QuantiPest

Apple scab (caused by *Venturia inaequalis* (Cke) Wint) scoring (estimation of primary and secondary inoculum)

Method/protocol submitted by:

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The second part of the protocol is adapted by Luciana Parisi, Laurent Brun and Frédérique Didelot from the method suggested by Olivier (2006).

Objectives of the method/protocol:

To estimate the primary inoculum (of the year n by observations in autumn n-1) and secondary inoculum (of the year n) of apple scab at the orchard level.

Brief description of the method/protocol:

This protocol presents an observation method and a scoring system to assess apple scab inoculum at the orchard level.

Possible uses of this method/protocol:

The method can be used in farmers' field to decide whether to stop the treatments in summer (estimation of the secondary inoculum in June), and to evaluate the potential of primary contamination for the following year (by the estimation of the autumn inoculum in October).

Method/protocol:

- Estimation of the secondary inoculum (June):

This observation takes place at the end of the period of ascospore ejection, when the scab lesions resulting from the last contamination period are supposed to be visible (end of the incubation period).
50 trees per orchard are observed. 2 shoots per tree, chosen randomly, are checked. Beginning at the top of the shoot, the observer looks for apple scab lesions at the upper and lower sides of the leaves (even the basal leaves of the shoot).

- o As soon as a scab lesion is seen, the observation of the shoot is stopped. The observer then assigns the score "1" to the shoot.
- o If no lesion is observed, the score "0" is given to the shoot.

The percentage of scabbed shoots is the sum of the scores of the 100 shoots observed.

- Estimation of the potential of primary inoculum for the following year (October):

This observation is carried out just before the leaves fall off (generally at the end of October, but this date has to be adapted to the annual and climatic context). The scab is then visible on the lower side of the leaves. As for the secondary inoculum, 50 trees per orchard are observed. 2 shoots per tree, chosen randomly, are checked. The observer checks the upper and lower sides of all the leaves of the shoot.

- o If no scab lesion is observed, the score "0" is given to the shoot.
- o If one or several lesions are visible on a leaf, the observer assigns the score "1" to the shoot.
    - If the lesions are isolated or if the leaf area with multiple lesions (on the whole shoot) is inferior or equal to the average area of one leaf, the letter "L" (low) is given to the shoot
    - If the leaf area with multiple lesions (on the whole shoot) is superior to the average area of one leaf, the letter "I" (important) is given to the shoot

Each shoot thus receives the score 1 or 0, and the descriptor L or I for the score 1. The scores and the descriptor of the 100 shoots of the orchard are the summarised, and the orchard is characterised by its level of autumn inoculum according to the table below:

	Sum of the scores = 0	1<Sum of the scores<20	21<Sum of the scores<100
Sum of "I" descriptors <10	Null	Low	Medium
Sum of "I" descriptors >10		Medium	Important

Estimation of the potential of primary inoculum based on autumn scoring

Advantages / Disadvantages of the method/protocol:

The method of estimation of the secondary inoculum, based on observation of the shoots, is faster than the observation of each leaf used in certain contexts. Gros et al (2009) show a good correlation between the number of scabbed leaf and the number of scabbed shoots.
The average observation time for 100 shoots is 45 minutes.

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

Gros C., Toubon J-F., Brun L., Plénet D. (2009). Démasquer la tavelure dissimulée sur feuilles en vergers de pommiers. Phytoma, 624-625 : 9-12.

Olivier J-M. (2006). Inoculum d'automne, Protection intégrée pommier-poirier, Editions CTIFL : p.36.