diseases. Traditional knowledge can be useful for selecting plant extracts in each region.

Preventive measures for plant protection will save people energy and money. Knowledge about plant health and understanding of the ecology of pests and diseases allows the farmer to choose the most effective preventive plant protection measures. The development of pests and diseases is influenced by many factors; therefore, it is extremely important to take precise measures during periods of greatest vulnerability of plants. To do this, it is necessary to choose the right time to apply protective measures, correctly combine various methods or a selective method. The introduction of plant protection services is much more effective than solving problems.

# Monitoring

Monitoring allows you to control the most important parameters of the field state. The basis of effective plant protection is regular monitoring of pests, diseases and weeds. Plant protection requires specific information about what pests, diseases and weeds are found in a given region or in agricultural fields, and what damage they cause. Thus, we can make individual field work plans, anticipate potential risks and develop measures to combat negative phenomena.

Continuous and careful monitoring of the degree of pest and disease infestation during the critical period for crop growth is the key to successful management. Farmers can monitor by searching for signs of damage in the field. This will allow you to take measures in advance, while the pest and the disease have not yet managed to cause significant harm.

The search for signs of disease allows the farmer to use natural plant extracts only when necessary. Most often, the search for signs of defeat on the field is carried out according to a pre-established zigzag or M-shaped scheme. The most frequent use of this particular scheme is due to the fact that it is easy to learn during training, it is convenient in practice and allows the farmer to inspect all areas of the field. Various types of feromone traps can also be used to monitor insect pests. The essence of this simple method is that. To collect more information about the presence of insect pests in the field, especially about fast-moving (mobile) insect pests (for example, fruit flies, lepidoptera insects).

References: Bondarenko N.V. Biological protection of plants. Methods of plant protection in agriculture, EOS data Analytics. Biological method of plant protection. The Great Russian Encyclopedia

# 5 Quality of Organic Products

The Law of the Kyrgyz Republic "On Organic Agricultural Production in the Kyrgyz Republic" gives the following definition: organic agricultural products - agricultural products produced in accordance with the requirements of this Law without the use of agrochemicals, pesticides, antibiotics, hormonal drugs, genetically modified (genetically engineered, transgenic) organisms, not processed using ionizing radiation. Organic agricultural products are produced in accordance with the rules of organic standards, and are also certified. Organic certification is a long time-consuming process, the successful result of which is the right to use the organic mark-marking proving the organic origin of the product. A sign (or organic labeling) is a signal to the buyer that the product is organic, which means it does not contain traces of pesticides, other pesticides, synthetic flavors, dyes, traces of antibiotics or hormones and is produced in strict accordance with the organic standard.

The quality of organic products is understood differently than the quality of ordinary agricultural goods. It is determined by the quality of the agricultural system and processing methods in general. This means that it depends on the method by which the plants were grown, how the livestock was kept, and how the resulting organic products were processed, stored and delivered to consumers. That is, from the technology of production of products, which is determined by strict rules and is subject to an equally strict control system. It is important that a given and controlling method of production makes it possible to obtain high-quality organic products.

The priority of organic agriculture is the quality of products produced. The production system of organic agricultural production prevents the introduction of foreign and harmful substances and the ingress of their residues into the agroecosystem, or at least guarantees their minimal presence. It gives naturalness (naturalness) to the nutritional and physiological properties of organic products, and provides high biological quality of their individual components, such as proteins, enzymes, vitamins and minerals.

The quality of organic agriculture products has a much larger scale than just a mechanical, chemical or microbiological assessment of the content of substances. The production method is associated with quality from an ethical, moral, socio-psychological and economic point of view, when the consumer realizes that the production method used was ecological, environmentally friendly, tactful and sensitive in relation to the maintenance of farm animals and to all animals, careful of non-renewable resources, raw materials and energy. Here, the relationship between nutrition and health, immunity, vital activity, lifestyle and worldview comes to the fore.

In modern scientific practice, the quality of products is determined just in the aspect of mechanical, chemical or microbiological assessment of the content of substances. In the concept of quality, interpreted in this way, the proof of a higher quality of biological products is, if not impossible at all, then extremely difficult. Their quality depends on a number of factors that mutually affect each other. From the point of view of the currently existing characteristics of the quality of agricultural products, it should be noted that many of their indicators in the relative steppe depend on the external environment (climate, weather), methods of raising and keeping animals. They depend significantly on the properties of varieties and breeds, so they can vary significantly. This applies to organic farming, which in some cases may suffer from external influences more than traditional agriculture, and its products may also be contaminated as a result of the general contamination of the environment.

**The results of some researches to inspect the quality of organic products of plant origin in comparison with traditional products:**

- from the point of view of technological quality, organic products, as a rule, have a higher content of dry matter (vitamins and minerals) and are better stored;
- convincing evidence of higher quality of organic products has been obtained in experiments on feeding rats. The latter intuitively preferred organic manufactured materials, which were already known from field tests, when wild animals preferred to eat plants that were not fertilized and not treated with pesticides.;
- bio-products contain fewer residues of heavy metals, nitrates and pesticides;
- the problem may be the content of some natural toxins or phytoalexins in the organic cultivation of plants, with which resistant plants themselves protect themselves from the effects of harmful factors;
- experiments (for example, with potatoes or meat) have shown that organic products have a better taste.

The quality of intensive farming livestock products can be negatively affected, among other things, by the remains of antibiotics and hormones. Moreover, in recent years, questions have been discussed about the danger of transferring diseases from animals to humans (mad cow syndrome, avian flu). In organic agriculture, the preventive use of antibiotics and the use of growth hormones is strictly prohibited, and therefore the dangers associated with the use of these substances should not be expected. An ethical point of view related to animal welfare should be added to the characteristics of animal products as a quality criterion.

In the aspect of the evaluation of animal products in organic production, we have the results of experiments with feed, which show, for example, that birds with ecological content compared to traditional, have increased egg production, an increase in yolk and protein weight, lower perinatal mortality. As for milk, the quality of milk in relation to the content of individual substances strongly depends on the feed ration of animals, the differences between farms are significant. From the point of view of individual feeds, a study was conducted in Switzerland evaluating the quality of cheese made from the milk of cows grazing in Alpine meadows. This cheese contains a relatively high amount of linolenic acid, an increase in the content of omega-3 fatty acids. The British study also showed a higher content of omega-3 fatty acids in the milk of cows that were fed mainly with silage from fodder legumes compared with the silage of cereal grasses. From the point of view of nitrogen sources on organic farms, legumes are of great importance and their impact can affect the quality of milk. Omega-3 fatty acids also play an important role from a hygienic point of view, in diseases of the cardiovascular system, arthritis, and even, apparently, can reduce the risk of Alzheimer's disease.

The effects of the feed diet and the method of keeping animals on the quality of beef have been investigated in several projects, the results of which were evaluated ambiguously in the literature. The higher quality of the meat of grazed animals is considered beyond doubt, and by a number of indicators, including its appearance. The German study concerned the influence of extensive breeds, that is, forms of livestock maintenance suitable for organic production on the quality of meat. In the process of systematic research within the framework of environmental programs, special attention was paid to the selection of suitable breeds. The results were in line with expectations. Use of breeds and categories which could be attributed to the ecological production of products, lead to exceptional quality of meat. Other studies also report a more favorably high content of polyunsaturated fatty acids. When keeping livestock on grass pastures, an increased content of n-3 fatty acids and a positive proportion of n-6; n-3 fatty acids were noted. However, among the reports evaluating the quality of meat, we can find contradictory results.

For example, in relation to poultry meat (chickens), topical issues of replacing antibiotics with natural products were initially resolved. Combined with organic farming. At the same time, it

was found that certain products (herbal mixtures, probiotics) could replace antibiotic active substances and thereby ensure the achievement of a positive effect when fattening and folding the body of wallpaper birds. However, the effect was noticeable only in comparison with the zero control. It is for herbal mixtures that the results turned out to be too variable, which is due to the problems of standardization of such mixtures. Another goal of the German chicken fattening study was to study slow-growing broilers. Which, due to their large mass and purpose for fattening at an older age, are more suitable for the production of eco-products. When they were slaughtered, there were no significant differences in body composition. It was also not possible to detect an improvement in the quality of meat and, what is especially important for external perception, the content of internal fat. Studies conducted by the same organization from Germany concerning the quality of eggs during storage did not reveal its dependence on the free or cellular content of poultry. However, according to the results of another study, with the ecological content of birds, the weight of eggs and the weight of yolk in eggs were greater. With their non-cellular content in eggs, higher carotenoids were noted due to green plants or as a result of the better ability of such eggs to preserve their properties during storage. And in general, the best quality of eggs from chickens raised on home farms, with walking content, is a well-known fact that does not cause doubt.

**Several examples of assessing the quality of organic products Quality and Safety of Organic Products were presented (Alfoldi et al. 2006):**

| Material | Product | Content compared to traditional product |
|---|---|---|
| Protein | Grain | 10-15% lower |
| Amino Acids | Grain | Well balanced content |
| Useful fatty acids | Milk, cheese, meat | 10-60% higher |
| Vitamin C | Vegetables, fruits, milk | 5-90% higher |
| Secondary metabolites of plants | Fruits, vegetables, corn, grapes | 10-50% higher |
| Pesticide residues | Fruits and vegetables | **Fruits** – on average 550 times lower, **Vegetables** – on average 700 times lower |
| Mycotoxins | Wheat, barley, corn, rice, children nutrition, apples | the crop production system does not affect the content of mycotoxins |
| Nitrates | Vegetables | 10-40% lower |

# Used literature

Organic agriculture. Borzhivoy Sharapatka, Irzhi Urban, Olomoun-2010

Organic agricultural production during certification is examined for a number of indicators. The Kyrgyz Republic has a sufficient number of testing laboratories for the study of water, soil, plants and fruits. The list of laboratories that have passed the international accreditation ISO/IEC 17025-2019 General requirements for the competence of testing and calibration laboratories is presented.

For the list of laboraties, **click here**

# 6 Organic Standards and Standard Requirements

*Photo by Bakhrom Tursunov on Unsplash*

The Law "On Organic Agricultural production in the Kyrgyz Republic" was adopted on May 18, 2019 and entered into force on November 21, 2019. The Ministry of Agriculture, Water Resources and Regional Development of the Kyrgyz Republic has asked FAO to prepare amendments to legislation within the framework of the project "GCP /KYR/ 022 / ROK - "support for legal and institutional building". Initially, this project assumed the development of only subordinate regulations, but the analysis of the law showed that it does not fully comply with international best practices, namely IFOAM and Codex Alimentarius are the leading international reference standards for organic products. (1)

Based on the document KMS 1361:2021, the national standard was developed and recommended for use in 2021. This standard covers the requirements for organic production, production, storage, processing and transportation and complies with international standards. (2)

# Organic Standard Requirements

The differences between the standard developed by the Kyrgyz State (CMS 1361:2021) and international standards (EU-NOP-JAS) are shown in the table below.

**Table 1. Standard differences**

| Product category | KMS 1361:2021 | EU | NOP | JAS |
|---|---|---|---|---|
| Plant production | X | X | X | X |
| Cattle breeding | X | X | X | X |
| Bee keeping | X | X | X | - |
| Wild fruits/berries harvesting | X | X | X | X |
| Aquaculture | X | X | - | - |
| Processed product | X | X | X | X |
| Alcoholic product | - | X | X | - |
| Cosmetics | - | - | X | - |
| Fertilizers and pesticides | X | X | X | X |

# Buffer zone:

This is a preventive measure to reduce cross-contamination with pollutants from adjacent convention areas and requires that the farm to be protected in order to reduce the intake of pesticides from various neighboring areas by applying the following preventive measures:

**The followings are considered as a buffer zone:**

- Vegetation strips (forest strips)
- Flower stripes
- Unauthorized uncultivated plantings, roads or uncultivated areas
- Certified cultivated plants
- Creation of an irrigation system for upper located non-organic zones

# Biodiversity:

Organic standards require maintaining soil fertility and natural protection from plant pests and define biodiversity as a key element of organic cultivation.

**Table 2. Cross contamination of buffer zones**

| | KMS 1361:2021 | JAS | NOP | EU policy 853.07& 889/08 |
|---|---|---|---|---|
| **Pollution warnings** | **The presence of a buffer zone between the organic field and the inorganic field is required if pesticides are used.** | | | **In order to prevent contamination or infection from contamination it is required to adopt preventive measures** |
| **!!! To protect organic food from pesticide contamination and organic pollution, a buffer zone is required** | | | | |

**Table 3. The thickness of the buffer zones depending on the risk of different spread of pollution**

| | Minimum height of the buffer zone | |
|---|---|---|
| **Managing adjacent convention fields** | **Low vegetation layer (below 80 cm)** | **High vegetation layer (above 80 cm)** |
| **A field where no fertilizer is used** | **Not required** | **Not required** |
| **Field and vegetable crops applied with hand sprayers** | **1-2 meter*** | **Before forest works or sowing season start 3 rows of tall plants (sunflower, corn) cultivation required** |
| **For field and fruit crops, for which trailed sprayers are used by attaching to tractors** | **2-4 meter** | **Before forest works or sowing season start 6 rows of tall plants (sunflower, corn) cultivation required** |
| **The use of weak technology in the cultivation of field and fruit crops** | **4-8 meter** | **Before forest works or sowing season start 6 rows of tall plants (sunflower, corn) cultivation required** |
| **Orchards applied by high-pressure chemical sprayers** | **10-20 meter** | **The forest belt is 2 meters high and 2 meters thick** |
| **Areas of application of air sprayers** | **30-300 meter** | **A strip of forest with a height of at least 5 meters and a thickness of 20 meters is required, or a strip of forest with a height of 15 meters and a thickness of 3 meters, covered with dense low shrubs** |

* This range is calculated depending on the frequency of spraying and wind direction.

**Table 4. Seeds and seed materials, KMS 1361:2021/EU 834/07 Reg. difference from 889/08/NOP/JAS**

| | KMS 1361:2021 | EU requirements | NOP | JAS |
|---|---|---|---|---|
| **Origin of seed and plant seeds** | Organic origin is required, seeds of annual plants should be used for 1 year, seeds of perennial plants should be used only after 2 years of organic cultivation | Organic is required | | |
| **The use of simple seeds and seed material** | It is allowed to use unprocessed inorganic seeds | The farmer must confirm the absence of organic seeds or seed material | | |
| **In addition** | If the farmer has confirmed the absence of organic seeds | A farmer must obtain a permit prior to sowing in order to obtain permission to use conventional seed material as seeds, otherwise it will be considered ordinary (this also applies to potatoes, not to any other vegetative seed material) | No additional procedures are provided | |
| **Processed seeds** | It is allowed when there are not treated or no organic seeds | Not allowed. The use of seeds is considered as the use of chemicals. Processed seeds require that the sown area again go through a conventional period | | It is allowed when there are no organic seeds or not treated seeds available |
| **Seedlings of annual vegetables** | - | It is required to be organic. In another case, harvested crop is considered as conventional | | |

# Crop rotation
## (grain crops and green fertilizers)

For annual cultivated plants:
Fertility and biological activity of soils should be constantly replenished and improved. For this:

- With the help of a multi-year crop rotation (at least 4-5 plants), including:
  grain crops (at least 25%) and siderate crops of green fertilizers (should be 10% of 25%) enrich the land with organic waste.
- sow siderate crops of siderates between the rows of the main crops;
- use of animal manure;
- Organic production waste, composted and uncomposted waste.
- Plant - based preparations and microorganisms for the purpose of activating composting;
- Stone flour and other biodynamic preparations;
- In order to preserve soil fertility and pest control, it is forbidden to grow one plant for 2-3 years in a row in one place
- For perennials, row spacing should be covered with cover plants or mulching material, cereals are preferred for this, it is recommended to grow even in short periods of the year, if climatic conditions allow. The table below shows an example of a crop rotation plan.

**Table 5. Crop rotation plan**

| № | Area | Crops |
|---|---|---|
| 1 | 1 | Wheat |
| 2 | 1 | Alfalfa |
| 3 | 1 | Black clover |
| 4 | 1 | Potato |
| **Results** | **4 ha** | **100%** |
| **Legumes** (black clover) | **1 ha** | **25 %** |

This crop rotation system meets the requirements of crop rotation, since 25% of the total area of grain crops.

# Organic fertilizer

Organic fertilizers are used to increase soil fertility.

**Table 6. The difference in the standards for the use of manure types**

| Manure varieties | KMS 1361:2021 | EU and JAS requirements | NOP (USD) |
|---|---|---|---|
| Obtained from organic animal husbandry | Applied. After composting, it is recommended to apply 120 days before harvesting | Applied | Allowed only after composting |
| Manure obtained from conventional livestock farms (with the exception of livestock production level) | Not clarified | Applied | Allowed only after composting |
| Manure obtained from livestock production | Not clarified | Not allowed | |

- It is not allowed to use nitrogen fertilizers and superphosphate, while the JAS standard allows the use of potassium chloride (from ore).
- Composted tree bark, sawdust;
- Stone phosphates, potassium sulfate is allowed to be used as fertilizers if certain elements are lacking in soil analysis.
- The use of organic and inorganic substances should not exceed the amount that the plant can use.
- Lime (CaCO3) is used as needed and recommended.

# Pests and weed control

The farmer is obliged to constantly update and improve his knowledge on the prevention of diseases and pests. Before using pest and disease control agents, it is necessary to carry out crop rotation, increase the population of naturally useful insects, use resistant varieties, and increase soil fertility.

**Table 7. KMS 1361:2021/EU 834/07 and 889/08/NOP/JAS policy difference**

| Requirements | | KMS 1361:2021 | EU 834/07 reglamant | NOP | JAS | Private standards |
|---|---|---|---|---|---|---|
| Complete farm conversion | All farms, including cattle and pastures, are managed according to an organic scheme | Allowed | Allowed | | | Forbidden |
| Plots of different status | Within one farm farmers grow crop on organic and transitional areas | Allowed | Allowed | | | Allowed |
| Parallel production | Within one farm farmers grow organic and transitional crops on the same area | It is allowed but an area crop rotation should not be applied | Forbidden (additional requirements are considered) * | Allowed under certain conditions | | It is forbidden |
| Mixed performance | One part of the farm grows organic products, and the other - inorganic. There are plants of traditional and organic cultivation | Organic and conversion sites should be separated from each other | | Allowed under certain conditions | | It is forbidden |

# Labeling

**Table 7. Labeling and identification in accordance with EU/NOP/JAS standards determination of conformity (2), (5)**

| KMS 1361:2021 | EU regulation | NOP USDA | JAS |
|---|---|---|---|
| >95% - there must be an organic ingredient, and the remaining 5% agricultural products require to be approved for use. | > 95% - ecologic ingredients EU 889/08 in the recommendations, it is allowed to add 5% of inorganic agricultural ingredients. | 100% - ecological ingredients,<br>> 95% - ecological ingredients,<br>70-95% - products from the list of ecological ingredients,<br><70% - non-ecological products<br>5% of non-organic agricultural ingredients are considered on the basis of chapter 205.606. Various additives and technical additives are considered in accordance with chapter 205.605. | >95% - refer to ecologic ingredients. |

**Sources:**

(1) The National Standard of the Kyrgyz Republic. Organic production. Requirements for production, storage, processing and transportation. 2021.

