1. Agricultural practices: Durabile vs. conventional.
Requirements for adaptation to vine and wine production

Understanding the short-term and long-term impact of agricultural practices: conventional vs durable (including organic and biodynamic).

Understanding the need for durability in the vine and wine sector.

2. Principles of organic viticulture

Understanding the main concepts and principles of ecological cultivation of grapes.

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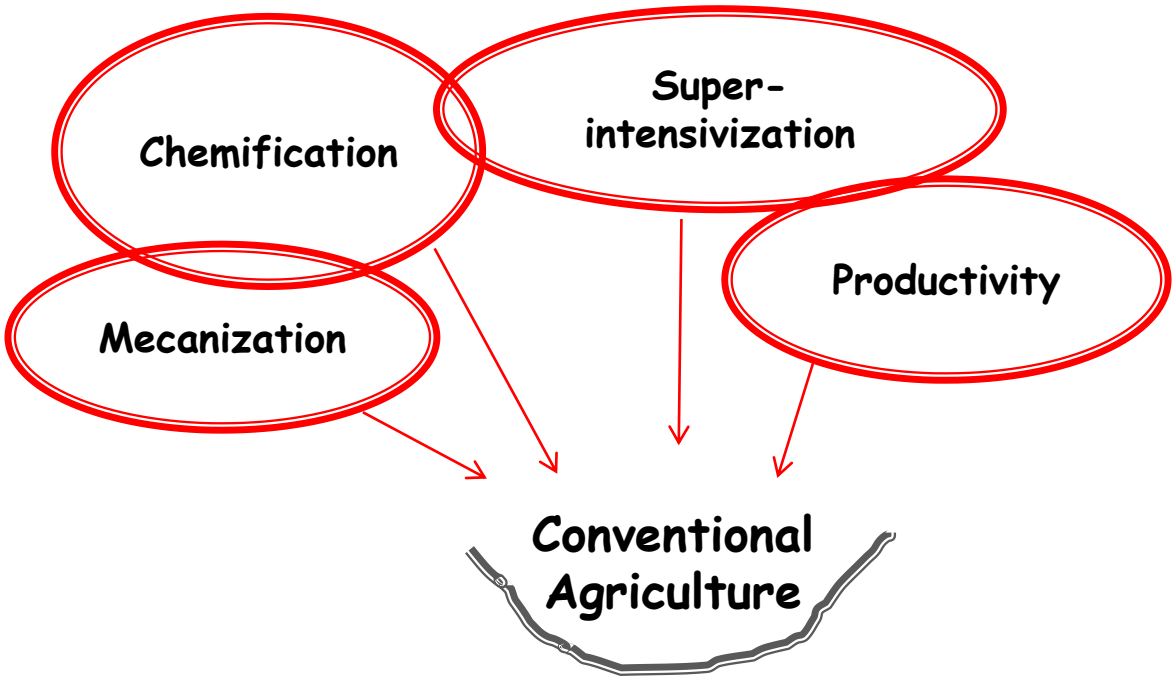
PRINCIPLES OF ORGANIC VITICULTURE

Conventional Agriculture ► usual or traditional practices, based on the intensive use of **chemical and energetic inputs**, typical for large farms, contrasting with alternative or durable agricultural practices.



Examples of conventional practices:

- deep tilling and furrowing of soil
- frequent use of pesticides
- use of synthetic fertilizers
- use of herbicides.

Examples of durable practices:

- limiting the number of soil works
- doing more than one work in one pass with the machine
- integrated pest management
- using manure, green fertilizers, composts for soil fertilization, instead of synthetic fertilizers.

Intensive conventional agriculture – characterized by high inputs, specific to large plantations, on leased plots or the land of associations led by trained specialists with management experience who tend to produce for the market.

Conventioal agriculture with low inputs – practiced in small households and in small associations (with or without legal personality) with limited material resources, which produce mainly for self-consumption and less for the market.

Why do we need to look at *durable agricultural practices vs. conventional practices?*

What did not or does not work right in conventional/traditional agriculture/viticulture?

What are the techniques that we want to adopt?

