Scouting of pests and diseases on rose foliage

Method/protocol submitted by:

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Objectives of the method/protocol:

To detect and quantify the main pests and diseases on rose foliage in greenhouse with a time-saving and non-destructive sampling method.

Brief description of the method/protocol:

The protocol consists in a visual and non-destructive method to describe the pasts and diseases on rose foliage in greenhouse.

Possible uses of this method/protocol:

The method was developed to improve pest monitoring in greenhouses in the context of research on integrated pest management.
It can also be used for released beneficials and for natural ennemies.

Method/protocol:

- Scouting method:

The observation unit is a stem bearing a flower at the harvest stage and the associated bent-shot, which is the photosynthetic basal foliage (N.B: all roses are not grown this way). A rose at the harvest stage is chosen randomly in the greenhouse each time the experiment is carried out. It is advised to realise the observation once a week.

- The flower and the five leaves nearest the flower are observed on both sides. Then the flower is gently beaten twice, using a plastic fly swatter, above a white A4 paper sheet. Population densities of bioagressors/biodefensors are immediately categorised into abundance classes without counting.
- Then the bent-shot is subjected to the same procedure, yet with more vigorous blows.

Thus, the procedure comprises 2 information levels by observed flower: stem and bent-shot. The observation time should not exceed 30 seconds for the 2 information levels and for a pair of observers. Observation on stem has to be given priority because it concerns the marketed product, but bent-shot phytosanitary aspects are also important.
When several people are implied in the experimentation, it is advised to make some simultaneous adjustment evaluations, in order to avoid excessive variability among observers.

- Visual abundance classes :

The classes are summarised in the table below:

OBSERVATIONS ON STEMS						OBSERVATIONS ON BENT-SHOT
CLASS	APHIDS	WHITEFLIES	MITES	THRIPS	OIDIUM /BOTRYTIS	ALL PESTS AND DISEASES
1	Absence	Absence	Absence	Absence	Absence	Absence
2	1 - 3	Adults only	Presence	1	On 1 leaf	Presence
3	4 -10	Eggs and larvae observed	High number of individuals	2 - 3	On more than 1 leaf	High density
4	11 - 30	High number of individuals	Cobwebbed stem	4 - 7	On the flower	-
5	31 - 100	-	-	8- 15	-	-
6	101 - 300	-	-	-	-	-
7	301 - 1000	-	-	-	-	-

o Observations on the stem

For all observations on stems concerning the pests, the abundance class is a qualitative characterisation of the cumulative number of individuals observed directly on the stem and on the white paper sheet after beating.
One observation per species (of aphids, whiteflies…) is realised if possible.
Be careful: the pests collected by beating sometimes stay still on the paper sheet during a few seconds before moving!

- **Aphids**: n classes
  Adult and larvae data are pooled.
  The abundance class schedule is logarithmic for reasons of convenience (this was shown to be useful on some other crops because of the good capacity of man's eye to detect exponential variations).
  The same classes can be used for mummies of *Aphidiide* sp or *Aphelinidae* sp.

- **Whiteflies:** 4 classes
  Winged adults (clearly visible when manipulating the leaves), larvae and eggs (fixed on the plant) are observed separately.
  Concerning the *Trialeurodes vaporariorum* species, fresh laying is white and form a circle; the eggs become black when mature. Larvae are transparent and yellowish. Their observation needs good vision. Generalised infestation can be quickly detected thanks to the presence of honeydews or ants.

- **Mites:** 4 classes
  Adult and larvae data are pooled.
  Mites are detected by observing injuries on foliage (discoloration). Thorough observation also allows seeing mites running on the plant or on the white paper sheet after beating.
  Be careful: several types of mites are usually observed on roses. The damageous mite is the two-spotted mite *Tetranychus urticae* but some beneficials can also be observed, for example *Neoseiulus spp.*, which is light yellow, or *Phytoseiulus persimilis*, which is red.

- **Thrips:** 6 classes
  Adult and larvae data are pooled.
  Since the mobility of thrips increases with light and heat, sampling should be performed during a luminous period of the day. Thrips often stay still on the paper for a few seconds after beating, then move or fly.

- **Oidium and Botrytis**: 4 classes
  The presence of the disease is characterised by white spots in the case of Oidium and discoloration in the case of Botrytis.

Two qualitative indicators are also given at the stem scale:
- the **stem length,** characterised by the flower-bent shot distance:
1 = close to the bent-shot (< 50 cm)
2 = medium size (50 -70 cm)
3 = long stem (> 70 cm)
- the **flower stage**
1 = just coloured
2 = harvest stage
3 = wide open

o Observations on the bent-shot

Classification into abundance classes is performed after vigorous blows of bent-shot. There are only three classes for all pests and diseases:
1 = absence
2 = presence
3 = high density
The class 3 corresponds to a severe degree of injury which affects the photosynthetic function of the bent-shot.

- Calibration of the abundance classes:

The calibration of the abundance classes allows to eliminate the systematic bias due to the underestimation of populations in quick visual observations.
A simple calibration model for thrips is avalaible (Boll et al., 2007). Please contact R. Boll for more details.

An application providing frequency histograms and spatial maps from the abundance classes observed is available upon request. Please contact the author.

Advantages / Disadvantages of the method/protocol:

This is a time-saving method since all pests and diseases are observed simultaneously and no detailed counting is performed.
With some practice, the method is relatively easy to perform. A tutorial based on photos is available online to train the experimenters.
However, the presence of several species of a same family of pests can make the observation more difficult.

The abundance class method implies a systematic under-estimation of the real number of pests/diseases. A calibration can thus be useful to refine the estimations.

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

Marchal C., Boll R., Julien P., Lapchin L., Poncet C. (2004). Protection intégrée en serre de rosier : suivi des bioagresseurs et aide à la décision. Dossier PHM - Revue-Horticole, 461

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