



ORGANIC AGRICULTURE PRACTICES IN VINEYARDS

NATIONAL CATALOGUE OF INNOVATIONS
IN ALBANIA

IDEASS – Innovation for Development and South South Cooperation

INTRODUCTION

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The acquisition of food, textiles and other resources from plants and animals has been a major concern for human society. Yet, as agricultural production intensified and expanded, the negative effects on the underlying resource base have also increased. The history of environmental damage caused by agriculture is well documented; impacts include air pollution from greenhouse gases such as carbon dioxide, methane, nitrous oxide; land degradation as a result of clearing, cultivation of sloping land and salinity; water pollution from fertilizers, pesticides, overuse and wetland draining; and the loss of biological and ecological diversity. In the area of conventional weed science, for example, considerable attention was paid to herbicides but this has not achieved a long-term decline in agricultural weed populations. Instead, farmers have become dependent on herbicides as



widespread resistance in a range of weed species has emerged. Although some may dispute the damage extent, the seriousness of these agricultural sustainability issues is reflected in the formal policies implemented in many countries to reduce those impacts, and in the financial benefits available for good environmental performance. Policies designed to improve the environmental sustainability of agriculture include bans on increasing numbers of pesticides such as the fumigant methyl bromide, financial incentives to revegetate, penalties for water pollution and funding for research into efficiency improvement or damage abatement technologies.

The history of agricultural systems at least in the last 30 years has given so many arguments that the right direction is moving from conventional agriculture to integrated and organic production. Conventional production using bad quality of inputs especially with conventional pesticides, fertilizations, plant regulations has created many health and environmental problems. Organic agriculture is now a reality with positive impact for producer, consumer and environment, and not only for actual generations but for the future generations too. The main difference between agricultural systems is quantity and quality of inputs and on the other hand the concept on environment. Organic agriculture uses friendly inputs and is much more sensitive to environment issues in comparison with other agriculture systems. The reader has the possibility to see this kind of concept in an Albanian organic vineyard. Albania has 12 thousand ha of vineyards. Organic grape and vine production is in its first steps, It began only 12 years ago. Only 20 ha vineyards are managed in Albania in an organic way. Only three vine factories are certified.

The Institute for Organic Agriculture was born from the Organic Agriculture Movement of Albania which began 14 years ago. The Institute was active especially after 2001. With the support of the Swiss Government, the Institute of Organic Agriculture of Switzerland (FiBL) and other interested specialists a long term strategy was developed and at the end of 2011 some other institutions were developed such as Institute of Organic Agriculture, Farmer Association for Organic Products (BioAdria), Certification Body- Albinspekt that now is accredited by the Albanian Government and some other European countries, Marketing Sector of bio and traditional Albanian products.



Organic agriculture is an agricultural system that uses materials that are not harmful for consumers and the environment in general; it harmonizes the economical, ecological and social interests for present and future generations. During these years, a farm research system of bio agriculture was set up for the first time and an infrastructure system is in place with training advice, demonstrations and publications; standardized materials for organic and integrated agriculture are produced by the institute; a collecting system for grapes and apples is set up from local cultivars, recommended to transfer to the Albanian biological agriculture; a modern signaling system and prognosis for diseases and pests in agriculture is set up through pheromone monitoring and electronic devices. The study is focused on the implementation of friendly organic agricultural practices in vineyard.



The experiment was carried out in a vineyard which is managed in an organic way for 6 years. In this block of the vineyard, there are used inputs that are listed in the standard of organic agriculture. In this block biodiversity (below and above soil), the soil hygiene and situation of beneficial fauna will be analyzed according to both organic and conventional systems. Organic and green manure are used for soil and plant nutrition. Copper and sulfur products are used for plant protection against main diseases. Copper and sulfur products are the basis of what we call fungicides (which are chemical compounds or biological organisms used to kill or inhibit fungi or fungal spores). Confusion

pheromones are used to control grape morth (*Lobesia botrana*) a key pest as everywhere in Europe, Asia and Albania too. Weeds regulation will be done through cultivation and mulching of the land.

The method is new for Albanian vineyard. The ecological and economical differences between conventional vineyard and biological vineyard are analyzed for the first time. The priorities of bio production system are reflected in some elements as soil fertility, microorganism dynamics, and economic advantages. This method is a new practice for Albanian agriculture but also for Balkan countries. The method will open the way for implementation of this method in other crops too. The "confusion method" is more or less as using of mobile phone instead of land line phone.