- Protecting the environment
- Maintaining natural balance
- Maintaining soil fertility
- Obtaining valuable products with biological and hygienic properties which do no affect the health of consumers.

„Human beings are at the center of the effort for durable development and maintaining of biodiversity. They have the right to a healthy and productive life in harmony with nature".

The progress of mankind is based, in general, on new discoveries in technical and scientific areas.

Sometimes, though, the development of human society requires the reactivation of some older technological systems, as in the case of organic agricultural practices. They may be older but they are the only ones efficient in solving serious problems related to health and environment. (Toncea, 2002).

Terminology

According to Regulation (EC) 834/2007 of the Council and Regulaton 889/2008 of the Commission, EU member states use the following terms, with the same meaning:

Organic agrculture → Anglia, Cyprus, Ireland, Malta (and UK)

Biologic agriculture → Austria, Belgium, Bulgaria, France, Greece, Italy, Luxemburg, Netherlands and Portugali.

Ecologic agriculture → Denmark, Lithuania, Poland, ***Romania***, Spain, Slovenia, Sweden and Hungary.

Some countries use two expressions at the same time: both ***biologic agriculture*** and ***ecologic agriculture*** (Czechia, Estonia, Germany, Letonia, Slovakia and Spain).

Short history of the movement towards ecologic agriculture

The theoretic foundation of ecologic agriculture was established between 1920 – 1960, immediately after the start of agricultural industrialization (Papacostea, 1981; Stoian, 2005) and the start of the "green revolution", by Rudolf STEINER in Germany, founder of the concept of "**biodynamic agriculture"**.

Biodinamic agriculture (1924) is based on obeying the natural laws of life and of the unity soil - plant - animal - human, the greatest importance being granted to "vital forces".

This movement was promoted by Rudolf STEINER and Ehrenfried PFEIFFER in Germania, forming the basis of "anthroposophy", a way of thinking that stresses «human intelligence as part of the divine wisdom and universal reason».

Organic agriculture (1940) appeared in the United Kingdom, after the second World War, and is based on the use of organic fertilization exclusively.

This movement attributes humus a fundamental role regarding biological equilibrium and soil fertility. Its founder, Sir Albert HOWARD, presented his theoy in "An Agricultural Testament", published in 1940.

In Switzerland H. MŰLER presents the concept of „organo-biologic" agriculture.

In France LEMAIRE C. and BOUCHER J. establish a school of "biologic agriculture".

In Romania the founders of the concept of ecologic agriculture were PAPACOSTEA P. - author of the first Romanian scientific work „Agricultura biologică" and TEACI D., PUIA I. and SORAN V. - authors of the concept of „Agroecosistem".

