Development and potential of fruit culture in mountain environment: some experience in alpine areas

GIUGGIOLI NICOLE ROBERTA
DISAFA -nicole.giuggioli@unito.it

ITALY

(30 132 858 ha)

Mountain

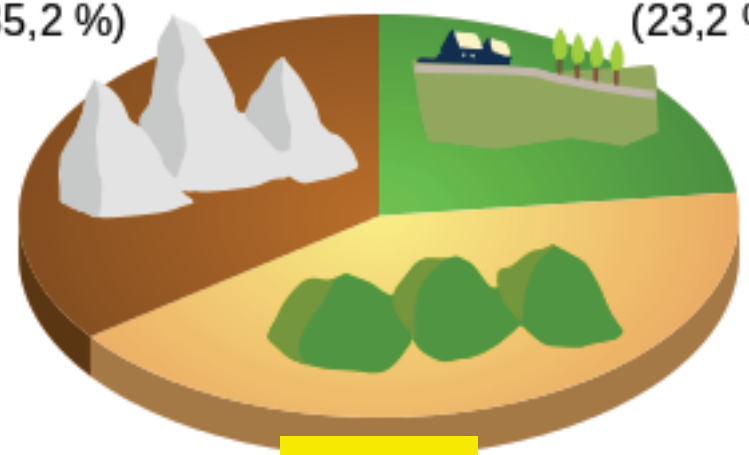
10 611 208

(35,2 %)

Plain

6 978 265

(23,2 %)



Hill

12 543 385

(41,6 %)

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Fruit industry in Italy is spread N/S along the Peninsula for over 1300 Km and 10°N range in latitude.

Different climatic zones:
- **Temperate**
- **Mediterranean**

allow to have one of Europe's most varied fruit industries.

The tradition of cultivating fruit and nut species has a long success story in Italy, originating from the Roman Empire and passing through the Middle Ages and Renaissance.

The modern fruit industry includes fresh market (85%) and processing (15%) generating 3,900 million euro/year. Within the current fruit exports (about 2,000 million euro) pome fruit, kiwifruit, table grape and peach are the main contributors, although orange exports are expanding rapidly.

Commercial scale fruit growing includes integrated and organic crop management programs. Pre-cooling, normal and controlled atmosphere, and a range of packaging extend the shelf life of high quality commodities. Supermarket chains control about the 30% of the market, but the tendency is to extend the control to about the 50%, such as in Central and Northern Europe.

From the beginning of the last century, the specialized cultivation of fruit trees was the prerogative of of Italy; olive groves, citrus and almond groves were picking the most of the opportunities offered by the ecological conditions .....

In the North, however, the fruit trees were present in crops promiscuous, in pomari and in the parks and gardens of the Renaissance, in the courts of the patrician villas, in the orchards of the Po valley, in the gardens of the monasteries and hospices…

The MODERN FRUITCULTURE will be established in the north at the end of the nineteenth century, first in the Piedmont hills and terraces in Trentino and after the War on the plains when enterprising farmers, cooperatives and consortia will take place.

Over the past 60 years, the Italian agricultural landscapes have followed two paths, that of 'abandonment and that of specialization.

The first, especially in mountain areas has led to the degradation, landslides .... And sometimes, where the environmental impairments were not excessive, return to nature.

The second, in the most fertile areas, saw the 'emergence of monoculture: systems and landscapes simplified, homogeneous, often consisting of a single plant species ..... An agriculture designed to only pursue economic goals.

(G. Barbera)

Years 1950-1960: GREEN REVOLUTION

- introduction and use of synthetic chemicals

Years 1970: DISCUSSION of the Use of chemicals products

Years 1980: DEVELOPMENT OF INTEGRATED CROP SYSTEM

Years 1990: AFFIRMATION of integrated crop system BUT people start to talk about organic and alternative agriculture. The issue of quality of production is increasing

Years 2000: we talk about INTEGRATED, BIOLOGICAL, BIODYNAMIC, HOMEODYNAMIC .....

We talk about not only of the quality of the product BUT also of the QUALITY OF THE SERVICE.

World, European and Italian fruit and nut production (000 tons)

	World	Europe	Italy	
			Production	% of European production
Pome fruit				
Apple	57,982	15,822	2,370	15
Pear	17,198	3,497	910	26
Stone fruit				
Apricot	2,738	814	200	25
Cherry	1,948	907	116	13
Peach and nectarine	13,413	4,417	1,700	38
Plum	9,142	2,708	170	6
Kiwifruit	926	457	310	68
Nut				
Almond	1,419	442	56	13
Chestnut	540,560	132	70	54
Hazelnut	843	160	122	
Walnut	1,268	293	15	5
Table Grape	12,500	4,620	1,600	34
Table Olive			62,400	
Citrus				
Lemon	11,039	1,613	530	33
Orange	64,712	6,000	1,900	32

The industry generates 3.900 million euro/year.

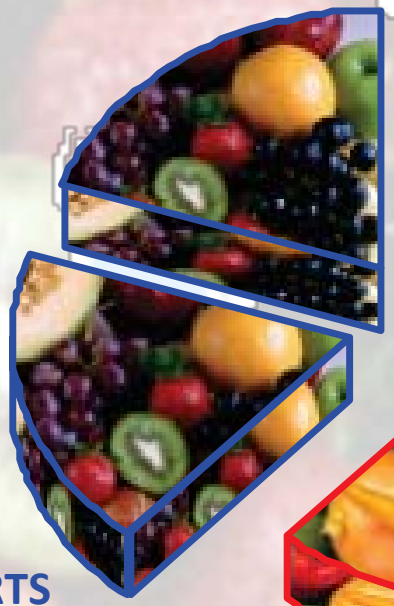
Within the current fruit exports (about 2.000 million euro/year) pome fruit, kiwifruit, table grape, peach are the main contributors.

FRUIT

3.900 Mill. euro/year

EXPORTS

2.000 Mill. euro/year



VEGETABLES

6.200 Mill. euro/year

The definition of fruit mountain takes into account the division that offers ISTAT (national institute of statistics) of the national territory

- *"The territory characterized by the presence of large masses with altitudes, normally not less than 600 meters in northern Italy and 700 meters in central-southern and insular.*

- *These levels can shift in relation to the lower limits of phytogeographic zones of Alpinetum, the Picetum and Fagetum, as well as in relation to the upper limits of the areas of mass culture of the vine in northern Italy and the olive tree in the central southern Italy and the islands.*

- *The areas between the landlocked masses detected, consisting of valleys, plateaus and similar configurations of the soil shall be construed as including in the mountain area."*

The fruticulture in the mountain could be defined as the arboriculture in the mountain areas.

But this definition is limited since it does not include the features of wildlife, landscape and socio-economic aspects that must be taken into account.

The fruit mountain ecosystem is characterized by a number of sets of paths, terraces, flood control works, rural buildings that make up the cultural landscape.

The need to consider cultural property that needs renovation and preservation. As a general cultural good.

THE FRUTICULTURE IN MOUNTAIN AREA IS AN IMPORTANT EXAMPLE OF MULTIFUNCTIONAL ARBORICULTURE

FRUIT PRODUCTION IS ASSOCIATED WITH THE PRESENCE OF BENEFITS AND POSITIVE EXTERNALITIES SUCH AS:

TOURIST SERVICES, RECREATIONAL SERVICES, HEALTHY SPACES, ENVIRONMENTS THAT IMPROVE THE QUALITY OF THE POPULATION.

Altimetric Zone	SAU (ha)	Fruticulture and Agriculture (ha)	Vine (ha)
Mountain	2.945.838 (1/4)	227.951 (13%)	37.1888 (5.5%)
Hill	5.724.795	962.453	386.629
Plain	4.185.414	526.067	240.478
Total	12.856.074	1.716.427	664.296

SUSTAINABLE AGRICULTURE

Production system that meets the needs of the present without compromising the ability of future generations to meet their own needs

Making sustainable natural resources, renewable, sustainable, and then, in order to ensure their reusability

SUSTAINABLE AGRICULTURE

FAMILY MANAGEMENT

BUSINESS MANAGEMENT

AGRICULTURAL SYSTEMS

- CONVENTIONAL

Low sustainability
High Environmental Impact

- INTEGRATED
- BIOLOGICAL
- BIODYNAMIC

High sustainability
High food safety

High Environmental Impact

Local

- Pesticide residues in soil and products
- Nitrate leaching into groundwater (and accumulation products)
- Diseases in agricultural workers

Global

- Pollution production sites and storage of pesticides and fertilizers
- Energy consumption for the production (and CO_2 emissions)

High sustainability

- **Preserve non-renewable resources**
- **Reduce losses and waste**
- **Reduce pollution of agricultural origin**
- **Save human energies**
- **Dissemination of sustainable farming practices**

Cultivation techniques

- Choices plant
  - varietal selection
  - seeding and planting
  - farming systems

- Pruning and vegetation control

- Nutrition
  - water
  - mineral

- Soil Management

- Defense

SUITABILITY

- Respect for the environment-natural genetic resources

- Knowledge of the characteristics of the soils and integration with the same

- Estimation of resources and adjustment of the objectives

INTEGRATED PRODUCTION

Reg. CE 1257/99 (ex-Reg. CEE 2078/92)

- ❑ Study of soil and climatic conditions
- ❑ Choice of variety
- ❑ Watering and fertilizing only to meet the needs of the plant
- ❑ Control of insects and pathogens entering predators
- ❑ Monitoring of environment and product safety
- ❑ Only chemicals included in European regulations can be used

LIMITED USE OF CHEMICALS PRODUCTS

❑ Integrated agriculture is an agricultural production method that makes use of the most modern technique for use in agriculture, **prefers techniques compatible with the conservation of the environment, food safety and quality processes.**

❑ Integrated agriculture promotes the continuous succession of crops on the land and the rhythms of farming that are closest to the ethological needs of the animals, in order to ensure the use of resources.

❑ Integrated agriculture is based on **production rules that involve the entire production chain.**

NUTRITION MANAGEMENT

Distribution of organic amendments to improve the physical-chemical and microbiological characteristics of the soil

Adjustment of contributions depending on the age and the different stages of the life cycle annual or multi-year

Limited amounts and regulated by the knowledge of the nutritional status of the soil

WATER MANAGEMENT

- ❑ Period of administration reasoned
- ❑ Quantity balanced
- ❑ Method of administration

Excess water are negative:

- **chemical fertility of soil: leaching cations and nitrogen transport and below the area explored by the roots ⇒ nitrate pollution in groundwater,**
- **physical fertility: clay deflocculation destruction ⇒ reduction porosity structure and water holding capacity (water available)**
- **biological fertility: predominant anaerobic conditions⇒ denitrification, development of toxic compounds (H2S, NH4, ...); favorable conditions for pathogens**

WEEDS CONTROL

Weed control must be located on the line and should not exceed 50% of the entire

Mechanical means (mowing, mulching, ...)

DISEASE MANAGEMENT

“The integrated protection is a strategy by which keep the populations of harmful organisms below the threshold of tolerance by exploiting the natural mechanisms of regulation and protection methods using acceptable from the point of view of ecological, economic and toxicology”

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MAXIMUM RESIDUE LIMITS (L.M.R.) PESTICIDES

National Regulation

Direttiva 76/895/CEE: fruit and horticultural products

European Regulation

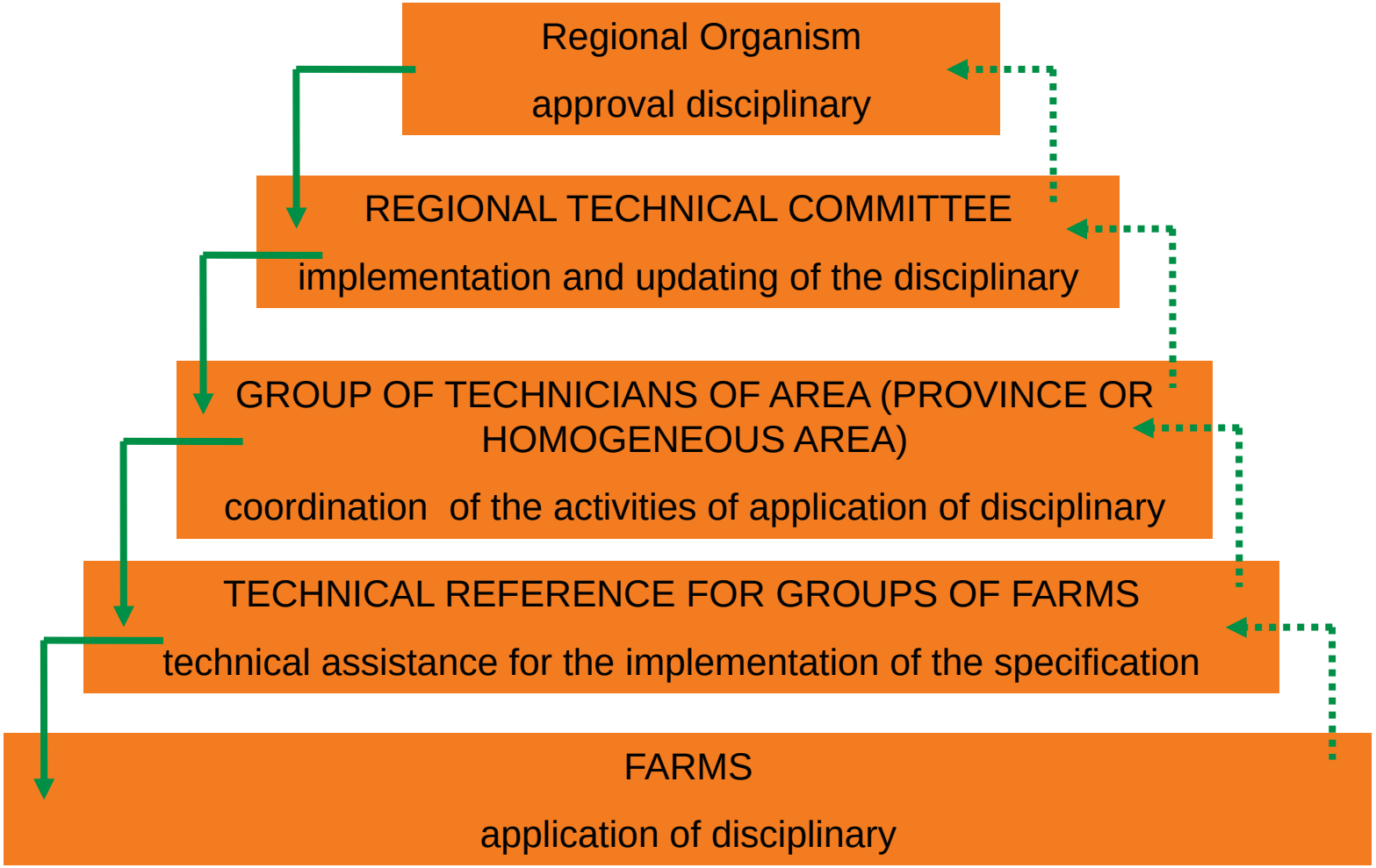
Need to limit the dispersion of chemicals in the distribution phase

APPROPRIATE USE OF MACHINES

… to avoid a negative impact on the environment, the health of the operator, on the quality and safety of agricultural product.

