Quick visual estimation of aphid populations on peach trees

Method/protocol submitted by:

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Objectives of the method/protocol:

Quantifying populations of three species of aphids, *B. persicae, B. prunicola* and *M. persicae*, on peach trees, at the level of the whole tree.

Brief description of the method/protocol:

This protocol presents a visual non destructive counting method based on abundance classes to quantify populations of *B. persicae, B. prunicola* and *M. persicae* on peach trees. A specific formula for each species allows the experimenter to estimate the real number of individuals for the 3 species.

Possible uses of this method/protocol:

Studies of population dynamics in open field and aphid monitoring in IPM framework.

Method/protocol:

- Observation unit:

The observation unit is the whole tree. It is observed from the ground, for 2 to 4 minutes (depending on the height and the density of the canopy). The observation is generally performed at the lower parts of the crown. The objective is not to inspect each branch or each leaf, but to give a global appreciation of the aphid infestation on the tree.

- Observation of the insects:

Each tree is assigned to an abundance class (see below) for each of the 3 insect species. All the life stages are pooled.

- Abundance classes:

The abundance classes are presented in the table below:

Class 0	Absence
Class 1	One small colony
Class 2	Several small colonies or one big colony
Class 3	One big colony and one or several small colonies
Class 4	Less than 10 big colonies
Class 5	More than 10 big colonies distributed on the whole tree
Class 6	One primary branch severely infested and few small colonies elsewhere
Class 7	One primary branch severely infested and numerous small colonies elsewhere
Class 8	Totally infested tree

Small colony: less than 30 individuals.

Big colony: more than 30 individuals.

With some experience, the distinction between « small » and « big » colonies becomes easy to perceive: the former are quite difficult to find and are located in the curled leaves whereas the latter are composed of numerous individuals visible on the leaves and the branches. The damages on the tree and the presence of honeydew or ants indicate the presence of aphids but there is no systematic relationship between their presence and the density of the pest at the moment of the observation: for instance, even a small number of aphids can damage the leaves. It is also advised to make sure the aphids are really present: they could have migrated or been predated.

- Estimation of the population number:

A linear relationship links the index of the visual abundance class and the logarithm of the number of aphids on the tree:

$$\text{Log } C = a + bV.$$

C = number of aphids of a given species on the observed tree
V = abundance class index of the abundance class the tree was assigned to

This relationship was established by detailed counting of the aphids, see Lapchin et Boll, 1985.

The number of aphids in the class 0 should be null. In fact, the observer attributing this class to a tree runs the risk of under-estimating the number of aphids, but cannot over-estimate it. The average number of aphids of the class 0 is therefore different from 0. To simplify the calculations, we attribute the value 1 to this class. In these conditions, a=0 and the previous equation becomes:

$$C = U^V$$

C = number of aphids of a given species on the observed tree
U = adjustment value for the species (see below)
V = abundance class index of the abundance class the tree was assigned to

The number of aphids thus follows a geometric series with a ratio U and a first term equal to 1 (the calibration of the class 0 is not equal to 0):

Adjustment values for the 3 species (see Lapchin et Boll, 1985 for the determination of these values):

	U
Old orchards (>3 years)	
B. persicae	6,70
B. prunicola	8,34
M. persicae	18,9
Young orchards (<3 years)	
B. persicae	6,72
B. prunicola	11,24

Advantages / Disadvantages of the method/protocol:

The same method is used for the 3 species, which reduces the observation time.
The total observation time is about 2-4 minutes whereas a detailed counting method (Lapchin et Boll, 1985, part IIB) needs at least 20-40 mn.
Other damaging aphids are present on peach trees (*Myzus varians*, *Brachycaudus amygdalinus*,..) but their adjustment values have not been calculated because of insufficient data.

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

Lapchin L. et Boll R. (1985): Echantillonnage des populations aphidiennes en vergers de pêchers. Comparaison de deux méthodes à l'aide de modèles de simulation d'échantillonnage. Agronomie, 5(3), 217-226.