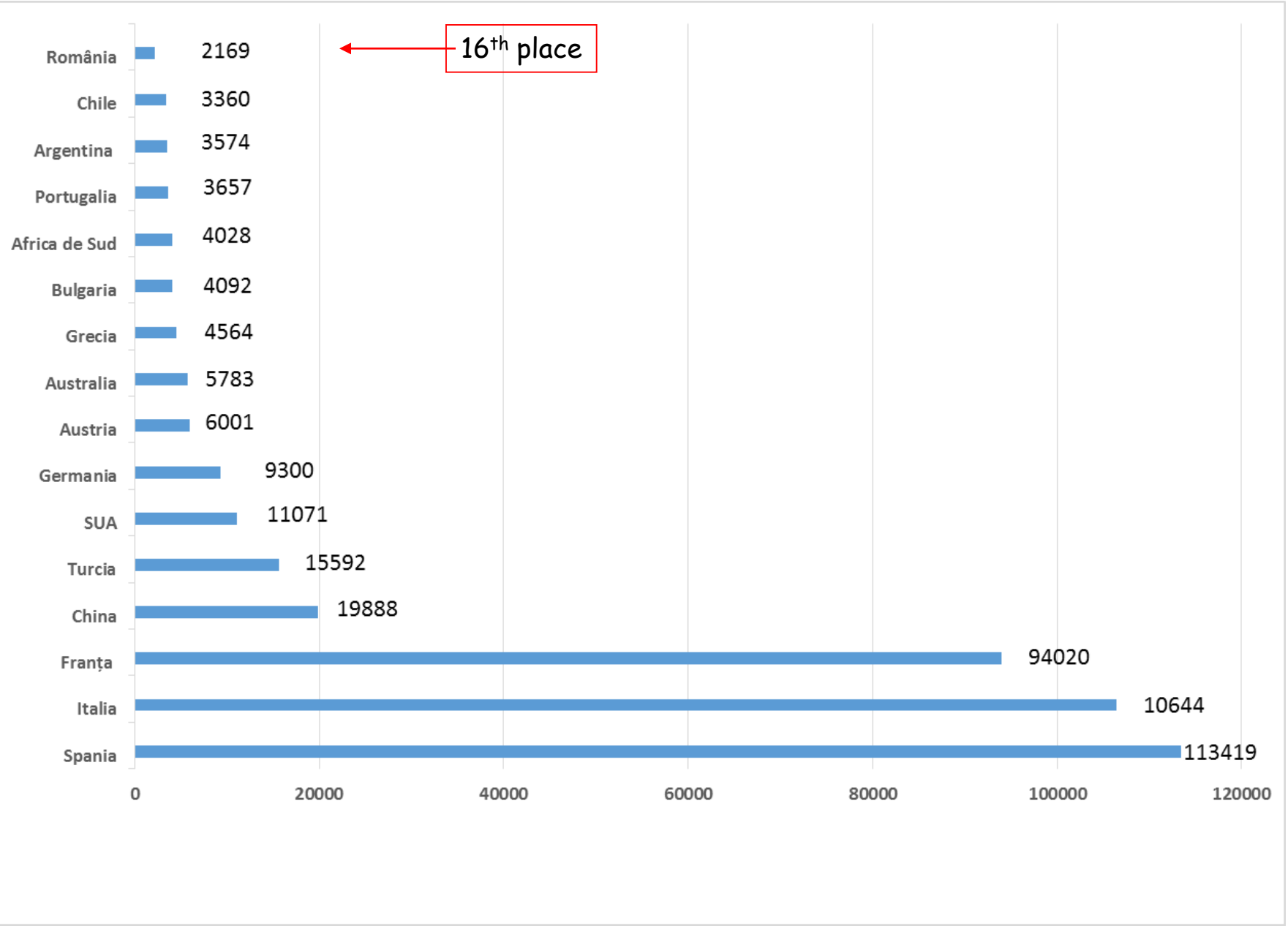
Ecologic agriculture 1970/1972. The principles of this concept were disseminated after the second world war by consumers and doctors preoccupied with the effects of food on human health.

► In 1972 in Versailles: establishment of the International Federation of Organic Agriculture Movements (IFOAM).

► In 1991 the EU adopted an regulation that establishes ***the methods, labelling and control of agricultural products obtained on the basis of an organic production process*** (Regulation CEE 2092/91).

According to this regulation, the ensemble of the filieres of production, transformation and import of organic products is subjected to the same rules in all EU member states.

Surface cultivated with organic grapevines in the main viticultural countries in the world (2018, ha)



Durable agricultural practices came before ecologic/organic ones.

Sustainable development, according to the potrivit Brundtland Report (1987) of World Commission on Environment and Development (WCED), is development that ***„considers the needs of the present, without compromising the capacity of future generations of satisfying their own".***

Durable agriculture

- an agricultural system that is environmentally friendly, economically viable and socially responsible.

- responds to the needs of people to produce constantly the required amounts of quality food and prime materials for industry, without affecting the equilibrium and biological diversity of the planet.

Durable agriculture integrates three important principles:

► ***health of the environment***

► ***economic profitability***

► ***social fairness.***

Agriculture ensures the durability of the environement when it:

► maintains in time the quality of soil, water and atmosphere;

► does not contribute to the reduction of the availability of non-regenerating resources;

► does not reduce biodiversity.

Agriculture is economically durable when:

► producers obtain easily a fair profit from their activity;

► consumers pay a fair price for the products they purchase and the income thus obtained is distributed fairly according to the labour provided and the risks taken.

The social aspect of durability is ensured when :

► the products obtained are benefic for the health of the consumers and help maintain rural communities;

► rural landscape is pleasant;

► the system allows agricultural workers to maintain a decent social level.