Regulations for the control of machines and risk of drift

Organization to apply the disciplinary of production



BIOLOGICAL CROP MANAGEMENT

Reg. CEE 2092/91

SOIL FERTILITY:

- Rotations
- Manure
- Compost

Agro-industrial residues

Urban residues

PEST AND PATHOGENS MANAGEMENT:

- Rotations
- Choice of variety
- Use of natural predators
- Control of diseases with natural extracts

TOTAL EXCLUSION OF CHEMICALS PRODUCTS

BIOLOGICAL SYSTEM

Agricultural system that adopts techniques that exclude the use of synthetic chemicals and forcing the adoption of systems of agricultural production and food, while respecting the natural and the seasonality of each production region

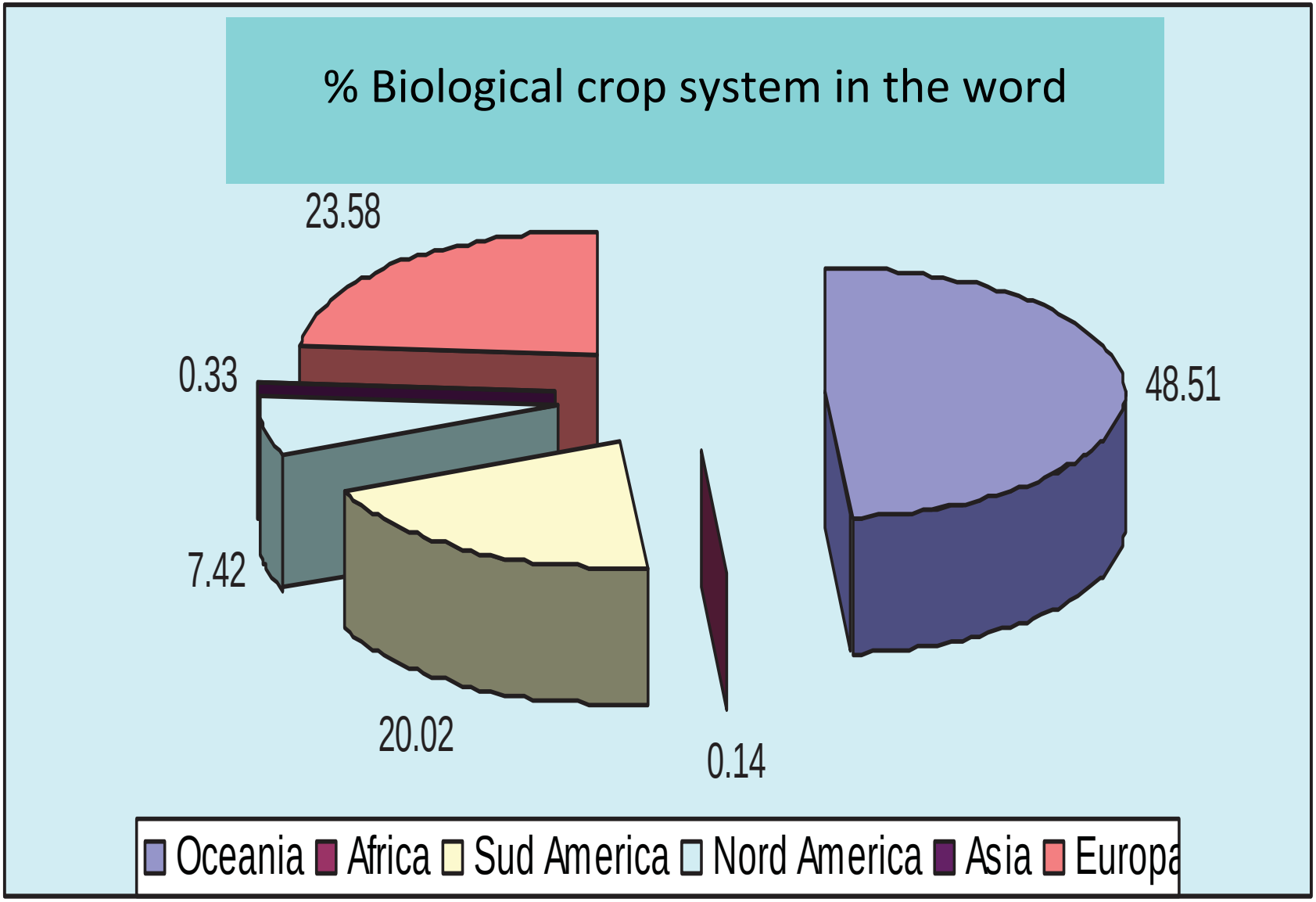
REGULATIONS TO BIOLOGICAL PRODUCTION

- Reg. 2092/91: standards for the production, processing, labeling and importation from outside.
- Reg. 2078/92: farming methods compatible with the environment.
- Reg. 1804/99: extension of the organic production method also to the animal sector

Control Organization

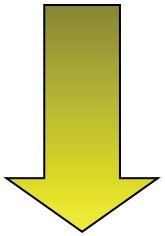
- Verify the method and production, which are in accordance to what has CEE Regulation 2092/91

- On the labels of the products from the organic agriculture, must appear on the label or the name of one of the certifiers


% Biological crop system in the word
23.58
0.33
7.42
20.02
0.14
48.51
Oceania
Africa
Sud America
Nord America
Asia
Europa

Principles of organic agriculture

1. Improve the biodiversity of the agroecosystem
2. Avoid technical means with environmental impact (local and global)



Objectives:

The stability and the sustainability of agroecosystem

The quality of the environment (local and global)

The quality of products

SOIL MANAGEMENT

Intercropping

1. LEGUME-GRASS (fodder)
2. AROMATIC SPECIES
3. PLANTS WITH ACTION OF DISINFECTION
4. STABLE MEADOW IN ORCHARDS (natural, mixed, subterranean clover)

SOIL MANAGEMENT

DISADVANTAGES

- Competition for water and nutrients
- Development rodents

ADVANTAGES

Greater humification

Water retention and nutrient

Protection from stress (mulching effect)

Speed (and cost) of winter work

SOIL MANAGEMENT

Processing

- avoid fast rotary tools ⇒ destroys the structure in clay soils
- avoid deep plowing
- avoid working with too damp soils ⇒ destroys the structure
- avoid periods of hot and dry ⇒ mineralization too fast

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Mineral nutrition soil management

ORGANIC MATTER

- Improves soil structure
- Increase the quantity and the solubility of nutrients
- Increase the water retention
- Increases the cation exchange capacity and the adsorbing power
- It keeps the pH close to neutrality
- Reduces the problems of iron chlorosis
- Increase the biodiversity of soil
- Improves chemical, physical and biological fertility

Mineral nutrition soil management

Mineral fertilizers

- Basic slag
- Aluminum calcium phosphate
- Calcium phosphate
- Crude salt K
- K with salt sulfate Mg
- PK fertilizer
- Sulphate of Ca
- elemental sulfur
- Mg sulfate
- Based fertilizers with microelements

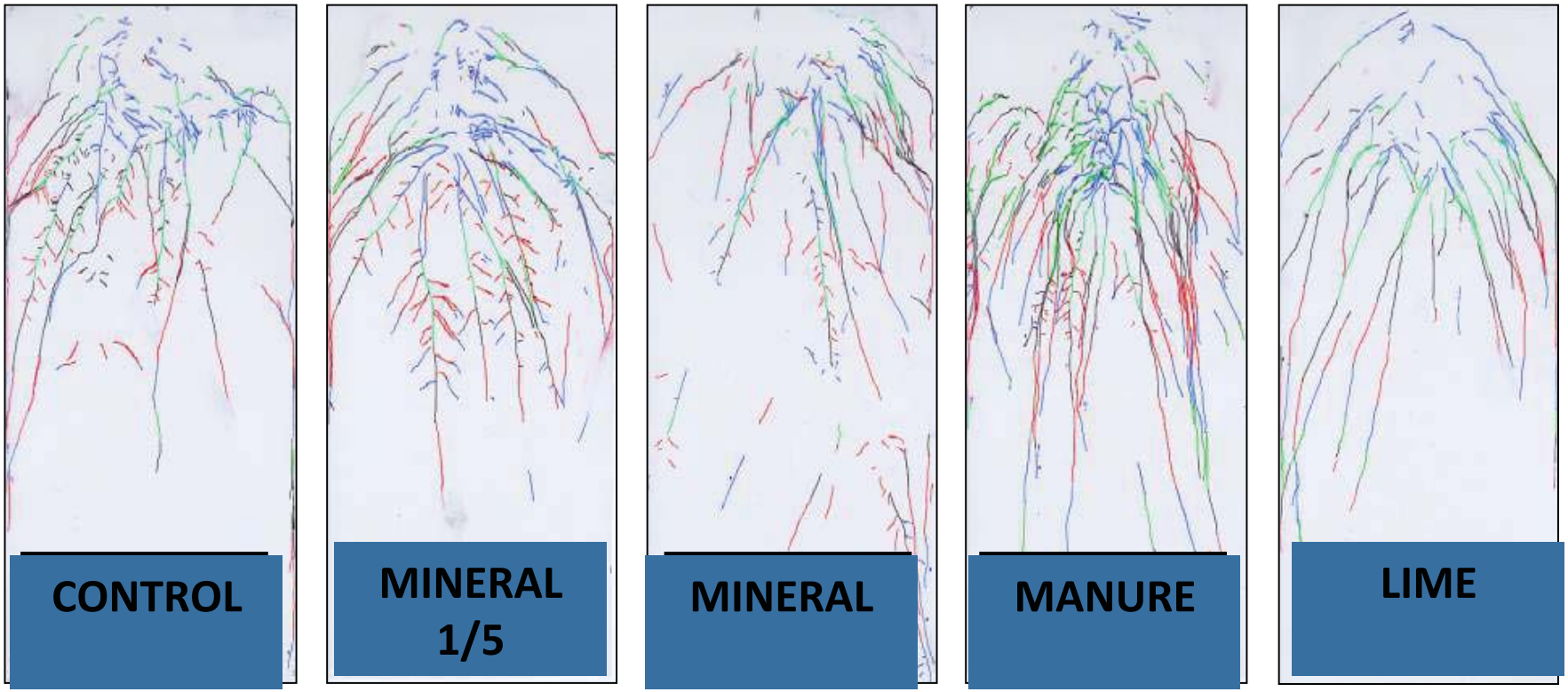
Mineral nutrition soil management

Organic fertilizers

- manure
- simple vegetable
- composted green
- mixed composted
- acidic peat
- neutral peat
- humified peat
- vermicompost from manure
- humic extract from the water vegetation of olives

FACTORS AFFECTING THE ROOT MORPHOLOGY

1 AVAILABILITY OF NUTRIENTS
2 DISTRIBUTION OF NUTRIENTS
3 PHYSICAL PROPERTIES OF SOIL
4 MICROBIAL ACTIVITIES



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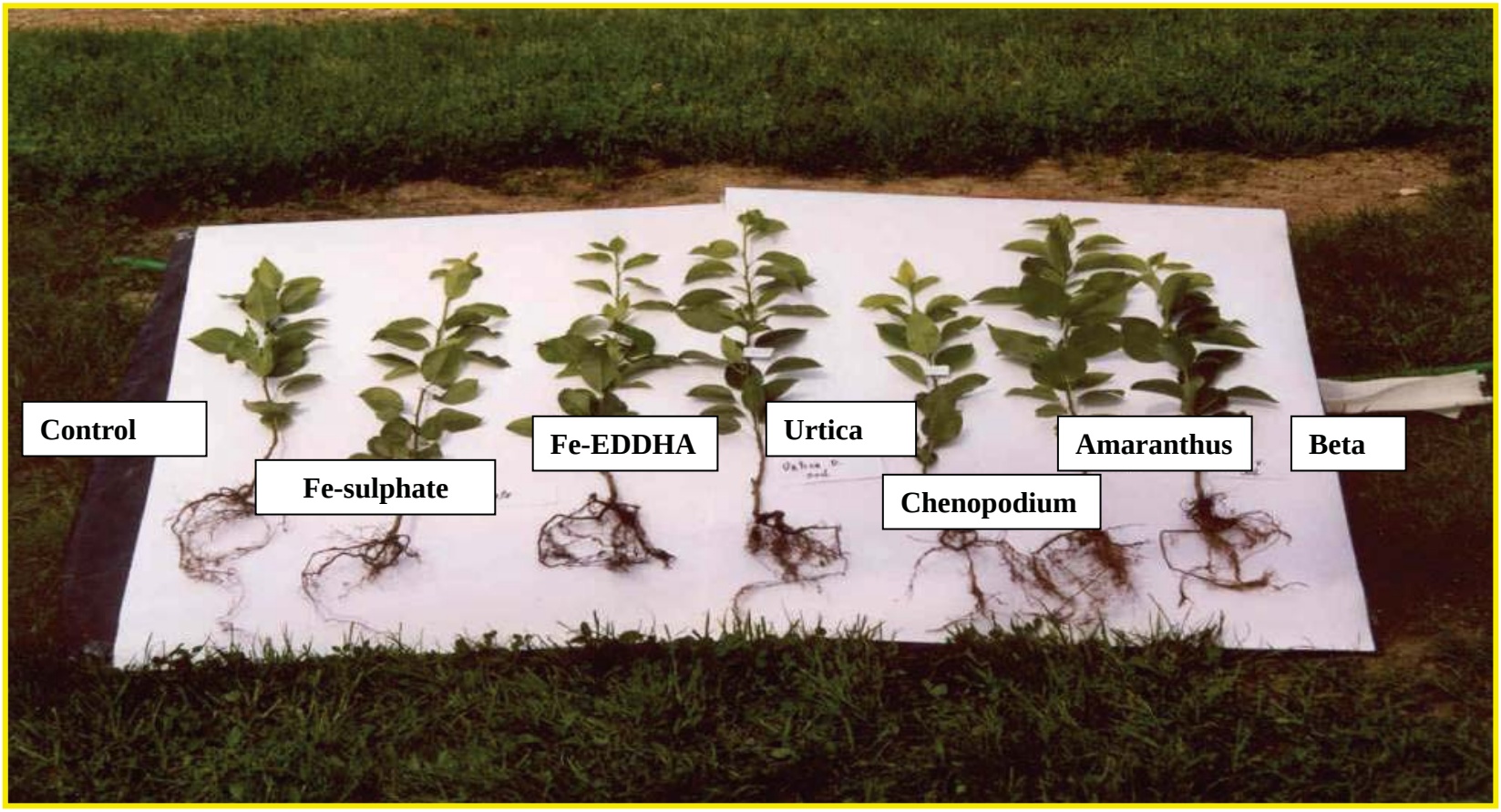
PLANT EXTRACTAS

Effect of plant extracts applied to the soil on pear trees



Weeding

- physical techniques (expensive): flame weeding, manuals processing , plastic film for mulching

1. Poliethylene (low-cost, waste problems)
2. Biodegradable (more expensive, no problem of waste)
3. Photodegradable (more expensive and low efficay in our environment)

Biological protection

It is a system of defense against pests that employs only organic tools such as:

1. insect predators or parasites of other insects;
2. pheromones, substances that is normally emitted by insects, but which can be reproduced in the laboratory, which act as chemical messengers, resulting in individuals of the same species stimuli and responses precise and repeatable;
3. pathogenic microorganisms (bacteria and viruses that are pathogenic for certain insects.

In this type of defense are not used substances toxic to humans..