(2) Proposal to adopt a new version of the law of the Kyrgyz Republic "On Organic Production in the Kyrgyz Republic". 2021. FAO.

(3) **https://www.ifoam.bio/sites/default/files/2020-04/ifoam_norms_version_july_2014.pdf**

(4) **https://www.ifoam.bio/sites/default/files/2020-04/fos-infoa4_en_2015_web_1.pdf**

(5) Transition from traditional agricultural production to an organic system. Organic legislation of different countries. 2020. Chancellor Marianna. The German certification body CERES -GmbH.

# Rules for labeling organic products

By Mustapaeva A. T.

Products and their ingredients, feed products certified as organic in accordance with the current legislation of the Kyrgyz Republic and these standards are designated by using the term "organic products" in the label, in advertising or documents accompanying organic products.
The use of other terms, their combinations, abbreviations or derivatives is not allowed.

It is not allowed to use any terms, including terms used by trademarks, as well as methods of labeling and advertising, which may mislead the consumer that the product or ingredients used in its production meet the requirements of organic agricultural production.

The term "organic product" is placed in a prominent place so that it is clearly visible, easy to read and not erased. The term "organic product" is not allowed to be used for a product if, according to the requirements of regulatory legal acts of the country adopted the standard, it is necessary to indicate in its labeling or advertising that it contains genetically engineered organisms, consists of genetically engineered organisms or is produced from genetically engineered organisms. The use of the term "organic product" when labeling feed.

The requirements for the use of the term "organic product" when labeling feeds do not apply to feed for unproductive animals, fur-bearing animals or feed for aquaculture facilities.

The term "organic product" can be used to label ready-made feeds:
- the finished feed meets the requirements of this standard;
- at least 95% of the dry matter in the product is organic.

The term "organic product" should:
a. be placed separately from the information provided for the labeling of this type of product, in accordance with the regulatory legal acts of the state that adopted the standard;
b. be presented in a color, format or font that does not attract attention to it more than to the description or name of animal feed;
c. in the immediate vicinity of the term "organic product" should be indicated:
    1. the mass of dry matter of feed material (feed materials) obtained by organic production;
    2. the mass of dry matter of feed material (feed materials) from products obtained during the transition to organic production;
    3. the mass of the dry matter of the feed material (feed materials) not specified in 1) and 2) of paragraph 11.2.3;
    4. the total mass of dry matter of feed of agricultural origin;
a. a list of feed names obtained by organic production;
b. a list of feed names obtained during the transition to organic production.

# Other special labeling requirements

Vegetable products obtained during the transition period may contain the following inscription: "product obtained during the transition to organic production", under the following conditions:

- at the time of harvest, the duration of the transition period is at least 12 months;
- the color, size and format of the inscription does not attract attention to it more than to the description of the product. All letters of the inscription must be the same size;
- the product contains only one ingredient of agricultural origin.

# Labeling of **non-processed** organic agricultural products

Live or non-processed organic agricultural products are labeled as "organic products" or must have indications of organic production, provided that:

a. produced and certified in accordance with [1] and other regulatory legal acts of the Kyrgyz Republic in the field of certification of organic agricultural production;

b. is produced or imported by an economic entity that is a participant in the certification body's certification program and meets all import requirements specified in the certification regulations;

c. labeling includes the name and code number of the certification body and the producer of organic agricultural products responsible for the product.

# Labeling of **processed** organic agricultural products

The labeling of processed products may contain an indication of organic production only in cases where:

a. the product was produced or imported in accordance with [1] and other regulatory legal acts of the Kyrgyz Republic in the field of certification, import of organic agricultural production;

b. the certification was carried out by the certification body;

c. labeling includes the name and address of the manufacturer who performed the most recent production or preparation operation, the name of the product, as well as the name and code number of the certification body that certified the product as organic.

The labeling should display the following "Organic product": when at least 95% of the ingredients of the product by weight are of organic origin, and all other ingredients of the product are of agricultural origin or are substances included in the list of permitted starting materials according to Annex I, except for the addition of water and salt.

# Labeling of products at the stage of transition to organic agricultural production

The products obtained in the period of transition to organic, should be marked as "the product obtained in the period of transition to organic production" provided that:

a. producers, processors were enrolled in a certification program, and that the production or processing carried out in accordance with the legislation in the sphere of organic agricultural production in the previous twelve months;

b. the label includes the inscription "product at the stage of transition to the organic production system"

c. the color, size and format of the label should not attract attention to it more than to the description of the product for sale. All letters of the inscription must be the same;

d. the list of ingredients should be in descending order by quantity and indicate which of its ingredients are produced at the transition stage;

e. designations related to the transition period do not mislead the buyer about the difference from the products of the production units that were in waiting, which have completely completed the transition period.

# Use of the conformity mark for organic products

The rules for the application of the conformity label for organic products are established by the authorized body and must contain appropriate pictograms, sizes, colors and technical characteristics. A conformity label for organic products may be included in labels or applications that accompany organic products, provided that it:

a. not used for products in transition;

b. used for products labeled as "organic" or "organic products", but not for products labeled as "made from organic products".

The authorized body must register the conformity label for organic products with the state intellectual property authority and control the use of the conformity mark of the organic logo. The authorized body may change the pictograms and the rules for displaying and using the logo. Manufacturers and/or certification bodies may include their identification logo, the logo or the mark of the certification body together with the label of conformity for organic products, provided that:

a. the inclusion of their identification logo or label is not a mandatory requirement for manufacturers wishing to obtain a certificate;

b. the identification logo or sign is not displayed separately more prominently than the conformity mark for organic products,

c. the identification logo or sign does not exclude the use of the conformity mark for organic products.

# Packaging of organic agricultural products

It is preferable to choose packaging from biodegradable materials that are used or can be reused.
Packaging should have minimal negative impact on products and the environment. It is not allowed to use packaging material that can lead to contamination of organic products. This rule applies to reusable bags or containers that have come into contact with any substance that is potentially capable of harming the organic integrity of the product.
Packaging materials and storage containers or baskets containing synthetic fungicides, preservatives, fumigants or nanomaterials are prohibited. Polyvinyl chloride (PVC) is not allowed for packaging.

# Organic products harvesting

Simultaneous collection of organic products and products that do not meet the requirements for organic production is allowed, provided that the necessary measures are taken to prevent any possibility of mixing or exchange, as well as to ensure the identification of organic products.

# Transportation

During transportation, it is necessary to separate the products of organic production, products obtained during the transition period, and products that do not meet the requirements for organic production.
Each batch of organic products must be accompanied by documentation ensuring its traceability and confirming the quality, safety and organic origin.
All vehicles used for the transportation of organic products must meet the requirements for the transportation of agricultural products, raw materials and food products.
It is allowed to use vehicles and/or containers in which products that do not meet the requirements for organic production were transported, provided they are properly cleaned before transporting organic products and exclude the possibility of selling products that do not meet the requirements for organic production, with reference to organic production.

# Storage of organic agricultural products

When storing organic products, identification of such products, their batches and prevention of any mixing or exchange with products and/or substances that do not meet the requirements for organic production, or contamination with such products and/or substances must be ensured.
The storage of materials with unclear origin and not permitted by this standard for the production of organic products is prohibited in the production units of organic crop production and animal husbandry.
Storage of medicines for veterinary use and antibiotics in production units is allowed, provided that they were prescribed by a veterinarian in connection with the treatment provided, their storage is carried out in specially designated controlled places, and the use is recorded in documents.

# 7 Transition to Organic Agriculture

## in certification processes

*Photo by Natalia Slastnikova on Unsplash*

Time between the start of organic production and obtaining an organic certificate is called the transition period, and this period takes two years for annual pasture and fodder crops and three years for perennial plants. However, this period may be reduced by no more than one year, depending on the conditions of previous land use, the general state of the region and similar indicators. If the field has not been plowed for 3 years, there is enough evidence that chemical fertilizers and pesticides have not been used and the soil has not been polluted, the conversion to "organic status" can be immediately reduced to zero.
In addition, the products included in the third year of this transition period will be available on the market with the inscription "organic agriculture - a product of the transition period". At the next stage, a farm that has successfully completed the transition process and controls the production of organic products has the right to receive an organic product certificate at the end of the transition period (Table 1).

**Table 1. Requirements of the transition period for crop production.**

| Period | Cultivated crop | Perennial crops |
|---|---|---|
| **0-12 months** | Conventional period – **C1** | Conventional period – **C1** |
| **12-24 months** | Conventional period – **C2** | Conventional period – **C2** |
| **24-36 months** | Organic – **Org**<br>**!!! 24 months before application** | Conventional period – **C3** |
| **More than 36 months** | | Organic – **Org**<br>**!!! Yield harvested from this date on is considered as organic product** |

The conventional period begins from the date of filing an application with the certification body and signing a contract with the company or from the date of the first inspection. For example, in January 2021, the farm submitted an application to the certification body. Harvest yield of bean product in May 2023 will be accepted as an "organic" product if it is plowed in May 2021.

For land plots transferred to organic production or where funds or substances are used in the process of transition to organic production, the use of which in organic production is not permitted, the beginning of the transition period is again established from the moment of the use of funds or substances.

Mushrooms, fruits, vegetables spontaneously grown in fields, pastures, forests and have not been interfered by people (untreated fields, not sprayed medicines, not planted plants and others) and if within 3 years no forest insecticides are applied, these products are considered as organic wild. The transition period of wild plants is reduced to zero.

Plants cannot be considered "wild" in the following cases:
- Gardens where small amounts of fertilizers are used;
- Walnuts harvested in farms/private gardens;
- Gardens that only the owner/tenant has an access to for harvesting

Where wild plants grow, there should be a buffer zone to prevent the penetration of other pollutants.
In terms of cattle breeding: animals must be bought on organic farms and kept in accordance with the organic standard from the moment of birth, but there are some exceptions. Livestock and livestock products can be sold as organic if the requirements of organic standards are met during the following time periods (Table 2). (1)

**Table 2. Differences in standards for the transition period of animal husbandry (1), (2)**

<table>
<tr><th colspan="2"></th><th>KMS 1361:2021</th><th>European Regla-ment 889/08</th><th>NOP</th></tr>
<tr><td rowspan="2">Cows and horses</td><td>Meat production</td><td colspan="2">12 months for cows (at least 3/4 of their life)</td><td rowspan="2">Since its birth</td></tr>
<tr><td>Milk production</td><td>Implementation of the conventional period for 90 days, then 6 months</td><td>6 months before the sale of milk as organic</td></tr>
<tr><td rowspan="2">Goat, sheep, pig</td><td>Meat production</td><td colspan="2">6 months for goats, sheep and pigs</td><td rowspan="2">1 year before selling with organic label</td></tr>
<tr><td>Milk production</td><td>Implementation of the conventional period for 90 days, then 6 months</td><td>6 months before the sale of milk as organic</td></tr>
<tr><td colspan="2">Poultry</td><td>Egg laying chicken: 6 weeks, starting from the 3rd day of their life</td><td>Egg laying hens: 6 weeks, other birds - 10 weeks, starting from the 3rd day of their life</td><td>From the 3rd day of their life</td></tr>
<tr><td colspan="2">Non-food products (wool and other fibers)</td><td>-</td><td>Not clarified</td><td>1 year before sale with organic labels (e.g., wool)</td></tr>
<tr><td colspan="2">Cattle raised for reproduction</td><td>-</td><td>You can buy male only from conven-tional breeding animals (breeding animals) on a reg-ular farm</td><td>It is allowed to purchase breeding animals from a con-ventional farm. The female must arrive at the farm no later than the last third of the incubation period, if the breed is organically main-tained</td></tr>
<tr><td colspan="2">Transition period for non-grazed pastures and open lands</td><td colspan="2">Non-grazed pastures and open spaces for cattle breeding must undergo a conven-tion period, this period to pastures can be reduced to 1 year (6 months if no chemicals are used on pastures)</td><td>No chemicals have been used in the last three years</td></tr>
</table>

Organic animal husbandry is characterized by:

- Organic feed is used;
- Does not use GMOs;
- The number of livestock depends on the available land area;
- High demands are placed on the health of animals (for example, suitable conditions of detention);
- Give preference to natural veterinary methods; the use of allopathic remedies only when there is no other method of treatment.

Beekeeping must undergo a convention period of 1 year to obtain organic status. Beeswax must be replaced with certified organic beeswax within the prescribed year. In cases where their replacement is not possible within one year, the certifying authority may extend the convention period.

Organic beekeeping is characterized by:

- Be in unpolluted areas - there should be no industrial centers using large amounts of pesticides and intensive agriculture near an organic beehive (radius of 3 km).;
- Natural materials, breeding methods and organic feed are used;
- Avoid using conventional veterinary drugs and pesticides.

Organic aquaculture is grown from organic broodstock and fish droppings obtained from organic fish farms, but there are some exceptions.

Organic aquaculture is characterized by:

- The plant and animal components of the feed must be of organic production;
- The use of growth stimulants and synthetic amino acids is not allowed;
- The use of immunobiological drugs is allowed;
- The use of chemically synthesized medicines for veterinary use, including antibiotics, is allowed only if necessary and provided that the use of phytotherapeutic, homeopathic and other medicines is impractical. (1)

Duration of the convention period in aquaculture production:

ü 12 months - when growing sturgeon fish for the production of food caviar;
ü 6 months - when growing sturgeon fish for the purpose of producing aquaculture products, except for food caviar;
ü 4 months - when growing fish, invertebrates and algae (except sturgeon). (2)

**Table 3. Conventional period KMS 1361:202/JAS/EC/NOP and difference between individual standards (1), (2)**

| | KMS 1361:202 | JAS | EC | NOP | Naturland | Biosuisse organic | Demeter |
|---|---|---|---|---|---|---|---|
| **Conventional period** | For perennial crops 3 years before harvesting<br>For field culture 2 years before sowing | | | For field and perennial crops 3 years before harvest | After receiving organic status | For perennial crops 3 years before harvesting<br>For field culture 2 years before sowing | If organic, it should have a minimum conversion period of 1 year |
| **Certification body before inspection** | Necessarily | Only from the second year after submitting the application | Necessarily | Not necessary | Necessarily | Necessarily | Necessarily |
| **Deposits** | 1 year - C0<br>2 year - organic | Must have a conversion period of 1 year | You can switch to organic right away | | | Must have a conversion period of 2 years | Must have a conversion period of 1 year |
| **Examples of reducing the conversion period (deposits)** | 1 year - C0<br>2 year - organic | 1 year – C1<br>2 year – organic | Organic | | | 1 year -C1<br>2 year - C2<br>3 year - organic | 1 year – C1<br>2 year – organic |

# Features of transition to organic agriculture

The transition to an organic production system requires a conventional period when organic production methods can be applied progressively in accordance with the established plan. During this period, it is important to carefully analyze the real situation on the farm and determine the actions that need to be taken.

The farm analysis should include the following:

1. Characteristics of the farm: size, distribution of land and crops, which crops, trees and animals are included in the farming system.
2. Soil analysis: assessment of soil structure, nutrients, organic matter content, extent of erosion and contamination by hazardous substances.
3. Climate: distribution and amount of precipitation, temperature, risk of frostbite, humidity.
4. Sources of organic substances and their application (organic fertilizers).
5. Availability of animal welfare systems and/or equipment.
6. Restrictions such as capital, labor, market access. (3)

As an example of the specific transition to organic agriculture can be used the Ak-Dobo cooperative. The commodity-service agricultural cooperative "Ak-Dobo " was established in 2018 within the framework of the program "Central Asia-Invest IV " with the financing of the European Union through the public association "Agro Lead". Organic standards were introduced in accordance with the requirements of the European Union. The cooperative consists of 25 farmer members, with a total area of 24.03 hectares. The main organic product was plum. When choosing members of the cooperative:

- The non-use of unauthorized funds in organic farming by peasants has been confirmed;
- Absence of crops requiring spraying with chemicals in nearby surrounding areas or any areas where corn, potatoes or other inedible crops were not cultivated;
- Fields with nearby perennial fodder crops cultivation areas (esparcet, black alfalfa).

25 farmers have written statements to confirm that for several years on their site (year of planting, area, planting scheme, number of trees, number of rows, buffer zone) no means or allowed substances for use in organic production have been used. Also, as an additional confirmation, an additional supporting certificate was collected from the district department of agrarian development that synthetic fertilizers and pesticides were not used in these areas. In addition, a third person, that is, a neighbor, received a paper document confirming that this farmer did not use the pesticide.
The cooperative has implemented an internal control system. An internal attestation committee and an internal appeals committee were established. Internal inspectors have also been created and trained to meet all the requirements of the organic standard. 25 farmers were divided into two groups, where they were trained in organic standards. Each procedure is recorded and all documents are sent to the certification body. The certification body of the cooperative was the Dutch company "Control Union".

The package of documents and forms of the cooperative "Ak-Dobo" sent to certifying authorities:

- Guidance on the implementation of the internal control system
- Assessment of farmers economy;
- Map of the location of fields;
- Farmer's field calendar;
- To shorten the convention period;
- History of farmers economy;
- II No. 1 (internal inspection);
- II No. 2 (testing of the expected harvest);
- II No. 3 (crops real harvesting);

- Documents of the attestation and appeal commissions
- Online map
- Farmer's commitment
- Database and others


After sending the documents, the auditors came and examined each farmer's garden, and a sample was taken from each garden for laboratory analysis. The audit of each farm was carried out because the cooperative received the certificate of "organic status" only in the 1st year. The absence of about 400 samples of pesticides was confirmed by a Dutch laboratory, and they received an "organic status" with a zero-transition period.
Sun Planet Organic LLC, a client of the organic plum, helped in exporting the product to Germany.

Challenges and obstacles in transition to organic agriculture. The "Ak-Dobo" cooperative has overcome a number of difficulties in the transition to organic production. They are as following:

- Selection of farmers to create a cooperative. It took a long time;
- Implementation of organic approach (since it was difficult for farmers to concentrate, they had to teach each one by one);
- Lack of garden maintenance (pruning, pest and disease control); recommended actions are not performed in organic cultivation. For example, they were not sprayed in a timely manner with lime-sulfur solution, copper-containing preparations;
- All the work that the farmers had to do, they did not do themselves, but expected from consultants. For example, when filling out a log, the consultant had to track each farmer every day;
- When harvesting, it was necessary to hire workers to label each box;
- Frostbite of the plant or lack of harvest during the year.
- Low financial potential of farmers, lack of interest of inspectors. (4)

In addition, other organic cooperatives have faced the following challenges and obstacles.