The main **characteristics of durable agriculture** refer to:

- Minumum impact on the environment, without releasing toxic and harmful substances in the atmosphere, and surface and ground water;
- Maintaining and repairing soil fertility, preventing erosion;
- Using water in such a way as to allow ground water layers to regenerate and not interfering with other social uses of the water;
- Must rely mainly on internal resources of the system and promote substance recycling;
- Preserving biological diversity in fauna, flora and microorganisms;
- Guarantee easy access to suitable technologies;
- Using local resources and minimize the use of non-regenerating energy.

According to the definition given by the International Wine and Vine Organization (2008) **"DURABLE VITICULTURE"** represents a system for the production and transformation of grapes which ensures:

► economic durability of structures and land

► obtaining quality products while observing the risks related to environment, product security and consumer health

► valorizing aspects regarding patrimony, history, culture, ecology and landscape.

Objectivs of durable viticulture:

- producing grapes and wines that correspond to the requirements from consumers,
- protecting the health and security of consumers and producers,
- using cover crops (long time grass cover, green fertilizers),
- extending organic fertilization,
- avoiding excessive nitrogen,
- reducing pre-emergent herbicide use
- monitoriing pests and using damage thresholds,.
- releasing predatory arachnoids,
- extending integrated pest control,
- efficient management of wastes and effluents,
- maintaining and valorization of viticultural landscape.

Accomplishing these objectives will lead to the improvement of the lifestyle of viticultural workers, but also the to improvement of society as a whole.

Durable viticulture requires

action for reducing the impact on environment, mainly on:

Landscape

Soil:
-erosion,
-Structure destruction,
-compacting etc.

Nearby bodies of water :
- contamination, eutrophication,
- flooding etc.

Viticulture and the problems of present-time world. Elements which prove the need to adopt durable and ecological practices

- ►population growth
- ►energy and prime materials crisis
- ►environment problems
- ►climate warming
- ►globalization

Conventional viticulture

→ **Durable viticulture**

→ **Ecological viticulture**

Population growth:

2007 – 6.7 billion people

2020 – 7.6 billion people

2050 – 9.4 billion people

– more agricultural products needed

– role of vine/wine products in human diet

– improvement of life quality

Crisis of energy and basic materials:

– highly intensive character of viticulture

– energy is more and more expensive

– need to save energy

► possibilities of cutting down energy consumption:

-phytosanitary protection

- herbicides
- fertilization
- irrigation

Conventional agriculture is an intensely energy-consuming system, costly for the society, with a potential to damage the environment and the health of people.

Environment problems

The use of unreasonable cultivation systems has caused the deterrioration of the environment by:

- polluting the soild and lowering its fertility,
- polluting the water,
- polluting the atmosphere,
- lowering yields.

Environment problems:

- the continuous reduction of the humus content,

- the soil errosion:
  - annuale losses caused by errosion:
    - 10 million tons of soil which contains:
      - 1.5 million tons of humus
      - 500 000 tons of NPK
  - unreasonable use of sloped terrain

- large scale use of chemical methods for fighting diseases, pests and weeds:
  - high consumption of pesticides (especially fungicides) in viticulture, compared to other sectors
  - distribution of pesticides:
    - plant
    - soil
    - atmosphere

!!! Need to observe the timing, dosage and interval from the last treatment until harvesting of grapes

- unreasonable irrigation,

- compacting of soil as a result of mechanized works at bad moments,

- unreasonable use of chemical fertilizers:
  - excess of nitrogen – exceeding concentrations of **nitrates in ground water, grapes, wines**
  - 1995 → „Laboratory of Water Hygiene in the Institutul for Public Hygiene and Health Bucharest":
    - ► 36.3% of the investigated wells (located in 92% of the communes of Romania) contained nitrates above the maximum acceptable concentration for drinking water.

Viticulture has seen progress too…

Viticulture as a de-polluting agent:

- viticultural plantations:
  - hydrogeologic stability
  - obstacle in the way of flows and erosion

!!!

- recycling of waste from vine and wine (coarde, vârfuri de lăstari, tescovină) and other organic waste from the household (leaves, straws, food waste).

