Characterisation of main pests on grapevine

Method/protocol submitted by:

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Objectives of the method/protocol:

Quantifying 3 diseases (downy mildew, powdery mildew, grey mould) and 5 sorts of animal pests (vine moth, mites, maly lantern fly, leafhoppers, phylloxera) on grapevine, at the field scale.

Brief description of the method/protocol:

This protocol presents a visual non destructive quantification method based on abundance classes to quantify diseases and animal pests on grapevine.

Possible uses of this method/protocol:

Characterisation of pest pressure in a region.
The protocol is currently used by technical advisers in the Tuscany region in Italy. The data collected (on about 20 farms) is aimed at editing weekly phytosanitary and phenological reports for farmers.

Method/protocol:

- Observation unit:
The observation unit is the field.

- Abundance classes:
Each field is assigned to a qualitative abundance class for each of the animal pests or diseases studied.
The observations are carried out weekly. The diseases and animal pests observed depend on the moment of the year.
The phenological stage of the grapevine according to a simplified BBCH scale is evaluated each week on 5 plants in good phytosanitary conditions and with homogeneous development stage and productivity. These 5 plants are situated in the interior of the field (not on the perimeter) and should not be adjacent. They should have different exposures (situated on both sides of the row).
The observation of diseases and animal pests is realised on the plants the experimenter encounters while walking between the 5 plants observed for phenological stages. The "observation path" (that is to say the way the observer walks between the plants) is the same each week.
The date and sort of the last treatment in each field are noted at each observation.
The abundance classes for the different pests are presented below:

  o Downy mildew of grapevine (*Peronospora viticola*) on leaves and grapes
  For these observations, the rainfall of the week before the observation is noted according to the following classification:
  - No rainfall

- Precipitations inferior to 10 mm
- Precipitations superior to 10 mm

▪ Downy mildew on the leaves:

Visual observation of the leaves allows the experimenter to assign the field to one of the following classes, depending on the infestation level of the field:

Level	Description
Absence	no symptom on the leaves
Low	a few plants in the field show low-level symptoms (5-10% of the plants' leaves are attacked)
Medium	the majority of the plants shows low-level symptoms (5-10% of attacked leaves), or some plants show high-level symptoms (more than 30% of attacked leaves)
High	the majority of the plants shows high-level symptoms (more than 30% attacked leaves)

▪ Downy mildew on the grapes:

Visual observation of the grapes allows the experimenter to assign the field to one of the following classes, depending on the infestation level of the field:

Class	Description
Absence	no symptom on the grapes
1-5%	1-5% of the plants show symptoms on the grapes
5-10%	5-10% of the plants show symptoms on the grapes
>10%	More than 10% of the plants show symptoms on the grapes

o Powdery mildew of grapevine (*Oidium tuckeri*) on leaves and grapes

▪ Powdery mildew on the leaves:

Visual observation of the leaves allows the experimenter to assign the field to one of the following classes, depending on the infestation level of the field:

Level	Description
Absence	no symptom on the leaves
Low	a few plants in the field show low-level symptoms (1-5% of attacked leaves/shoots)
Medium	the majority of the plants shows low-level symptoms (more than 5% of attacked leaves/shoots), or some plants show high-level symptoms (more than 30% of attacked leaves/shoots)
High	the majority of the plants show high-level symptoms (more than 30% of leaves/shoots with symptoms)

▪ Powdery mildew on the grapes:

Visual observation of the grapes allows the experimenter to assign the field to one of the following classes, depending on the infestation level of the field:

Class	Description
Absence	no symptom on the grapes
1-5%	1-5% of the plants show symptoms on the grapes
5-10%	5-10% of the plants show symptoms on the grapes
>10%	More than 10% of the plants show symptoms on the grapes

o   Grey mould of grapevine (*Botrytis cinerea*) on grapes

▪   Grey mould on the grapes:
Visual observation of the grapes allows the experimenter to assign the field to one of the following classes, depending on the infestation level of the field:

Level	Description
Absence	no symptom in the field
Low	only 1-5% of the plants show low-level symptoms on the grapes
Medium	5-10% of the plants show low-level symptoms on the grapes, or some plants show high-level symptoms on the grapes
High	more than 10% of the plants show high-level symptoms

o   Vine moth (*Lobesia botrana*)
2 sorts of measures are realised:
▪   Average number of vine moths trapped: average number of adult males trapped weekly in the pheromone traps of the monitored field; three traps per hectare will be installed
Infestation: visual observation of the grapes and the inflorescences allows the experimenter to assign the field to one of the following classes, depending on the infestation level of the field:

Class	Description
Absence	no injury caused by *Lobesia botrana* is observed
0-5%	0-5% of the inflorescences/grapes are attacked by *Lobesia Botrana*
5-10%	5-10% of the inflorescences/grapes are attacked by *Lobesia Botrana*
10-15%	10-15% of the inflorescences/grapes are attacked by *Lobesia Botrana*
15-25%	15-25% of the inflorescences/grapes are attacked by *Lobesia Botrana*
25-50%	25-50% of the inflorescences/grapes are attacked by *Lobesia Botrana*
>50%	More than 50% of the inflorescences/grapes are attacked by *Lobesia Botrana*

o   Mites
Visual observation of the field allows the experimenter to assign it to one of the following classes, depending on the infestation level:

Level	Description
Absence	no mites visible in the field
Low	mites present on 10-20% of the leaves of a limited number of plants (5-10%). Presence of *Phytoseiidae*
Medium	mites present on 20-50% of the leaves of more than 10% of the plants, or on all the leaves of a limited number of plants (2-5%). No *Phytoseiidae*
High	mites present on more than 50% of the leaves of more than 10% of the plants.

The main species of acari/mite present is noted:
▪   No species of mite present
▪   The main species present is *Eotetranychus carpini* (Yellow spider mite)
▪   The main species present is *Panonychus ulmi* (Fruit tree red spider mite)
▪   Both of the species described above are present in the field

- o Mealy lantern fly (*Metcalfa pruinosa*)
  Visual observation of the field allows the experimenter to assign it to one of the following classes, depending on the infestation level of the field:

Level	Description
Absence	no *Metcalfa pruinosa* infestations visible in the field
Low	1-5% of the plants are attacked by *Metcalfa pruinosa*
Medium	5-10% of the plants are attacked by *Metcalfa pruinosa*
High	more than 10% of the plants are attacked by *Metcalfa pruinosa*

- o Leafhoppers/cicadellidae
  Visual observation of the field allows the experimenter to assign it to one of the following classes, depending on the infestation level of the field:

Level	Description
Absence	no injury caused by grasshoppers is visible
Below threshold	the number of young leafhoppers/cicadellidae is inferior to: ▪ 1-2 on 100 leaves in spring and beginning of summer ▪ 50 on 100 leaves in full summer season
Above treshold	the number of young leafhoppers/cicadellidae is inferior to: ▪ 1-2 on 100 leaves in spring and beginning of summer ▪ 50 on 100 leaves in full summer season

The main species of leafhoppers/cicadellidae is noted:
- ▪ No species of leafhopper present
- ▪ The main species is *Empoasca vitis*
- ▪ The main species is *Zygina rhamni*
- ▪ The main species is *Scaphoideus titanus*

- o Grape phylloxera (*Viteus vitifoliae Fitch*)
  Visual observation of the field allows the experimenter to assign it to one of the following classes, depending on the infestation level:

Level	Description
Absence	no symptom of phylloxera attacks in the field
Sporadic presence	a limited number of leaves on few plants show symptoms of infestation
Widespread	a variable number of leaves on different plants spread in the field show symptoms of infestation

Advantages / Disadvantages of the method/protocol:
The visit of one field takes approximately 20-30 minutes and it is carried out by one advisers.
The observation obtained concerns a wide range of diseases and animal pests.
Good identification skills (of pests and symptoms) are required.

References or examples of studies carried out by using this method/protocol:
Web-site of Agroambiente: http://agroambiente.info.arsia.toscana.it/arsia/arsia?