Agronomic technique:

Selection of more resistant varieties hardy, intercropping, rotations and appropriate processing, irrigation, fertilization, pruning, planting density and sowing

Physical technique

Sterilization of soil by heat, destruction of outbreaks of inoculation and / or infection, use of sticky traps, hand or mechanical insects picking

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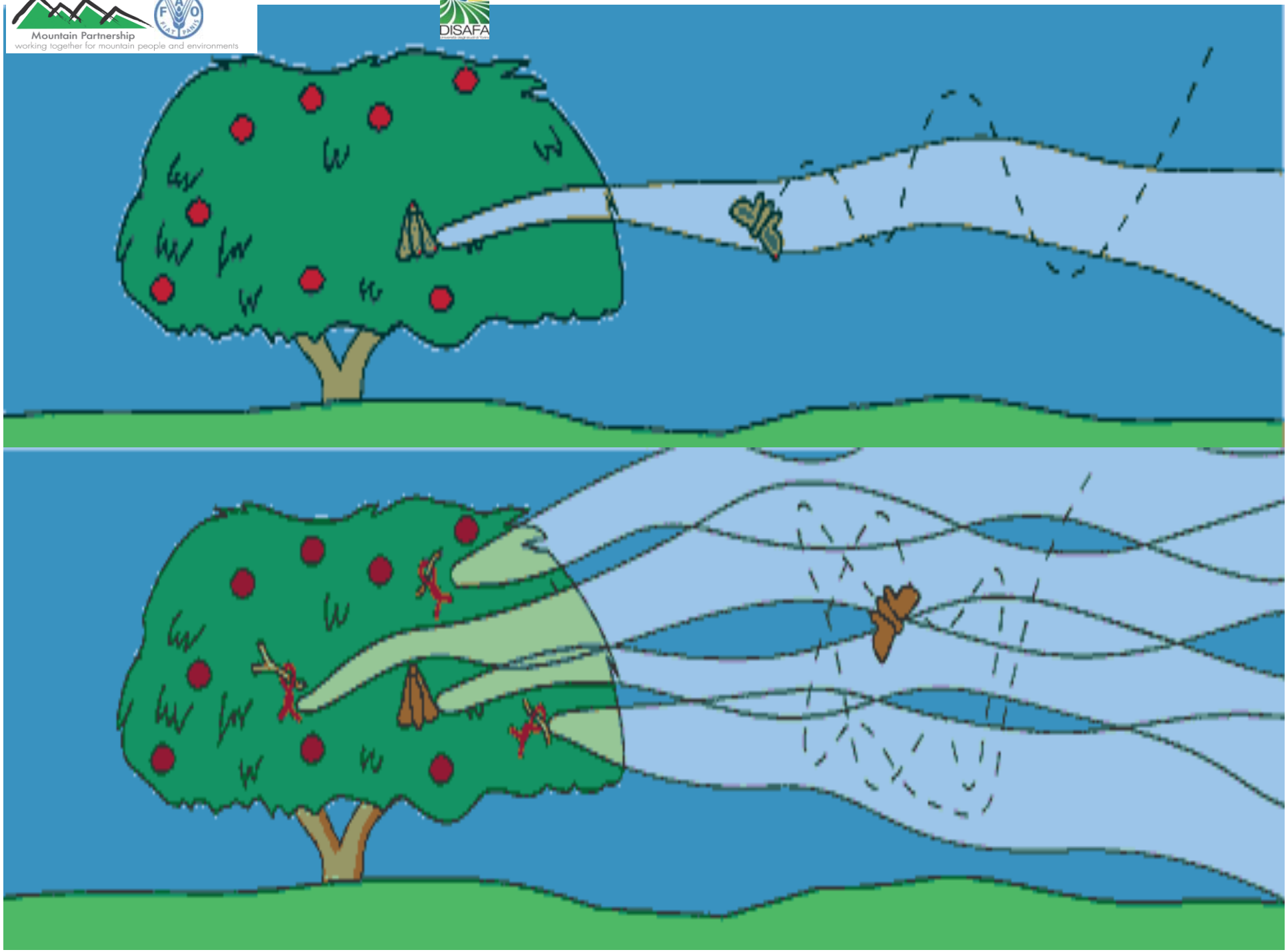

BIODYNAMIC CROP MANAGEMENT

The farm is a closed system and

self-sufficient in which the crops, animals, operators

and the whole environment surrounding cosmic cycles that are

included in the therefore affect farming.

Reg. CEE 2092/91

THE BIODYNAMIC IS BASED ON THREE PRINCIPLES:

1 - Organize the company as a true living organism where the various "organs" (land, vegetable garden, orchard, fences, pasture, animals, forest, water, animals) interact harmoniously with each other under the guidance of the farmer

2 - Improvement of fertility of the soil organic matter through properly composted (OVERLAPPING)

3 - Maintaining the relationship between plants and the cosmos thanks to the choice of the appropriate time for working, sowing and collections to be made possible, depending on the position of the moon, sun and planets with respect to the 12 zodiac constellations in background.

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Label from integrated fructicolture

Biologic certification Organs

MAIN ATMOSPHERIC CHANGES ASSOCIATED WITH ALTITUDE

1 Reduction of atmospheric pressure and the partial pressure of all gases including O_2 and CO_2

2 Reduction of the air temperature and the relative influence on the humidity RH values

3 Increased solar radiation and irradiation night

4 Increased UV component of total solar radiation

Rain and wind are factors related not only to altitude but also to the region an the location

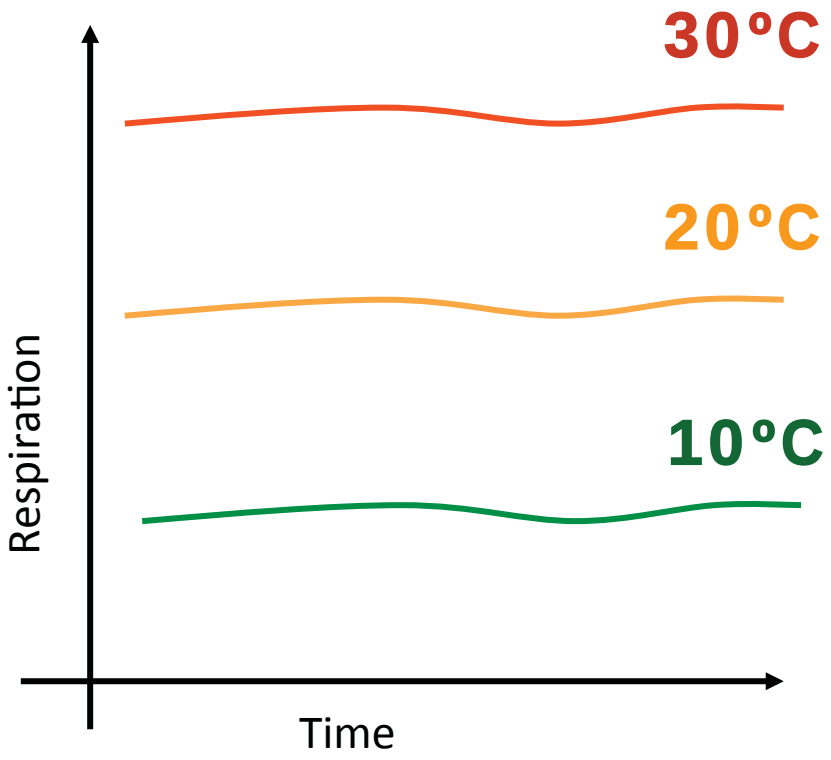
ATMOSPHERIC PRESSURE

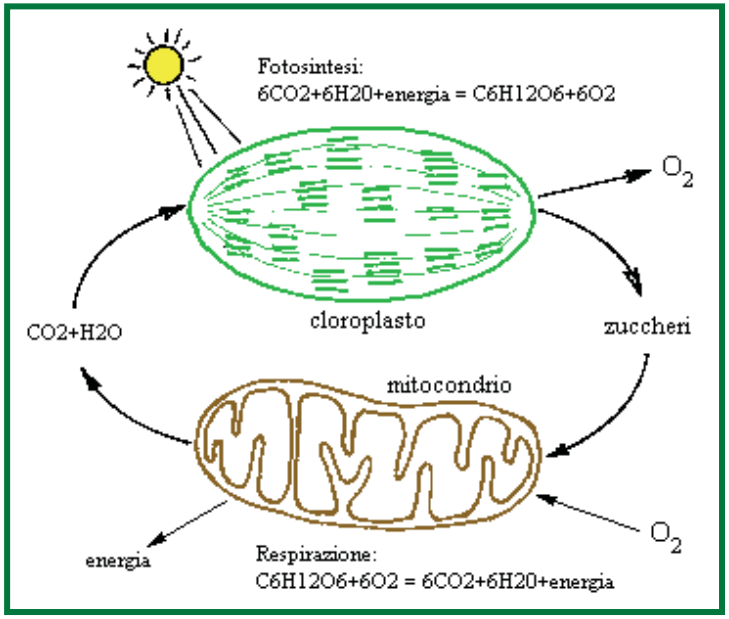
- The total atmosheric pressure and the pressure of a single gas is reduced by 11% for every 1000 meters

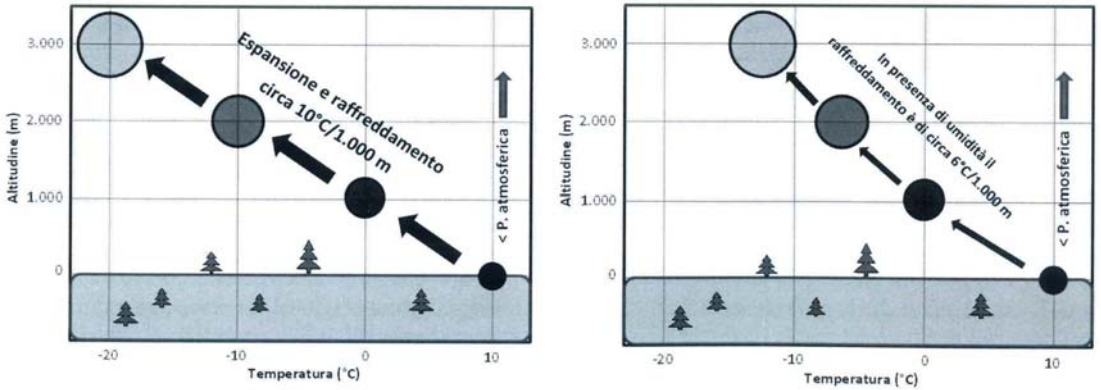
- So if at the sea level the CO_2 pressure is of 390 ppm

after 1000 metres will be only of 350 ppm….

BUT this does not translate into a lower efficiency in photosynthesis because the gases are more mobile and the rate of gas diffusion is greater.


30°C
20°C
10°C
Respiration
Time


Fotosintesi:
6CO2+6H20+energia = C6H12O6+6O2
O2
cloroplasto
zuccheri
CO2+H2O
mitocondrio
energia
O2
Respirazione:
C6H12O6+6O2 = 6CO2+6H20+energia



TEMPERATURE CHANGE with ALTITUDE

Left: Adiabatic cooling and warming occurs as a parcel of air moves up and down in the atmosphere. As an air parcel rises it expands because the surrounding pressure decrease with altitude. Energy is required to do the work of expansion. Kinetic energy is converted to potential energy. **Temperature is proportional to kinetic energy and so the parcel temperature decreases at a rate of 10°C per 1000 metres**.

Right: Moist adiabatic cooling and warming occurs when condensation (or deposition) is occurring inside a parcel of air.The rate of cooling during ascent is less than dry adiabatic rate because the cooling caused by expansion is partly offset by the warming from latent heat of condesation. A typical moist adiabatic lapse is 6°C per 1000 m, but it varies widely.

SUMMURY OF THE ALTITUDE EFFECT ON ENVIRONMENTAL PARAMETRES

Parametres	Altitude effects
Atmospheric pressure	Riduction (-11% each 1000 m of altitude)
Temperature	Riduction (-6% each 1000 m of altitude)
Solar radiation	Increase (+10% each 1000 m of altitude
UV radiation	Variable in function of the wavelenght 15-25% UV B and 10% UV A each 1000 m of altitude

Altitude effects on selected environmental parametres influence the development of the fruits and the final quality traits of the fruits.

SPECIFIC QUALITY TRAITS THAT ARE CHARACTERISTIC of “MOUNTAIN FRUITS”

- Elongated shape
- Reddish fruit skin color
- Higher pulp crispness
- Higher antioxidant potential
- Higher nutritional value
- More intense aroma and taste

- Elongated shape: for apple fruits due the double effect of the major UV and infrared radiation and the major production of endogen ormon (giberellins)

- Reddish fruit skin color: for the apple due the increase of anthochyanins production.

The increase is influenced by the major solar radiation. The rule of solar radiation was confirmed by different studies on different species throught technique of :

- Bagging (apple and peach)
- Use of net hill of different colour (apple and peach)
- Defoliation (grape cv. Merlot)
- Use of the reflecting sheeting in planting

ATTENTION TO THE REDDISH FRUIT SKIN COLOR IN FUNCTION OF THE VARIETY

- Negative aspect for the cv. Granny Smith---- (faccetta rossa)
- Positive for the cv. Golden Delicious

SENSORIAL DIFFERENCES OF APPLE CULTIVARS AS AFFECTED BY THE PRODUCTION SITES

Altimetric Zone	Hardness	Crunchiness	Juiciness	Switness	Acidity	Taste
Plain	5.73b	5.70b	4.90b	5.98a	4.60b	5.83a
Mountain low altitude	4.10c	4.10c	4.65b	5.13b	5.10a	4.29b
Mountain middle altitude	6.48a	6.92a	6.02a	6.02ab	5.13a	6.25a

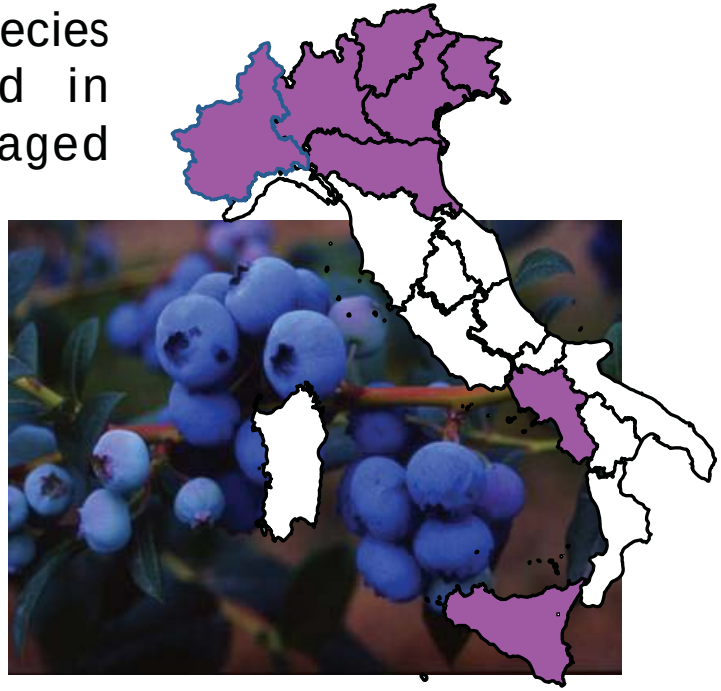
Average with the same letters are not significantly different-Data by Donaty et al.2006

Berry fruits

Highbush blueberry *(Vaccinium corymbosum L.)*
Brambles: red raspberry *(Rubus idaeus L.)* and blackberry *(Rubus ulmifolius Schott.)*
Gooseberry and currants *(Ribes sp.)*
Strawberry *(Fragaria x ananassa Duch.)*

Strawberry culture is spread throughout the Country on a total surface of 4,254 ha (more than 3,000 under plastic tunnel) and the total yield exceeds 140,000 t/year.

Other berry fruit species are mostly spread in small family-managed farms.



Integrated and Organic Crop Management techniques are preferred.

Rubus idaeus L.

Vaccinium corymbosum L.
V. ashei Reade

Rubus ulmifolius Schott.