- The agricultural production cooperative "Alysh-Dan Organic", which grew organic apricots in the Batken region, was established in 2008 and switched to organic in 2012. IMO and Organic Standard worked with certification bodies. The difficulty of the cooperative's transition to organic was the lack of sales of dried apricots. In addition, there were no organic remedies for diseases and pests of apricots in Kyrgyzstan. (5)
- Issyk-Kul Organic Agricultural Commodity and Service Cooperative in Issyk–Kul region switched to organic in 2012. The cooperative grows valerian medicinal herb and exports it to European countries. 2 years passed the transition period and in the third year received the status of organic. IMO and Organic Standard worked with certification bodies. The main problems are the low cost of the certificate and the absence of subsidies for organic certification from any state. This may also be due to farmers' ignorance of organic matter, convincing them of organic matter, spraying pesticides that are not allowed in organic matter, lack of equipment for weed control, lack of a large number of mineral fertilizers in the first years of the transition to organic cultivation and very low yields until the land is restored. Even after the Cooperative received the status of organic, the prices of organic medicinal herbs did not change, but were sold at the prices of products of conventional farms. (6)

**Sources:**

(1) Transition from traditional agricultural production to an organic system. Organic legislation of different countries. 2020. Chancellor Marianne. The German certification body CERES -GmbH;
(2) Rules for the transition from traditional agricultural production to organic farming. 2020. Department of Organic Agriculture of the Kyrgyz Republic;
(3) Textbook on Organic Agriculture (FAO). 2017;
(4) Interview. Nurgazy Bolotbayev is an expert on organic agriculture;
(5) Interview. Tursunali Tolomushev - Chairman of the Agricultural Cooperative "Alysh-Dan";
(6) Interview. Sonungul Zhyltyrova - Chairman of the Issyk-Kol Organic Agricultural Commodity and Service Cooperative

# Extent of Organic Agriculture in Kyrgyz

In recent years, the demand for organic food has been constantly growing in the world. The Kyrgyz Republic is a country in which the natural biodiversity and ecological state are not disturbed and preserved almost in its original form, in connection with which the republic has all the conditions for the production of environmentally friendly organic food.

It is well known that land resources are limited in the Kyrgyz Republic. This leads to the production of insignificant volumes of agricultural products, including organic ones, as a result of which it is uncompetitive on the world market.

At the same time, the republic has all the conditions and opportunities to enter the market of the near and far abroad with organic agricultural products having special taste qualities, which have no analogues on the world market.

The country has all the conditions and prerequisites for organic production, and the variety of food products known for their special aroma, vitamin content and taste qualities is a special advantage of the Kyrgyz Republic and the potential for successful organic agricultural production.

**Organic agricultural production** – this is a developing direction of the agricultural sector of the economy at the current stage, in which agricultural production is accompanied by providing the population of the country with environmentally friendly food. The Law of the Kyrgyz Republic (dated May 18, 2019 No. 65) "On organic agricultural production in the Kyrgyz Republic" establishes the main directions in the field of ensuring food security in organic agriculture of the Kyrgyz Republic.

**Organic agriculture products varieties**

The Law of the Kyrgyz Republic establishes the following types of organic agricultural products:

1) agricultural products of animal and vegetable origin;
2) products of primary processing of agricultural plants, animal husbandry, aquaculture intended for consumption as food or feed;
3) feed (feed products);
4) plant seedlings and sowing material;
5) yeast used as food or feed;
6) aquaculture facilities.

# 8 Organic Value Chains and Markets

*Photo by Patrick Schneider on Unsplash*

# Best Practice Guideline for Agriculture and Value Chains

The Best Practice Guideline for Agriculture and Value Chains is a contribution by the organic movement to the global discussion on sustainable agriculture. It aims to lead, guide and inspire people from every part of the world to work cooperatively to reverse the destructive path modern agriculture has taken on our planet. It aspires to empower individuals and organizations to exercise their own ingenuity and assume leadership, and to improve their own performance and practices, quality of life, and the well-being of their communities.

Changing to sustainable agriculture implies necessary changes in behaviors of all actors in the value chain. IFOAM "Best Practice Guideline for Agriculture & Value Chains" document encompasses the entire value chain until the final consumer. Each party in the value chain can use the guidelines herein regardless of their stage of development, realizing that their situation is unique, yet part of a common whole. Other stakeholders who support and interact with these value chains, including those involved in research, policy, marketing, or supporting Infrastructure, may also use these guidelines. The guidelines cover the economic, social, environmental, cultural, and accountability aspects of value chain development. Lastly, the document is a contribution by the organic movement to the global discussion on sustainable agriculture

Best Practice Guideline for Agriculture & Value Chains:
**https://www.ifoam.bio/why-organic/organic-landmarks/best-practice-guideline**

# Organic Markets

*By: Abdanbekova Madina*
*(Leading specialist Department of Organic Agricutlure)*

The growth of cities and urban working population, including working women, leads to the formation of a new lifestyle focused on convenience, which inevitably leads to a global increase in demand for organic baby food. At the same time, in some regions, the higher cost of organic baby food compared to traditional is retaining this growth. Nevertheless, it is expected that by 2023 the total market volume will amount to 10 billion US dollars and will reach a cumulative annual growth rate of 10% for the period 2018-2023.

# Global market of Organic Food and Beverage

- There is no unified system for collecting statistics on sales of organic food and beverages.
- Special standards apply to cosmetics and clothing, there is no centralized data collection system.
- 179 countries are engaged in organic agriculture.
- The world market for organic food and beverages, worth of 92 billion euros, is expected to grow by 12.4% by 2027, with the largest market share belonging to fruits and vegetables.
- The largest markets continue to increase annual growth in 2018; USA (5.9%), Germany (5.5%), France (15.4%), China (5.8%) and Italy (7.9%).
- Europe is increasingly dependent on imports, as the territory is not growing at the required pace.
- This gives producers from Kyrgyzstan the opportunity to enter European markets, while neighborhood of China should also be assessed as a possible opportunity for organic food products from the republic.

## The organic food market is growing **faster (25%) than the traditional market (15%)**

Almost every supermarket has a department or a shelf with organic products; Expansion of the range of products, in particular, processed; Large sales volume supported by imports; High satisfying demand; Consumers, quality requirements;
Certification is required.

# Quality

- It is necessary to follow the quality standards required in the markets of the EU and other countries.
- Lack of knowledge about the necessary quality among farmers and intermediaries.
- Current production is focused on low-grade goods
- More can be gained by increasing the value through sorting and packaging

# Packaging

It is important to:

- Contain and protect the product
- Identify the product and its advantages in attracting customers
- Keep the potential for portion-size packaging for further product development and snack market opportunities

# Conclusion

There is a demand in the market for all categories of healthy products, in particular, nuts, fresh fruits, dried fruits, vegetables, spices, herbal teas. There is a demand for organic cotton in the textile industry. For marketing, it is necessary to obtain certification of organic products, as well as additional certificates, for example, for compliance with the rules of fair trade, "GLOBALGAP", in particular for the sale of fresh vegetables and fruits to supermarkets. There is a demand for organic products that meet the quality and food safety parameters. Market research helps to get more specific information on the dynamics of demand by region. For the distribution of organic products, it is necessary that producers declare themselves by participating in fairs and business events, and talk about the potential of organic agriculture in the region. Joint efforts contribute to the disclosure of potential.

# 9 Marketing for Agro-Food Mountain Products

**By Carlo Murer**
An expert in marketing and commercialising agricultural mountain products and Mountain Partnership Secretariat of FAO.

When developing marketing strategies, we need to step into the wider picture and understand what a Food System is, how it works, its main drivers and the impact not only on our diets but also the resources involved (human, natural, financial and cultural). In this wider picture, we can see where our value chain is inserted, and how it interacts with the different players and elements of the system, which will help to design the best strategy to succeed in the market.

The food system is a complex web of activities involving production, processing, transport, and consumption. According to the University of Oxford, issues concerning the food system include the governance and economics of food production, its sustainability, the degree to which we waste food, how food production affects the natural environment and the impact of food on individual and population health. The agri-food economy is the complex interface that exists between nature and society. Agri-food economies are the socio-technical systems that convert natural resources into food.

Although food is considered to be enough at the global level, food insecurity, malnutrition and hunger, particularly after the Covid-19 pandemic, are increasing (UN 2019, Fisher 2019, FAO 2021). We are surrounded by system failures and food insecurity! Food insecurity and shortages are considered to be shameful system failures. The situation appears particularly worrisome when analysing the rural mountain population, particularly in developing countries, where the incidence of food insecurity is growing faster than the population growth (Romeo et al 2020).

# Impact of food production and family farming

It is estimated that agriculture globally uses up to 40% of the land and 70% of freshwater. Food systems contribute to one-third of the total emissions of anthropogenic greenhouse gas emissions.

Family farming, feeding up to 80% of the world population, is considered responsible for a resource intake of 25% of the total resources (land, water, fossil fuel) consumed in food production; whilst the so-called industrial food chains use at least 75% of the world's agricultural resources, but producing food for less than 30% of the world population. Family farming represents 90% of the farms in the world and manages around 70-80% of farmland worldwide.

# Who will feed us?

- Peasants (not food corporations) feed the world: 70% of the world's population is fed by the Peasant Food Web, using only 25% of resources.
- Industrial food production fails to feed: Only 24% of the food produced by the Industrial food chain reaches people – the rest is wasted in meat production inefficiencies; lost in transport, storage and at the household; and diverted to non-food products.
- Industrial food costs us more: For every dollar spent on industrial food, it costs another 2 dollars to clean up the mess. (ETC 2017)

# Farming is not an easy life – the correlation between consumption and production of food

The food we eat or drink directly affects those who produced those foods, the economy that transformed them and put them up for sale, and the environment where they were produced and then thrown away in the form of waste.

**"A significant part of the pleasure of eating is in one's accurate consciousness of the lives and the world from which food comes. Eating is an agricultural act. Eating ends the annual drama of the food economy that begins with planting and birth."**
Wendell Berry

# The systems approach

The emergence of the 'Food Systems' discourse and corporate solutions to hunger and malnutrition acknowledge that:

- The food system is a matter of public interest
- Food must be understood as a common and human right, not as a commodity
- Trade and investments are the determinants of food injustice

A fully integrated focus on food systems requires:

- Being equitable and inclusive (economic resilience);
- Producing broad-based benefits for all people (social resilience); and
- Generating positive and regenerative impacts on the natural environment (environmental resilience).

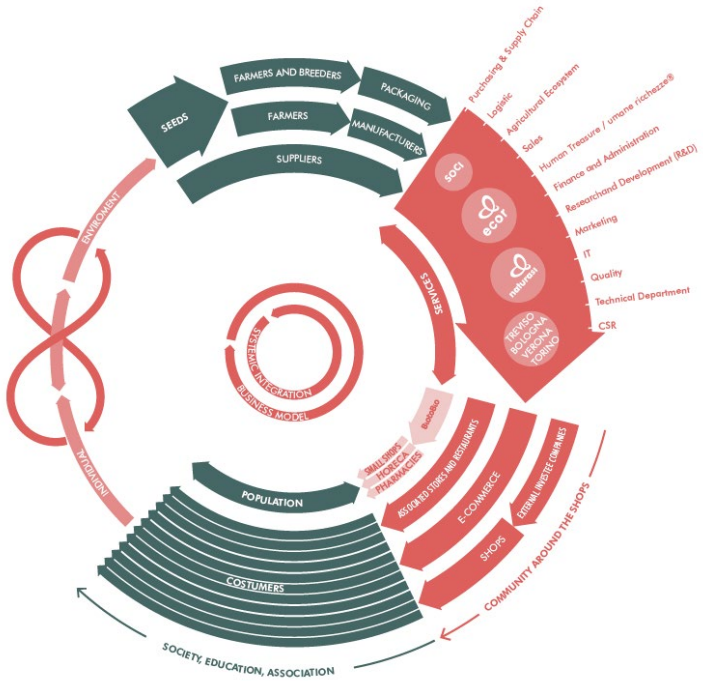



*Figure 1: The ecosystem of NaturaSì (ITA)*

# Theoretical Framework

Developing a marketing strategy will require a framework that the diverse stakeholders agree upon to launch their products and succeed in the market. For that, it is important you consider:

- Need for an economic approach to support family farmers in developing countries through marketing and commercial support or facilitation
- Enable institutions to facilitate access to market
- Map value chain as the basis for action
- Identify the correct balance between:
    - Diversification of production and specialisation
    - The internalisation of operations and outsourcing
    - Diversification of market channels
    - Local market and export

Structural deficiencies such as limited access to basic services (transport, markets, health care, education), infrastructure and enabling institutions, common in many rural mountain areas, reduce resilience and hinder the capacity of these people to cope with food deficiencies (IFAD 2011, Romeo et al 2020).

What for?

- Aggregation of production
- Joint processing
- Increased capacity of investment
- Certification through PGS or Third-party certification
- Increased capacity to obtain funds, grants, loans
- Professional assistance (agronomic assistance, quality assurance, processing, marketing)
- Penetrate the market
- Engage in the management of outlets to get direct relations with consumers

# Food sovereignty: The focus on local agri-food systems

Food Sovereignty is the right of people to self-determine the food they want to eat, the way they want to produce, and the way they want to exchange it.

The definition of food sovereignty is the right of people to:

- define their food and agriculture
- protect and regulate domestic agricultural production and trade to achieve sustainable development objectives
- determine the extent to which they want to be self-reliant
- restrict the dumping of products in their markets
- and to give local fisheries-based communities priority in managing the use of and the rights to aquatic resources.

Food sovereignty does not negate trade, but rather, it promotes the formulation of trade policies and practices that serve the rights of people to safe, healthy and ecologically sustainable production (Peoples Food Sovereignty Network 2002).

## The value of the local community and local market

The further away the market is, the more intermediaries are needed; costs increase and farmers' income and independence decrease; the need to produce larger volumes increases and this favours monoculture (commercial cultivation) and the loss of biodiversity; and the rural population ends up having to buy the food they used to produce.

Western societies are also going back to food sovereignty-inspired models which are:

- Alternative food chains
- Community Supported Agriculture
- Groups for a fair purchase

The drawbacks, however, are that:

- The goal is normally the international market (export)
- Often it is not reachable for quantity or quality reasons or the required bureaucracy (entry barriers)
- Sometimes export can become a terrible trap

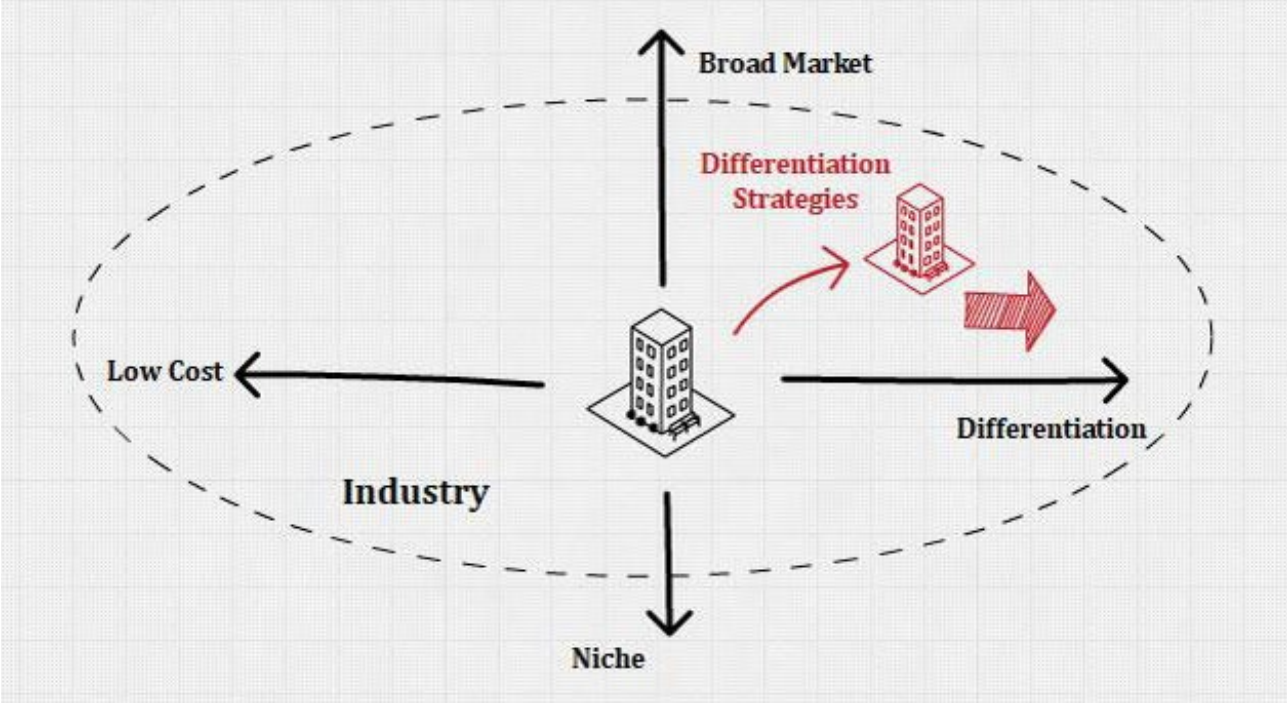
## What is Marketing?

A market is a place of meetings and exchanges (economic transactions) between producers, intermediaries and buyers and marketing involves the participation of these actors in the market. Communication is essential in this place: to know how to speak, what to say and what to respond, must be understood to achieve customer satisfaction and convey your values!