This innovation has been supported by IBB, Vila DUKA, FIBL, and the Agriculture University of Tirana, Albania (<http://www.ubt.edu.al/>).

WHAT PROBLEM DOES IT SOLVE

In the organic vineyard the soil and the environment contain fewer wastes so the product is more healthy and tasteful and the products used to spray the vine are organically approved and their price is 20-30% lower than the price of conventional insecticides. For these reasons, the method harmonizes economic, ecologic and social interests. The method is justified economically, because it is more cheaper for a long time, it protects the beneficial fauna and so it avoids the secondary insects. Avoiding the secondary insects as spider mite, trips, aphids has reduce the cost of plant protection in vineyard. The grape produced in organic way has open the working places.

The method was implemented in Albania for the first time only in recent years. The method is implemented also in conventional vineyard. In this sense, the method has contributed to Green Agriculture Movement in Albania, and can be considered as a real "confusion method" with pheromones against grape moth *Lobesia botrana* and 10 % cheaper than conventional insecticides.



Lobesia Botrana

If we calculate the ecological positive effects and reduction of treatments for secondary insects the priority of the methods is 30-40 % cheaper than conventional insecticides. This project is considered among the most successful in innovating Albanian agriculture creating conditions for further technical and organizational innovations.

The innovation contributes to human development in many ways. It harmonizes the economical and social requirements of the people. It is an effective method because: It is low cost so farmers do not have to spend money on expensive chemical insecticides; People get a healthy, organic and infection-free fruit or vegetable.

By applying this method when protecting plants, various food intoxications that insecticide spraying causes to people are avoided. So, the customer gets a very healthy and high quality fruit or vegetable.

Sustainability

In order to ensure that organic agriculture is the answer to sustainability problem, it has to be adapted to the local farming, social, geographical and climatic factors. The European form of organic agriculture, especially its current market-driven style, is not necessarily the most appropriate system for other countries. The progress made in organic agriculture has increased permanently in the last 30 years.

In the world scale, 37 million hectares are managed in an organic way. It is important to emphasize that the top 10 countries proceeding with organic agriculture are the 10 smallest countries (Austria, Denmark, Switzerland etc.). This is so because organic agriculture is a survival element for farmers in open trade economy. Albania is also a small country and it is obliged to develop a qualitative agriculture and to protect the environment in order to be attractive for tourism and agro tourism.

Organic agriculture principles are guides to tailor organic practices to each individual farming location. For example, there will always be locations where certain crops cannot be grown with sustainability or economically using the current range of organic methods. The more is known about environmental, social and economic performance of organic agriculture in a growing range of settings, rational decisions can be made about the prospects and limitations of organic agriculture and general requirements for success can be identified. It could be expected that settings similar to those found in Europe where organic



agriculture was originally developed would be the most suitable. However, low-input systems in remote locations with marginal environments have also been found to be well suited to organic agriculture.

In many countries, organic agriculture has affected most areas of agriculture and food production. It has been adapted to local conditions, both social and agronomic, to produce viable sustainable farming strategies. This has resulted in a multitude of sustainable and profitable organic enterprises emerging around the world showing that organic agriculture can have a central role in ensuring that agriculture becomes fully sustainable.

Advantages

Biological agriculture is the best combination in both worlds of organic and conventional agriculture oriented towards increasing soil humus levels and improving the vitamin and mineral levels of our food. It is a natural sciences approach based on chemistry, physics biology and microbiology using sound agricultural management practices. The first fundamental of biological farming is to consider people: their health and well being as a function of the food and environment that we produce in farming. The second fundamental is valuing the soil and its biology as the basis for all fertility.

Applying biological agriculture perspectives and methods results in:

- Higher mineral and antioxidant levels in produce
- increased soil fertility, yields and storability
- reduced erosion, fertilizer use, and leaching
- Fewer insect, weed and disease pressures.



THE INNOVATION IN PRACTICE

The study was carried out in Ishmi village 20 km to the north of the city where I live. The experiment was carried out in a vineyard which is managed in an organic way for 7 years. The soil is fertilized with organic manure, 20 tons per hectare between the plants and it is planted with (*Vicia faba*) between the roses for green manure. The products with copper and sulfur bases and pheromones for monitoring and controlling of grape moth were bought. The control of fungi diseases will be made according to the *prognosis system*.

