Twinning Project

BA 12 IB AG 01

"Further strengthening of capacities of phytosanitary sector in the fields of plant protection products, plant health, seeds and seedlings, including phytosanitary laboratories and phytosanitary inspections"

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General methods for IPM standards

Integrated pest management is a system of growing crops and producing food that:

- **minimises the use of chemicals,**
- **rationalises the application of fertilisers,**
- **reduces the impact of machinery on the soil structure**
- **minimises the impact on water quality of agronomic practices**

all respecting toxicological, eco-toxicological and economic principles

Methods of cultivation and post-harvest treatments have been developed:

- **As general rules for all crops**
- **Specific for each crop**

Which are the general norms of integrated pest management applicable to all crops ?

General methods for IPM standards

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This presentation is based on the prescriptions of the Rural Development Plan of the Emilia-Romagna Region.

Why the RDP ?

The rationale is to link the subsidies to farmers to the adoption of IPM.

The farmer is entitled to receive the funds envisaged in the RDP if the farm is managed according to the principles and recommendations of the IPM system.

This is facilitated by the fact that a public efficient Agricultural Advisory Service operates in Emilia-Romagna, so the farmers can receive precise indications regarding many farm management issues, ranging from soil characteristics, agro-meteorology, soil tillage, irrigation, selection of plant material, fertilisation and pest management.

The farmers are requested to prepare an application which is basically a cultivation plan, there are specific formats provided by the AAS to be filled.

General methods for IPM standards

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Selection of the suitable environment:

The characteristics of the agro-climatic environment are fundamental to establish the suitability of a a given land for a given crop
Usually the suitability of land for certain crops is the result of a long history and therefore we know that in such a place potatoes grow particularly well or that the yield of wheat is higher than in another place. So the choice of main crops is based on long term observations. Sometimes this information is not available as we would like to introduce a new crop or a new variety, this happens more frequently than one might think, in Italy for instance:
Kiwi – from zero to leading world producer
Soya – the discover of the photo-neutral variety allowed the spreading in higher latitudes.
So there are cases when we need to assess the suitability of land

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Protection of the natural eco-system:

The most widely used interventions to guarantee land and nature protection are indicated in the “greening measures” contained in the Rural Development Plans, and they are generally the following:

- Hedges to prevent the leaking and spreading of chemical residues
- Ditches to prevent erosion and to facilitate water management
- Green corridors to allow the continuity of movements for natural fauna
- Wooded areas to host micro and macro fauna and natural vegetation
- Tree lines
- Grass strips

The areas with these natural features within each farm should cover not less than 5% of the utilised agricultural area of the farm.
These “greening” package has been the subject of many criticisms as defined for all countries and situations, regardless to the environmental differences.

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Choice of variety and plant material:

The agricultural advisory system in Emilia-Romagna and the Regional Research Centres may provide a list of “recommended varieties and cultivars”, at least 70% of the cultivated area of the farm should be planted with recommended varieties.

The varieties list is revised every year and it is published so that all farmers can acknowledge which are the most suited varieties depending on the agro-ecological conditions in which the farm is located, the soil characteristics, the growing cycle, the target markets, type of irrigation if any, etc…

GMOs are banned

For pomes and stone fruits it is compulsory to use “virus free” certified plant materials. In case of varieties not yet certified, but under the certification process, the AAS provides the so called “blue label”. In case the propagation of the seedlings is made on the farm, the parent material (rootstock and grafts) must be certified virus free.

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Soil tillage and land preparation:

The preparation of land for sowing and planting must be done having care to preserve the fertility of the soils and to prevent erosion and degradation.

Furthermore the cultivation plan must aim at preserving a good soil structure having care to develop a high diversification of micro flora and fauna.

Other important considerations relate to soil compaction and conveyance of excess rainfall.

In case of major operations like deep ripping, soil grading, etc…, these operations have to be carefully planned in order to ensure the above recommendations.

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Crop rotation:

Crop rotation is essential to ensure the following objectives:

- Retention of soil fertility (different root systems, N fixation)
- Limitation of weeds with reduced use of herbicides (wheat alternate with lucerne)
- Limited use of pesticides, thanks to lack of host plants (nematods, Diabrotica, fungi)

Crops are classified as main crops, secondary crops (< 120 days) and other crops.

A minimum five year crop rotation is compulsory to qualify for Rural Development funds associated to IPM.

Within the 5 years only 1 repetition of the same crop is possible, and at least 3 main crops have to be grown.

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Crop rotation (suite):

The farmers submit a a rotation plan, according to the rules outlined above, the plan is illustrated on the farm map where the various cultivated plots are shown in the 5 year .

Specific provisions are applied in case of tunnels or greenhouses, which remain at least 5 year on the same land: the rotation is not necessary provided that the soil is disinfested by means of heat or other non-chemical systems every second year.

In case of secondary crops – crops that remain less than 120 days on the land – they are not counted in the rotation, the rotation is counted for main crops only. Secondary crops might be grass or legume crops, that are either mown or ploughed back into the soil, or any other short term crop.