# Two Opposite Marketing Strategies

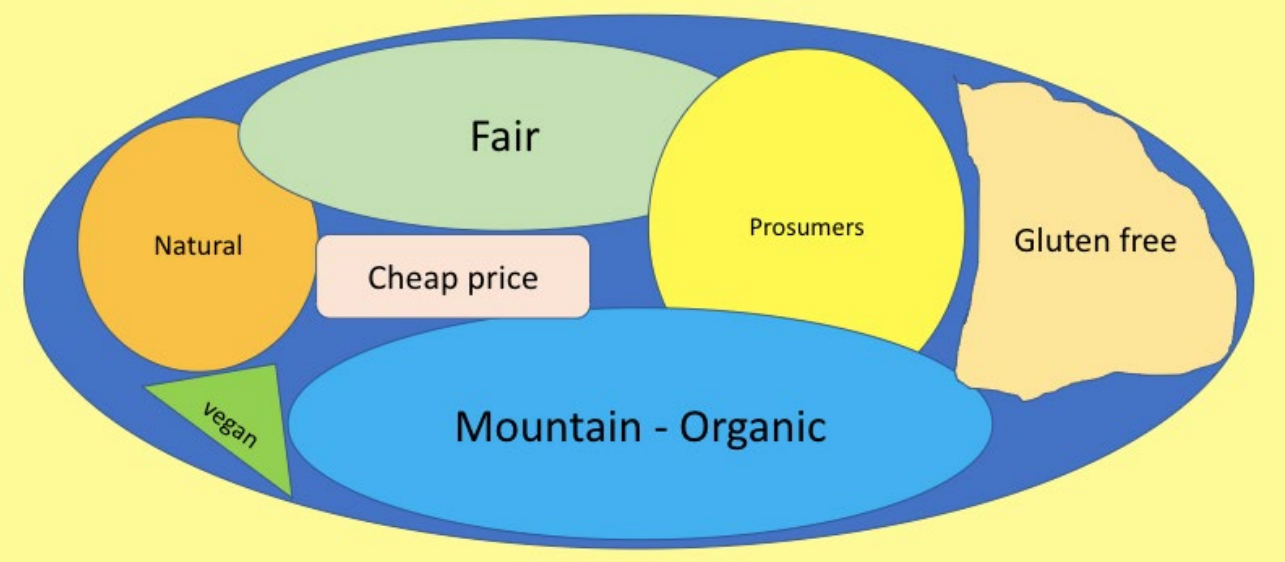
**Cost leadership strategy**
The company aims to become the lowest-cost manufacturer in a particular segment of its market (for example, low-cost airlines, size of the company, economies of scale, preferential access to raw materials, etc.). The first solution to lowering costs can involve reducing the price paid to farmers for their raw materials and having unfair working conditions and low remuneration of the employees.

**Differentiation strategy (specialization)**
The product must be created and perceived as unique, first in the market, rich in values and difficult to be replicated by others (entry barriers), and one must choose a narrow competitive segment within a business sector. The company selects a group or segment of the market and adjusts its strategy to offer them to the exclusion of others. The company seeks to achieve an overall competitive advantage by optimising its strategy for target segments. One risk of using a differentiation strategy is that competitors could quickly develop ways to copy the differentiating features (overcome entry barriers).



# Segmentation ➔ targets ➔ Positioning

Segmentation of the consumer population, identifying your target, people potentially interested in your product.




# Understanding the motivations of consumers toward organic shopping

**Mature vs emerging organic markets (the case of Germany and Chile)**
Both altruistic and egoistic arguments are significant drivers of attitudes towards an intention to buy organic food in Germany (a mature market). In Chile (an emerging market), mostly altruistic motives significantly impact consumer attitudes and intentions.

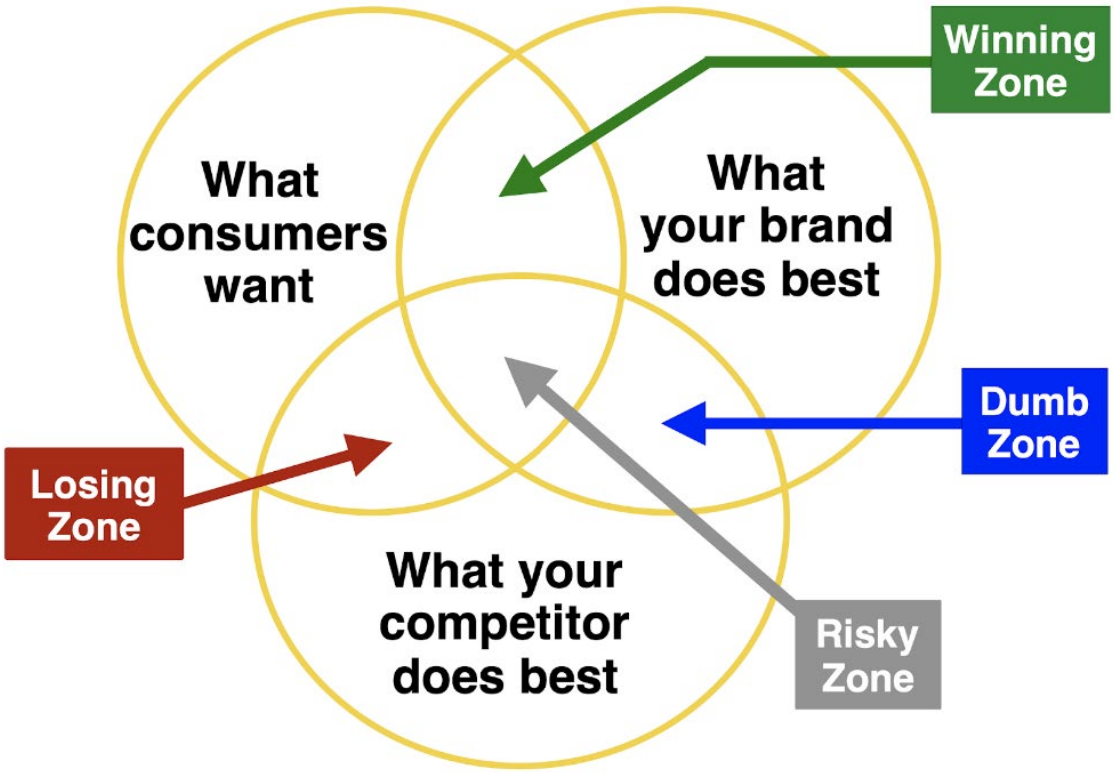
**Egoistic vs altruistic motivations**
Egoistic: convenience aspects, nutritional- and health-related motives, product sensory attributes and price.
Altruistic: environmental and ethical aspects

Along with the evolution of the organic market, egoistic aspects related to organic consumption might also gain importance in determining consumer behaviour, as is already the case in European mature markets.

In both countries, information should be comprehensive and communicated by a credible source to enable growing consumer trust in the organic food sector as a sustainable alternative to the conventional food supply.

**Positioning** is the way a product or a brand is perceived by consumers in comparison with other similar products in the same market.

The focus cannot just be selling what you produce. You must find the correct **trade-off** between what you can produce and what people want to buy, presenting your product in the best possible way.




Carlo Murer

# Marketing differentiation strategy: the storytelling

## Differentiation – the Story

We cannot hope to compete with industrial farmers that farm in the lower, flatter and more productive lands, applying chemicals; **we could immediately lose the competition!** We will be never able to compete for the lowest price, for mass production.

Our farming techniques provide positive ecosystem services, whilst industrial farming destroys ecosystems without paying for the damages that it creates. We must fight in a different battleground and find our own "specialised" market.

Differentiate the product – avoid comparability – look for uniqueness. Focus on **traditional varieties**, the old tastes that would otherwise get lost. Traditional varieties have been selected by farmers over centuries because tasting good and are productive in that particular environment. Never believe in the trap of modernised GMO varieties. They are intended to make somebody else rich, destroying all the rest.

# The perceived value of farming in the mountains

Mountains are perceived as natural environments. They are close to the sky, normally far from urban or industrial settlements, and they are the source of water for the lower lands. We must use this perception to the advantage of our farmers, to the advantage of our sustainable production systems and therefore to the advantage of our environments.

# Consumers for our products

In a marketing strategy, it is needed to bring in special and conscious consumers for special products. The type of consumer that looks for information, knowledge, credible stories, transparency, and culture. Mountain products for example cannot be just commodities, they must tell the story of the producers. Therefore, here is the strategic importance of labels and the narrative!

**It is needed to put into practice the following:**

- Identify your group of producers
- Identify the list of raw materials they produce
- Decide which commercial structure works best
- Define what you can process and how
- Decide where to sell and how
- Define who and what you need to reach it (professionals, logistics, processing, retail, etc.)

**Which is the right balance? The risk of a commodity trap!**

Livelihood and commercial strategy: a twofold marketing approach (Ansoff matrix):

- market development strategy, presenting a wider assortment to the known local market
- a riskier market diversification strategy, presenting few suitable products to the new markets represented by the wealthy class of urban and national markets or the international markets.

# Commodity Trap

A commodity is a basic good used in commerce that is interchangeable with other goods of the same type. It usually refers to a raw material used to manufacture finished goods. The quality of a given product may differ slightly, but it is essentially uniform among producers.

The commodity trap is the process by which a good or service becomes widely available and interchangeable with those offered by others. In this way, the products become indistinguishable, and people choose only based on price.

Small mountain producers must dedicate themselves to the production of exclusive, non-interchangeable, non-comparable, organic and high-quality products, so that price will no longer be the central element of choice. Differentiation rather than the leadership

of costs is a rule that might play a key role in a successful story.

# Hyper-competition

Don't copy what others already do. Everyone can do the same and the only survival dynamic is to lower prices. Lowering sales prices means lowering the price recognised by producers, and this is contrary to our main goal.

# Structuring and mapping value chains

The full range of activities which are required to bring a product from conception, through the different phases of production, delivery to final customers, and final disposal after use, gaining value.

Recommended exercise:

- Design a flow chart identifying each step (function) in the value chain from seed to consumer's table
- Identify responsible persons per each function
- List the whole range of products available from farmers with their interrelated value chains
- List potentially interesting markets channels for each of those products


# Diversification in the markets:

Farmers and producers can build economic resilience through diversification in the markets, as follows:

- diversification of production
- A basket of Mountain Products
- diversification of production ensures resilience and sustainability
- diversification of market channels
- diversification of production helps to diversify market channels
- diversification of market channels ensures resilience and sustainability.

# A new concept shop: Mountains in the town

**Positioning/placement**

- Physical positioning
- Positioning in the head of the consumer -> Perceived value

**The concept**

- A specialized shop advertising the concept of the brand (for other shops too)
- Only mountain products
- Only organic PGS-certified products
- Transparency on name, farm, region of producers (producer's face and pride on the shelf)
- A wide enough range of mountain products
- Priority to mountain national products
- Relation with MP projects in nearby countries or from the words
- Children-friendly traditional and natural food

**Pay attention to:**

- General look and feel (consciously define what you want to appear),
- Carefully studied products layout:
    - Fresh products such as fruits and vegetables at the entrance,
    - Not just organic, but also eco-friendly,
- Instore communication (short but effective), describe products, tell stories about producers, how they cultivate, PGS, among others,
- Make clear your values,
- The location, go where your target clients are. Look for a parking place,
- The assortment of products proposes only what your target clients look e.g., Mountain, organic, healthy, etc.

The packaging and the label are often the only way we have to communicate with the consumer. It must be distinctive compared to the other products in the shops. In Europe, everything is already seen, it's difficult! The label must give information, ensure transparency and build trust. Consider a QR code connected with the MP website where the philosophy is explained. The story of the precious Berberè (+200%)

# 10 Genetic Engineering and GMOs

# GENETICALLY MODIFIED ORGANISM (GMO)

Currently, with the development of modern technologies, new discoveries are taking place in our country. One of them is the regular use of genetically modified organisms using genetic engineering methods.
Genetic engineering is the process of changing the DNA of an organism in order to introduce new, valuable, necessary qualities into the body. Many organisms, from bacteria to plants and animals, are genetically modified and used for academic, medical, agricultural and industrial purposes.

# Genetic engineering

Genetic engineering is a set of methods, techniques and technologies for the production of recombinant RNA and DNA, the extraction of genes from an organism (cells), the manipulation of genes, their introduction into other organisms and the cultivation of artificial organisms after the removal of selected genes from DNA. Genetic engineering is not a science in a broad sense, but is a tool of biotechnology using methods of biological sciences, such as molecular and cellular biology, genetics, microbiology, virology.
It is known that although the cellular structure of each organism is similar, the way in which deoxyribonucleic acid, in short, DNA, encodes information, and the structure of DNA (nucleotide sequence) are universal among all living beings. Currently, as mentioned above, with the development of modern technologies, the genetic code, its functions, and purpose are of great interest. As a result, it became possible to intentionally change the genetic code of one organism in several ways.

Over the past 20 years, genetic engineering has achieved great success, as the scientific field has reached a new level. The sequence of nucleotides in the genetic modification of CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats in 2012, introduced by a professor D. Dudna. Can be selected using such methods. The CRISPR system, also known as molecular scissors, is an innate immune response of bacteria against viruses that works to align genetic information. But scientists have come to the conclusion that this innate trait is convenient and safe for choosing nucleotide sequences.

Besides CRISPR system, in order to “knock out” or put into “sleeping” state system is a genetic exchange between DNA molecules that share a common extended region with a similar sequence based on homological recombination; a genetic engineering method used to modify an endogenous gene.

# Genetic Modified Organisms

A transgenic organism is formed as a result of introducing a gene of one organism into the genome of another organism or replacing the function of a certain gene using the methods described above. Usually, DNA from different sources is called recombinant DNA. As already mentioned, the organism that receives this DNA is a genetically modified organism, or GMO for short.

# The main stages of creating GMOs:

1. Cut out the selected genes
2. Transfection is the introduction of a gene into a vector (bacterium) for transmission into the body
3. Transfer of a vector with a gene into the body
4. Transformation of body cells
5. Selection of genetically modified organisms.

# GMO creation goals

The most common GMO crops are soybeans, corn, cotton and grape seed oil. Currently, about 60-70 percent of processed foods sold in grocery stores contain genetically modified ingredients. Direct transfer of genes responsible for useful traits is a natural development of the breeding work of animals and plants, which has expanded the capabilities of breeders to control and expand the possibilities of the process of creating new varieties, in particular, the transfer of useful traits between non-breeding species.
A 1996-2011years study on the use of transgenic soybeans, corn, cotton and rapeseed was conducted in 2012 (based on reports from seed companies) showed that growing crops resistant to natural conditions, pests and diseases is cheaper, and in some cases even higher. Crop yields due to pests are significantly reduced. According to the analysis of some world farms, losses from pests indicate that the yield of GMO crops is 21.6% higher than that of unmodified crops, and the consumption of pesticides is 36.9% lower, and the cost of pesticides has decreased in this regard, and the incomes of agricultural producers have increased by 68.2%.

# The use of GMOs and the state of genetic engineering in Kyrgyzstan

The issue of using genetically modified products is acute in Kyrgyzstan. According to the Sanitary and Epidemiological Department under the Ministry of Health, a draft law on the prohibition of the use of GMO products in Kyrgyzstan was submitted to Jogorku Kenesh (Supreme Council) for consideration. This draft was considered in three readings at a meeting of the Parliament, but was not implemented.

Deputy of the Jogorku Kenesh of the Kyrgyz Republic E.J. Baybakpaev in accordance with the laws of the Kyrgyz Republic "on restriction of cultivation, production, import and sale in the Kyrgyz Republic of products containing genetically modified organisms" and "on amendments to certain legislative acts of the Kyrgyz Republic" (the Code of the Kyrgyz Republic on violations, the laws of the Kyrgyz Republic "On Consumer Rights Protection", "on consumer Rights protection") has initiated. Despite the approval by authorities of Kyrgyz Republic Government dated from December 25th of 2018, Article 626 of the attached conclusion of the Government of the Kyrgyz Republic on the draft laws of the Kyrgyz Republic" On amendments to the Law of the Kyrgyz Republic "On Public Health") has not been published yet.
At the same time, Kyrgyzstan is a member of the Eurasian Economic Union (EAEU) and the EAEU is allowed to sell products containing up to 0.9 percent of GMOs in the technical regulations of the Customs Union "food safety" (CU CU 021/2011), "food labeling" (CU CU 022/2011). In accordance with paragraph 9 of Article 7 of CU 021/2011, if the manufacturer has not used GMOs in the production of food products, and GMOs in food products are 0.9 percent or less, GMOs are considered a mixture that has not been destroyed accidentally or technically, and such food products do not belong to products containing GMOs. However, the label must necessarily say "does it contain GMOs":

- Products containing the following labels "GMO-free", "Non-GMO" and "Made without genetically modified ingredients" contain GMOs-no more than 0.9%;
- Products with labels "100% organic", "Organic", "Made with organic ingredients" mean that this product is mostly GMO-free.

At the same time, paragraph 1 of Article 8 of the CU 021/2011 establishes that in the production (manufacture) of food products for the nutrition of children, food products intended for pregnant and lactating women, the use of food (food) raw materials containing GMOs is not allowed.
Today only a few laboratories in the Kyrgyz Republic have the ability to detect genetically modified organisms. One of them is the laboratory of molecular genetics, microbiological and diagnostic studies at the Sanitary and Epidemiological Department of the Ministry of Health[1].

# Modern portable GMO detectors

Currently, with the development of technology, simpler ways to determine the presence or absence of GMOs in food products are emerging, and many companies (Phytocontrol (ELISA), HLR, BIOVET (Agravision Rider), Lactoservice (AID 041 Cry1Ab LFS kit), warts, etc.) are selling portable test devices or test strips.
Determining the GMO content in food products with such portable testing tools becomes fast and simple, and prices range from $200 to $4,000, but still make the job much easier.

[1] **https://dgsen.kg/struktura-centra-laboratornyh-ispytanij**

# 11 Global Organic Standards, Certification and Regulations

– IFOAM – Organics International's perspective

## How supporting certification can help level the playing field for organic

Click here to learn more.

The growth of production of organic agriculture pushed governments around the world to draft national legislation to set requirements for organic production and create a framework for certification. This legislative framework aims to give more credibility to national organic products and may diminish trade barriers through equivalence agreements between trading countries. Organic legislation may help policymakers to create a set of policies that could push farmers to shift to organic through subsidies, tax cuts or support to extension services and research.

Developing a full-scale legislative framework is not the only option to protect producers and consumers from organic fraud. Some countries on the embryonic stage of their development may consider developing a national or regional organic standard adapted to local conditions and link it to an organic mark and accepted verification systems. The standard would set minimum requirements for organic agriculture, protect terms organic, bio, eco and define who can certify organic producers. Certification may be conducted not only by national or international certification bodies but also by representatives of a national organic movement or by consumers and other producers like in Participatory Guarantee Systems.

**This chapter will introduce a reader to organic guarantee systems and policy. It will depict the history of their development and their technical aspects. Several toolkits, like the regulation and policy toolkit, are described here to help policymakers to develop or improve national regulation and policy.**

# Why and when **does Organic Agriculture production need certification?**

**Standards & Certification**

Click here to learn more

The organic sector pioneered production method certification for agriculture. Many of the standard practices in agriculture-related food and non-food certification schemes today, e.g., production standards, traceability, chain of custody, group internal control systems, are innovations that were initially developed from within the organic sector.

Certification has been a powerful tool for creating trust, and thereby markets, for organic products. The primary purpose of certification is to give the consumer confidence that the products they buy as organic are in fact organically produced. But there are also other benefits of certification:

1. Production planning is facilitated - Certification requires the producers to have documentation and production planning. This can make production more efficient and profitable.
2. Facilitation of marketing and extension - The data collected in the process of certification can be very useful for market planning, extension and research.
3. Certification creates transparency - There is a fundamental principle of transparency that requires certification programs to publicize who is certified and what products are certified. This transparency facilitates direct contacts between producers and consumers/buyers, and unnecessary middlemen lose the power they have had based on access to information.
4. Certification improves the "image" of Organic Agriculture in society as a whole and increases the organic movement's credibility and visibility.
5. Certification can also facilitate the introduction of special support schemes for Organic Agriculture since it defines a group of producers to support. Without certification, it is challenging to implement special support for organic farms.

