



## Characterisation of main pests on peach tree

### **Method/protocol submitted by:**

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### **Objectives of the method/protocol:**

Quantifying 5 diseases (brown rot, powdery mildew, leaf curl, shoot blight, peach canker) and 7 sorts of animal pests (oriental fruit moth, peach twig borer, aphids, white peach scale, San José scale, mites, Mediterranean fruit fly) on peach, 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 peach.

### **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 several farm 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 each week. The diseases and animal pests observed depend on the moment of the year.

The date and sort of the last treatment in each field are noted.

The abundance classes for the different pests are presented in the tables below:

- Brown rot (*Monilinia fructigena*)

- Presence:

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 on the leaves
Low	a few plants in the field show low-level symptoms (5-10% of attacked organs)
Medium	the majority of the plants shows low-level symptoms (5-10% of attacked organs), or some plants show high-level symptoms (more than 30% of attacked organs)
High	the majority of the plants show high-level symptoms (more than 30% of organs with symptoms)

- Sort of attacked organ:
  - No organ of the tree attacked
  - The flowers are attacked (spring)
  - The fruits are attacked (summer)
  
- Powdery mildew (*Sphaerotheca pannosa*) on leaves and fruits

  - 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:

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

Level	Description
Absence	no symptom on the fruits
Low	a few plants in the field show low-level symptoms (1-5% of attacked fruits)
Medium	the majority of the plants shows low-level symptoms (1-5% of attacked fruits), or some plants show high-level symptoms (more than 10% of attacked fruits)
High	the majority of the plants show high-level symptoms (more than 10% of fruits with symptoms)



- Leaf curl of peach (*Taphrina deformans*)  
Visual observation of the leaves allows the experimenter to assign the field to one of the following classes, depending on the infestation level:

Level	Description
Absence	no symptom
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/fruits), or some plants show high-level symptoms (more than 30% of attacked leaves/fruits)
High	the majority of the plants show high-level symptoms (more than 30% of leaves/fruits with symptoms)

- Shoot blight of peach (*Stigmata carpophila*)  
Visual observation of the leaves allows the experimenter to assign the field to one of the following classes, depending on the infestation level:

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

- Peach canker (*Cytospora leucostoma*)  
Visual observation of the leaves allows the experimenter to assign the field to one of the following classes, depending on the infestation level:

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

- Oriental fruit moth (*Cydia molesta*) on fruits



- Attacked plant organ:

Attacked plant organ	Generation
Shoots	First generation
Fruits	Following generations

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

Level	Description
Absence	no symptom in the field
Low	a limited number of fruits (1-2%) are injured by oriental fruit moth
Medium	about 2% of the fruits are injured by oriental fruit moth
High	More than 2% of the fruits are injured by oriental fruit moth

- Characterisation of the infestation:  
The main development stage present in the field is indicated according to the following categories:

Development stage	Description
Absence	no oriental fruit moth in any development stage observed. No symptoms observed
Eggs	eggs of oriental fruit moth are observed on the fruits
Larvae	larvae are observed in the fruits
Signs of former presence of larvae in the fruits	no larvae are observed in the injured fruits but signs of former presence is visible (holes where the larvae went in/out of the fruits)

- Peach twig borer (*Anarsia lineatella*) on fruits

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

Level	Description
Absence	no symptom in the field
Low	a limited number of fruits (1-2%) are injured by oriental fruit moth
Medium	about 2% of the fruits are injured by oriental fruit moth
High	More than 2% of the fruits are injured by oriental fruit moth

- Characterisation of the infestation:  
The main development stage present in the field is indicated according to the following categories:

Development stage	Description
Absence	no oriental fruit moth in any development stage observed. No symptoms observed
Eggs	eggs of oriental fruit moth are observed on the fruits
Larvae	larvae are observed in the fruits
Signs of former presence of larvae in the fruits	no larvae are observed in the injured fruits but signs of former presence is visible (holes where the larvae went in/out of the fruits)



○ Aphids

▪ Green peach aphid (*Myzus persicae*)

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 in the field
Low	a limited number of trees show low-level symptoms (1-10% of the shoots attacked)
Medium	the majority of the plants shows low-level symptoms (more than 10% of attacked plant organs), or some plants show high-level symptoms (more than 30% of attacked plant organs)
High	the majority of the plants show high-level symptoms (more than 30% of plant organs attacked)

▪ Cigar-rolling peach aphid (*Myzus varians*)

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 in the field
Low	a limited number of trees show low-level symptoms (1-10% of the shoots attacked)
Medium	the majority of the plants shows low-level symptoms (more than 10% of attacked plant organs), or some plants show high-level symptoms (more than 30% of attacked plant organs)
High	the majority of the plants show high-level symptoms (more than 30% of plant organs attacked)

▪ Mealy peach aphid (*Hyalopterus amygdali*)

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 in the field
Low	a limited number of trees show low-level symptoms (1-10% of the shoots attacked)
Medium	the majority of the plants shows low-level symptoms (more than 10% of attacked plant organs), or some plants show high-level symptoms (more than 30% of attacked plant organs)
High	the majority of the plants show high-level symptoms (more than 30% of plant organs attacked)



○ White peach scale (*Pseudaulacaspis pentagona*)

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
Low	a limited number of trees show low-level symptoms (1-5% of the shoots attacked)
Medium	the majority of the plants shows low-level symptoms (more than 5% of attacked plant organs), or some plants show high-level symptoms (more than 30% of attacked plant organs)
High	the majority of the plants show high-level symptoms (more than 30% of plant organs attacked)

○ San José scale (*Quadraspidiotus perniciosus*)

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 presence of San José scale
Low	a limited number of trees (1-2%) show signs of infestation
Medium	more than 2% of the trees are infested
High	more than 10% of the trees are infested

○ 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 presence of mites
Low	presence of mites on some leaves (10-20%) of a limited number of trees (5-10%). Presence of <i>Phytoseiidae</i>
Medium	presence of mite injuries on more than 20-50% of the leaves of more than 10% of the trees, or on all the leaves of a limited number of trees (2-5%). Absence of <i>Phytoseiidae</i>
High	Presence of mite infestation on more than 50% of the leaves of more than 10% of the trees

○ Mediterranean fruit fly (*Ceratitis capitata*)

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
Low	a limited number of fruits (1-2%) show signs of infestation
Medium	more than 2% of the fruits are infested
High	more than 10% of the fruits are infested



**Advantages / Disadvantages of the method/protocol:**

Field monitoring takes about 20-30 minutes and it can be carried out by one advisor.

**References or examples of studies carried out by using this method/protocol:**

Web-site of Agroambiente: <http://agroambiente.info.arsia.toscana.it/arsia/arsia?>