Climate warming stems from the **greenhouse effect**.

► physico-chemical phenomenon which results from the presence in the atmosphere of gases that absorb infrared radiation emmanated by the surface of the earth.

- greenhouse effect gasses:
  - carbon dioxide (63%)
  - methane (19%)
  - nitrogen oxide (6%)

- rising of average monthly temperatures in summer and winter

- diminishing precipitations, especially in summer

- shortening of transition seasons (spring and autumn),

- increase of the frequency of extreme weather phenomena (strong wind, tornades, scorching summer days, floods etc.)

■□ **Causes of climate warming:**

– human activity, especially industrial, with emanation of greenhouse gasses, especially CO_2 (burning fossil fuels, faulty management of waste)

– destruction of forests, massive deforrestation

– agriculture activity

– increase of ultraviolet radiation levels (UV–B) due to the thinning of the ozone layer in the stratosphere.

Prognosis for this century:

– doubling of the CO_2 concentration in the atmosphere

– the increase of the average temperature at surface level by approximately 1-4.5°C.

■□ Possible effects of climate changes on the grapevine:

- improvement of the quality of the production (sugar, anthocyans, aromas)

- sliding towards the North of the limits of cultivation for grapevine (by 10-30 km until 2020 double this rate between 2020 and 2050)

- grapevine growing at higher altitudes

- diversification of the assortment (red wine varieties become suitable for Transylvania and Northern Moldavia)

- extending the cultivation of Mediterranean-origin valuable varieties (ex.: Syrah)

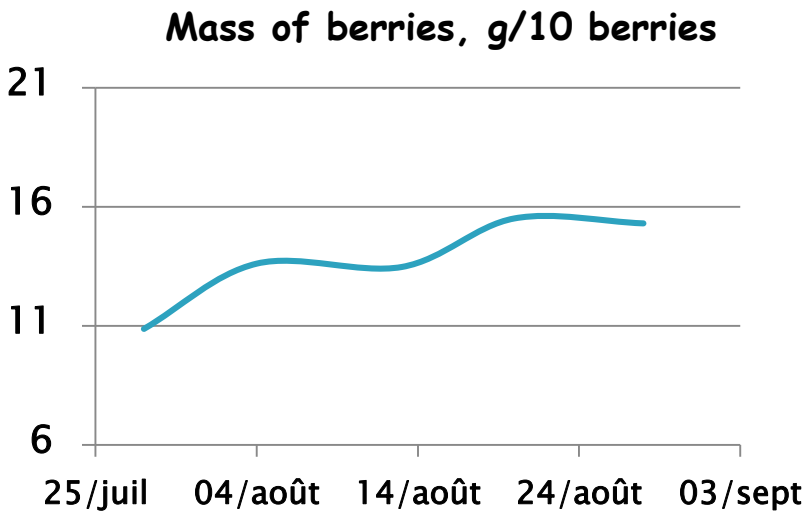
- **faster phenophases** (ripening of grapes 2-3 weeks sooner)

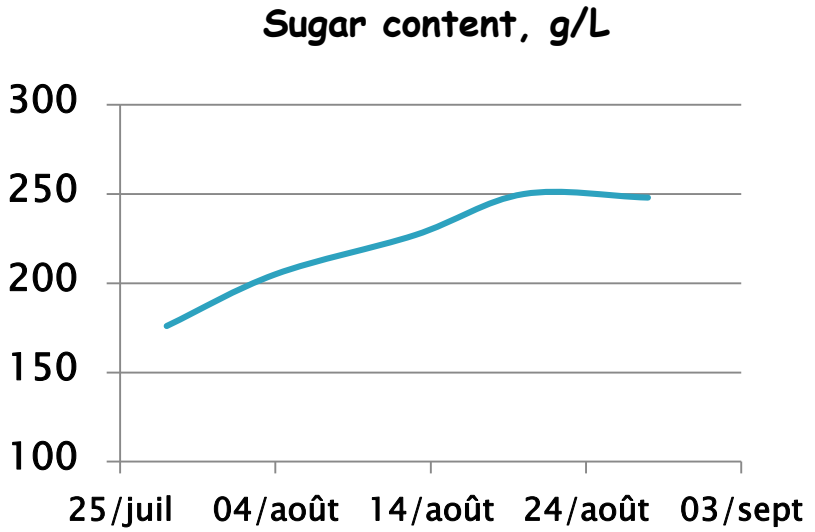
- insufficient acidity of grapes, when ripen, for some varieties

- need to adapt some technological steps to the characteristics of the year:
- - încărcături de ochi,
  - operaţii în verde,
  - phytosanitary treatments,
  - soil maintenance,
  - irrigation.