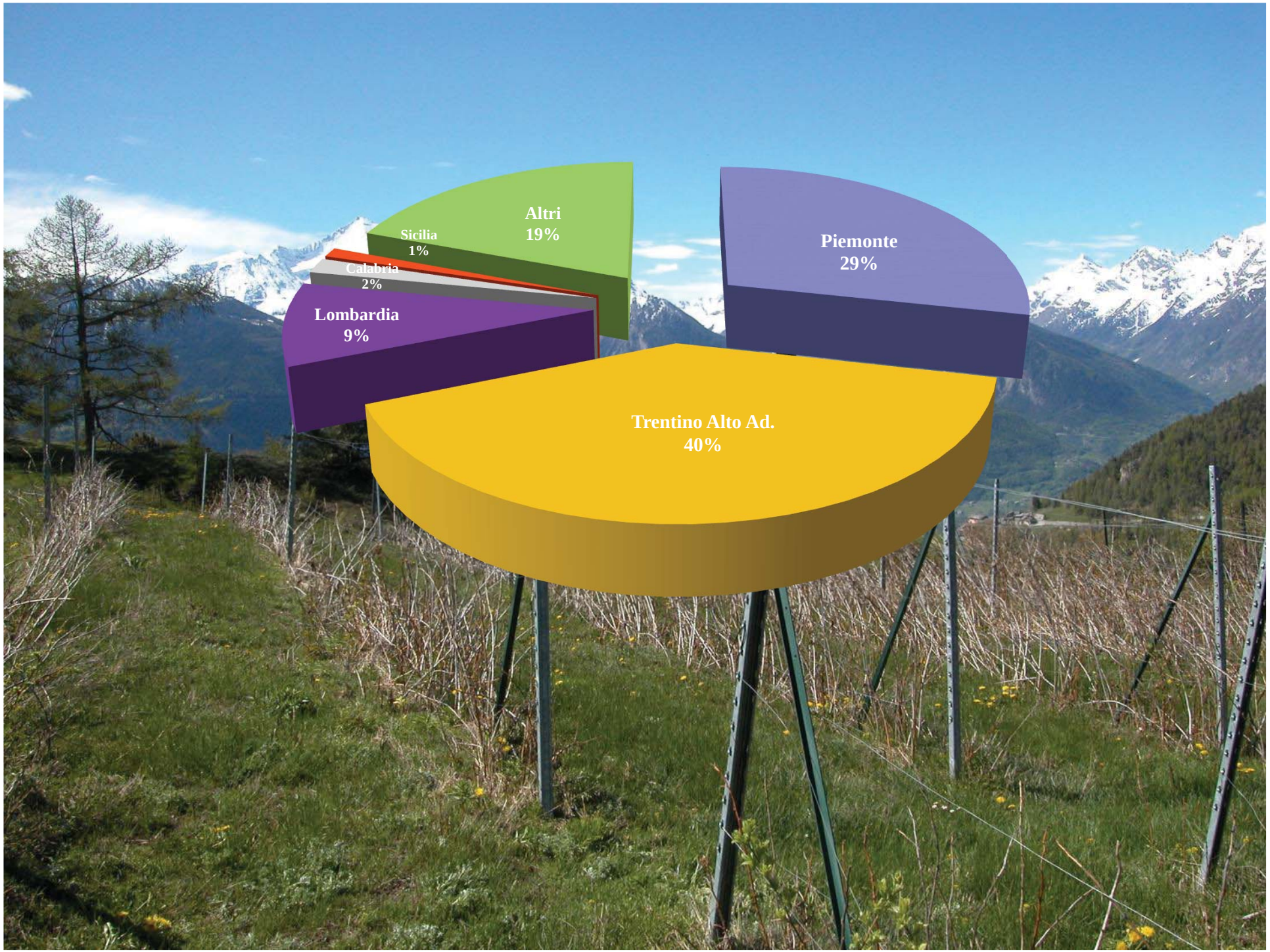
Ribes rubrum L.

R. nigrum L.

R. grossularia L.

Vaccinium vitis idaea L.

V. macrocarpon Ait.


Altri
19%
Sicilia
1%
Calabria
2%
Lombardia
9%
Piemonte
29%
Trentino Alto Ad.
40%

Higbush blueberry

Botanic family: Ericacee

Vaccinium corymbosum

Variety

Early ripening: Spartan, Patriot,

Middle ripening: Berkeley, Bluecrop, Bluerey

Late ripening: Coville, Lateblue,Darrow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Vaccinium myrtillus

Vaccinium corymbosum

Vaccinium vitis-idea

Amelanchier ovalis (False)

SOIL AND CLIME

It is not demanding in terms of climate, good resistance to cold even at minus 30°C, does not tolerate limestone, which causes chlorosis and stop growing but it requires an acidic soil pH from 4.5 to 5.5.

To produce it requires a period of intense cold in the winter (at least two months).

The soil should be well-drained, deep, fresh and rich in organic matter.

PLANT

Breeding can be done in the bush or trellis using special supports (poles and wires). Too for breeding bush is recommended to use a guardian for each plant, especially if the plant is carried out in areas where rainfall snow are abundant.

WATERING

Blueberry has a shallow root system (located mainly at depths smaller than 60 cm) .

Regular, consistent irrigation is critical, as highbush blueberries are sensitive to fluctuations in soil moisture. Provide about 1 inch of water every week, increasing to 4 inches per week while the berries are ripening. Too little water may result in small berries, but too much water can cause bland, overdeveloped fruit. Watering early in the day allows ample time for the foliage to dry before nightfall, thus preventing moisture-related diseases.

IRRIGATION

Microjet and drip irrigation systems are currently the most commonly used in blueberry plantings, while sprinkler irrigation is used mainly for frost protection and coolin

SOIL MANAGEMENT

Mulching increases the amount of organic matter in the soil, keeps moisture in the soil, protects roots from heat and helps to control weeds (pine beak, white-over-black plastic mulch, derivates from industrial processes, such as fresh pine telephone pole peelings (25% bark, 75% elongated fibers of cambial wood) and pine fence post peelings (75% bark, 25% fibers)


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The average distances of the plant are around 3 m between rows x 1.70 m in the row.

PRUNING

- It is important to remove all blooms that appear the first year to ensures that the bush is well-established before it bears fruit.

- During the first two to three years, highbush blueberries require no pruning other than removal of weak or dead branches. Thereafter, prune the bushes every year, in late winter or spring. Cut dead or damaged branches nearly to the ground, and cut old, non-producing growth to ground level. Leave six or seven healthy older shoots and one or two new stems on each bush.

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FERTILIZATION

- Most blueberry plantings require nitrogen applications each year, while other nutrients are generally applied only as needed. Ammonium sulfate (30-100 kg/ha) is the preferred nitrogen source for blueberry, especially if the soil pH is relatively high (above 5.0), because it tends to decrease soil pH levels.

- The application method strongly influences the effects of nitrogen on yield and plant growth. Fertigation through drip irrigation has been shown to provide superior results, as compared to surface applications of nitrogen, probably because of the easy availability of nitrogen placed in the root zone.

FERTILIZATION

- Foliar fertilization can effectively supply mineral nutrients during periods of maximum demand by the crop and low availability in the soil.


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Harvest

- The collection is scalar. The yield is about 1500-2000 kg per 1000 m^2 then about 2 kg per plant.

- A person collects about 4 kg of fruit per hour. The collection is carried out with regular steps every 3-4 days. Blueberries can be stored in the refrigerator for a few days. The fruit also bears the freezing.

Pest and diseas

Root rot diseases caused by *Armillaria mellea* (Vahl:Fr.) P. Kumm., *A. ostoyae* (Romagnesi) Herink and *Phytophthora cinnamomi* Rands affect blueberry crops when these fungi are present in the soil and environmental conditions are favorable for disease development

Fungi that cause leaf spots, twig blights and cankers.

Leaf pathogens primarily reduce photosynthesis in the infected tissues but, when they induce premature defolia- tion (i.e. *Septoria albopunctata* Cooke, *Gloeosporium minus* Shear and *Dothichiza caroliniana* Demaree & M.S. Wilcoxis), they affect subsequent flower bud formation.

Pest and diseas

The birds (starlings, sparrows, etc.). like the fruits ripen so it is advisable to protect the crop with the nets. The recent introduction Drosophila suzuki requires a 'particular attention.

Bottles of vinegar on branches

Development of Botrytis on fruits

The main and most important characters required for the highbush blueberry cultivars are:

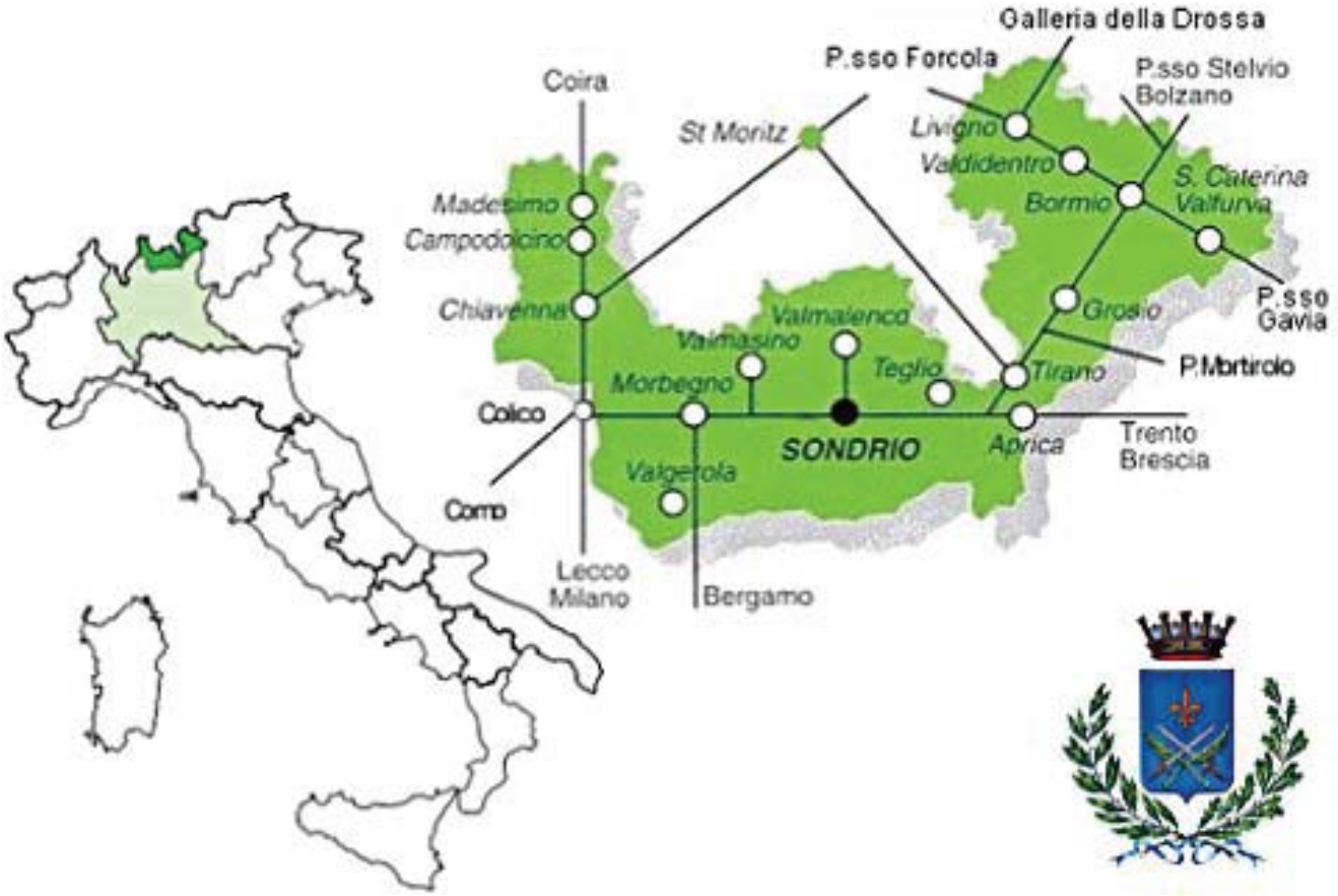
- precocity
- resistance to major pests and diseases;
- adaptability to different climes and resistance to water short ages;
- good and high productivity;

character merchandise and technology:

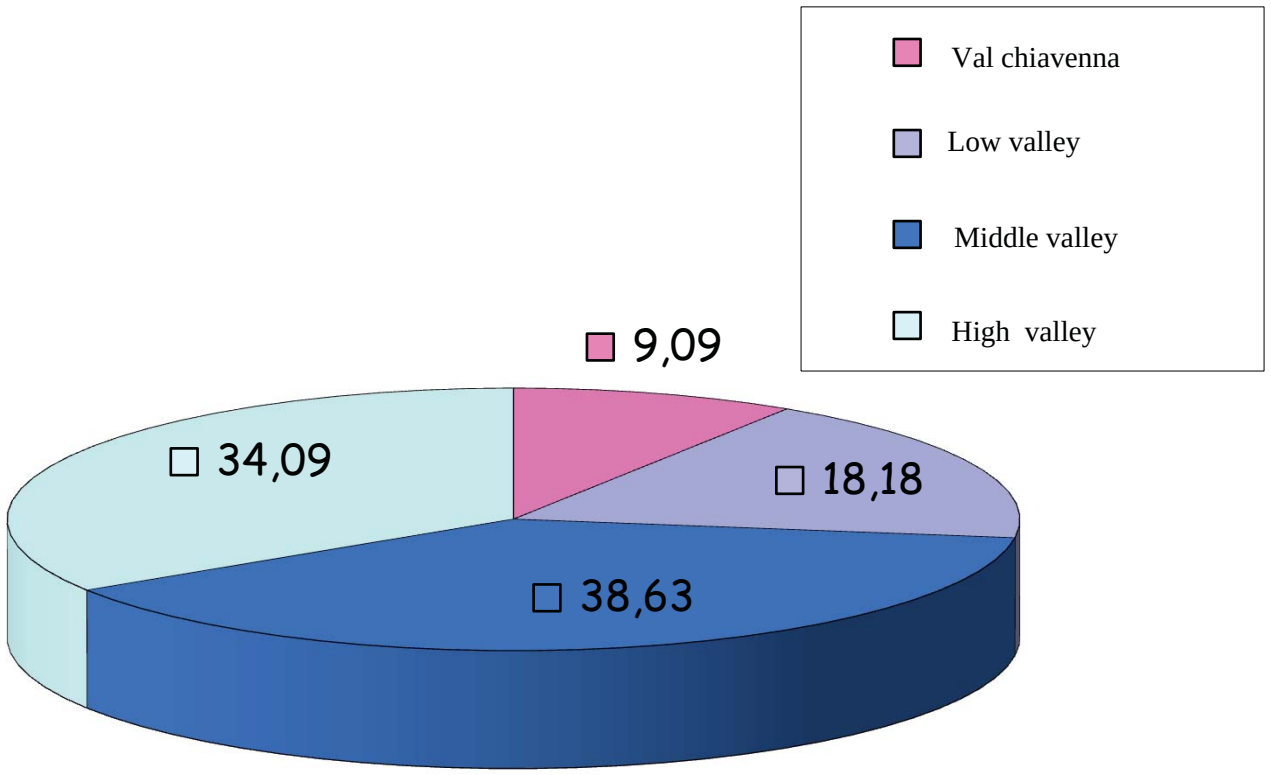
- berries large;
- light in color;
- reduced stem scar
- high shelf life
- simultaneous maturation
- extension of the period of maturation;