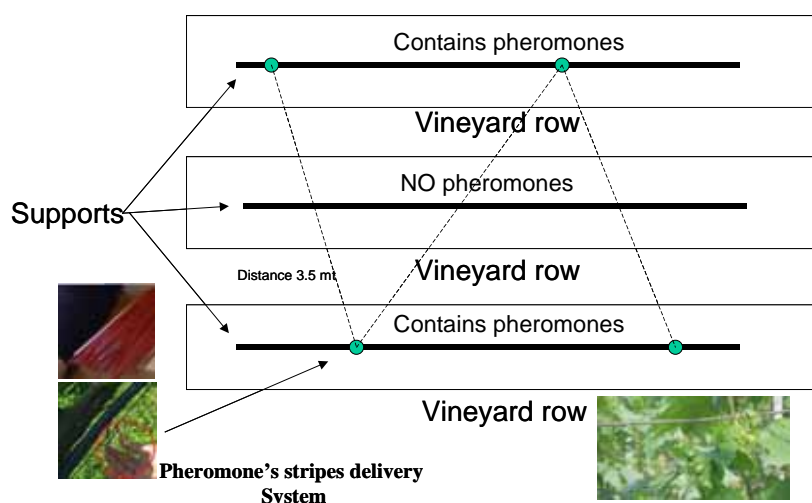


Preparation and placement of pheromones

In first half of April the treatments were made according to monitoring of diseases with electronic equipments (RIM Pro program). Later the treatments were done against (*Plasmopara viticola*) downy mildew.

During the seasons the control of downy mildew was combined. The quantity of copper during the season was not more than 4 kg/ha in order to respect the EC standard. The pheromones were hung in the vineyard on the 28th of April 2012.

VINEYARD TRIPLET, PHEROMONES PLACEMENT METHOD



Scheme 1

They were hung in the second string of the vineyard row, for every 5-6 meters a new pheromone is hung. No pheromones are hanged in the middle block (refers to a block of the vineyard which doesn't contain pheromones but is contained between two other blocks which contain pheromones) but his is replaced by the hanging of pheromones in the two outer blocks of a specific triplet (Scheme 1).

Regarding the distance between rows that is 2 meters we can calculate that a pheromone actively protects 25-30 m² of vineyard. For the protection of the grape from oidium we use a sulfur base product Microthiol (80% sulfur). The protection of the grape from (*Plasmopara viticola*) is done using the copper product "Putiglio Bordoleze". The removal of the weeds is done by the cultivation of the land. In the conventionally managed vineyard the cultivation is done using conventional

fertilizers like Urea, Nitrate and Diamonium Phosphate.

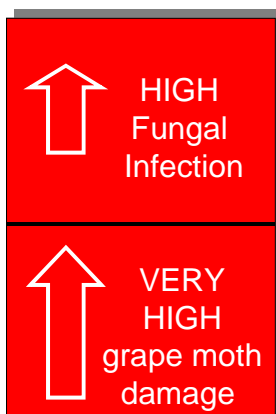
Method Development

Two vineyards were used to conduct the experiment. The first one is a 7 year-old organically managed vineyard and the second one is a 10 year-old conventionally managed vineyard. Land manuring in the organically managed vineyard was made by using organic manure, 20 ton/ha and green manuring was done with *Vicia faba*.

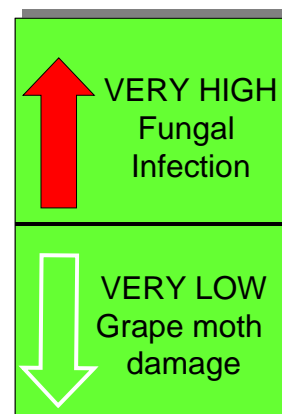
During the vegetative period the organic product "Herbagreen" was used, this organic manure is obtained from the plants leaves by spraying.