!!!

Fetească neagră - Bucharest, 2019





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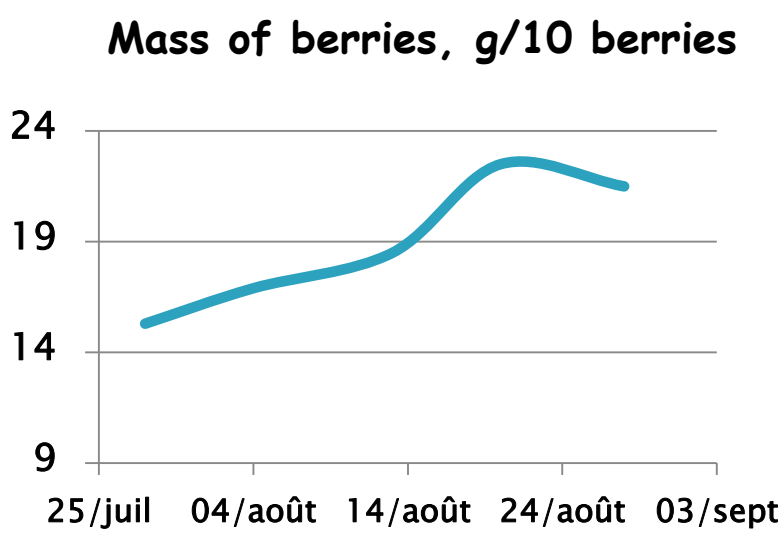
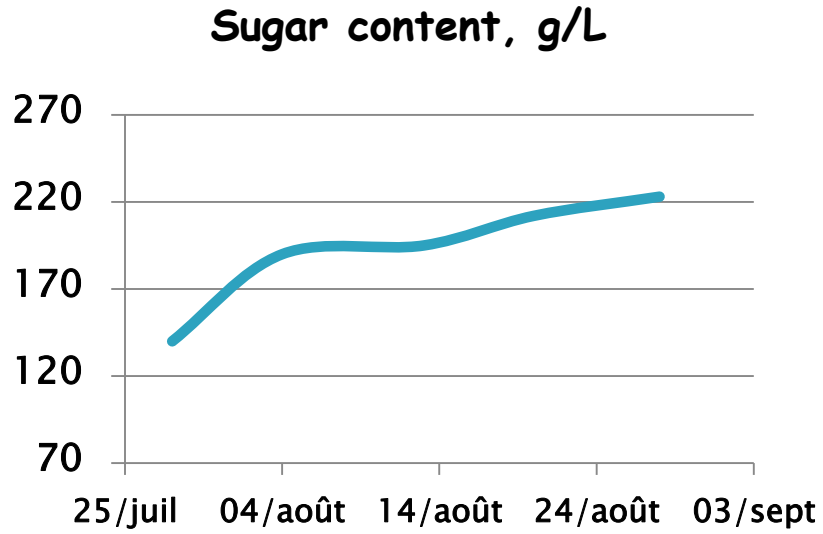
Fetească regală - Bucharest, 2019