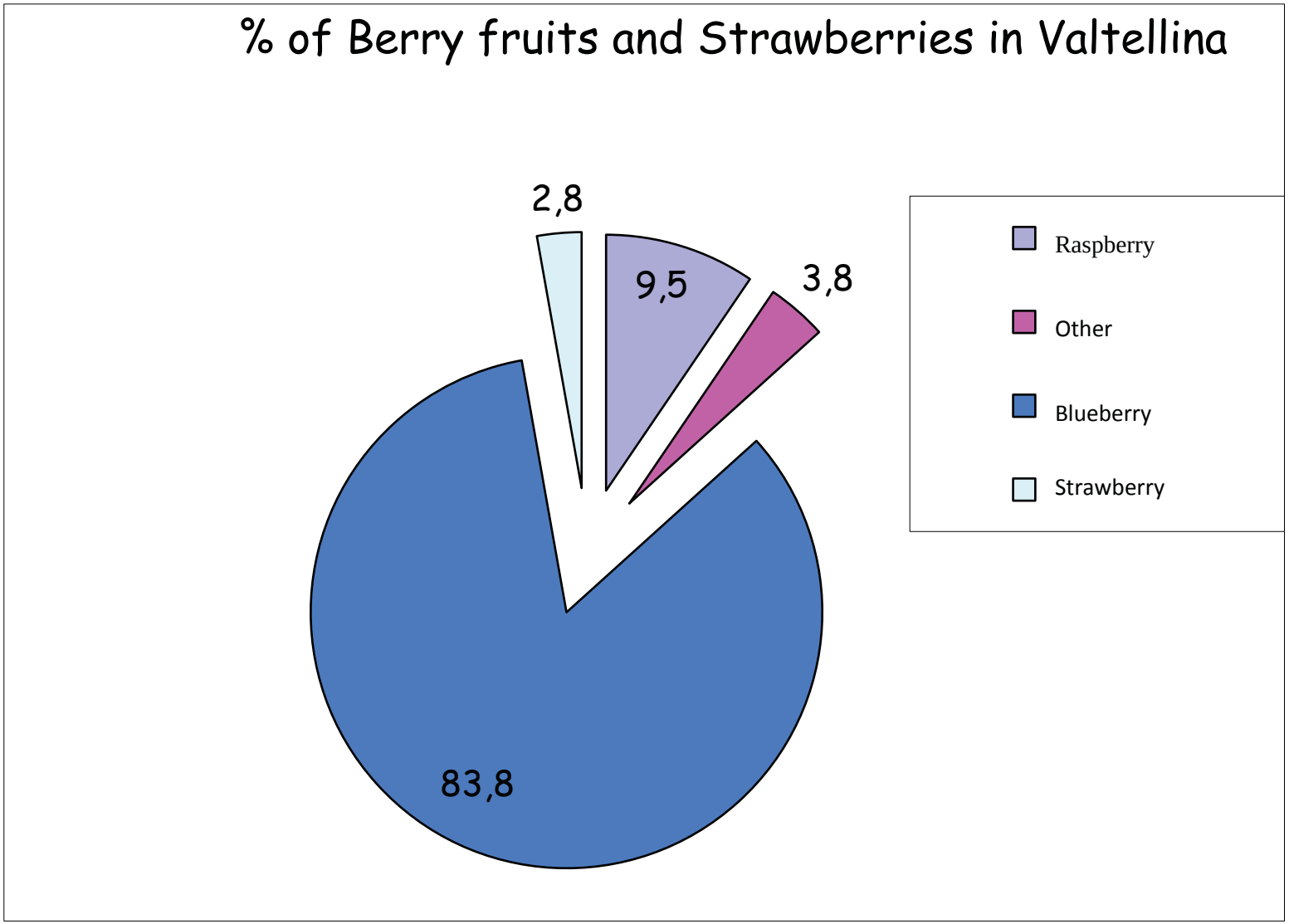
- high organoleptic characteristics (aroma, taste, flavor);
- high content of antioxidants and nutraceuticals merits

THE BLU VALLEY…LA VALTELLINA



% of Blueberry in different area in Valtellina




% of Berry fruits and Strawberries in Valtellina
2,8
9,5
3,8
83,8
Raspberry
Other
Blueberry
Strawberry

CLIME

The Valtellina is one of the major valleys of the Alps from east to west;

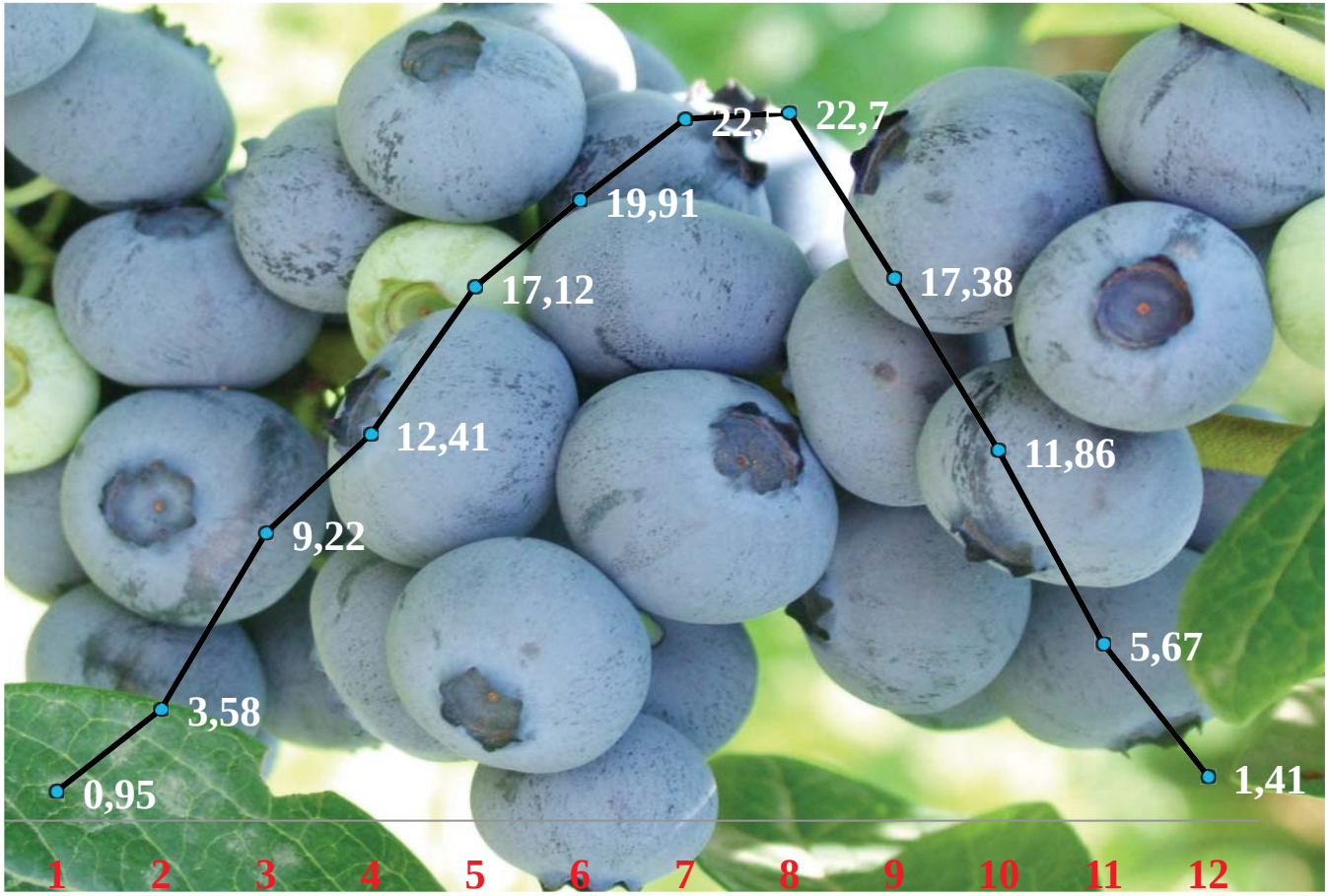
is characterized by a continental climate, with a circulation of large masses of cold, dry air from Central and wet ones from the Atlantic and the Mediterranean.

From the thermal point of view one can observe a peak temperature in the months of July and August, with highs of 34 ° C, while the coldest period occurs in January-February with a minimum of - 8-10 ° C.

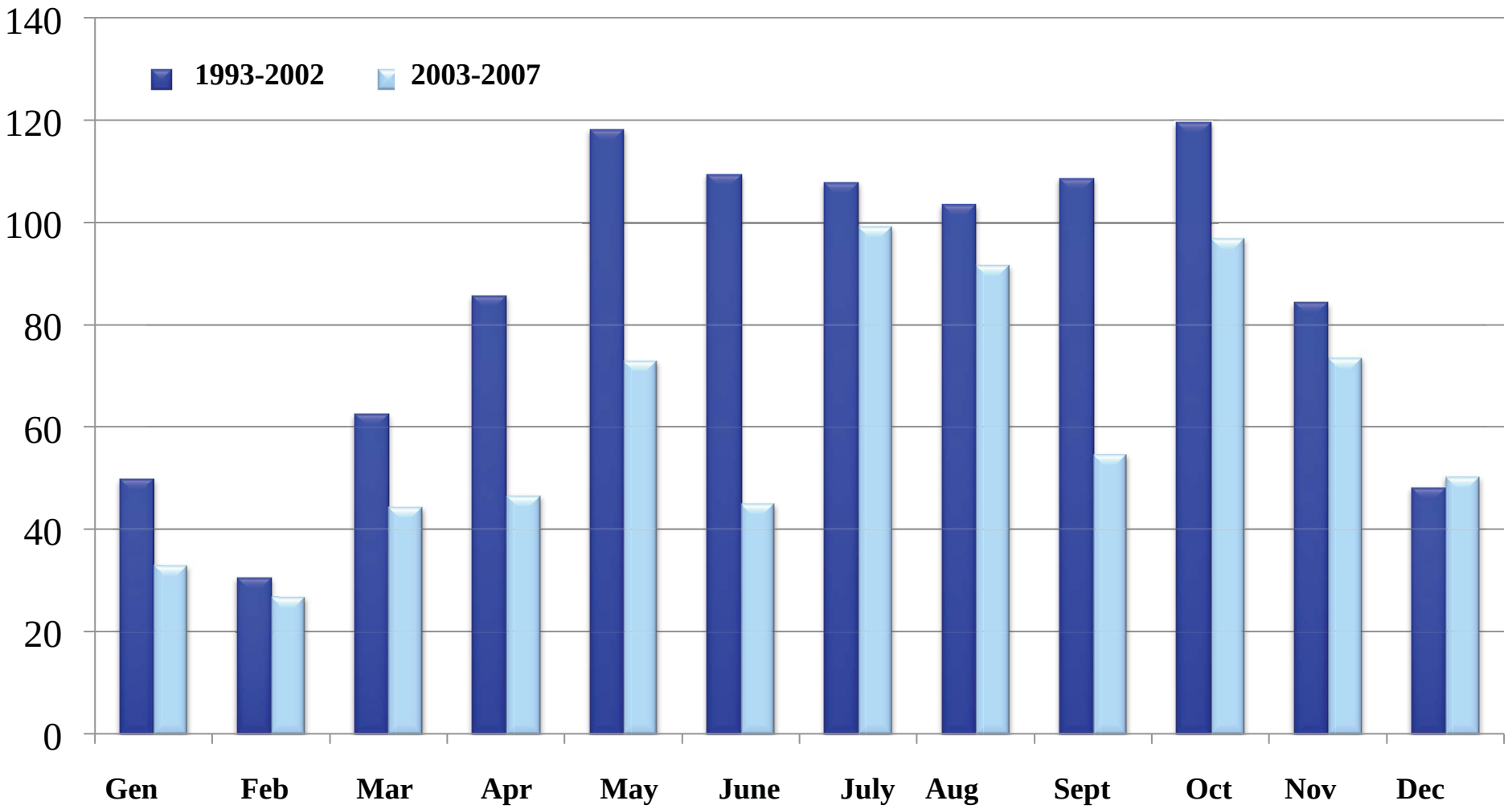
Rainfall fluctuate on average 1000 mm per year, with peaks during summer and autumn.

The predominant winds are the Breva and phon

Temperature (°C) in the Area



Rainfall in the years



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KEY OF SUCCES OF BLUEBERRY IN VALTELLINA

 the particular east-west orientation of the valley with the Rhaetian characterized by intense exposure to the south, and one orobico facing north, with different characteristics and more consistent;

 for the nature of the soil sub-acids and acids, rich in organic matter;

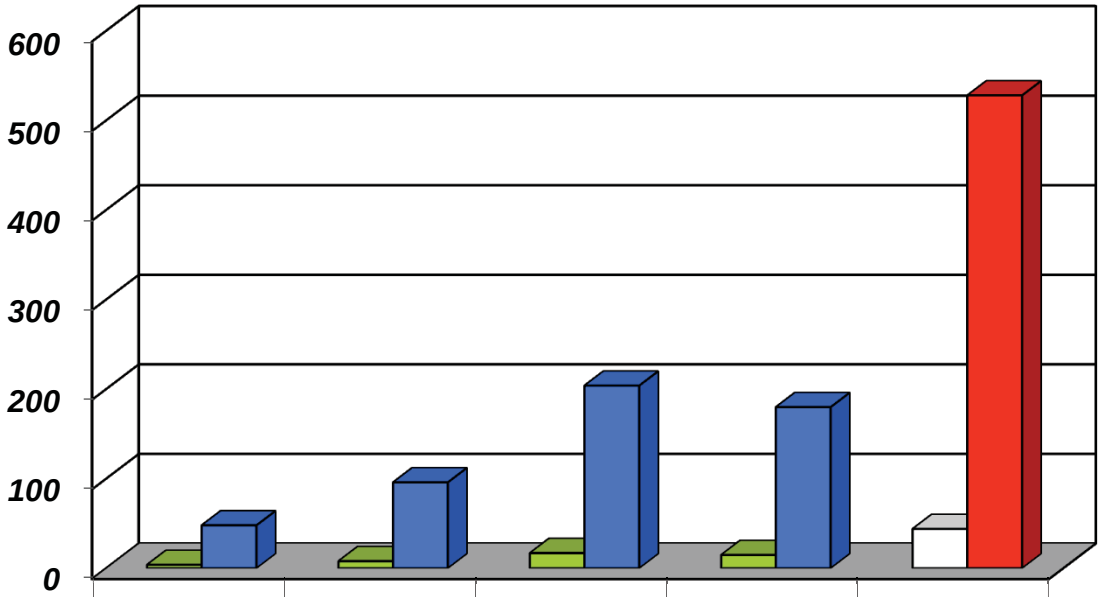
 to the favorable climate (between day and night and rainfall);

 for the type of the Valtellina farm characterized by small fields, often located in marginal areas and cultivated by the members of the family..

Due to the fragmentation is usual to find different cultures in the same area

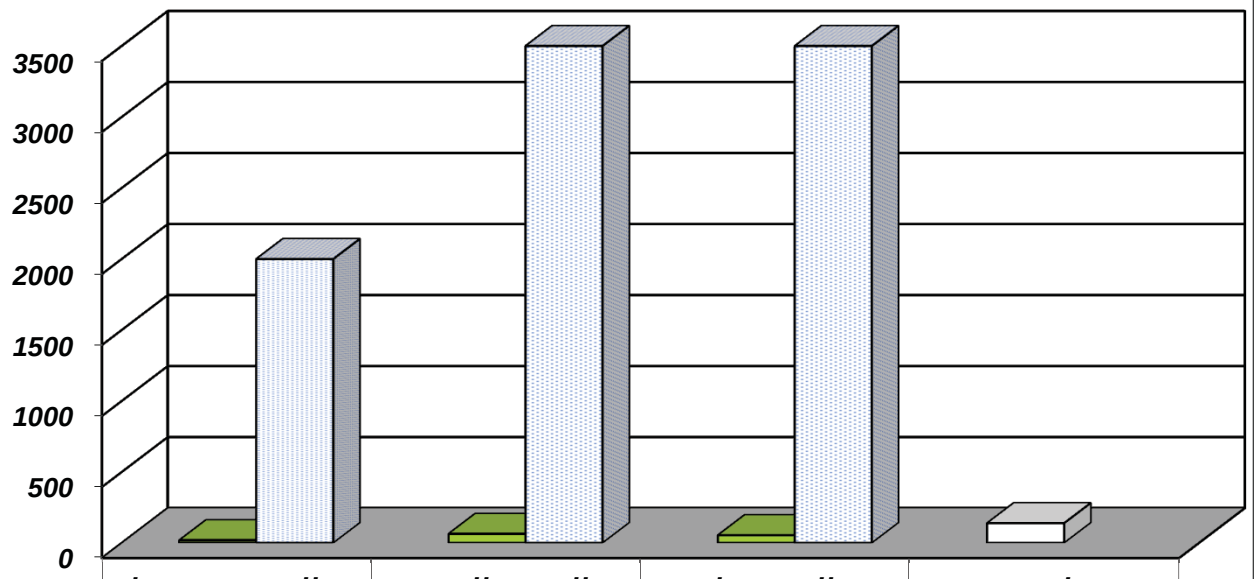
Species	Type	%	Variety
Strawberry	No-Everbearing	60	Elsanta®, Marmolada®Onebor*
	Everbearing	40	Albion*, Elsinor®Civri30*, Irma*
Blueberry	Early	60	Duke, Draper*
	Middle	35	Brigitta Blue, Legacy, Ozark Blue,Liberty*
	Late	5	Aurora*
Raspberry	No-Everbearing	60	Tulameen, Glen Lyon*
	Everbearing	40	Polka*, Himbo Top®Rafzaqu*, Heritage, Sugana*
Bramble	Early	15	Araphao*
	Middle	90	Lochness* (Nessy®)
	Late	5	Chester, Navaho*

