



Scouting of aphids on wheat to evaluate resistance of wheat varieties

Method/protocol submitted by:

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Objectives of the method/protocol:

The objective of the protocol is to give a method for quick characterisation of aphids on wheat, at the stalk scale, to evaluate resistance of wheat varieties.

Brief description of the method/protocol:

The protocol consists in a visual and non-destructive method to describe the populations of cereal aphids (*Sitobion avenae*, *Rhopalosiphum padi*, *Metopolophium dirhodum* and *Rhopalosiphum maidis*) on wheat to evaluate resistance of wheat varieties.

Possible uses of this method/protocol:

Research: The protocol is used for the first, fast screening in the evaluation of resistance of a collection of wheat genotypes.

Method/protocol:

- Scouting method:

The unit of observation is the stalk (ear and upper leaves).

A minimum of 10 plants located on a diagonal across the plot will be observed, and the most frequent score obtained on the 10 stalks will be given for each species.

All species are counted at the same time and listed separately.

To estimate differences in the population development, weekly counts from the beginning of the aphid settlement to the break down of the population are recommended. A minimum of 3 counts is advised.

- Visual abundance classes:

The visual abundance classes used in the scouting are detailed below.

VISUAL CLASS	INFESTATION	THEORETICAL NUMBER OF APHIDS
1	no aphids	0
2	single alate	1
3	alate or apterae with first larvae	3
4		5
5	small colony	10
6		15
7	larger colony or numerous small colonies	25
8		35
9	large quantities of aphids	>50

Visual abundance classes for scouting aphids on wheat

- Estimation of the population number:

For statistical analysis the following transformation of scores to aphid number can be used (nonlinear correlation between the scores and the aphid numbers, obtained thanks to studies realised by JKI these 10 last years):

$$\text{Number of aphids} = -2,759 + e(0.646 + 0.3691 * \text{visual class})$$

- Population development:

To estimate and compare the population development, the counts have to be repeated weekly. In the case of higher temperature and a rapid aphid development it is advised to perform counts two times a week from beginning of aphid settling* (BCC) until ripening and/or break down of the population.

For statistical analysis the average ordinate (AO) of the area under the population development curve is calculated from the repeated counts according to the following formula (Moll et al., 1996):

$$AO = \frac{1}{D} * \sum_{i=1}^{t-1} \frac{1}{2} (B_i + B_{i+1}) * d_i$$

D: days between first and last rating

di: days between ratings

Bi: score on ith rating

Advantages / Disadvantages of the method/protocol:

The method is a very fast (1-2 min per plot), but not exact way to compare aphid infestation of different wheat genotypes.

It can be realised by one person.

Infested stalks being more conspicuous, there is some risk to overestimate the aphid population. However, this risk is considered acceptable for selecting resistant genotypes.

Likelihood of confusion between the aphid species is relatively low, with exception of mixed populations of *R. padi* / *R. maidis*, where correct identification depends on skills and experience of the observer.

The method is easy to learn.

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

http://barley.ipk-gatersleben.de/methods/biotic_methods.htm



Moll, E.; Walther, U.; Flath, K.; Prochnow, J. and Sachs, E. (1996): Methodische Anleitungen zur Bewertung der partiellen Resistenz und die SAS-Anwendung RESI. Berichte aus der BBA, H.12, 60pp.