Certification is a market instrument. It enables producers to access a particular market, often with a premium price. In many cases, the only way to create or maintain a separate "organic market" is through a labeling scheme, including standards and certification. However, all early markets in industrial countries developed without certification.

However, in some situations, certification is an unnecessarily complicated and costly system. In the end, what matters is that consumers trust the product that they buy and if they can do it without certification.

Third party certification, including group certification, is the most widely recognized form of guarantee system and is a reliable and often necessary tool for international trade. Nevertheless, across the world, credible organic agriculture movements have emerged based on participatory guarantee systems (PGS), which have existed even before third-party certification became a more widespread quality verification system for organic agriculture.

Increasingly, governments are regulating organic marketing by introducing organic labeling regulations, including import compliance to national regulations. The lack of mutual recognition agreements between regulating authorities is causing barriers in the international trade of organic products. The combination of My Market My Rules and line-by-line conformity assessment mentality has created a fragmented organic market where a certified organic product of one standard system may not be recognized as organic by another standard system.

It has resulted in operators needing multiple certifications (if exporting to different markets), incurring additional inspection and paperwork costs with little to no further improvement in product quality or assurance as an organic product.

Click here for more information
**on the full diversity of organic agriculture**

# Philosophy and ideology

When organic pioneers such as Rudolf Steiner, Robert Rodale, Albert Howard, and Lady Eve Balfour first published their ideas on agriculture in the 1920s, it was more an expression of ideology than an attempt to define biodynamic or Organic Agriculture. It is doubtful whether they foresaw the need for detailed legislation that establishes the minimum perch space and feed ingredients that allow a hen's eggs to be labeled as organic. Their interest was in drawing attention to the biological basis of soil fertility and its links with animal and human health.

# Labelling

The Demeter biodynamic label grew directly out of the teachings of Rudolf Steiner and was probably the first organic label to develop. Another early attempt to define organic production came from the Soil Association, Lady Eve Balfour's charity, in 1946. The Association published its first standards in 1967, primarily to protect the consumer and the genuine organic farmer from misleading claims. Farmers were invited to register their farms with the Soil Association and to sign a declaration to abide by these guidelines. On-site inspection to verify that farmers met the standards did not commence until the mid-1970s, and with this, the first organic seals were born. At the time, the market for organic food was small, and neither trading standards officers nor legislators took any interest in what constituted an organic product.

# Certification

During the 1970s, groups of farmers in different parts of the US began to embody the principles of organic farming in standards. Some of these groups developed their certification systems to assure buyers that products labeled as organic were produced according to their standards. One of these groups, California Certified Organic Farmers, began certifying organic farmers in the 1970s. In the eastern US, small organizations grew up under the Northeast Organic Farmers Association (NOFA).

The various producer organizations defined the principles through consultation with their members. Characteristically, this resulted in splits in the movement, which led to different standards being developed even within countries, let alone across the world. It seems hardly surprising given the complexity of farming systems and the wide variation in agro-ecological and social conditions that influence them. It is perhaps more surprising that by the end of the 1990s, there was broad global understanding and agreement regarding what constitutes organic food production and processing. This achievement can largely be credited to IFOAM - Organics International, a non-governmental organisation founded in 1972 to the increasing global interest in Organic Agriculture.

IFOAM - Organics International is seen as representing the organic movement worldwide. Its mission is to enable an exchange of information and ideas and to foster cooperation across cultural, language, and geographic barriers. IFOAM - Organics International published its understanding of Organic Standards in 1980 and continued to revise them biennially up to 2005. IFOAM – Organics International Basic Standards and the IFOAM – Organics International Accreditation Program are generally respected as the international guideline from which national standards and inspection systems may be built upon and used extensively as a reference by standard-setters and legislators.

You can see the Organics Certifiers directory **here**. The directory is a global database for third-party Certification Bodies. It displays detailed information on third-party certifiers, such as the countries where the certification bodies have offices and provide certification/ inspection activities, the market approvals they have, the use of private labels (if any) and many others.

## Getting Certified

The key to the whole certification process is the operator and their commitment. However, due to formal requirements, commitment is not enough, a high degree of organization is also required. That is particularly the case for complex operations.

The steps for the first round of certification for any production are:

1. Preparations by operator, reading standards and general information;
2. Enquiry to certification body or bodies;
3. Receipt of Information pack, i.e., standards, application form, general terms and conditions;
4. Select certification body;
5. Prepare all required documents and submit application as per instructions;
6. Confirmation of cost schedule, procedures, fee payment and signing of contract between certifier and operator;
7. Application screening and further documentation submission by the certification body, possibly leading to demand for more information;
8. Confirmation of inspector and inspection visit;
9. Inspection visits and reporting by inspector;
10. Comment on inspection report by applicant;
11. Report assessment and certification decision (and conditions) by certification body;
12. Fulfillment of any pre-conditions for certification;
13. Certification agreement signed by the parties;
14. Fulfillment of any post-certification conditions for certification.

For more information and assistance on development of internal control systems, **visit: Internal Control Systems (ICS) for Group Certification.**

# Market Acceptance

For most operators, certification is about market acceptance. Regardless of existing regulations, buyers and traders and private organic labeling schemes can have ideas about organic production, inspection, and certification requirements. So, even within the EU, it is not a thoroughly "level playing field" for all products that fulfill the needs of the EU organic regulation.

Regulations do not cover all production scopes, e.g., cosmetics and textiles. Hence there is scope for private labeling schemes to continue to be active. To differentiate themselves, private organic labeling schemes are likely to uphold higher requirements to existing regulations. It is debatable whether this is constructive for the development of the organic sector as it maintains fragmentation within the organic market and pressure to raise the bar when the market share of organic to the total agriculture product market is still so small. Setting Up a Certification Program

# Why develop domestic certification programmes?

In many cases today, certification for Organic Agriculture in developing countries is still carried out by certification bodies based in Europe or the US or their offices in the country or region. Is there something wrong with a few international certifiers doing all certifications in the world? There is no simple answer to this question.

It can, of course, be suggested, with "free world market" arguments, that if there is a highly efficient certification body in one country, it is logical that they export their service to another country where conditions may not be conducive to establishing a domestic certification body. Considerable investments have to be made to establish a domestic program before it can get international recognition. These resources could perhaps be better invested in other ways to develop Organic Agriculture.

There are both positive and negative aspects to having local certification programs.

# Positive considerations:

- More appropriate set of requirements and interpretations.
- Better knowledge of conditions, languages, etc.
- Cost structure in line with conditions of operators in the country.
- Keeping money within the country, thus supporting local institutional development.
- Higher level of "solidarity" and understanding between the producers and the certifiers, reducing the risk of fraud.
- Better possibilities to make unannounced inspections.
- Better information flow to and from the certifier.

# Negative considerations:

- Lack of competence and information in the starting-up phase.
- High investments to create a new program may take resources from other activities.
- Conflict of interest issues may lead to struggles to "control" the local situation.
- Difficulties in getting international recognition.
- If the client base in the country is too small, the cost of international accreditations will be unbearable and non-viable in the long run.

Many of the positive and negative considerations can be realized or resolved by having an international certification body set up an office in the country to facilitate export certification. However, in the long term, without a domestic certification program, there is no local champion for developing a domestic organic sector. Taking the whole picture into account, the establishment of domestic certification programs has long-term development advantages. That said, one should not rush into establishing a domestic certification body when organic production is not yet sufficiently established in the country for a domestic certification program to be effective in adding value and be viable in doing so as a service provider.

**Table.**
**List of certified bodies serving enterprises of Kyrgyzstan** [1]

| Name (country) | Code | A: unprocessed vegetable products | B: products obtained from animals | C: Aquaculture and unprocessed fish products | D: Products used for food | E: Processed agricultural products used as fodder | F: Seeds and material used for crops cultivation |
|---|---|---|---|---|---|---|---|
| **Organic Standart (Ukrain)** | KG-BIO-108 | x | x | - | x | - | - |
| **Bio.inspecta AG (Switzerland)** | KG-BIO-161 | x | x | - | x | - | - |
| **(Germany)** | KG-BIO-140 | x | - | - | x | - | - |
| **Ecocert SA (France)** | KG-BIO-154 | x | x | - | x | x | - |
| **Ecoglobe (Armenia)** | KG-BIO-112 | x | x | - | x | - | - |
| **Letis S.A. (Argentine)** | KG-BIO-135 | x | - | - | x | - | - |
| **ORSER (Turkey)** | KG-BIO-166 | x | x | - | x | x | - |
| **CCPB Srl (Italy)** | KG-BIO-102 | x | x | - | x | x | - |
| **Kiwa BCS Oko-Garantie GmbH (Germany)** | KG-BIO-141 | x | x | - | x | x | - |
| **Control Union Certifications (Netherlands)** | KG-BIO-149 | x | x | x | x | x | x |

[1] Based on a study by Bermet Beishenkanova, a local consultant of the KOICA within the project on the implementation of organic agriculture policy and increasing the potential of farmers in Kyrgyzstan

Organic certification of area/products in Kyrgyzstan, as shown in Table 1, is divided into 3 types: organic certification of pilot villages is selected and certified by the Department of Organic Agriculture under the Ministry of Agriculture, Water and Rural Development of Kyrgyzstan. Their number is 10 regions (with 3746ha). But they are focused only on the domestic market. In addition, according to the PGS system from the organic Federation BIO - KG in Kyrgyzstan, 1052 farmers are engaged in organic farming on 3 127.84 hectares. However, according to the observations of local consultants of the KOICA's project on the implementation of organic agriculture policy in Kyrgyzstan and increasing the capacity of farmers, it is unlikely that PGS system will work inside Kyrgyzstan. Because in Kyrgyzstan, the basic elements of PGS (equal thinking, equal participation, openness, trust, horizontal organization, learning process) are difficult to implement in practice. The main reason is the local mentality, mistrust among farmers to organic agriculture and lack of support (people tend to support their relatives, familiar people, or to their own friends rather than to a stranger).

In addition, we can say that the organic industry in Kyrgyzstan is relatively new, there are few active farmers interested in organic farming, there is not enough information provided to farmers on organic agriculture, and the price difference between conventional agriculture and organic production is minimal. In addition, there is a weak direct connection between producers and consumers. Moreover, participation of stakeholders (community) forms the PGS' main body/stem.

**Table 1: Organic guarantee system of Kyrgyzstan, certification situation**

| Guarantee system | 2020 officially issued organic area or number of farmers / cultivation area (ha) | Application | Limitations and examples |
|---|---|---|---|
| **Kyrgyzstan Organic Agriculture Department** | 10 hectares (3746ra)[1] | Internal market | Not dedicated for export |
| **Participatory Guarantee System (PGS) of BIO - KG Organic Federation in Kyrgyzstan** | 1052 farmers/ 3127, 84 ha[2] | Controlled by a number of agreed groups of farmers and a federation | not for export and large wholesale markets / farmers who are actively engaged in organic products are less than a given number, since the influence of the Kyrgyz mentality (support to relatives and friends) is strong. Therefore, it is difficult to work with confidence, there is no guarantee that it will be tested by consumers |
| **International Third-Party Certification (Group Certificate)** | Bio-farm cooperative - 1,394 farmers (2,950ha)<br>Cooperative Alysh-Dan - 1200 frined (125 ha)<br>Aksy San Planet Organic -848 farmers with (349ha) | Export market | It is very difficult to get a certificate every year, service fee is expensive. |

[1] Department of Organic Agriculture of the Ministry of Agriculture, Water and Rural Development of Kyrgyzstan
[2] http://biokg.org/

# Steps in the development of a certification program

Below are essential aspects when considering the development of a certification program. Each country and situation must be recognized as unique, and the actual development plan must adapt to prevailing conditions.

## Organic production

There is no doubt that there are opportunities for organic production everywhere in the world. But there must be a certain "critical mass" of production before there is any possibility to establish a viable certification program. It makes little sense to develop a third-party certification program for a few operators. Such a certification program cannot achieve independence with only a handful of clients. For such situations, one should consider that PGS is a much more affordable alternative for providing organic guarantees in the domestic market (see section 3.8 for more information on PGS). At the same time, export could continue through the use of foreign certification bodies. The advantages and disadvantages of both approaches should be considered and compared.

Any certification will depend on proper documentation of the production system, which will always be essential. The staff of projects or existing extension services must be trained in developing documentation compatible with certification requirements. This documentation will, in most cases, also be valuable for extension purposes. Supporting activities include:

- Documentation of production sites
- Documenting the use of chemicals
- Field histories
- Field and site map drawing
- Producers' education and awareness

Producers and processors must be educated in organic production, processing, and the requirements for certification. This can also be achieved through cooperation with extension services, NGOs, etc.

## Standards

Local, national and regional standards need to be developed. The standards development process is more than just writing out standards, it should create robust discussion among interested parties about production conditions, marketing realities etc. Supporting activities include:

- Seminars and consensus building
- Reviewing consistency of requirements and application in the field
- Comparison with export market regulations and international norms (particularly the COROS norm)

# Inspection

Developing appropriate forms and instructions for the inspectors is essential and a code of conduct for the inspectors. Also, issues related to independence, conflict of interest, etc., must be addressed. Development activities include:

- Form development
- Inspectors' handbook and contract
- Inspector's code of conduct
- Training courses (development of in-house training of inspectors)
- Supervision and evaluation of inspectors

# Certification process and infrastructure

There are many policies and procedures needed to operate a certification program and a working administration. It includes governance and certification decision-making structures (committees) with their corresponding terms of references and guidelines. To-dos include:
Decision-making process
Committee terms of references and procedures
Policies for appeals and complaints.
Records
Operating/Quality Manuals
Training of officers
Quality development and internal review

# Information and markets

Not only do products need marketing, but also the certification program as such. There is a need for a marketing plan for the certification program, development of a certification mark, the rules around its use, etc. To-dos include:

- Participation in international fora
- Brochures and other reading material
- Seminars
- Promotional activities (social media campaign)

# Management and business planning

Certification is also a business that must work. It requires the same managerial skills as a company. To-dos include:

- Budgeting and long-term business planning
- Development of fee schedules
- Development of inspection services for other certification programs
- General management issues

# Interaction with authorities and development updates

A certification body and program operate within a national and international context of development. A certification program must cultivate productive dialogue with responsible authorities and be updated on developments within and outside of the country. To-dos include:

- Monitoring news and development reports
- Seminar's participation
- Meetings with authorities and national sector organizations

# Accreditation

Besides national accreditation where required, the certification body needs to consider the need for other accreditations to service exports. In general, accreditation should only be considered if it will expand business opportunities and the projected additional clients will be sufficient to cover accreditation costs and related overheads. If not, the certification body will need to develop alternative strategies to service the needs of those operators (such as acting as an inspection agency for a foreign certifier having those required accreditations). It is a highly strategic decision, and there can be several options to consider depending on the certification body's situation.

# Bridging the development gap

It is difficult to establish an organic certification body from scratch in countries with a small domestic market. The certification body needs to have the necessary approval to service exporter clients, such as NOP accreditation or EU approval. However, to get this accreditation or approval, they need to already be in operation and have established all the necessary procedures. Those who started early, e.g., Argencert (Argentina), COAE (Egypt), and IBD (Brazil), were able to adapt to increasing demands gradually. It will not be the same for those starting today.

There are advantages to establishing a joint venture with an established international certification body to address the above gap. Through this, a recognized certification service can be offered right at the onset. Another is to enter into collaboration agreements with international certification bodies to provide inspection services for them. One such example is the Certification Alliance. One challenge to addressing in such an arrangement is the ultimate objective of the local partner. Most international certification bodies would be reluctant to enter into such an arrangement if the ultimate aim of the local partner is to take over the business entirely.

# Certification Alliance One-stop domestic & export certification service

Certification Alliance (CertAll) is a collaboration platform for domestic certification service providers and export certification providers working in the Asia region. The platform currently includes the participation of 12 Asian-based and two non-Asian certification service providers. Nine are in ASEAN.

Operators in countries where national organic labeling regulations are implemented with no export recognition arrangements require certification specified to their respective national regulation and export market requirements.

The key objective of the CertAll platform is to facilitate integrated domestic and export certification services to operators where members are working. It is done through multilateral client management and inspection arrangement, allowing participating members to offer each other's certification. Participating members can jointly offer their domestic certification and export certifications by other members as required by a client operator through one application and inspection process.

Example: Based on the CertAll arrangement, Organic Alliance Malaysia (OAM) can also offer export certification to the EU, USA, Japan, South Korea, China, and elsewhere in ASEAN through partners such as Organic Agriculture Certification Thailand (ACT); Quality Certification Service (QCS), based in the USA; Organic Food Development and Certification Center of China (OFDC), based in China; Australian Certified Organic (ACO) and partners in regulated ASEAN countries.

Acting as a client manager, OAM provides information, handles the application, and conducts inspection as assigned by the applicable partner export certification provider(s). Certificates are issued by the respective certification provider(s) on completion of the process.

When there is a substantial domestic market or an unregulated regional market, the situation is different. In those cases, the business's early stages can be supported by income from domestic or regional certification. Certification systems for the local market can be adapted to the local market size, the capacity of the producers, and their purchasing power. This way, local service providers can gradually learn the trade and slowly grow into a position where they can offer an internationally compatible service. They can also place themselves in a good bargaining position if they consider forming joint ventures with foreign certification bodies wanting to enter their market.

# Information activities linked to certification

The certifier is dependent on the successful marketing of the certified production: without sales, nobody will buy the certification service. At the same time, the certifier should not get involved in marketing of the products.

## Information to consumers

The certification symbol itself gives almost no information to the consumers. It is important that the certifier informs the public of the meaning of its certification system and standards. This will have the dual role of ensuring that consumers get satisfactory information to make an informed choice, as well as being a promotion of the certified production.

## Information to the market actors

It can be very valuable for the market actors if the certifier can supply them with statistics on the production. That facilitates market planning. Some certifiers also supply interested parties with information, like a list of all producers having a certain crop, but normally the certifier will not provide data on the exact quantities of production of individual operators. Whether they do or not depends on the confidentiality policy and the operators being informed of and having approved this practice.

## Marketing the certification service

There is a need to market the service as such, especially if there is competition. As with all marketing activities, you must have a clear picture of what you want to achieve and who the target for your activities will be. In a situation where Organic Agriculture is just starting you would probably market yourself best by direct contact with all interested parties.

## Assisting the certified producers in their marketing

Many certifiers will assist the marketing of certified production through:

- Information about the certification program
- Participation in trade fairs
- Publications (lists of certified products etc.)