ha and Production



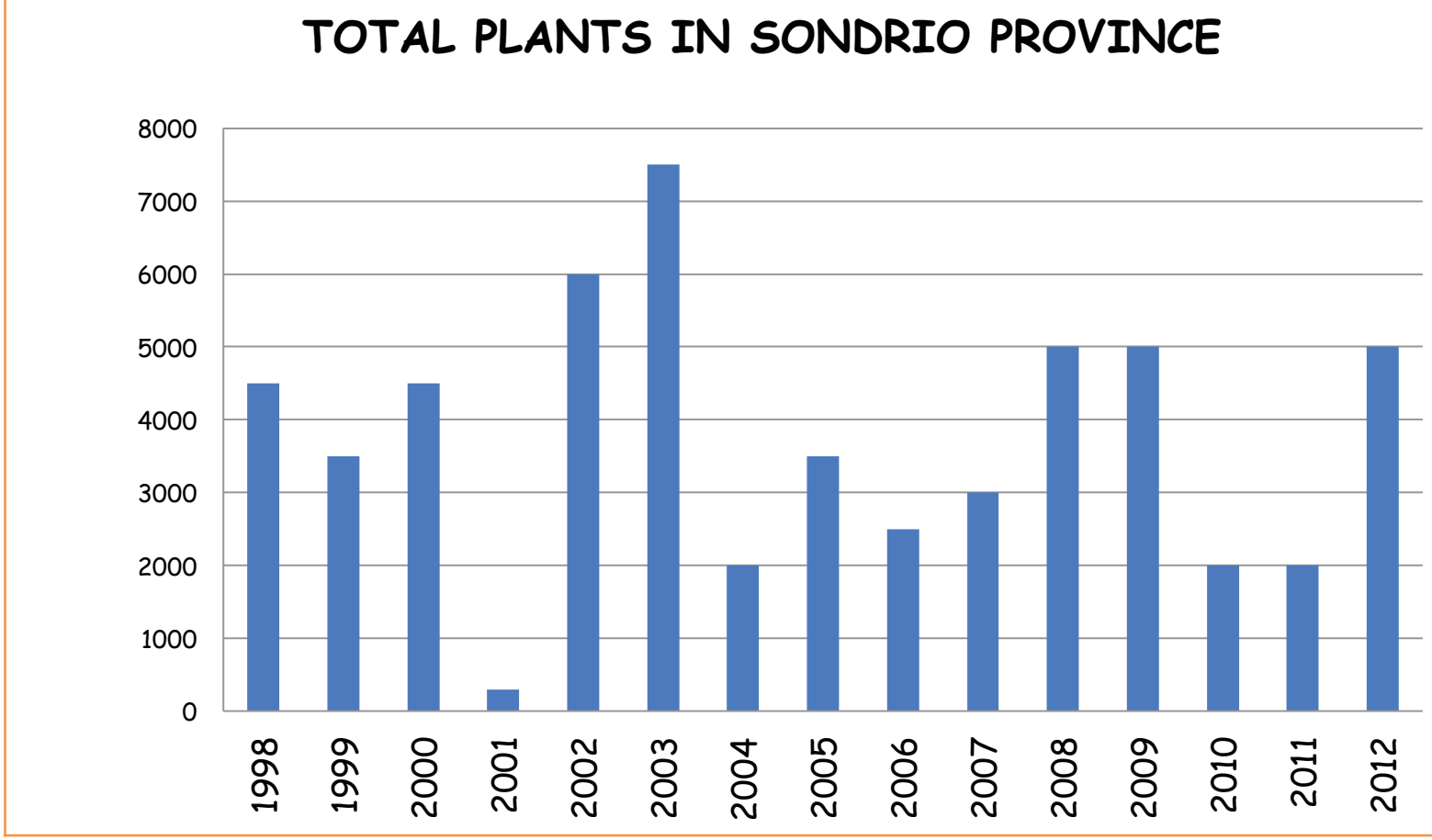
	valchia venna	bassa valle	media valle	alta valle	totale
ha a mirtillo	4	8	17	15	44
produzione potenziale (t)	48	96	204	180	528

Average of size of the producer farm

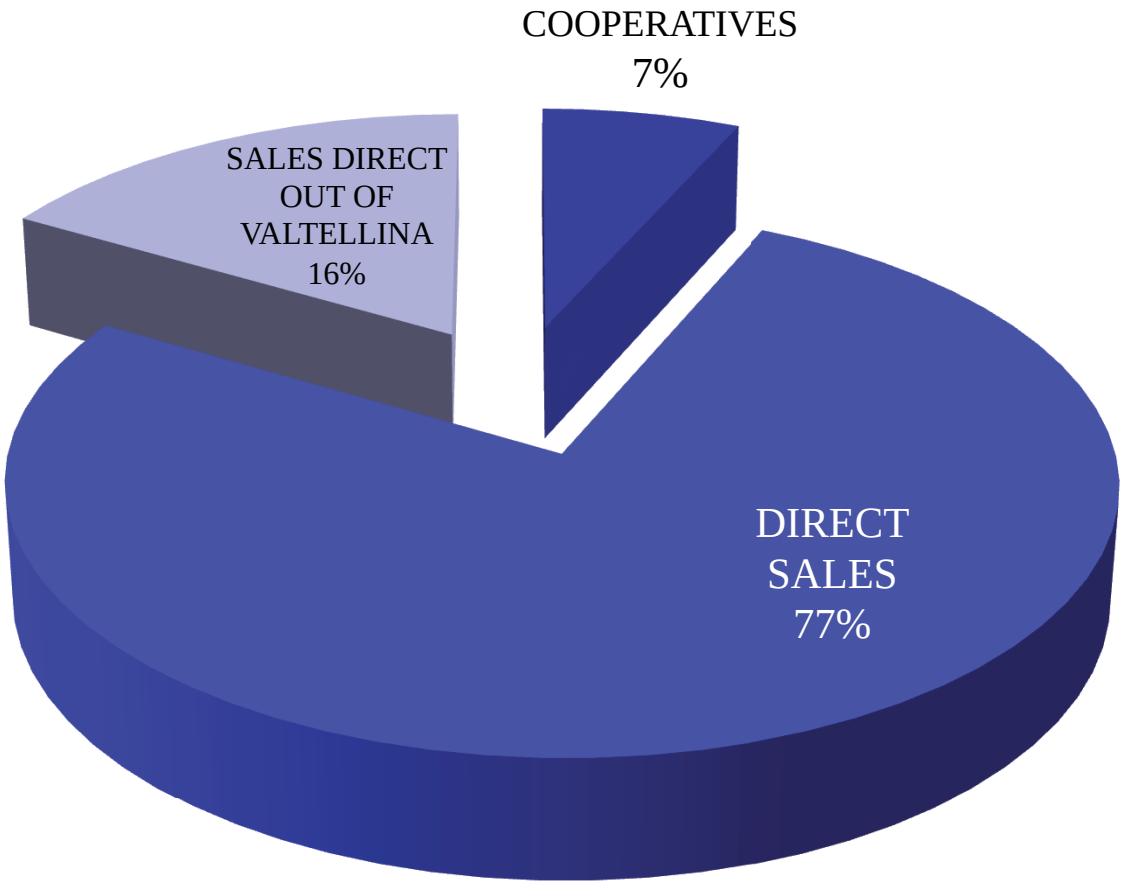


	bassa valle	media valle	alta valle	totale
n° aziende	20	65	55	140
sup. media (m2)	2000	3500	3500	

TOTAL AREA CULTIVATED	N of TOTAL PLANTS	TOTAL PRODUCTIVE AREA	TOTAL PRODUCTION	ECONOMIC VALUE
44 ha	132.000	38 ha	456.000 kg 456 t	2.280.000 euro



MARKETING (%)


COOPERATIVES
7%
SALES DIRECT
OUT OF
VALTELLINA
16%
DIRECT
SALES
77%

TYPOLOGIES OF FARM IN THE AREA

1

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1

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1

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1


350 g e
Lotto/Da consumarsi preferibilmente entro:
vedi fondo del vaso.
Da conservare in frigorifero dopo l'apertura
NON DISPERDERE NELL'AMBIENTE


Miel Erini
MIRTILLI
Vaschetta gr 300
€ 4,50
Vaschetta gr 200
LAMPONI
€ 2,00
Ad ogni acquisto superiore a 20 Euro potete aggiungere una vaschetta piccola in omaggio, a scelta, ... ma registratela ... grazie
Per ragioni contabili e fiscali è importante registrare bene il n° vaschette, il prodotto e gli € uro
SLIDE TO OPEN
SLIDE TO OPEN

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1

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2

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2

DISAFA


Succo di Mela
100%


FRUTTICOLTURA ALPINA
UVA
MELE
PICCOLI FRUTTI

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3


Olmo
AZIENDA AGRICOLA
MASONI OLMO
mirtilloolmo@hotmail.it
9088128
0342 214934


AZIENDA AGRICOLA
FUMASONI OLMO
CELL. : 338 9088128
www.mirtilliolmo.com
lmo

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ERSAF
Ente Regionale per i Servizi all'Agricoltura e alla Foresta
FONDAZIONE FOJANINI DI STUDI SUPERIORI
MIRTILLETO SPERIMENTALE
PER LA SELEZIONE VARIETALE
IN VALTELLINA
FONDAZIONE FOJANINI DI STUDI SUPERIORI DI SONDRIO
IMPIANTO IRRIGUO REALIZZATO CON MATERIALI DELLA DITTA IRRITEC & SIPLAST

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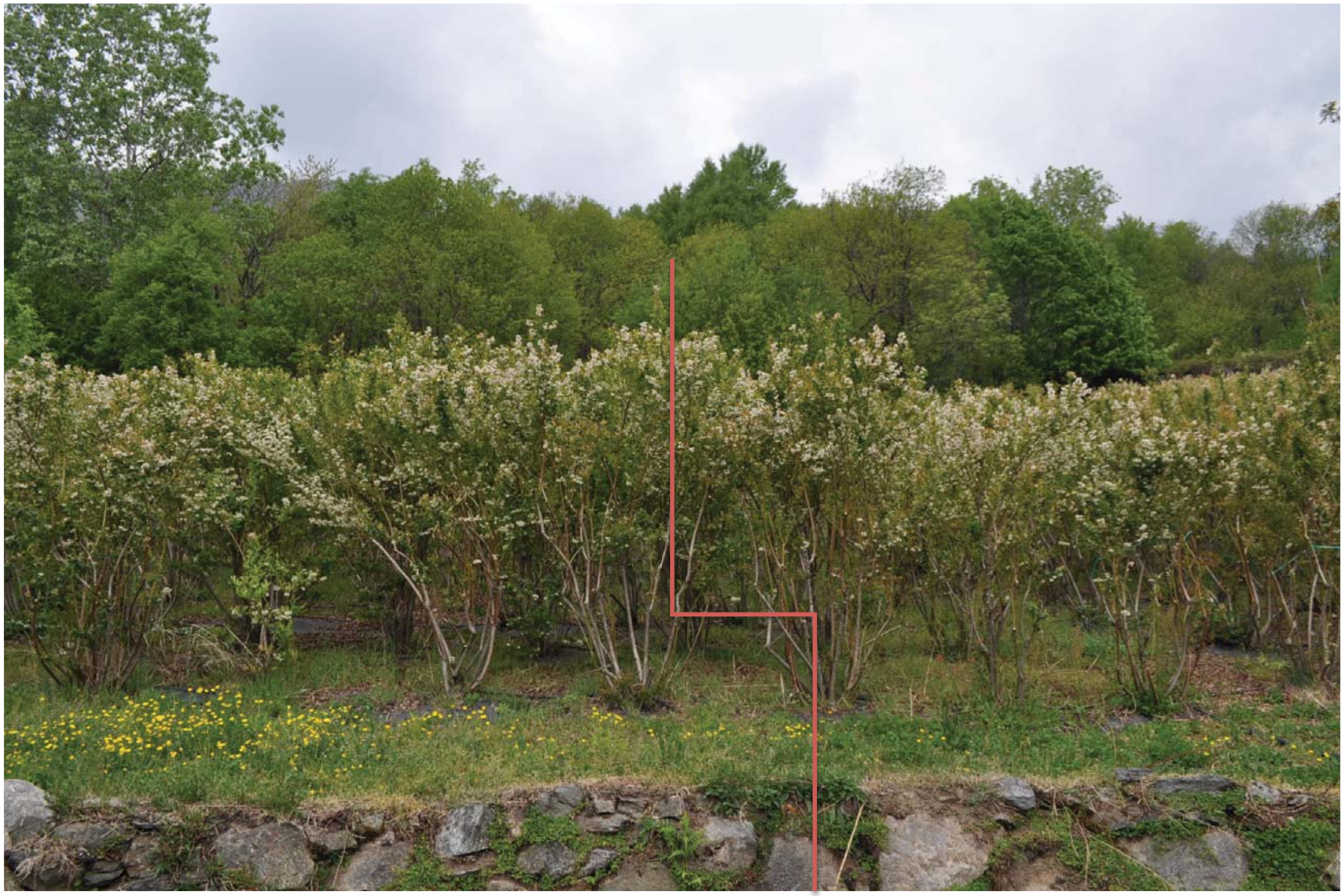

High 2,5 metres

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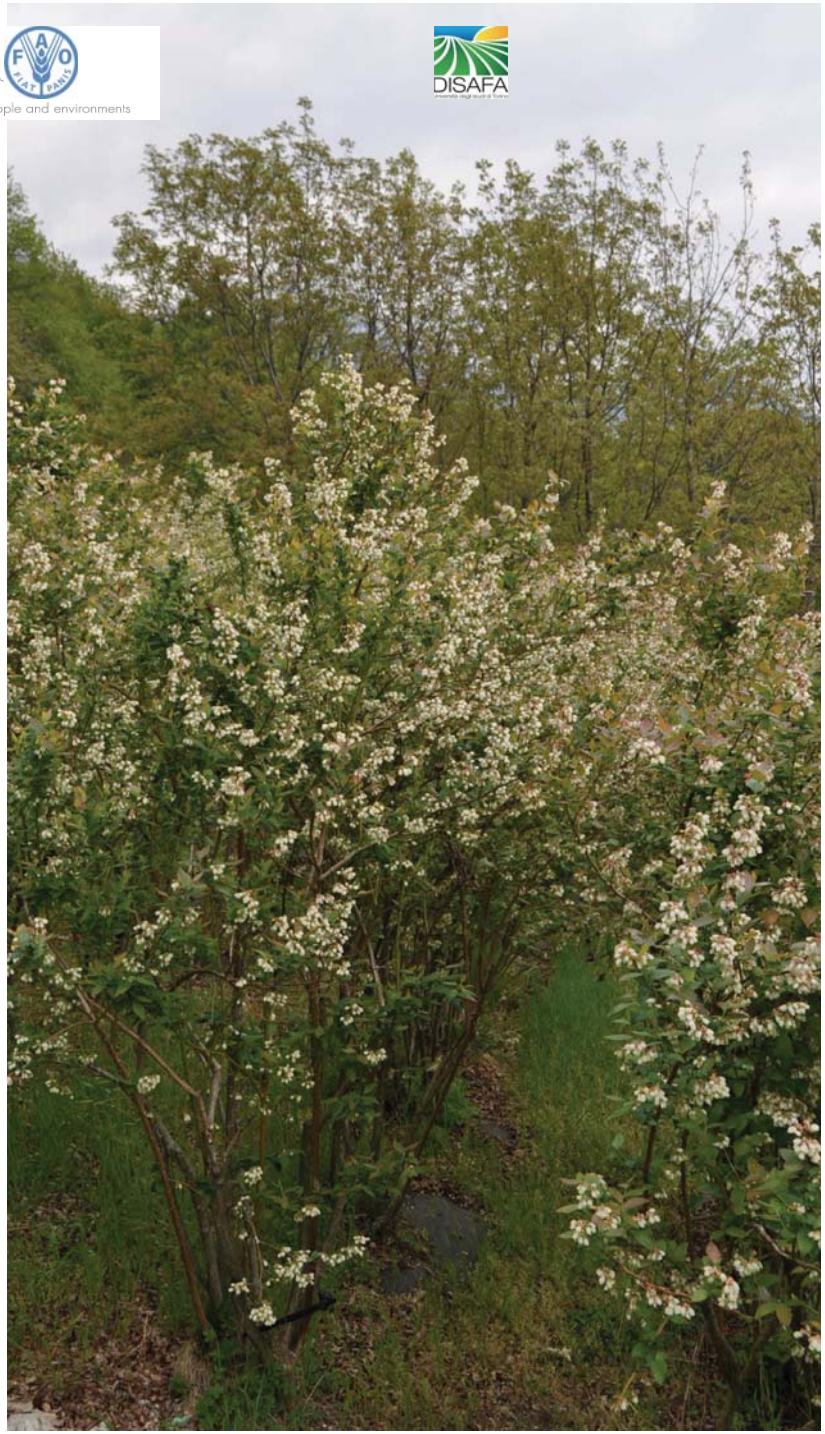

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Red raspberry

Botanic family: Rosacee

Rubus ideus

- Raspberries may be classified by fruit color and/or fruiting habit
- They may be red, black, purple, or yellow-fruited types

Raspberry

(Rubus ideus)

(Rubus occidentalis)

Yellow Raspberry

Types and Cultivars (Varieties)

- The red raspberry is first to ripen, followed by the black, purple, and yellow cultivars. Compared with black raspberries, red raspberries tend to be more cold hardy, have larger berries, and have more erect canes.