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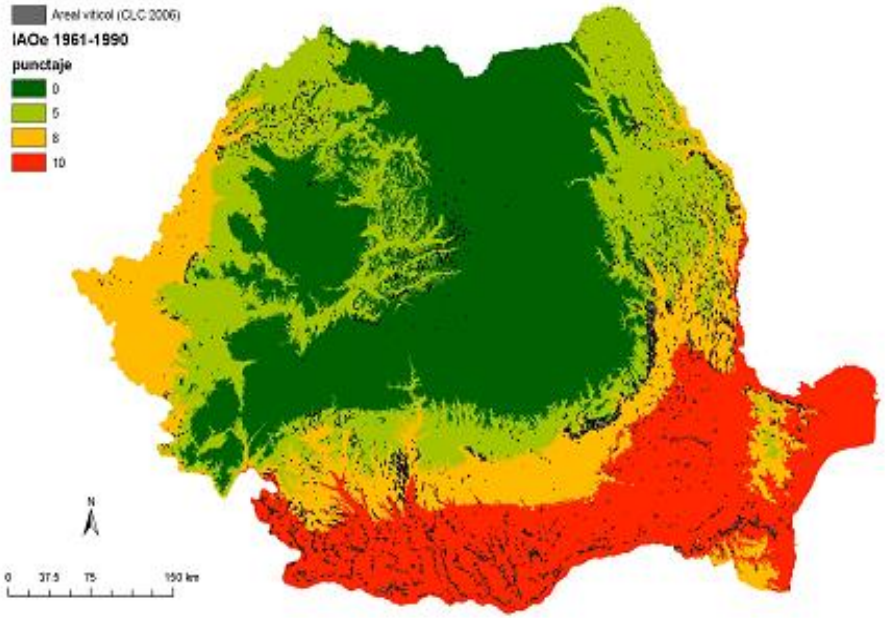
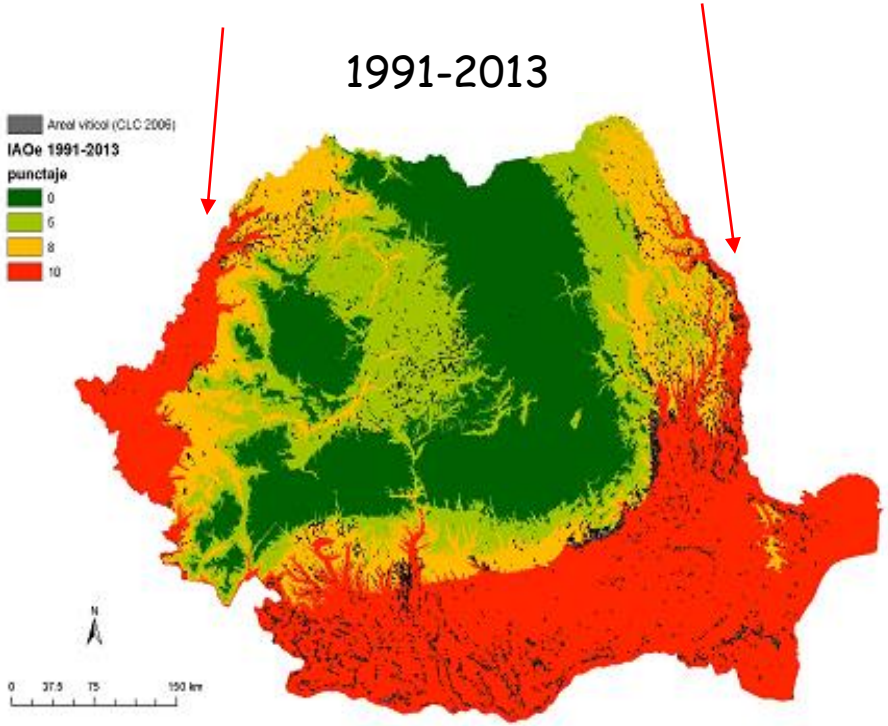
Oenoclimatic aptitude index (IAOe) describes the degree of climatic suitability of a region for the production of red wines, that is the possibility of synthesis of anthocyans in the grape.

The cultivation range for varieties for quality red wines has been extending.

1961-1990



1991-2013



after Irimia L.M., 2014

Globalization – increasing circulation of capital, goods, services, persons and information and technological knowledge.

► intense exchange of technological information within the whole viti-vinicultural world and the appearance of large firms specialized in the production and commercialization of wines;

► in the past, demand and supply were concentrated in the traditional producing countries (France, Spain, Italy etc); the areas for production and consumption gradually extended and new supply appeared (Australia, New Zealand, South Africa, Chile etc) as well as demand (especially from Northern regions).

