Characterisation of main pests on pear tree

Method/protocol submitted by:

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Objectives of the method/protocol:

Quantifying 2 diseases (pear scab, brown spot disease) and 9 sorts of animal pests (codling moth, oriental fruit moth, tortrix moth, scales, pear-bedstraw aphid, pear sawfly, pear psyllid, acaridae, eriophyroidea) on pear, 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 pear.

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 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 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:

o Pear scab (*Venturia pyrina*) on leaves and fruits

- Pear scab 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 attacked leaves)
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 show high-level symptoms (more than 30% of leaves with symptoms)

- Pear scab 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 of the field:

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 leaves), or some plants show high-level symptoms (more than 10% of attacked fruits)
High	the majority of the plants shows high-level symptoms (more than 10% of attacked fruits)

- Leaf wetness condition:

This factor has to be checked if rainfall has occurred in the week preceding the observation. This data can be observed using a specific sensor.

o Brown spot disease (*Stemphylium vesicarium*) on 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
Low	a few plants in the field show low-level symptoms (1-5% of attacked leaves)
Medium	the majority of the plants shows low-level symptoms (1-5% 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 30-40% of attacked leaves and defoliation)

- Codling moth (*Cydia pomonella*) 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 of the field:

Level	**Description**
Absence	no symptom in the field
Low	a limited number of fruits (1-2%) are injured by codling moth
Medium	about 2% of the fruits are injured by codling moth
High	More than 2% of the fruits are injured by codling 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 codling moth in any development stage observed. No symptoms observed
Eggs	eggs of codling 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)

- Oriental fruit moth (*Cydia molesta*) 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 of the field:

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)

- Tortrix moths
  - Infestation level:

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 symptom observed
Presence, treatment realised	injuries are visible but are limited by a treatment
Presence, no treatment realised	Injuries are visible, no treatment has been realised yet

The main species of tortrix moth present is noted:

- No species of tortrix moth present
- The main species present is *Pandemis heparana*
- The main species present is *Archips rosana*
- The injuries are caused mainly by other species than the ones mentioned above

- Scales

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 symptom observed
Presence, treatment realised	colonies are visible but are limited by a treatment
Presence, no treatment realised	colonies are visible, no treatment has been realised yet

- Pear-bedstraw aphid (*Dysaphis pyri*)

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 symptom observed
Presence, treatment realised	injuries are visible but are limited by a treatment
Presence, no treatment realised	Injuries are visible, no treatment has been realised yet

- Pear sawfly (*Hoplocampa brevis*)

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 symptom observed
Presence, treatment realised	injuries are visible but are limited by a treatment
Presence, no treatment realised	Injuries are visible, no treatment has been realised yet

o Pear psyllid (*Psylla pyricola*) on fruits

- Infestation level:

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	some trees show low-level symptoms (psyllid colonies and/or honeydew present on 5-10% of the plant organs)
Medium	psyllid colonies and/or honeydew are present on 5-10% of the leaves of all the trees, or some trees show high-level symptoms (psyllid colonies and/or honeydew present on more than 30% of the leaves)
High	the majority of the trees shows high-level symptoms (psyllid colonies and/or honeydew present on more than 30% of the plant organs).

- Characterisation of the infestation:

The main development stage present in the field is indicated according to the following categories:

Development stage	**Description**
Absence	no pear psyllid in any development stage observed
Eggs	eggs of pear psyllid are observed
Neonates/honeydew	neonates and production of honeydew are observed
Signs of former presence of larvae in the fruits	adults of pear psyllids are observed

o *Acaridae*

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 breeding ground observed
Presence, treatment realised	breeding grounds are visible but are limited by a treatment
Presence, no treatment realised	breeding grounds are visible, no treatment has been realised yet

o *Eriophyoidea*

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 symptom observed
Presence, treatment realised	injuries are visible but are limited by a treatment
Presence, no treatment realised	Injuries are visible, no treatment has been realised yet

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?