- Black raspberries are less cold hardy; have smaller, seedier, and more aromatic berries; and have arching canes.

- Purple raspberries are hybrids of red and black raspberries and tend to respond in growth habit similar to black raspberries. Most yellow raspberries are similar to red raspberries in growth habit.

- Raspberries may aso be classified as summerbearing or everbearing.

Summerbearing cultivars produce one crop in the early summer (June – July) the production is on branches

Everbearing cultivars can produce up to two crops a year, one crop being produced in the spring and the second crop in the fall. Most everbearing raspberries are of red or yellow type.

First production on branches , the late production is on shoots of the year.

Summerbearing cultivars

Cultivar	AREA	HARVEST TIME	PRODUCTION	FRUITS				
				WEIGHT (g)	° Brix	ACIDITY (meq/l)	ASPECT	TASTE
GLEN LYON	Nord	early	3	2,1-3,6	8,1-10,7	25,42-30,02	2-3	2-3
COWICHAN	Nord	middle	2	4,4 - 4,6	11,16 - 11,20	23,67	4	5
GLEN AMPLE	Nord	middle	5	3,6-4,2	10,1-11,7	29,31-38,12	2-3	2-3
TULAMEEN	Nord	middle	3	2,8-4,1	10,1-13,4	21,01-36,00	3-4	4
	Centro	middle	4	1,9-1,9	9,0-9,9	20,51	4	3

Everbearing cultivars

Cultivar	Area	HARVEST TIME	PRODUCTION	FRUITS				
				WEIGHT (g)	° Brix	ACIDITY (meq/l)	ASPECT	TASTE
SUGANA	Nord		4	4,6 - 4,8	9,74	18,03	4	4
ERIKA	Nord		3	4,8	10,20	21,22	4	4
HIMBO TOP®	Nord	middle	6	2,32-4,25	9,5-11,1	15,00-33,18	3-4	3
	Centro	-	-	-	-	-	-	-
HERITAGE	Nord	late	4	1,45-2,99	9,4-12,1	22,00-32,70	3	3-4
	Centro	middle	5	1,2-1,7	10,6-11,2	21,22-22,90	4	2


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SOIL

Raspberries will grow and produce on many different types of soil but will be most productive on sandy loam soils well supplied with organic matter and plant nutrients.

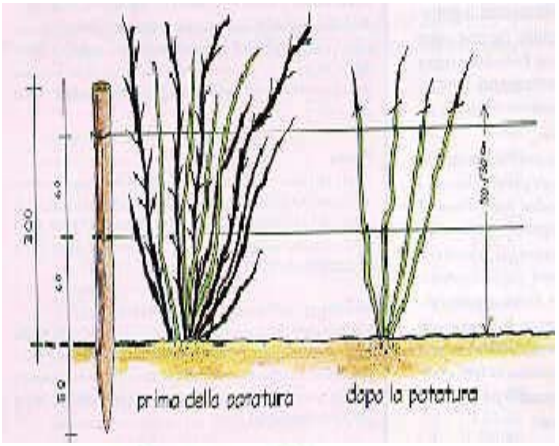
The soil should be well drained and have a pH between 5.8 and 6.5. It's necessary to plant raspberry bushes on ridges or in raised beds if drainage is a problem.

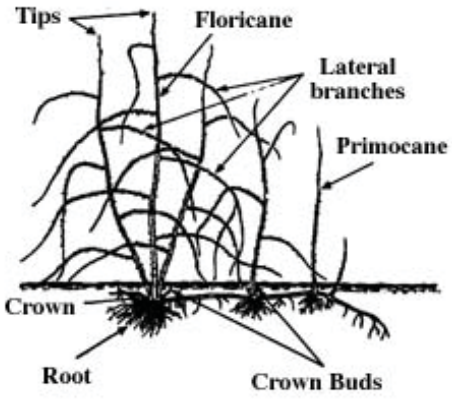
Plant

A trellis can help make the crop easier to manage and keep the canes off the ground so that berries are cleaner and easier to pick. A trellis can be constructed with posts at 15 to 20 foot intervals with cross arms to support wires placed 24 to 28 cm apart. The wires should be about 36 inches high for red raspberries and 40 cm high for the black and purple types.

Pruning

- It is very important to understand the terms used to describe various parts of a raspberry plant before attempting to prune raspberries Raspberry canes are of two types, primocanes and floricanes. Primocanes are first year canes while floricanes are second-year fruiting canes.





- Summer red raspberries should be pruned twice a year, first in the spring and immediately after harvest. The spring pruning, in late March or early April, consists of removing all weak canes and cutting back tall canes (over 5 feet) to 4.5 to 5 feet. The second pruning consists of the removal of canes that produced fruits, right after harvest.

- Everbearing red raspberries can be pruned to produce fruit once a year or twice a year. If you follow the pruning methods used for summer red raspberries, "Heritage" raspberry will produce fruit once in spring and once in fall. However, many home gardeners and commercial growers mow or cut all "Heritage" canes to the ground in early spring (March or April) for the sake of simplicity.

Cultural Practices

The raspberry must be kept free of weeds, watered when necessary, fertilized, pruned regularly, kept free of insect and disease pests, and in some cases, supported with a trellis.

Manual

Weeding between the rows

IRRIGATION

Sprinkling

Organic fertilization

(manure every two years)

Mineral fertilization

Ammonium sulphate 7kg

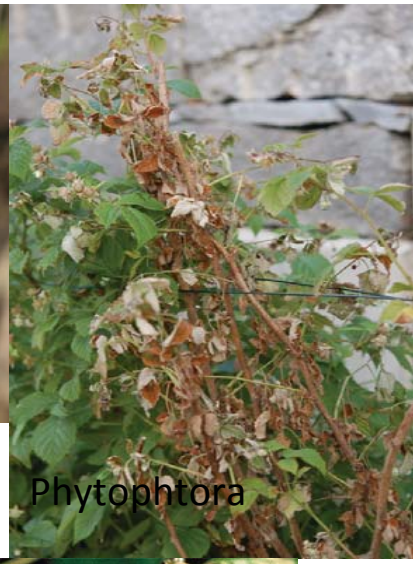
Potassium sulfate 12kg

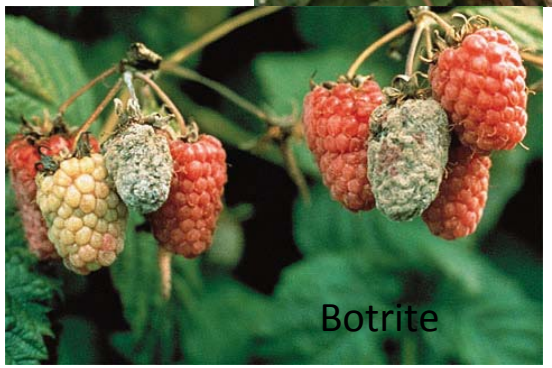
Superphosphate mineral 9kg

Iron sulphate 50kg

Pest and diseas


Didymella


Phytophtora


Botrite


Byturus tomentosus

- In case of excess moisture raspberry may be subject to various rots as botrytis (rot of the fruit), the Phytophthora (collar rot and root). In these cases, you greatly reduce the moisture or treat the plants with natural products such as spraying the plants with Equisetum.
- Parasites are the worm (Byturus tomentosus), aphids, and the midge (formation of galls on stems). Dealing with specific natural and organic insecticides.
- The cecidomia can be eliminated by cutting the part of the stems with the presence of galls and burning them.


Afidi


Drosophila suzuki


Larva maggiolino

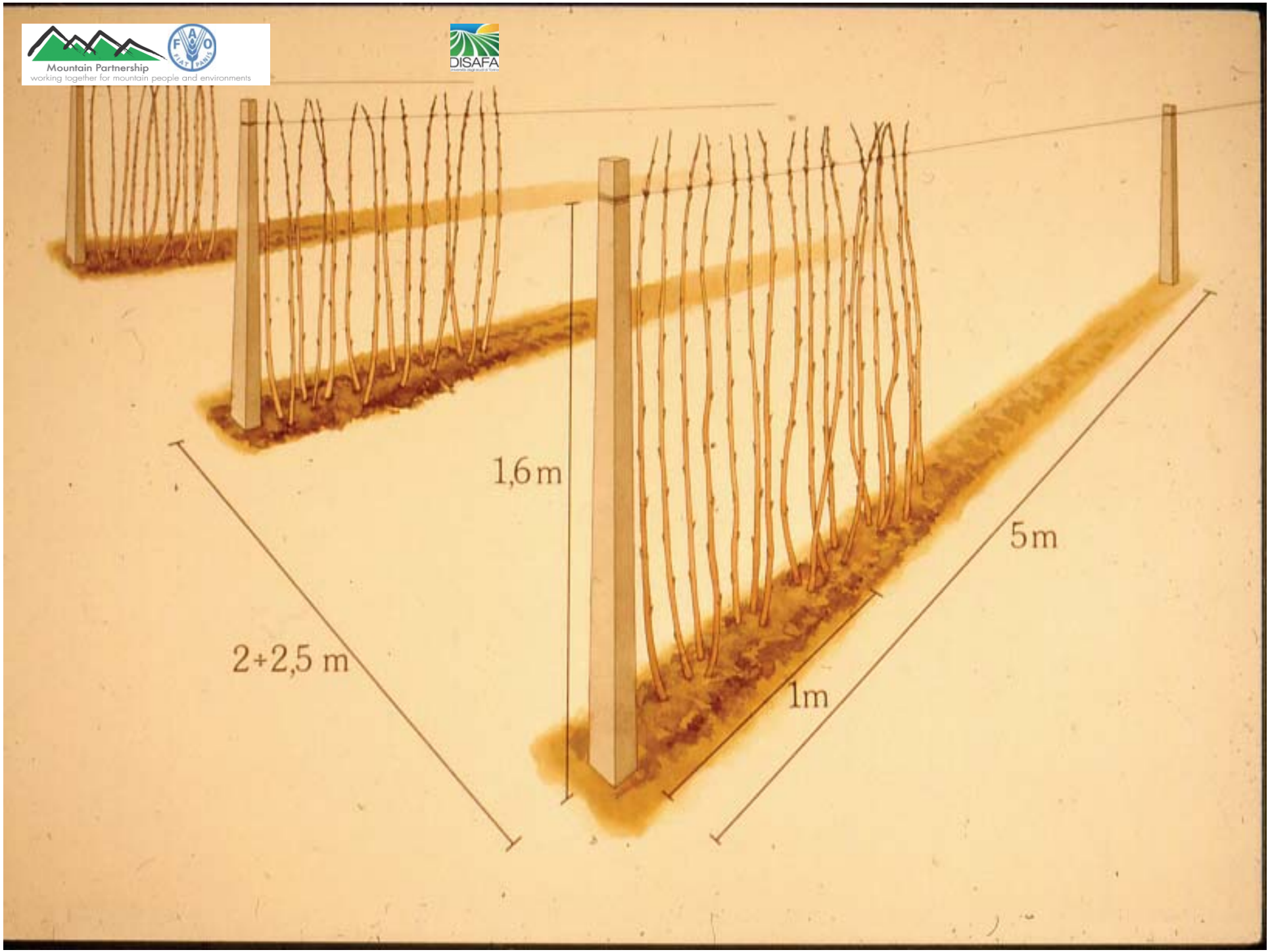
Plant

Raspberries should not be grown in an area in which tomatoes, potatoes, eggplant, peppers, or other crops susceptible to Verticillium wilt have been grown in the past 3-4 years.

System

- V system: the support poles are tilted towards the interrow,
- T system: the poles have a cross bar at the top.

Both systems allow a good light interception in the rows. The new vegetation (suckers) develops vertically, while the branches in production, slanted V are tied to wires placed at the end of V or T.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1,6 m
2÷2,5 m
1m
5m


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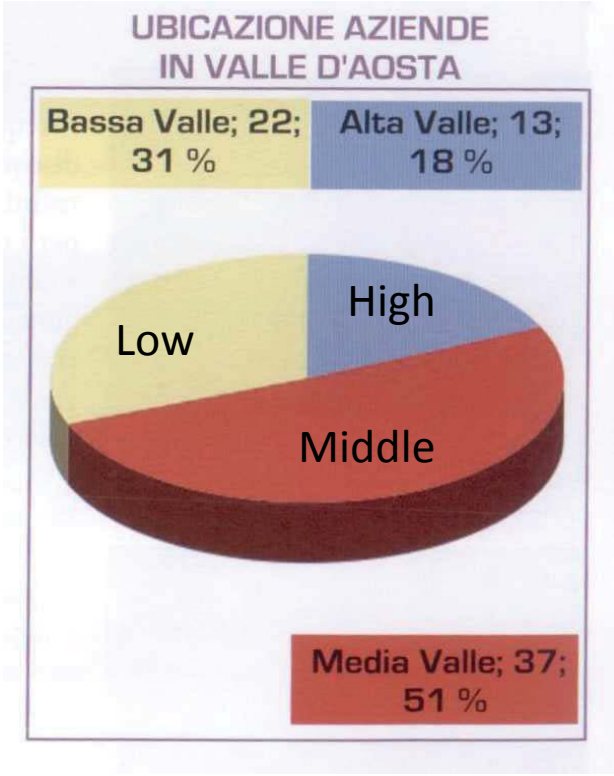
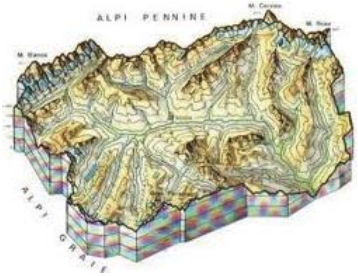
A STUDY CASE
BERRIES in AOSTA VALLEY

BERRY FRUITS
in
AOSTA VALLEY





Today, the cultivation of berry fruits covers about 9 ha divided into 72 companies of various sizes with production estimated average of 1-2 kg per square meter.