The demand – The annual wine consumption) stayed relatively constant during the last 10 years, reaching 244 million hl in 2019;

♦ consumption decreases in traditional producing countries and rises in new consuming countries (North America, Asia);

♦ approximately 90 % of the world wine consumption is done by 25% of the world population; 15 countries make up 80% of the market.

The supply – depends on: cultivated surfaces, production obtained, regulations in the field, behavior of investors and companies.

♦ surfaces cultivated with grapevine in the world decreased by 25% during the last 30 years (stable at 7.4 milioane ha in recent years), as a result of shrinking surfaces in EU (by 34%). At the same time starting in the '90s, New World countries adopted strategic programs for the development of vine and wine production.

For hundreds of years viticulture contributed to:

- Increasing the diversity of species and habitates,
- Balanced use of biological systems and natural resources,
- Careful presence and behaviour of humans in the land,
- Preserving the environment.

... **Until it became intensive**, and the reverse happened:

⇨ biodiversity decreased,

► productivity increased very much → excedent of production in many countries,

⇨ loss of soil fertility and therefore the need to replace biological systems with chemical interventions.

All these led to:

- biological imbalance
- degradation of the environment

THE ALTERNATIVE ??

- DURABLE VITICULTURE
- ECOLOGIC VITICULTURE

ECOLOGIC VITICULTURE

***Ecologic viticulture* as defined in the European Union means:**

►a cultivation system aiming to valorize and maintain productive biological systems without making use of synthetic chemical substances.

OBJECTIVES of ecologic viticulture:

►conservation and increasing of soil fertility by use of adequate cultivation techniques and refraining from using synthetic fertilizers;

►cultivation of healthy, resistant plants, without treatments with organic herbicides, insecticides, and fungicides, with dangerous effects on the ecosystem;

►using pollutant-free materials and residual products and large scale use of recycled products;

►reducing contamination of water with nitrates, phosphates and pesticides;

►promotion and increase of diversity of species of plants and fauna within the viticultural ecosystem;

► avoiding genetically modified plants;

► obtaining high quality wines;

► ecologic viticulture contributes to the diversification of the wine assortment;

► it provides jobs, as the cultivation practices specific to ecologic viticulture require continuous monitoring of the plantations, rational interventions and certain manual operations, and the labour required is of a higher level compared to that in conventional viticulture.

PRINCIPIILE agriculturii/viticulturii ecologice

după Federaţia Internaţională a Mişcărilor de Agricultură Organică (IFOAM):

Principiul sănătății	➢ să asigure şi să îmbunătăţească starea de sănătate a solului, plantelor, animalelor, oamenilor şi a întregii planete, **ca tot unitar şi indivizibil.** ➢ să susţină şi să sporească sănătatea ecosistemelor şi a organismelor de la cele mai mici din sol până la fiinţele umane; ➢ să producă alimente de o înaltă calitate, hrănitoare, care să contribuie la prevenirea îmbolnăvirii și protecţia sănătăţii oamenilor, precum și la bunăstarea acestora.

Ecologic principle	➢ it is based on living ecologic systems and cycles, works with them and attempts to stimulate and support them; ➢ inputs must be reduced by reusing, recycling and efficiently manage materials and energy, with an aim to improve quality of environment and to preserve resources. Ecologic vitivcultural systems must correspond to ecologic cycles and balances in nature.

Principle of fairness	➢ relations must be built which ensure fairness towards the environment and living conditions; ➢ human relations must ensure fairness at all levels and among all participants to the production process – farmers, workers, processors, distributors, traders and consumers. **Fairness, respect, justice and consideration for the world around**, regarding relations among people but also relation between humans and other living creatures.

Principle of administration / caution	➢ activity must be carried out in a cautious and responsible manner so as to protect the health and welfare of present and future generations as well as the environment; ➢ cautiousness and responsibility are key issues in the management, development and technological choices in ecologic viticulture.

The ecologic production is recognized in the world as being:

→ A durable strategy (long term productivity)

→ A strategy that helps differentiate products

→ A modern approach of viticulture matching the preferences of post-modern consumers and the requirements regarding product quality and environment issues.