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Sowing, planting, cultivation :

The general principles to be respected in the cultivation are:

- Achievement of good yields with a good phytosanitary state
- Limitation of weeds, diseases and pests
- Maximise the effect of nutrients
- Maximise irrigation and water use efficiency

The general principles above have to be respected both for annual as well as perennial crops

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Soil tillage :

Land with > 30% slope:

- for annual crops only sod seeding, zero tillage
- for perennial crops in the planting phase: tillage depth < 30 cm, or ripping < 40 cm. Compulsory green cover between lines and between trees, to be mown as required

Land with slope < 30% > 10%:

- tillage depth < 30 cm
- ripping: no depth limit

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Soil hydraulic management :

Land with > 10% slope:

- Digging of temporary ditches to dispose of excess water at a distance of no more than 60 mt measured on the max slope
- for tree plantations with slope > 10 < 30% it is compulsory the green cover between lines, if the slope is > 30% the green cover must be applied also between trees on the line

The farm plans are usually drafted on maps at 1:5000 scale with contour lines, that are produced by the Cartographic Office of the Region.

Special provisions apply to areas with a high hydrogeological risks as in this case the vertical flow of excess water may cause landslides, so it necessary to let the water run along the max slope to be then conveyed in the drainage network, or there must be a deep drainage system.

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Soil hydraulic management :

Land with < 10% slope:

- When gravel soils that contain < 18% clay it is compulsory the green cover between lines in the Autumn - Winter period in order to reduce the leakage of nutrients

For hilly and mountain areas with slope > 10% the green cover is compulsory as indicated above, unless the rainfall is below 150 mm in the period March-June and the clay content of the soil is > 35%, in this case the harrowing and superficial scarification of the soil reduces the evaporation of water from underground

Detailed soil maps are available in the region

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Phyto-regulators and bio-stimulators:

- Phyto-regulators are allowed only according to the indications contained in the specific crop standards. Phyto-regulators are subject to the registration and recording rules of all pesticides, including recording of their applications
- Bio-stimulators can be applied without limitations

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Fertilisation :

- It is compulsory to have a fertilisation plan, in practice it is necessary to have a detailed soil map of the farm. Generally the regional soil map at 1:50.000 scale provides the basic information to develop a fertilisation plan.
- Soil analysis are not necessary for plots of < 1 ha (for annual crops) or 0,5 ha (for tree plantations)
- In case of a new application a provisional profile of the soils can be submitted to be later improved from the 2nd year

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Fertilisation :

The factors to be considered for the nutrition plan are:

- Soil analysis as outlined before
- Expected yields on the basis of previous experience in the farm or in the nearby farms, or if the crop is new from literature
- Fertilisation has to be limited to the replacement of the nutrients subtracted by the harvested crop, with an allowance for losses due to leakage that have to be limited as much as possible (N cycle in water)
- The nutrition plan for each year is presented by the end of February for annual crops, by the 15th April for seed crops, vegetables and tree plantations
- Plans can be modified with motivations in the course of the year
- Everything has to be recorded and kept for future consultation

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Types of fertilisers :

All the fertilisers authorised can be used, including also residues from food industries authorised as fertilisers.

Application of fertilisers :

The application of fertilisers is based on the absorption capacity by the plant of the supplied nutrients.

In the IPM standards for each specific crop there are indications on the types and amounts of fertilisers to be applied (taking into account the soil analysis).

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Soil Analysis for fertilisation :

Soil analysis have to be repeated every 5 years as the contents of nutrients, organic matter and the soil structure may vary with the years with agronomic practices. Parameters are: granulometry, pH in water, organic matter, total and active lime, total and exchangeable N, absorbable P. Cation Exchange Capacity and ratio Mg/K might be necessary to interpret the other parameters.

Instruments to develop the fertilisation plan :

The AAS makes available some pre-compiled fiches where the farmer has to introduce the information related to the farm location, crops to be grown, etc….
These fiches are excel files that execute automatically the calculations of the quantities and types of fertilisers to be applied.
The system operates also online, through a web application that starts with the identification of the plots of the farm on the regional cartography soil map and elaborates indications for the fertilisation plan

General methods for IPM standards

Analisi chimico-fisiche del terreno
Azienda:
Appezzamento X: 10,90667 Y: 44,89701 Data: 24/11/2016

Sabbia: 19,37 %	**Argilla: 32,26** %	**Limo: 48,37** %	**Classe: Franco limoso** argilloso
pH:		**8,01**	**Giudizio: Leggermente** alcalino
Calcare		**8,95** %	**Giudizio: Poco** calcareo
Calcare		**3,21** %	**Giudizio: Medio**
Sostanza		**2,33** %	**Giudizio: Medio**
Fosforo assimilabile		**44 mg/Kg**	**Giudizio: Elevato**
Potassio assimilabile		**316 mg/Kg**	**Giudizio: Elevato**
Azoto totale:		**1,7** %	**Giudizio: Medio**
Rapporto C/N:		**7,95**	**Giudizio: Basso**
Disp. ossigeno:		**Buona**	