The plantations are located throughout the region starting from an altitude of about 400 meters above sea level to arrive at an altitude of 1700-1800 meters.

- The production period is due to the seasonality in our region, starting from the end of May with strawberries to arrive in mid-October with blackberries and raspberries flowering. This period that coincides with the summer tourist activity Aosta Valley.

- The particular climatic conditions of the region guarantee high quality production with a limited use of synthetic chemicals, also developed the concept of the formula ecological "zero-mile”

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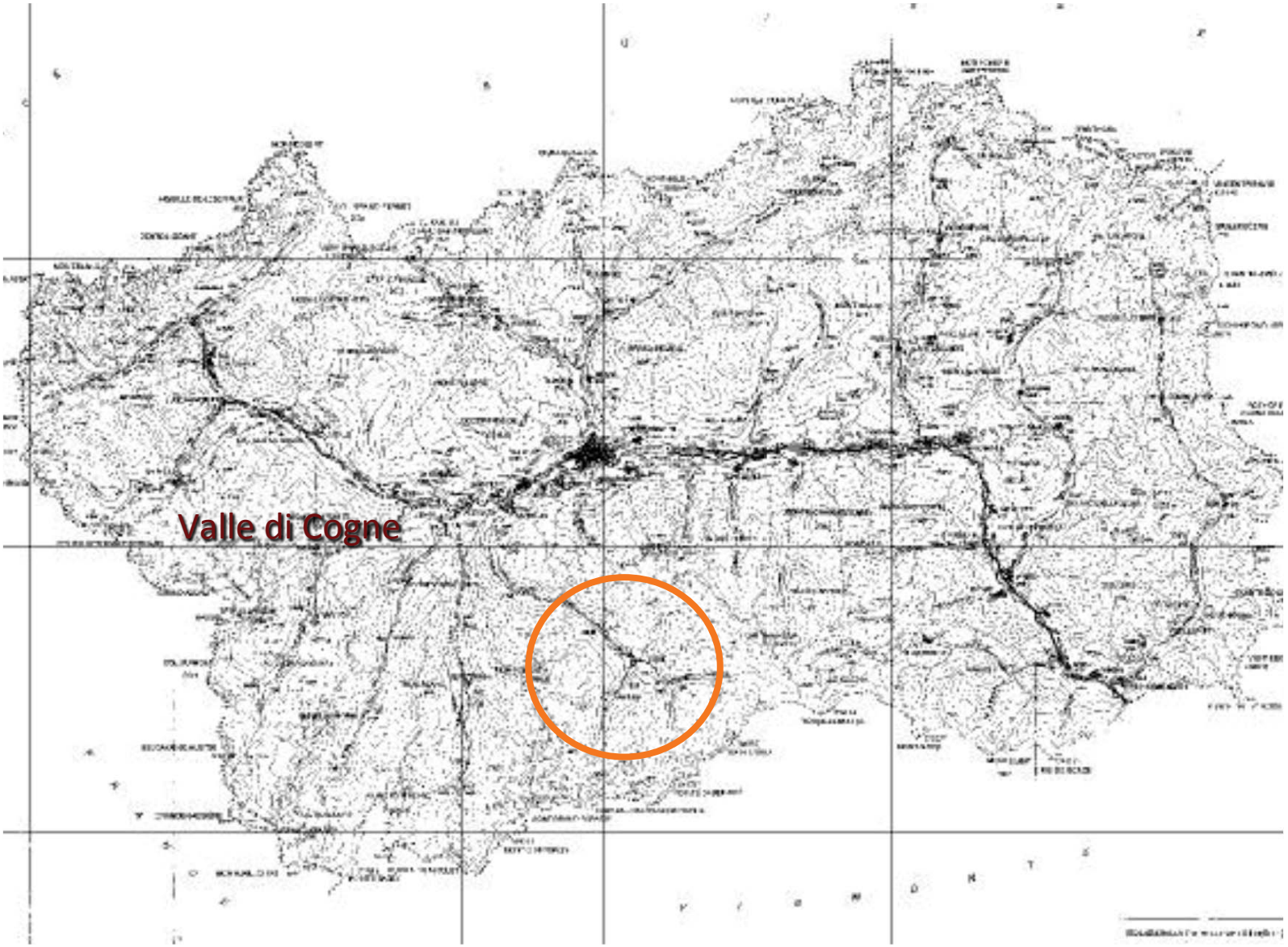

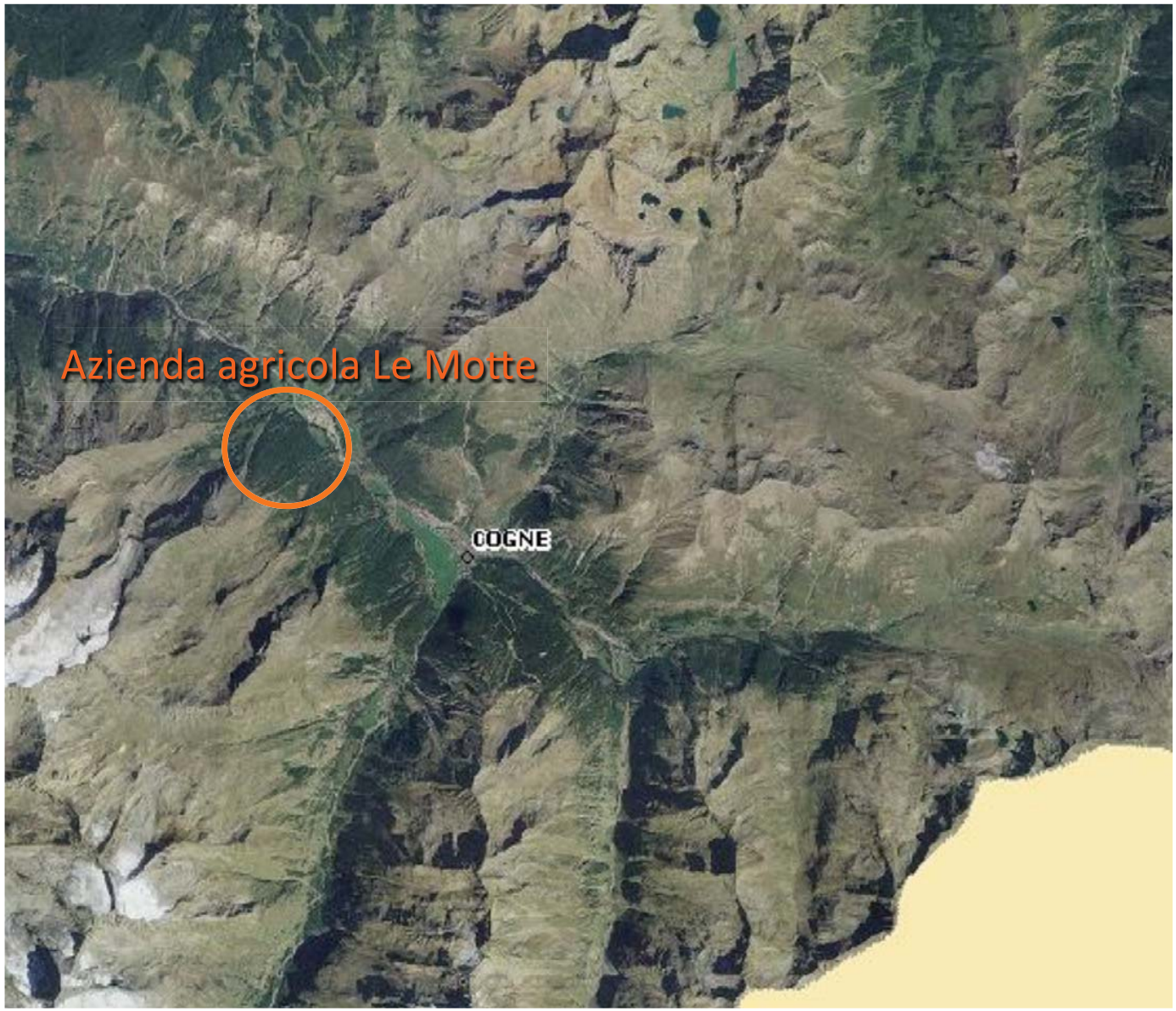
Azienda agricola Le Motte
COGNE

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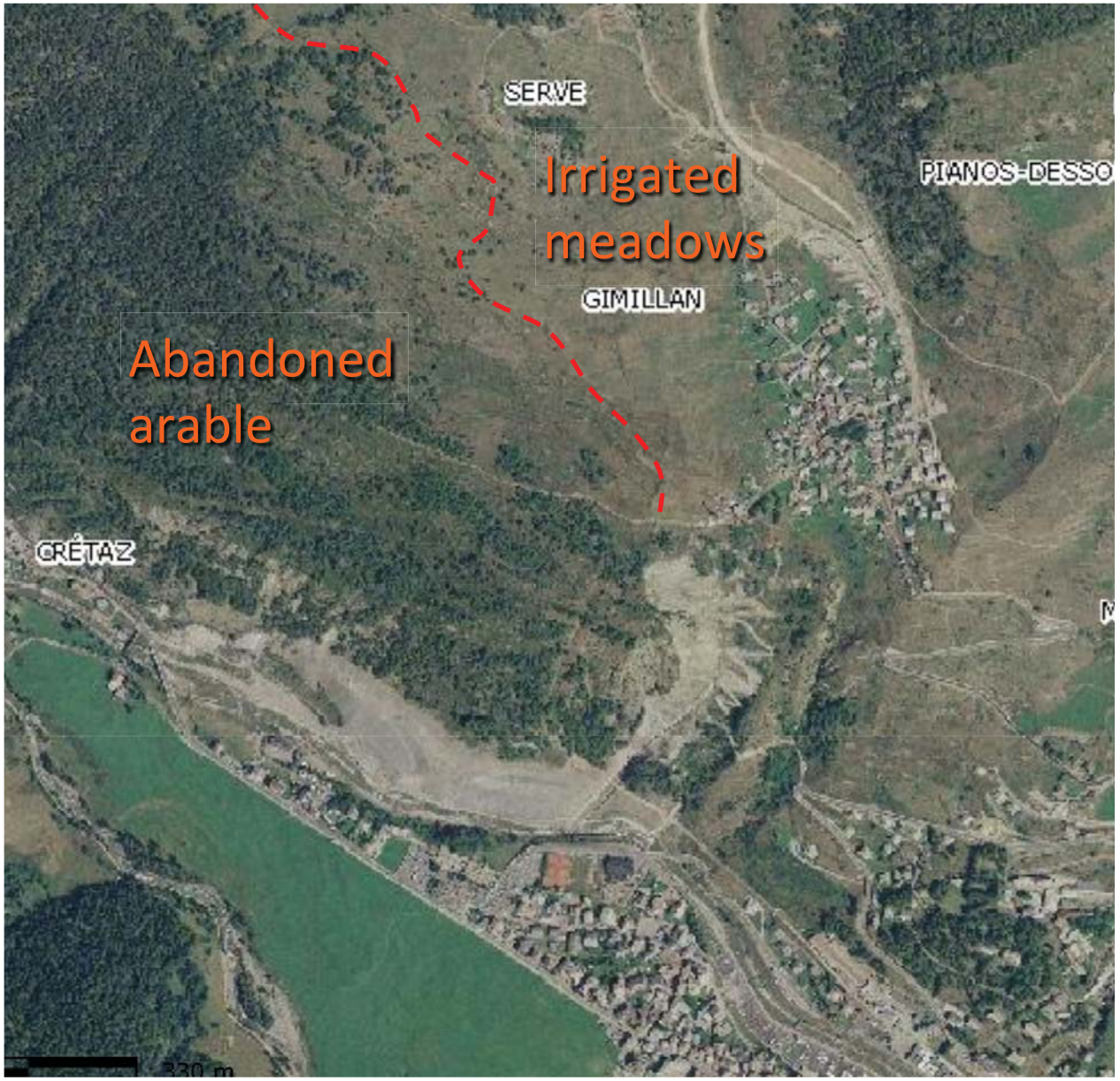
SERVE
Irrigated meadows
PIANOS-DESSO
GIMILLAN
Abandoned arable
CRÉTAZ
330 m

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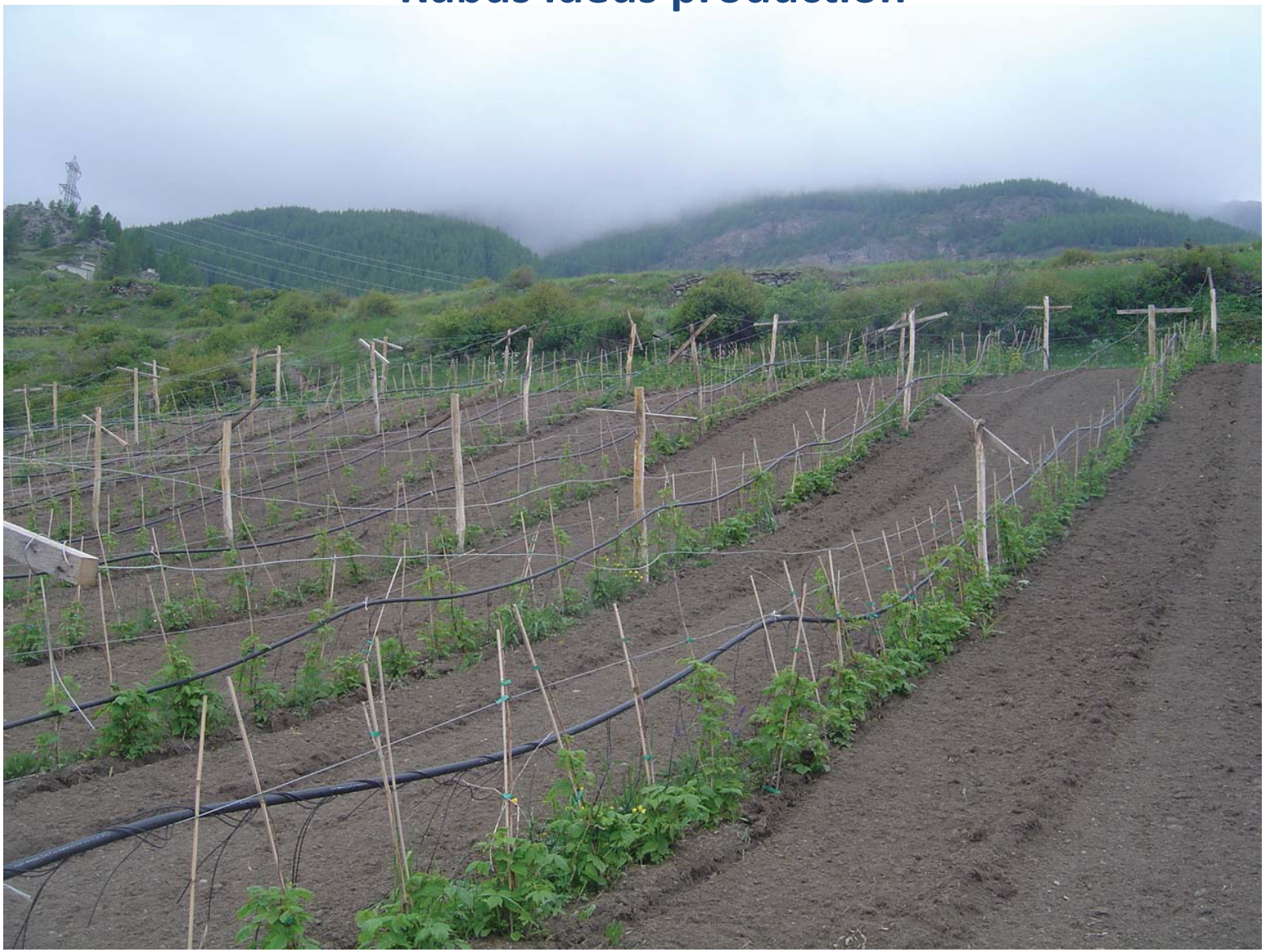
Rubus ideus production



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