



Field test for foliage blight resistance

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Introduction

This protocol was produced in the framework of the EUCABLIGHT concerted action (2003-2006). The objective was to develop a harmonised method for testing host resistance to foliar late blight therefore facilitating the comparison and compilation of data.

Facilities required

A field where natural infection can be expected, or where inoculation is possible, and where overhead irrigation is possible. If necessary fungicides (protectants) can be used to protect the young crop, but applications should stop at least three weeks before inoculation.

Plants

Always use seed tubers - they provide the best plants. The crop should be given the usual treatments in terms of manure, weed and pest control. Use only herbicides and insecticides that have no effects on potato late blight.

Field lay-out

Plot size is a minimum of three plants, but can be adapted to your own preference as long as all plots are the same size. The field should be organised in randomised blocks. Spreader plants of a moderately susceptible variety should be used to separate plots to ensure a reliable source of inoculum during the epidemic and also when natural infection is used.

Replication

The minimum number of replicates is two.

Controls

If possible, Eucabligh standard cultivars should be included: Eersteling, Gloria, Bintje, Escort, Alpha and Robijn. These controls should be represented in all replicates. SASA single R-gene differentials should be included in at least one replicate: r0 (Craig's Royal) and R1 – R11.

Inoculum

Artificial inoculation is preferred over natural infection. For inoculations, use of single isolates of a complex race is better than use of race mixtures. A suitable inoculum density is 50000 zoospores/ml. This can be prepared by cooling (5-12°C) a sporangial suspension of about 15000 sporangia/ml for 1.5-3 hours. Keep the suspension cool during transport to the field, e.g. on ice. Zoospores remain motile longer if you use 1% (=10 ml/litre) potato tuber extract (McKee, 1964): boil 300 g of sliced fungicide-free potatoes for 20 minutes in 1 litre water, remove the potatoes,



allow debris to settle and use the clear liquid in your suspension, especially if you have a clean suspension in tap or distilled water. If zoospores are not available, extra care should be taken to ensure sufficiently prolonged leaf wetness after inoculation.

Inoculation

At inoculation, the crop should be closed, with plants touching in the rows and beginning to flower, but not yet senescing. To ensure successful inoculation, overhead irrigation is necessary. The amount should be sufficient to achieve prolonged leaf wetness during the nights throughout the epidemic. Inoculation must be done in late evening, so the (zoo)spores in the inoculum are protected from sunlight and can benefit from the night's natural leaf wetness. You may inoculate either the whole trial, or only the plots, or only 1-2 leaves of each plot, or only the spreader plants, or put out infector plants.

Scoring

A minimum of 5 disease scores should be taken over time, from the first reading on a susceptible genotype until the 5th reading on a more resistant genotype. The 5th reading on a susceptible genotype should be at least 100% infection, or scoring should be continued until this is reached. Disease scores should be given as percentage of foliage affected according to James, 1971; use 0.1% for the first symptoms, e.g. the first sporulating lesion in the plot.

SEVERITY	DESCRIPTION
0	No disease observed
0.1%	First sporulating lesion in the plot
1.0%	General light infection. About 5-10 lesions / plant
5.0%	About 50 lesions / plant; 1 in 10 leaflets affected.
25%	Nearly every leaflet infected but plants retain normal form; plants may smell of blight. Field looks green although every plant is affected.
50%	Every plant is affected and about 50% of the leaf area is destroyed. Field appears green flecked with brown.
75%	About 75% of the leaf area destroyed; field appears neither predominantly green nor brown.
95%	Only a few leaves on plants, but stems are green.
100%	All leaves dead, stems dead or dying.

Adapted from: James, C. 1971. *A manual of assessment keys for plant diseases*. Canada Department of Agriculture. Publication No. 1458.

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