Important to consider is that such activities should be standardized. All certified operators should get the same kind of assistance. If you display certified products in a trade fair you should offer this service to all your operators, unless you just have a small number of products as samples of what kind of production you are certifying. The certifier should never get involved in activities that are related to sales, sourcing of materials or business contracts.

# 12 Accreditation and Regulations

# The Organic Guarantee System of IFOAM – Organics International

The Organic Guarantee System (OGS) of IFOAM - Organics International is designed to facilitate the development of quality organic standards and certification worldwide, and to provide an international assurance of those standards and certification.

The current (OGS) of IFOAM - Organics International, adopted in 2010 offers the following services:

1. The IFOAM **Family of Standards**;
2. The IFOAM **Standard**;
3. The IFOAM **Accreditation**.

## The IFOAM - Organics International Family of Standards

The Family of Standards is the core of the IFOAM Organic Guarantee System and contains all standards officially endorsed as organic by the Organic Movement. IFOAM – Organics International recommends any program that relies on "organic" products or ingredients to consider referencing the IFOAM Family of Standards as a criterion for what constitutes a trustworthy organic standard.

See who is part of the Family of Standards **here**.

The IFOAM Family of Standards is a framework used to recognize organic standards and regulations based on equivalence with the IFOAM Standards Requirements, also known as the COROS: Common Objectives and Requirements of Organic Standards.

The COROS was developed jointly by the OGS of IFOAM - Organics International and the Global Organic Market Access (GOMA) project, a tri-party collaboration between IFOAM - Organics International, FAO and UNCTAD. The COROS was developed based on the IFOAM Basic Standards and Codex Alimentarius, the two pre-existing international reference organic standards, a review of a significant number of existing standards and regulations across the world as well as input and comments through a worldwide open stakeholder consultation process.

> The **COROS** articulates broad objectives that production rules in organic standards and regulations commonly seek to achieve, and presents common requirements that relate to the objectives. It contains requirements that are commonly found in organic standards and regulations globally. The COROS is intended for use as a tool in the actual assessment and equivalence determination between organic standards and regulations.

In the context of the Organic Guarantee System of IFOAM - Organics International, the COROS serves as the IFOAM Standards Requirements: the international reference against which organic standards and regulations are assessed against, for the purpose of inclusion in the IFOAM Family of Standards. Equivalence assessments are conducted by IFOAM - Organics International according to its policies and procedures and results are made available to the public within the framework of the IFOAM Family of Standards. Governments are encouraged to use the Family of Standards as a basis for granting equivalence to other organic standards and regulations for the purpose of regulating imports. Hence the IFOAM Family of Standards is intended to become a voluntary tool for international multi-lateral equivalence agreements between governments or between private standard owners. Governments may also use the equivalence assessments done by IFOAM - Organics International against the COROS as a basis to facilitate their own unilateral or bilateral decisions on equivalence.

# The IFOAM – Organics International Standard

The IFOAM - Organics International Standard is an off-the-shelf organic certification standard maintained by IFOAM - Organics International to be used by private certification bodies. It is a globally applicable organic standard that can be used directly for certification. Certification bodies and standard managers can sign a contract with IFOAM - Organics International to obtain the right to use the IFOAM Standard for certification or to claim compliance with it. It has also replaced the IFOAM Basic Standards (IBS) as the basis for obtaining Accreditation in the IFOAM Accreditation Program. Instead of compliance to the IBS, certification bodies wishing to keep or obtain IFOAM Accreditation have to use the IFOAM Standard or ensure compliance of their private standard to it.

# IFOAM – Organics International Accreditation

IFOAM Accreditation is a service available to certification bodies. The IFOAM Accreditation Requirements is the new name for the Accreditation Criteria for Certification of Organic Production and Processing (IAC). It is derived from the ISO Guide 17065 (General requirements for bodies operating product certification systems) as well as it reflects requirements particular to organic production and processing.

# The IFOAM – Organics International Norms

The IFOAM Norms are subject to periodic revision under the supervision of the World Board of IFOAM - Organics International. Specific revisions or new areas of the IFOAM Norms may also be initiated by the members of IFOAM - Organics International. Draft revisions (normally two drafts) of the normative document under revision are circulated to the membership and other key stakeholders for comments, which the relevant Committee takes into account in the preparation of the next draft. IFOAM - Organics International members have the opportunity to submit motions to the final draft and to vote on each motion. The final version, including all approved motions, is approved by the IFOAM - Organics International membership by simple majority through an electronic vote.

# The IFOAM – Organics International **Standard for Organic Production and Processing**

The IFOAM Standard for Organic Production and Processing is based on the four principles of Organic Agriculture as well as the COROS (Common Objectives and Requirements of Organic Standards).

Besides providing definitions (section 1), the IFOAM Standard covers the following:

- **organic ecosystems:** ecosystem management, soil and water conservation, inappropriate technologies (genetic engineering and nanotechnology), wild harvested products and common/ public land management;
- **general requirements for crop production and animal husbandry:** split production and parallel production, maintenance of organic management;
- **requirements specific to crop production:** choice of crops and varieties; conversion period; diversity in crop production; soil fertility and fertilization; pest, disease, and weed management; avoiding contamination; protected cropping; breeding of organic varieties;
- **requirements specific to animal husbandry:** animal management, animal origin and conversion period, breeds and breeding, mutilations, animal nutrition, veterinary medicine, transport and slaughter, bee keeping;
- **requirements specific to aquaculture;**
- **processing and handling:** general requirements; ingredients; processing methods; pests and disease control; packaging; cleaning, disinfecting and sanitizing of food processing facilities; and textile fiber processing;
- **labelling;**
- **social justice** (concerning labor and human rights, non-discrimination and equal opportunities);
- **criteria for the evaluation of inputs, additives and processing aids authorized in organic production and processing;** and
- **lists of permitted substances;** including fertilizers and soil conditioners, crop protectants and growth regulators, additives and processing/post-harvest handling aids, and equipment cleansers and disinfectants, substances for pest and disease control and disinfection in livestock housing and equipment.

# Regulations and import access

The impetus for regulation worldwide started when the EU regulation (EEC 2092/91) was implemented. This was in most cases triggered by the demands of exporters, who want to access the EU market, with their respective governments. As the EU regulation foresaw government to government recognition agreement as the main way for imports, exporters urged their respective governments to promulgate regulation as a prerequisite to engaging in a government-to-government recognition agreement to access the EU market. However, that has not met expectations.
Currently, the EU and US markets together represent a large portion of global sales of organic food and beverage, although this figure is sinking. As a result of their markets' strength, the EU regulation and USA rules have resulted in an overwhelming majority of production in global south countries being certified basically according to the EU rules or exactly to US rules for export, not to a national or regionally developed standards for domestic or regional development.

## Access to the EU

The EU regulation (EC) 2018/848, entered into force on 01 January 2022 and completely redefied access of organic products to the EU from third countries. Previous Regulation (EC) No 834/2007 enabled four import regimes through:

- List of recognised equivalent third countries
- List of recognised control bodies/authorities for the purpose of **equivalence**
- List of recognised control bodies/authorities for the purpose of **compliance**
- Import authorisations managed by member states.

In reality only two of them were active – import of products certified by a standard that was recognized by the European Commission as equivalent and import of products certified with Equivalent European Union Organic Production & Processing Standard for Third Countries by accredited certification bodies or authorities.

The new EU Regulation (EC) 2018/848 recognizes only two regimes:

- Trade agreements with Third Countries
- Control Bodies/Authorities recognised for the purpose of **compliance**
-

Currently the EU has equivalence agreements with Argentina, Australia, Canada, Chile, Costa Rica, India, Israel, Japan, the Republic of Korea, Switzerland, Tunisia, the United States of America and New Zealand. Under the new regulation all countries have to renegotiate all equivalence agreements as trade agreements. This change shifted organic trade from technical into more political proximity, as for trade agreements approval of the EU Commission has to be followed by voting in the EU parliament.

Control bodies and authorities from Third Countries where there is no trade agreement with the EU have to comply with the new regulation. It means that requirements for production, processing, labeling and certification will be the same for farmers in the EU and in Third Countries without trade agreements. The aim of this change was to create a level playing field for farmers in the EU and abroad as some equivalent standards had softer requirements then the EU regulation. However, it created a major trade barrier for exporting producers in Third Countries as they have different climate conditions and some of them do not have access to required inputs authorized by the EU commission.

Is a regulatory framework for organic production needed in the early stage of development?
Is a regulatory framework for organic production needed in the early stage of development?
Most governments when they start to get interested in Organic Agriculture, embark on an 'organic regulation'. These regulations are typically market regulations that try to limit the use of the word, 'organic', to products produced according to standards set by the government and certified by an organization approved by the government. In OECD countries these regulations are often, but not always, triggered by a concern for the domestic market, while in most developing countries they have been installed mainly for, and in some case apply only to, exports. The main push for organic regulations comes from producers or organic certification bodies who want to have fair competition; consumers are rarely involved.

Three main reasons are often mentioned for why mandatory regulations are considered to be the right policy response to develop the organic sector:

- giving Organic Agriculture a more respectable and credible image
- development of the local market
- access to export markets

# Giving credibility to the sector

It is quite obvious that the introduction of an organic regulation means an official recognition of organic. That will strengthen the sector, make it visible and credible and remove some biases against organic both in the public and private sectors. Once the government has acknowledged organic farming through an organic regulation, it is hard to ridicule or ignore organic farming. However, a mandatory regulation is hardly the only way for a government to accomplish this.

# Export market access

The EU, Japan and the USA have implemented systems for import approval of organic products. As these are based on mandatory governmental regulations, it can be assumed that the easiest way to get access to these markets is to implement similar systems, also in the exporting country and through equivalence get market access. However, in all three markets very few products enter through an equivalence agreement. To negotiate equivalence is very resource-demanding and time consuming.

The main way for products to get access to the US and EU markets, is by a certification organization that is accepted in those markets.

Regulation is still sometimes seen as a tool for assisting organic producers to access export markets through equivalence agreements, but the reality does not match this expectation. In any case, it is not a quick solution (e.g., Chile applied for EU recognition in 2000 and was pending until 2008) and it is very resource consuming. In most cases, when it comes to exports, the result of national regulation is just another layer of complication for producers, who apart from having to fulfill the export market requirements, also have to fulfill domestic regulation. This additional cost (if not compensated by subsidies and other incentives) reduces, rather than increases, their international competitiveness, as they compete with producers who do not have to bear this double cost.

Finally, there is no need to make the regulation mandatory for the domestic sector, if the aim is to support the export sector, it is sufficient to make a governmentally supervised system for export marketing of organics (e.g., this is the case of India, whose regulation is not compulsory for the domestic market). The key to export market access lies in competent and qualified certification agencies and efforts to strengthen them should have priority.

# Development of domestic markets

It is believed that consumers will not trust organic products unless the government has set standards and a mandatory system of certification in place. While this is expressed in some of the case studies, there is little empirical evidence for this assumption.

Because of the weakness of the data, it is difficult to draw any meaningful conclusions, but in any case, there is little support for the opinion that the introduction of the regulation at the EU level dramatically changed the market conditions, or the spread of organic farming.

It is difficult to conclude anything about the merits of a mandatory regulation for domestic market development from case studies. Costa Rica has mandatory regulations, and there is no indication that the domestic market in Costa Rica is more dynamic than the domestic markets in Australia, New-Zealand, South Africa or Russia. Nevertheless, it is plausible that in a situation with real market confusion and widespread fraud, in countries with a general high confidence in government, that a domestic market regulation might be of some use. Still, even in countries with regulations in place for a decade, there is consumer skepticism about the reliability of organic products and there is also fraud. In countries with a widespread skepticism against government one might even see some negative reactions to a governmental regulation. In some countries with mandatory regulation there are special rules for small farmers, e.g., in the US NOP, farmers selling organic products for less than US$ 5000 annually are exempt from certification, i.e., they can make the organic claim, they have to follow the standards but don't have to be certified.

# Process and implementation

There is a widespread underestimation of the time and resources needed to put organic regulations in place.  Many countries have passed mandatory regulations on organic, but then failed to implement them. This is worse than having no regulation at all, as an unimplemented mandatory regulation moves everything into limbo. If there is a law that requires mandatory certification for organic products, governmental standards and government approval of certification bodies, no organic market can take place unless all these components are applied. A domestic certification body can't develop its business as they are not yet approved, producers can't apply for certification if the standards are not yet defined, and the government can't approve certification bodies until it has established its supervision and approval systems. All of this also needs budget allocation and trained staff. Lack of implementation is reportedly the main factor in countries' failure to get approval as a third country by the EU.

If the country embarks on a mandatory organic regulation, it is of critical importance that such a regulation is both "farmer-friendly" and "trade-friendly". A badly drafted organic regulation will most likely do more harm than good. To "import" an organic regulation ("copy and paste" approach), e.g., from the EU, is not likely to be successful.

# The IFOAM - Organics International **"organic regulation toolkit"**

To help governments and private sector representatives navigate the complexities of organic regulatory strategies, and make choices adapted to their situation, IFOAM - Organics International has created the **"Organic Regulation Toolkit".**

The toolkit is designed for governments, organic sector organizations, consultants and others involved in the development of organic guarantee systems. It presents an overview of the voluntary and regulatory instruments that can be used to support the development of appropriate frameworks where there is a national ambition to develop the organic sector. The options, in terms of voluntary and regulatory instruments, are many. They range from having a voluntary standard associated with a common organic logo managed by the sector umbrella organizations (e.g., East African Community), to having a regulation compulsory for export only (e.g., India) or having a full compulsory organic regulation. The choice between those different scenarios depends on the level of development of the sector (and particularly of the internal demand for organic products).

The Organic Regulation toolkit was designed by IFOAM - Organics International based on best practices identified through a global review of organic guarantee systems and regulations, decades of experience in advising governments and the private sector in this area. This toolkit is conceived to guide the user towards the most appropriate tools and templates, based on the local conditions.

The user is encouraged to adapt the templates to their own needs, but always in consultation with their organic sector stakeholders. Users can also consult IFOAM - Organics International experts with regards to the appropriateness of certain adaptations, and whether they would likely have an impact on the credibility and acceptability of the national system at the international level.

# Alternatives to mandatory **organic regulations**

There are several regulatory options to protect the consumers and organic producers from false marketing claims. Most countries already have regulations regarding truthful labeling and prevention of consumer deception. Such rules can also be applied to organic claims. Since there are both CODEX and IFOAM - Organics International standards available, as well as the IFOAM Family of Standards, which lists all internationally-recognized organic standards (approved by IFOAM - Organics International), it is quite simple to clarify (either as amendment to existing regulation or as instructions to the supervising authority) that in order for a product to be sold as 'organic' it has to be produced according to internationally recognized standards. Another option is to use regulation to back a voluntary national standard (private or public). Such a regulatory solution can either include requirements for certification, other conformity assessment methods, or be left open.

# Getting Certified

## The Situation

The growth of Organic Agriculture and the accompanying trade has brought with it an increasing burden related to the verification of the production method that gives confidence to distant buyers and consumers. Initially the most onerous expression of this need was the requirement for organic producers to carry multiple certifications to cover the different markets into which they were selling. However, the growth in international trade and the increasing tendency for countries to regulate the sector has resulted in a newer burden; the need for certification bodies to carry multiple accreditations.

Several processes (projects, organizations and programs) in the international arena have been working in different ways to ease this burden. The Global Organic Market Access (GOMA) project followed the work of the International Task Force on Harmonisation and Equivalence in Organic Agriculture (ITF). The project sought to simplify the process for trade flow of organic products among various regulatory and/or private organic guarantee systems. GOMA focused on harmonisation and equivalency of organic standards and certification performance requirements as mechanisms for clearing trade pathways. In particular GOMA has focused its efforts on enabling regulatory authorities to better establish equivalency between their regulations. A notable success has been the reference by the European Commission to the International Requirements for Organic Certification bodies (IROCB) as a basis for equivalency. Another outcome of the ITF-GOMA process was the adoption of the COROS (Common Objectives and Requirements for Organic Standards).

IFOAM – Organic International has built on those tools to create two programs that aim to facilitate equivalency recognitions: the IFOAM Family of Standards, and the IFOAM program of recognition of conformity assessment systems. Those two programs are based respectively on the COROS and the **IROCB** as international norms, to which standards and control requirements are respectively held. The idea promoted by IFOAM - Organics International, is that those programs would serve as a common international equivalency approval methodology, so that each country does not have to conduct equivalency assessment of each of his trade partners, but instead can rely on assessments done by IFOAM or even better, on the approval of the other country's standard into the IFOAM Family of Standards (and similarly for the control systems). This approach is currently followed by only a handful of countries, but advocacy to replicate it more broadly is still on-going.

If additional answers are not found quickly there is a distinct possibility that many indigenous certification bodies in the developing countries will not survive, and only international certification bodies based in the global north will remain in the organic certification business, which is increasingly competitive. The loss of local certification bodies would certainly have negative impacts on the integrity of organic and on
the market development perspectives in developing countries.

# 13 Participatory Guarantee Systems

– Shared Vision, Shared Ideals

Third party certification is regarded as a reliable tool for guaranteeing the organic quality of a product, but it is not the only tool. Alternatives to third party certification, which are more affordable and accessible to small holders, have been gaining ground and recognition, especially due to the work IFOAM - Organics International does to promote the diversification of Organic Agriculture.

Participatory Guarantee Systems (PGS) are a good example of a practical alternative to third-party certification and an effective way to develop local organic markets, particularly well adapted to small-scale farming.

The terminology and conceptual framework for describing Participatory Guarantee Systems (PGS) was first developed from the International Alternative Certification Workshop held in Brazil in 2004 and sponsored by IFOAM - Organics International and the MAELA. During this event, the dynamics of different alternative organic certification systems were shared and their common features documented, allowing for a common definition to be identified. The officially adopted definition states: "Participatory Guarantee Systems (PGS) are locally focused quality assurance systems. They certify producers based on active participation of stakeholders and are built on a foundation of trust, social networks and knowledge exchange." (IFOAM - Organics International, 2008)

Since 2004, PGS have gained recognition throughout the world, in the organic sector, and in the agroecology movement, as credible, relevant and cost-effective mechanisms through which producers can guarantee that their products have been produced according to the four principles of organic agriculture4. IFOAM – Organics International recognizes the full diversity of organic agriculture, including terms of verification or quality assurance systems. PGS are alternative and complementary to ISO-type independent third-party certification: just like third-party certification systems, PGS consist in quality assurance systems that aim to provide a credible guarantee for consumers seeking organic produce.

PGS differ from third-party certification in their approach. Direct participation of farmers, consumers and other stakeholders in the verification process is not only encouraged in PGS, but may be required. Such involvement is realistic and achievable given that PGS are likely to serve small farms and local, direct markets. Participation costs are low and primarily require voluntary time involvement rather than financial expenses. Moreover, paperwork is reduced, making PGS more accessible to small operators.