The protection of the plants from the grape moth (*Lobesia botrana*) was done by using confusion pheromones (ISONET L), 500 pheromones/ha. The interactive matter originates from Japan and the formulation is done by the biofactory "Andermat Biocontrol" Switzerland

CONVENTIONAL



ORGANIC VINEYARD



Scheme 2

Method evaluation by biosensors

To evaluate the method, soil health was considered as the number of earthworms (*Lumbricus terrestris*) in a defined volume of soil exactly counted, the amount of humus for a defined volume of soil was also measured, and chemical analyzes of the soil were conducted. The quantity of earthworms (*Lumbricus terrestris*) as main living organism in the soil is eight time higher in the soil in vineyard managed in an organic way or concretely: (8 *Lumbricus terrestris* for m² in organic vineyard and only 1 *Lumbricus terrestris* for 1m² in the vineyard managing of conventional way). That is so, because the inputs used in bio-vineyard are much more friendly in comparison with the inputs used in conventional vineyard.

RESULTS

It was concluded from experiments and analyses that the vine has been protected from fungal diseases and grape moth (*Lobesia botrana*) in a very efficient way in both systems. Considering the fungal infections in leaves and truss, the following scale of infection can be concluded. Comparison between results obtained from the two vineyard is shown in Scheme 2.

The fungal diseases in the organically managed vineyard are a little higher than those managed conventionally, but the same cannot be said about the damages made by the grape moth (*Lobesia botrana*) where the organically managed vineyard is almost immune because it is carefully treated with confusion pheromones while in the conventionally managed vineyard the grape moth is treated by using common conventional insecticides.

Plant protection

The biotechnological method with confusion pheromones has protected the production better than chemical

Production systems	Fertilization	Protection from <i>Oidium</i>	Protection from (<i>Plasmopara v.</i>)	N° Treatment	Protection from (<i>Lobesia botrana</i>)	Infection
Organic vineyard	Organic manure & Green manure with the plant (<i>Vicia faba</i>)	Microthiol (3 treatments)	Putilio bordoleze (3 treatments)	6	500 pheromone/ha (ISONET L)	2
Conventional vineyard	Diamonium Phosphate & Urea	Falcon&Folicur (2 treatments)	Melodi Combi Mikal Flash (3 treatment)	5	Deltamethrin Calipso	11

insecticides. Infection from grape moth larva was 2 % at bio-vineyard and 11 % in conventional vineyard as shown in table above as 2 % at bio-vineyard and 11 % in conventional vineyard as shown in table above.

Soil fertilization : The quantity of macro (NPK) and microelements (Mg) in the soil are in every case higher in bio-vineyard than in conventional vineyard .The organic mater (humus) is higher in bio-vineyard than in conventional vineyard, respectively 1,7 and 1,4 %.

Environment impact:

Efficiency of the farms in two agricultural systems: One litre of wine produced with bio-grape origin is sold 5 Euro /litre and of wine and conventional wine is sold 3-4 Euro for litre.

INTERNATIONAL INTEREST

Implementation in the practice of confusion pheromones against key pest grape moth (*Lobesia botrana*) in vineyard has convinced some donors to support the grape producer to give up conventional insecticides and to use bio technical methods with confusion pheromones. Swiss Government and Institute for Organic Agriculture (FiBL), Switzerland have given and continue to give a good support for Albanian farmers.

Recently the innovation was evaluated and presented in Hong Kong, Special Administrative Region of the People's Republic of China in October 2012. The project was awarded with the third prize (<http://www.hkisf.org/portal/en/>).



TO KNOW MORE

Authors invite readers to deepen their knowledge about their innovation by consulting the following on-line references and bibliography:

- “Okologischer Weinbau” Author: Hoffman.Kopfer. Werner
Description: German book about organic vineyard.
- “Prodhimi i rrushit biologjik” www.ibb.al
Description: Albanian technical brochure about the production of organic grape.
- “Prodhimi i molles biologjike” www.ibb.al
Description: Albanian technical brochure about production of organic apple.
- “Prodhimi i domates biologjike” www.ibb.al
Description: Albanian technical brochure about the production of organic tomato.
- “Prodhimi i patates biologjike” www.ibb.al
Description: Albanian technical brochure about the production of organic potato.
- “Prodhimi i ullirit biologjik” www.ibb.al
Description: Albanian technical brochure about the production of organic olive.
- www.infonet-biovision.org/res/res/files/488.OrgFarm.pdf
- “Mjedisi shtepia jone e perbashket” Author: Enver Isufi
Description: Albanian book about ecology.
- www.publish.csiro.au/samples/OrganicAgSample.pdf
- <http://agritech.tnau.ac.in>

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