General methods for IPM standards

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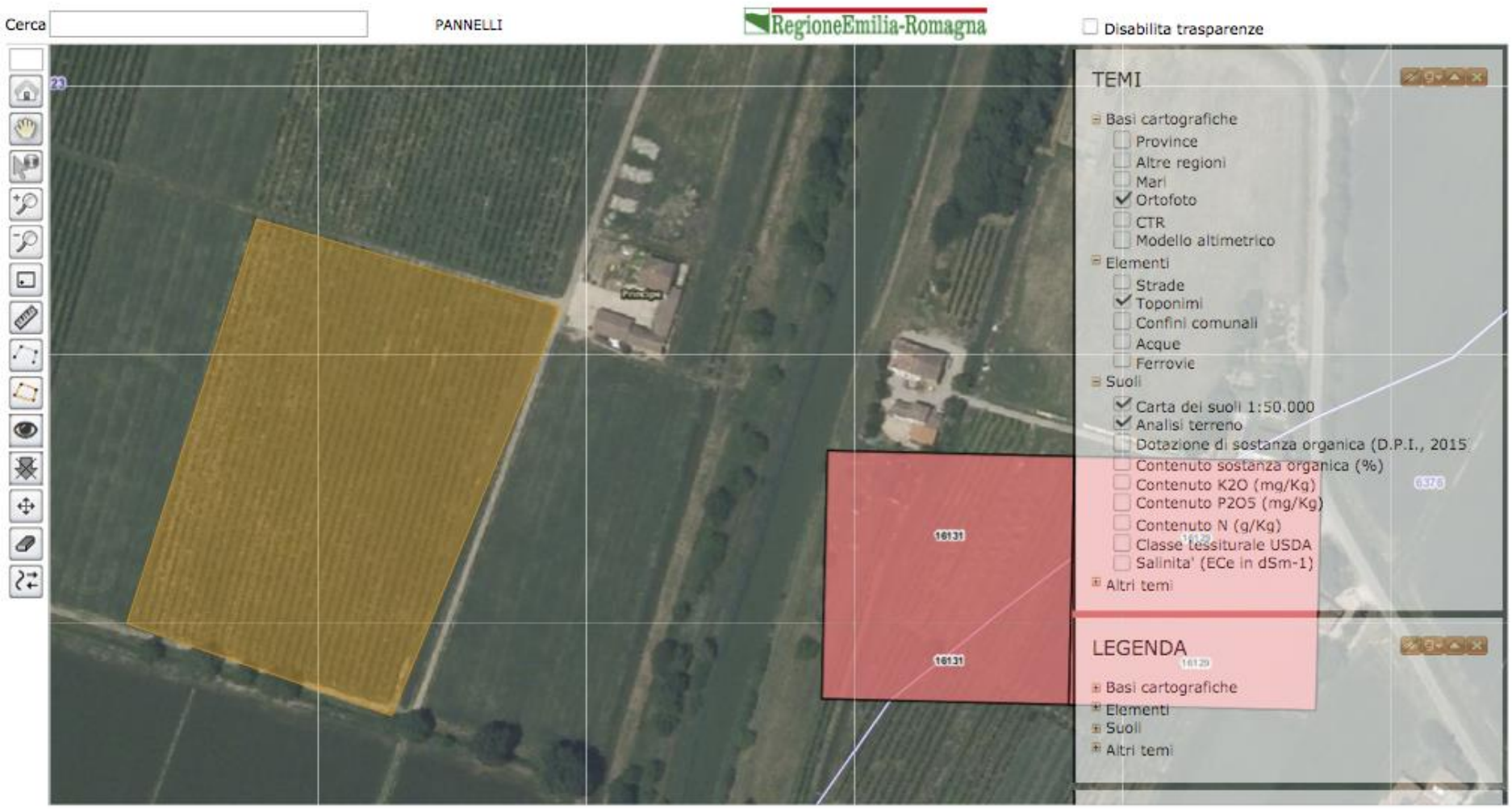

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Irrigation:

Date and volume of irrigation:

1. **Surface and sprinkler irrigation: date and volume (cum) of each application**
2. **Micro-irrigation: volume for the whole growing/irrigation cycle, dates of start and end of the application**

Rainfall data:

This are usually available from the public network of meteorological stations and gauges which is very diffuse, else one could use a pluviometer

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Phytosanitary protection :

The first general rule for the farmer is to keep accurately a register of:

- Acquisition and storage of pesticides
- Use of pesticides
- Disposal of containers and unused pesticides

The AAS establishes specific recommended phytosanitary rules for each crop that when necessary may vary according to local eco-systems and agro-ecological conditions.

The basic principle of IPM is that the phytosanitary treatments are not based on a calendar but on the observation and monitoring of potential pests, in order to evaluate if the threshold of damage warrants a treatment.