There are indications that PGS have the potential to significantly contribute to reducing food insecurity and improving food sovereignty and nutrition, especially among farmers and consumers in rural areas5, thus supporting organic farming as a strategy for achieving multiple SDGs. Accordingly, PGS have been described as a pro-poor development tool. Active participation on the part of stakeholders, as foreseen by PGS, results in greater empowerment and responsibility. PGS place a high priority on knowledge and capacity building – not only for producers, but also for consumers. Because they are based on direct personal relationships and sustainable development values, PGS can help consumers and producers to establish and favor direct or short-distance market relationships.

IFOAM – Organics International and MAELA have supported this process and helped to ensure that organic producers may access organic guarantee options that best suit their needs. Alongside individual and third-party certification, PGS are now regarded as a viable option to guarantee the quality of organic products.

- **Participatory Guarantee Systems**
- **New Resources for PGS Advocates and Practitioners**
- **A Guide to Participatory Guarantee Systems (PGS) for Organic Agriculture**
- **Find out** about the key elements and features in the **PGS Guidelines**.

**Table 46: Status of organic agriculture regulations**

| Region | Country | Status of regulations | Relevant Remarks |
|---|---|---|---|
| Africa | Algeria | Drafting | |
| | Botswana | | |
| | Burkina Faso | | |
| | Burundi | | Regional voluntary standards (EAOPS[1]) |
| | Cameroon | Drafting | |
| | Cape Verde | | |
| | Central African Republic | | |
| | Comoros | | |
| | Congo, Dem. Rep. | | |
| | Congo, Rep. | | |
| | Djibouti | | |
| | Egypt | Not fully Implemented | |
| | Equatorial Guinea | | |
| | Eritrea | | |
| | Eswatini | | |
| | Ethiopia | Not fully Implemented | |
| | Gabon | | |
| | Gambia | | |
| | Ghana | | |
| | Guinea | | |
| | Guinea-Bissau | | |
| | Ivory Coast | | |
| | Kenya | | Regional voluntary standards (EAOPS) |
| | Lesotho | | |
| | Liberia | | |
| | Libya | | |
| | Madagascar | Not fully Implemented | PGS recognition. |
| | Malawi | | |
| | Mali | | |
| | Mauritania | | |
| | Mauritius | Drafting | |
| | Morocco | Not fully Implemented | |
| | Mozambique | | |
| | Namibia | | |
| | Niger | | |
| | Nigeria | | |
| | Rwanda | | Regional voluntary standards (EAOPS) |
| | São Tomé and Príncipe | | |
| | Senegal | | |
| | Seychelles | | |
| | Sierra Leone | | |
| | Somalia | | |
| | South Africa | Drafting | |
| | South Sudan | | |
| | Sudan | Drafting | |
| | Tanzania | | Regional voluntary standards (EAOPS) |
| | Togo | | |
| | Tunisia | Fully Implemented | |
| | Uganda | | Regional voluntary standards (EAOPS) |
| | Zambia | | |

[1] EAOPS = East African Organic Standard

## Standards, Legislation, Policies › Public Standards and Regulations

| Region | Country | Status of regulations | Relevant Remarks |
|---|---|---|---|
| | Zimbabwe | | |
| Asia | Afghanistan | | |
| | Armenia | Not fully Implemented | |
| | Azerbaijan | Not fully Implemented | |
| | Bahrain | | |
| | Bangladesh | Drafting | |
| | Bhutan | Drafting | |
| | Brunei Darussalam | | |
| | Cambodia | Drafting | |
| | China | Fully Implemented | |
| | DPR Korea | | |
| | East Timor | | |
| | Hong Kong | | |
| | India | Fully Implemented | PGS recognition. |
| | Indonesia | Fully Implemented | |
| | Iran | Not fully Implemented | |
| | Iraq | | |
| | Israel | Fully Implemented | |
| | Japan | Fully Implemented | |
| | Jordan | Not fully Implemented | |
| | Kazakhstan | Not fully Implemented | |
| | Kuwait | Fully Implemented | |
| | Kyrgyzstan | Not fully Implemented | |
| | Laos | | |
| | Lebanon | Drafting | |
| | Malaysia | Fully Implemented | |
| | Maldives | | |
| | Mongolia | Not fully implemented | PGS recognition. |
| | Myanmar | | |
| | Nepal | | |
| | Oman | | |
| | Pakistan | Drafting | |
| | Palestine | | |
| | Philippines | Not fully Implemented | PGS recognition. |
| | Qatar | | |
| | Republic of Korea | Fully Implemented | |
| | Saudi Arabia | Not fully implemented | |
| | Singapore | | |
| | Sri Lanka | Drafting | |
| | Syria | | |
| | Taiwan | Fully Implemented | |
| | Tajikistan | Not fully Implemented | |
| | Thailand | | |
| | Turkmenistan | | |
| | United Arab Emirates | Fully Implemented | |
| | Uzbekistan | Drafting | |
| | Vietnam | Not fully Implemented | |
| | Yemen | | |
| Europe | Albania | Fully Implemented | |
| | Andorra | Fully Implemented | |
| | Austria | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Belarus | Not fully implemented | |
| | Belgium | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Bosnia & Herzegovina | Not fully Implemented | |
| | Bulgaria | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Croatia | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Cyprus | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Czech Republic | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Denmark | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Estonia | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Finland | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | France | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Georgia | Fully Implemented | |
| | Germany | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Greece | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Hungary | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Iceland | Fully Implemented | |
| | Ireland | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Italy | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Kosovo | | |
| | Latvia | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Liechtenstein | Fully Implemented | |
| | Lithuania | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Luxemburg | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Malta | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Moldova | | |
| | Monaco | | |
| | Montenegro | Fully Implemented | |
| | Netherlands | Fully Implemented | Regional compulsory regulation (EU Reg) |

## Standards, Legislation, Policies › Public Standards and Regulations

| Region | Country | Status of regulations | Relevant Remarks |
|---|---|---|---|
| | North Macedonia | | |
| | Norway | Fully Implemented | |
| | Poland | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Portugal | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Romania | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Russia | Not fully Implemented | |
| | San Marino | Fully Implemented | |
| | Serbia | Fully Implemented | |
| | Slovak Republic | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Slovenia | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Spain | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Sweden | Fully Implemented | Regional compulsory regulation (EU Reg) |
| | Switzerland | Fully Implemented | |
| | Turkey | Fully Implemented | |
| | Ukraine | Not fully Implemented | |
| | United Kingdom | Fully Implemented | Regional compulsory regulation (EU Reg) |
| Latin America and the Caribbean | Antigua and Barbuda | | |
| | Argentina | Fully Implemented | |
| | Bahamas | | |
| | Barbados | | |
| | Belize | | |
| | Bolivia | Fully Implemented | PGS recognition. |
| | Brazil | Fully Implemented | PGS recognition. |
| | Chile | Fully Implemented | PGS recognition. |
| | Colombia | Fully Implemented | |
| | Costa Rica | Fully Implemented | PGS recognition. |
| | Cuba | Not fully Implemented | |
| | Dominica | | |
| | Dominican Republic | Fully Implemented | |
| | Ecuador | Fully Implemented | PGS recognition. |
| | El Salvador | Not fully Implemented | |
| | Grenada | | |
| | Guatemala | Fully Implemented | |
| | Guyana | | |
| | Guyana | | |
| | Haiti | | |
| | Honduras | Fully Implemented | |
| | Jamaica | Drafting | |
| | Mexico | Fully Implemented | PGS recognition. |
| | Montserrat | | |
| | Nicaragua | Fully Implemented | |
| | Panama | Fully Implemented | |
| | Paraguay | Fully Implemented | PGS recognition. |
| | Peru | Fully Implemented | PGS recognition. |
| | Saint Lucia | | |
| | Saint Vincent and the Grenadines | | |
| | St. Kitts and Nevis | | |
| | St. Lucia | Drafting | |
| | St. Vincent and the Grenadines | | |
| | Suriname | | |
| | Trinidad and Tobago | | |
| | Uruguay | Fully Implemented | PGS recognition. |
| | Venezuela | Not Fully Implemented | |
| | Canada | Fully Implemented | |
| | USA | Fully Implemented | |
| Oceania | Australia | Fully Implemented | Only for export. |
| | Fiji | | Regional voluntary standards (POS) |
| | French Polynesia | Fully Implemented | Regional voluntary standards (POS); PGS Recognition. |
| | Kiribati (Micronesia) | | Regional voluntary standards (POS) |
| | Marshall Islands | | Regional voluntary standards (POS) |
| | Micronesia | | Regional voluntary standards (POS) |
| | Nauru | | Regional voluntary standards (POS) |
| | New Caledonia | Fully Implemented | Regional voluntary standards (POS); PGS recognition. |
| | New Zealand | Fully Implemented | Only for export. |
| | Niue | | Regional voluntary standards (POS) |
| | Palau | | Regional voluntary standards (POS) |
| | Papua New Guinea | | Regional voluntary standards (POS) |
| | Samoa | | Regional voluntary standards (POS) |
| | Solomon Islands | | Regional voluntary standards (POS) |
| | Tonga | | Regional voluntary standards (POS) |
| | Tuvalu | | Regional voluntary standards (POS) |
| | Vanuatu | | Regional voluntary standards (POS) |

*Source: IFOAM – Organics International 2021*

# 14 Best Practices for Development of Organic Sector

## – Policy Toolkits

*Photo by Irene Strong on Unsplash*

The guidelines make up the cornerstone of the toolkit and present the fullest possible compilation of facts, arguments, and tips on the full panel of policy measures that can be used to support organic agriculture. Most of the sections of this main report are also broken down into separate documents, for easier download and use. The report is targeted at policymakers and policy advocates. The toolkit looks at the following topics: reasons that justify public support for organic agriculture, historical and global overview of such public support, advice on determining the right mixture of support measures through national/regional action plans and guidelines, examples of different forms of policy support, specific policy measures to support organic agriculture, and the general agricultural and food policy framework and how it may impact organic agriculture.

See the IFOAM – Organics International Global Policy toolkit **here**.

A total of 26 categories of support measures can be taken to boost supply and/or demand of organic products. However, it is not possible for a strategic organic action plan to implement all 26 categories of measures (mostly because public resources are limited). In addition, not all measures are suitable in all contexts. Priorities will be set and choices will have to be made.
In order to help policy makers and stakeholders participating in strategic organic planning, we have developed this decision-helping framework that helps filters the most suitable measures depending on the national context. The decision aid can be found **here**.

IFOAM – Organics International has also developed a policy template for countries with an emerging organic sector, to assist in the development of these emerging policies. **See here**.

# Action plans

Many governments have developed approaches to supporting organic agriculture, which are variously called policies, strategies and plans/action plans. Except for certain political declarations, these approaches are the result of a planning process. Approaching the issue of organic policies through an organic action plan will require the engagement of various stakeholders, commitment across several ministries, suitable budget allocations and ensuring coherence with other national policies and action plans that concern the agricultural sector and/or rural development more broadly.

Organic action plans provide a framework for integrating policies and measures in order to encourage organic sector development. Thus, action plans serve as a strategic instrument for governments to achieve policy goals, particularly when multiple policy areas (such as agriculture, environment, trade) and different levels of policy formulation are to be integrated. Action plans can avoid contradictory policies while also ensuring that the different measures are complementary. The development of organic action plans is a complex exercise. It should contain at least the following steps:

1. Analysing the current situation of the organic sector and its development needs.
2. Establishing the aims/goals and objectives of the action plan
3. Identifying appropriate policy measures to address the aims and objectives.
4. Deciding on the measures and allocating budgets.

For more detailed recommendations, examples and tools, with a particular focus on Action Plan evaluation, consult the 2008 Manual **"Organic Action Plans Development, implementation and evaluation - A resource manual for the organic food and farming sector".**

# The EU organic action plan

In 2021 The European Commission adopted the EU Farm to Fork and Biodiversity strategies, which set organic farming as a core element of sustainable food systems' transformation. The Farm to Form strategy set a target of at least 25% of the EU's agricultural land under organic farming. To achieve this target, the EU Commission drafted the organic action plan. The action plan is categorised according to three interlinked axes that mirror the structure of the food supply chain and sustainability objectives of the European Green Deal.

**Axis 1:** stimulate demand and ensure consumer trust.
**Axis 2:** stimulate conversion and reinforce the entire value chain.
**Axis 3:** organics leading by example: improve the contribution of organic farming to environmental sustainability.

Three axes are supported by 23 actions that are financed by eco-schemes, integrated into the Common Agricultural Policy of the European Union. More information about the Organic Action Plan could be found **here**.

# Specific Actions and Developments

Choosing the correct measures depends on local conditions and also on the stage of development. Many make the mistake and look at the countries with the most developed organic sector and try to copy what is done there, but the truth is that many actions just make sense in a certain stage of development and many strategies are time bound.

Below the main strategies in their various stages are outlined.

# Market development

| Development stage | Recommended actions |
|---|---|
| **Budding stage** | **Domestic market**<br>Individual market initiatives to develop a market suitable to their capacity. Most likely this will be a niche market targeting small groups of consumers with short supply chains.<br>• Marketing initiatives to cooperate in consumer awareness activities, e.g., participation in annual events.<br>• Marketing initiatives and sector organizations to develop a practical organic labeling scheme whereby organic products can be identified to consumers.<br>• Market image to be consistent with the values of the key target consumers (most likely not the average consumer).<br>• Sector organization to facilitate marketing by creating some opportunities at events, by developing the image and labeling schemes, and by assisting with practical needs of the initial marketing initiatives, e.g., packaging materials.<br><br>**Export market**<br>• Exporters to learn the features of international organic markets.<br>• Exporters to cooperate in their efforts to make the country appear to be a reliable supplier of good organic exports. They should also try to cooperate in logistics, e.g., sharing containers.<br>• Sector organizations to organize producers and negotiate with foreign certification organizations for good service, reasonable costs, and use of local staff.<br>• Government or sector organizations should acquire knowledge of the organic import regulations in order to advise exporters on how to handle them. |
| **From marginal to promising alternative** | **Domestic**<br>• The organic labelling scheme to be continuously developed, adding components of quality assurance, e.g., certification and PGS systems.<br>• Marketing initiatives to enter strong cooperation, e.g., by forming cooperatives or similar.<br>• Sector organizations to develop a generic marketing strategy to increase organic sales. Sector organization should try to avoid getting involved too deeply in individual marketing initiatives to avoid conflict of interest and loss of credibility.<br>• Larger-scale consumer awareness campaigns to be designed by sector organizations and marketing initiatives.<br>• Government to engage in promotion of organic e.g., in consumer information and environmental campaigns and also by serving organic foods at major events.<br>• Local and central government to procure organic foods for schools, hospitals and other public institutions<br>• Attempts to get organic products into mainstream channels and lower the distribution costs.<br>• Observe pricing strategies to avoid having organic perceived as prohibitively expensive.<br><br>**Export**<br>• Exporters, sector organizations and government to develop export strategy and to promote the export products at strategic events, e.g., Biofach<br>• Cooperation among exporters to continue to create a strong 'brand' of organic for the country |
| **Mainstreaming stage** | **Domestic**<br>• Uptake of organic by major businesses.<br>• Sector organizations to promote and facilitate multiple marketing strategies adapted to all kind of producers and consumers.<br>• Market image of organic to be adjusted to mainstream consumer expectations and preferences.<br>**Export**<br>• Joint export efforts to continue. |

# Regulations

| Development stage | Recommended actions |
|---|---|
| **Budding stage** | • Government to train its staff to ensure that they have a proper understanding of organic regulations.<br>• Government to participate as a stakeholder in any sector initiatives regarding standards and certification development.<br>• Government to ensure that organic is not harmed by regulations,<br>• e.g., mandatory seed treatments, mandatory spraying programs, or mandatory fumigation.<br>• The sector organizations should not prematurely call for organic regulations. |
| **From marginal to promising alternative** | • Government to participate as a stakeholder in any sector-led initiatives regarding standards and certification development.<br>• If useful for export, government should consider a system to support the sector for acceptance of their exports in other countries, e.g., by a voluntary export certification program<br>• Government to participate in international standard-setting processes such as Codex Alimentarius.<br>• The sector organizations should carefully analyse the advantages and disadvantages of any organic regulation for all organic stakeholders, and if calling for regulation, ensure that any regulation is kept simple and is not exclusionary in reality. |
| **Mainstreaming stage** | • Government to regulate the organic market if the sector organizations think it is useful, otherwise not.<br>• If regulating, government should consider using a simple regulatory framework, leaving most details and implementation to sector bodies.<br>• Sector bodies to participate actively in any regulatory development, ensuring that regulations are practical and contribute to the development and expansion of the sector. |

# Agriculture policy

| Development stage | Recommended actions |
|---|---|
| **Budding stage** | • Government should train their staff to understand the conditions for organic farming and should assign some clear responsibility for organic farming issues, e.g., in the ministry of agriculture.<br>• Sector organizations should understand policy formation processes and identify strategic entry-points for organic in normal processes.<br>• Sector organization should identify policies that discriminate against organic and ask for mitigation. |
| **From marginal to promising alternative** | • The sector should unify itself and speak to the government with one voice.<br>• Government should analyse its policies to understand how they affect organic, and when organic is discriminated against the government should eliminate those biases<br>• Government and the sector should develop organic policies and action plans together<br>• Government should establish a national advisory body for organic, including sector representation and relevant agencies<br>• Government should develop carefully designed incentives/support programs for organic farming<br>• The sector should continuously collect data about the existence of organic farming and production to show its development<br>• The sector should emphasize the opportunities for organic to contribute to the stated policy goals of the country |
| **Mainstreaming stage** | • Government should integrate organic into all mainstream policies<br>• Government should develop carefully designed incentives/support programs for organic farming<br>• The sector should develop its own scenarios and proposals for an alternative agriculture policy |

# Supporting structures

| Development stage | Recommended actions |
|---|---|
| **Budding stage** | • Farmers to cooperate in interest groups<br>• Individual researchers (champions), students doing research, in cooperation with farmer-supporting NGOs<br>• Start shift to on-farm research and farmer priorities<br>• Start capacity-building of the research sector, participatory approaches<br>• Farmer exchange visits should be organized/supported<br>NGO-run extension agents or private crop advising is probably most successful |
| **From marginal to promising alternative** | • Relevant forums for cooperation in research and development in organic should be established<br>• A strong link should be established between farmers, extension and research. Government and sector organization need to demand and facilitate this<br>• More formal research projects/programs drawn up, joint projects between research institutes and NGOs<br>• Longer-term research can be initiated<br>• Private/commercial extension services to be encouraged<br>• Engagement of public extension, starting with comprehensive training, including practical work in the field<br>• School gardens during primary and secondary education<br>• Environment, health and nutrition introduced into the secondary school curriculum<br>• Curriculum development in agricultural colleges and universities and in adult education<br>• Specific organic colleges started |
| **Mainstreaming stage** | • The research institutes do comprehensive research on organic<br>• Organic as part of normal extension and education curriculum |

# The sector itself

| Development stage | Recommended actions |
|---|---|
| **Budding stage** | • Create platforms for meeting, e.g., an annual event. Do not structure too early, keep communication channels open<br>• Link the different stakeholders (government, NGO, commercial actors) with each other<br>• Seek regional and international contacts |
| **From marginal to promising alternative** | • Define what image of organic to portray vis-à-vis consumers (e.g., modern, healthy), producers (e.g., good for farm family, good for the environment, good for profits), food business (e.g., trendy, demanded by consumers, profitable) and government (an all-inclusive concept that is profitable and will contribute to stated national goals)<br>• Get organized in one national organic movement; try to include all key stakeholders<br>• Do not try to do everything, rather coordinate, delegate as much as possible among members<br>• Organize the sector by developing alliances with like-minded organizations, e.g., environmental groups, consumer groups, sustainable development NGOs<br>• Engage in regional and international (e.g., IFOAM - Organics International) networks |
| **Mainstreaming stage** | • Create alliances with business networks and conventional farming organizations |

# 15 Agricultural Policies to Transform Food Systems

# Sustainable Food and Agriculture Systems

A sustainable food system (SFS) according to **FAO**, is a food system that delivers food security and nutrition for all so that the economic, social, and environmental bases to generate food security and nutrition for future generations are not compromised. In other words:

- It is profitable throughout (economic sustainability);
- It has broad-based benefits for society (social sustainability); and
- It has a positive or neutral impact on the natural environment (environmental sustainability).

