Assessment of fusarium head blight on wheat

Method/protocol submitted by:

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Objectives of the method/protocol:

To estimate the attacks of fusarium head blight on wheat at the field scale.

Brief description of the method/protocol:

This protocol presents a sampling method and a scoring scale to assess fusarium head blight development in field experiments on wheat.

Pathogens causing the disease

Up to 20 species of Fusarium can be found on the spikes, the most frequent are *Fusarium graminearum* (Gibberella zeae), *F. culmorum, F.crookwellense*, *F. avenaceum* …

Possible uses of this method/protocol:

Breeding wheat varieties.

Method/protocol:

N.B : the symptoms on the ears do not allow the observer to make a distinction between the *Fusarium* species colonizing wheat spikes. The severity scale is thus the same for all the species and isolates of *Fusarium*.

- Observation unit

The observation is carried out in micro-plots designed for varietal and breeding lines selection.

- Observation period and frequency

A first assessment is realised 350 degree-days after inoculation of the variety, when the rate of accumulation of dry matter in the grains reaches its maximum, to evaluate the primary inoculation. A second assessment is made 450 degree-days after contamination, when the accumulation of dry matter in the grains is slowing down, to monitor the progression of the disease between flowers.

- Disease assessment

The disease is assessed thanks to a visual severity scale with 9 classes describing the percentage of spikelets per ear attacked by the disease: see figure below.
A global mark is given to the plot, based on the totality of the ears.

Severity classes describing the percentage of attacked spikelets

N.B : variations in luminosity can affect the scoring. To limit this effect, be careful to always realise the assessments with the sun-light in the same direction (sunlight coming from behind the observer preferably).

For some genetic or methodological tests, more detailed (and more expensive!) scorings are also performed. The ears observed are chosen randomly.

- Estimation of the ratio of ears with fusarium:

Depending on the precision wanted, observe 50 or 100 ears. Count the number of ears having at least one spikelet with symptoms. A spikelet is considered as diseased when at least two flowers are desiccated by fusarium head blight (see figure).

Example of diseased spikelet

- Estimation of the number of diseased spikelets per ear:

Count the number of spikelets desiccated by fusarium head blight (per ear) on 50 or 100 ears.

Advantages/disadvantages of the method/protocol:

The symptoms of *Fusarium* are specific enough and different from other diseases colonising the spikes. But recording may be difficult if a pathogen or an insect attack accelerates the senescence of the spikes.

The 0 - 9 scale has the advantage of being very fast but requires well trained persons for a reliable assessment.

The counting of the number of spikes and spikelets with symptoms does not necessitate well trained persons, but is much more time-consuming.

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

Saur L ., Trottet M., and Morlais J.-Y. (1992). Heritability and recurrent selection for resistance to Fusarium head blight in winter wheat. Agronomy for sustainable development, 12(4): 297-302.

Jean-Yves Morlais, Maxime Trottet (2005). Evaluation au champ de la résistance du blé à la fusariose de l'épi in Le cahier des techniques de l'INRA, numéro spécial Méthodes d'appréciation du comportement variétal vis-à-vis des bioagresseurs, p.69-72.