Transforming the food system and ensuring food security for all is a major challenge. To know more about SFS, read **"Enabling sustainable food systems: Innovators' handbook".**

This is an incredibly practical resource, written collaboratively to bring real-life experience and lessons from local food systems actors from Asia, Africa, the Americas, and Europe leading initiatives to grow, share, sell and consume more sustainable foods in their local contexts. According to FAO, the handbook was written for "sustainable food systems innovators...who are actively experimenting in (re)valuing agriculture in sustainable food systems, i.e., changing the way we produce, transform, transport, store, sell, and consume our food and agricultural products. In the authors' experiences, these actors can be farmers, researchers, traders, consumer groups, committed individual consumers, NGOs, local-level officials, among many others."

## Further reading materials:

- **Organic Farming Drives Sustainability in Global Agriculture**
- **The Organic Movement Contributing to SDG2: Zero Hunger**

# Organic 3.0 – for truly sustainable farming and consumption

Organic agriculture can significantly contribute to addressing global, environmental and social challenges as well as achieving the Sustainable Development Goals (SDGs). In order to fully utilize its potential, organic agriculture needs to grow, continuously improve its performance and inspire mainstream agriculture. Organic 3.0 provides a roadmap for innovative, inclusive, fair and impactful organic development from farm to the final consumer. The overall goal of Organic 3.0 is therefore to enable the widespread uptake of truly sustainable farming systems and markets based on organic principles.

## ORGANIC 3.0: STRATEGY

The strategy for Organic 3.0 includes six main features, consistently promoting the diversity that lies at the heart of organic and recognizing there is no 'one-size-fits-all' approach:

- A culture of innovation, to attract greater farmer conversion and adoption of optimal practices. Organic 3.0 proactively scouts for traditional and newly arising innovations and assesses them against impact risks and potentials.
- Continuous improvement towards best practice, for operators along the whole value chain covering all dimensions of sustainability: ecology, society, economy, culture and accountability.
- Diverse ways to ensure transparency and integrity, to broaden the uptake of organic agriculture beyond third-party certification;
- Inclusiveness of broader sustainability interests, through proactively building alliances with the many movements and organizations that have complementary approaches to truly sustainable food and farming. However, it also clearly distinguishes itself from unsustainable agriculture systems and 'greenwashing' initiatives;
- Empowerment that recognizes the interdependence and real partnerships along the value chain and also on a territorial basis; It particularly acknowledges the core position of smallholding family farmers, of gender relations and of fairness in trade; and lastly
- True value and cost accounting to internalize costs and benefits, encourage transparency for consumers and policy-makers as well as empower farmers as full partners.

**Organic 3.0 - Sustainable Food and Farming**

# True Cost Accounting in agriculture

It is difficult to calculate the external costs for agriculture. How do you value a lost species? How to assess the health effect of a constant low dose of pesticides in food? There have been several attempts made and in industrialized countries they often land on estimates in the range of USD 150300 per hectare and year. Conversion to organic farming, on the contrary, will reduce external costs considerably. An attempt has been made to calculate these cost, True cost Accounting (TCA). To learn more, **visit TCA here**. IFOAM – Organics International has written a paper on TCA in transforming the food system, to read more, **see here**.

# Organic farming

## - An efficient integrated system approach to challenges

Eliminate all subsidies that encourage natural resource degradation or depletion and internalize environmental and social costs as far as possible
Throughout the world, government policies providing subsidies for agricultural inputs have led to their inefficient use - and ultimately to the degradation of important natural resources. Whether for water, electricity, fertilisers, or pesticides, input subsidies artificially lower prices, thus inviting widespread overexploitation and waste. Not only are agricultural inputs subsidized, numerous costs incurred by farming are also covered by society. If farm-owners had to pay for the off-site damages caused by overusing pesticides, for example, they would use these chemicals sparingly.

# India's subsidies reach new heights

For 2009, the Indian governments subsidies reached new heights. The Food Corporation of India, responsible for food subsidies will use USD 10 billion and the Ministry of Fertilisers USD 20 billion for subsidies for chemical fertilisers. In addition, there is a plethora of other federal and state subsidies. The fertilizer subsidy amounts to 110 dollars per hectare, but the real figure is much higher as many lands do not receive any fertilisers. Despite these mechanisms, 16 000 farmers committed suicide in 2007, due to policies which encouraged the use of chemical inputs while not taking natural cycles into account (Tehelka 2009).

Another distortion common in industrial countries is the heavy taxation of labour, which (probably unintentionally) has the effect that mechanisation and replacement of human labour with machinery is promoted. Apart from creating unemployment it also leads to unnecessary mechanisation.

# Subsidizing irrigation water

> Large government subsidies – an estimated USD 33 billion a year worldwide – keep water prices artificially low, discouraging farmers from investing in efficiency improvements. *(State of the World 2000)*

Eliminate agricultural support programs that create commodity surpluses and lower global commodity prices

In many industrialised countries, agriculture and trade policies have institutionalised powerful support programs that artificially raise commodity prices - distorting economic signals to farmers - and, in turn, create wasteful surpluses with high financial and environmental costs. The surpluses are normally dumped in other markets, thereby threatening farmers in those countries. By lowering global commodity prices and restricting market access, these policies hamper economic development throughout the world, particularly within poor countries. Production practices that damage natural resources should not receive public support. Those methods, like organic farming, that rely on the biological management of soil and pests, thereby conserving agriculture's resource base, should be targeted for funding.

# Reform national economic indicators of the agricultural sector to reflect depletion and degradation of natural resources

Current methods for determining national and sector income are often grossly misleading indicators of sustainable economic development. Current systems rely on Gross domestic Product (GD); however, a new system has to come to the forefront, which is more inclusive, relying on multiple factors: **the Happiness Index**. By design, these national income accounts ignore natural assets, assuming that their productivity has no link to economic health. Yet nothing could be farther from the truth, particularly not for such sectors as agriculture that depend on natural resources.

When conventional national income accounts are carefully scrutinized, it can be that what was counted as income actually amounts to loss in the form of natural resource degradation and depletion. Policy-makers will not get a true indication of progress towards sustainable development until the depreciation of natural assets is treated with the same seriousness as the depreciation of human-made assets.

Increased funding for agricultural research is particularly critical in low-income developing countries. Despite these nations' heavy dependence on agriculture, **IFPRI** reports that public expenditures on research generally total less than 0.5% of their agricultural gross domestic product. By comparison, higher-income developing countries spend about 1% and industrialized countries spend 2 to 5%.

It is not only necessary to spend more, but also to re-direct research. Today, most research money is spent on the application of agrochemicals and gene technologies, however, there has also been an increased interest in organic research. To find out more, visit the Research Institute of Organic Agriculture (**FiBL**) homepage.

# Ban and/or restrict hazardous chemicals and practices

While major progress can be made by the internalization of costs and other measures, there is still a need for clear legal prohibitions and/or strict regulations on a number of agrochemicals, mainly pesticides and on production methods like the use of GMOs. The "precautionary principle" should be vigorously applied.

# The precautionary principle

The precautionary principle says that in some cases – particularly where the cost of action is low and the risks of inaction are high – preventive action should be taken, even in the absence of complete scientific certainty about the problem being addressed.

# 16 Final Remarks

## "NATURAL RESOURCES MANAGEMENT" (WATER AND LAND RESOURCES)

**By J. Bakirova**

Natural resources play a significant role in the country's economy, however, the sustainability of the economy depends not only on the rational use of natural resources, but also on the depth and variety of processing of raw natural raw materials. Natural resource management is a state task designed to ensure the sustainable use of natural resources, regulate and limit the negative impacts of economic activity on the environment.

Natural resources management in Kyrgyzstan, due to the global significance of natural materials on its territory and the transboundary nature of natural processes, as well as the consequences of its impact, has global and regional aspects. Most international projects and programs, aimed at supporting the development of countries like our country, are based on the promotion of principles and practices of sustainable development as well as sustainable use of natural resources. The practice of sustainable use of natural resources will be promoted in the country as successfully as priorities reflecting national, regional and global interests, which are correctly identified and aligned, and programs within these priorities will be consistently and effectively implemented. To a large extent, this process will depend on the involvement of civil society and the private sector in this process.

The formation and implementation of a policy in the field of natural resources and environment management is carried out in the country in accordance with the main priorities of the state's development, within the framework of current legislation and the execution structure approved by the government. It can be said that the process of development of environmental legislation is the subject of activity in this area and its outcome, as well as the development of national and sectoral strategies and programs for the management of natural resources and the environment. Over the 30 years of Kyrgyzstan's independence, certain experience and practice have been accumulated in this matter. But at the same time, the frequent change of government, entailing subsequent structural changes and a number of other circumstances, negatively affected the quality of the formation and implementation of policies in the field of natural resources management.

The basic problems in formation and implementation of policy in the sphere of natural resources and the environment management are:
low enforcement of legislation through the development of bylaws, resolutions, decisions and orders;

- maximal policy focused on the performance of control functions and not on the implementation of environmental improvement programs;
- weak interaction between sectors in the process of policy formation and implementation (if something was done, it was only out of necessity, usually caused by external factors);
- poor interdepartmental coordination in the management of natural resources and the environment;
- the short-term nature of almost all decisions taken and the lack of a programmatic approach to their implementation;
- lag in attracting and adapting developing procedures and mechanisms for effective management of natural resources and the environment;
- weakness in decision-making due to insufficient knowledge of the situation on the current state of natural resources and the environment (weak monitoring);

Ownership of land in the Kyrgyz Republic. In accordance with the Constitution of the Kyrgyz Republic, land is in state, communal, private and other forms of ownership.
Land resources, land fields of the republic are distributed as follows:

- Agricultural land (arable land, pastures, forests) 75.5%
- Sands, rocks, scree, other inconveniences 11.9%
- Glaciers and snowfields 3.6%
- Lakes and rivers 3,7%
- Roads, buildings, industrial lands, settlements 5.3%.

Kyrgyzstan's land resources are limited. Of the total 146 thousand square km of the land fund, 93 thousand square km. are used in agriculture, including arable land in processing more than 1.3 million hectares. The main part of agricultural land for 2020 is natural pastures with an area of 9 million 89 thousand hectares. All the best valley lands are practically studied. As a result of population growth and systematic alienation of land for non-agricultural needs, there is a reduction in the area under arable land per capita. This indicator averages 0.44 hectares in the world, and 0.75 ha in Kyrgyzstan. Further, the size of arable land per inhabitant over the past 20 years has decreased from 0.41 to 0.3 hectares, including irrigated - from 0.27 to 0.195 hectares. By 2030, 0.18 and 0.1 hectares are projected, respectively.

# Recommendations

Environmental management largely depends on the actions of the person himself, the process of resource management, including on the part of a broad stratum of society. In this case, we should not forget that the reserves of natural resources on Earth are not infinite, that is limited, which in turn means the need for rational resource use and preservation of natural properties of the nature. There is an increasing need for additional study of the basis of such a science as ecology in economical land use.

Currently, there are quite big problems in the use of land resources, the main ones among which are the following: land degradation, due to the gradual loss of soil fertility as a result of weathering, improper watering, violation of agrochemical methods of land cultivation;

The population of the Kyrgyz Republic is mainly employed in agriculture (about 60%), more than 35% of GDP is created by farmers, agricultural exports account for 17-19%. The territory of arable lands of the republic is approximately 1.3 million hectares, but this does not mean that all these lands are used or are fertile, since their yield in most cases depends on effective irrigation, which is not always carried out in practice.

The main issue to pay attention to is gathered result, which is the yield and quality of the grown product from each hectare of land. In the conditions of a rapidly developing trend of improving land quality and increasing soil fertility, increased yields are achieved through the use of intensive and artificial land use methods, that is, through the use of pesticides, mineral fertilizers, heavy machinery, etc.

But on the other hand, the increase in soil fertility is not always accompanied by the preservation and protection of soil fertility and compliance with agricultural norms. Therefore, the government of the country on the one hand and farmers on the other, along with caring about yields, are obliged to think about how to prevent land degradation in the future.

In the Kyrgyz Republic, the rural population is more than 60%, which is proof that most of the country's citizens are directly dependent on land and water resources. The country's land and water resources, regardless of its political structure and economic condition, have always been, are and will remain in the future the main natural resources. Land and water resources have always directly contributed to the improvement of the welfare of the people, its economic growth, especially its poorest layers of local societies.

# Organic farming support

## – an effective and efficient policy instrument.

Policy instruments are evaluated against the criteria 'environmental effectiveness' and 'economic efficiency' (OECD, 2004). While effectiveness requires that the policy instruments are able to deliver effects that help meet policy targets, efficiency ensures that these targets are met with minimal costs.

By using a mathematical optimization model (linear programming), Schader (2009) could show that support schemes for organic farming as one part of a larger portfolio of agri-environmental measures helps to minimize the cost for farm support, while increasing its environmental effects. Therefore, there is no contradiction between the Tinbergen Rule and organic farming support payments.
Introducing organic farming support payments in addition to independent and targeted policy instruments (e.g., payments for nature conservation and payments for soil conserving tillage, carbon tax) may result in either lower costs for achieving the same level of policy targets, or in a better target achievement with less expenditure as it tackles several policy targets at once.

In order to partly verify the theoretical models, Schader (2009) analysed empirical data of the Swiss agri-environmental scheme for three policy targets 'reduction of fossil energy use', 'improvement of habitat quality (landscape and biodiversity)' and 'reduction of eutrophication (N and P)'. Direct payments for organic farms were both very effective and efficient at achieving the targets, comparable to policy instruments targeted at specific environmental problems.

# Cost-effectiveness of organic farming
## compared to specific agri-environmental measures.

What could be reasons for a better cost-effectiveness of organic farming compared to specific agri-environmental measures?

1. Organic farming is perhaps the only way to pursue different challenges at the same time within one consistent policy instrument. For example, a basic element of organic farming is compost use which leads i) to higher yields in low input systems while at the same time ii) the increased soil organic matter is beneficial to biodiversity and soil structures and iii) the abandonment of mineral nitrogen fertilizer reduces energy use and thus contributes to climate change mitigation. Organic agriculture therefore is likely to deliver cost-efficient solutions to complex global challenges of agriculture.

2. Organic Agriculture guides farmers to solve the perceived discrepancy of integrating environmentally-friendly measures in the daily farm management business. Various authors showed that organic farmers consider professional honor not only to be determined by maximum yields but also by successful implementation of nature conservation measures (Stotten, 2008). Thus, farmers' acceptance of agri-environmental policies could be considerably increased by Organic Agriculture (Schader et al., 2008).

3. The system approach of organic farming, e.g., the combination of many different rules, may induce synergetic environmental effects additional to the effects of each single restriction. The promotion of high nature value elements on farms, such as hedgerows, beetle banks and habitats for other beneficial insects in grass or wildflower strips along field margins becomes ecologically and agronomically much more attractive in combination with a ban on insecticides (Niggli et al., 2008).

4. Organic Agriculture is the only farming system that consistently succeeds in generating higher market values through premium prices. Due to consumers' trust in the organic labels and additional willingness-to-pay for organic products, payment levels do not need to cover the full costs of implementing organic farming. This makes organic farming attractive to policy-makers aiming at generating public benefits through both policy support and market mechanisms.

5. The multi-purpose character of Organic Agriculture could increase its cost-effectiveness due to potentially lower transaction costs compared to targeted agri-environmental measures (Dabbert et al., 2004). According to Lippert (2005), savings of transaction costs in Organic Agriculture include: a) lower administrative costs, because less agri-environmental measures (AEM) have to be administered per farm (economies of scope in administration); b) generally lower control costs, because the full ban of synthetic pesticides and mineral fertilizer is easier to control than thresholds; c) lower costs of control due to a combined control of several attributes (economies of scope at inspection level); d) lower fixed administrative costs due to the use of existing structures for the establishment of control systems; and e) lower intensity of control, as organic farmers risk their reputation if convicted of violation of standards.

Recent scientific publications showed that designing policy instruments on the grounds is neither a knock-out criterion against organic farming policy support, nor does it imply that multi-objective policy instruments like organic farming are necessarily inefficient. On the contrary, we demonstrated on the basis of the most recent scientific literature that organic farming policy support and specific tailored policy instruments are complementary, while focusing only on one of these approaches could bear inefficiencies.

Therefore, we suggest building future agri-environmental policies on two levels:
The first level, the basis, addresses the main objectives, especially climate change, biodiversity and global food security through organic farming support. This multi-objective policy instrument is a perfect means to capture both the strong interrelations and potential trade-offs between separate food security, biodiversity and climate change policies in a consistent policy concept.

The second level consists of tailored policy instruments that will be built on top of this basement. These tailored policies accommodate the national and regional differences and are to ensure that the targets for biodiversity, climate change and food security could be fully met. In this respect, tailored policies need to be flexible and region-specific, making reference to geographical and socio-cultural conditions.


# Jaratylysh

Reader + Trainers Handbook

KOICA
Korea International Cooperation Agency

KDS Korea Institute for Development Strategy

IFOAM ORGANICS INTERNATIONAL