

PHYTOPHTHORA ROOT ROT – SEEDLING RESISTANCE

Test accepted: March 1995

Test updated: June 2024

Pathogen: *Phytophthora medicaginis* (Hansen & Maxwell)

Test authors: Sharie Nygaard, Jessica Tofte, and Donald Barnes

PLANT CULTURE

Container Seedling cavities within a water reservoir or a deep flat or tub with a single drainage hole which is capable of being plugged

Media Coarse vermiculite or a porous soil mix (eg., 3:2 sphagnum-based soilless mix: perlite); provide a coarse drainage layer (eg., gravel); pure sand medium **is not** desirable

Temp/Light 20-24°C; 12-16 hr daylength

No. of Plants 50-70 per replication

No. of Reps 3 minimum

INOCULUM CULTURE

Source Seedlings grown on infested soil

Storage Axenic culture on V-8 juice agar plates

Temperature 4-12°C

Storage Life 6 months

INOCULATION PROCEDURE

Age of Plant 10-12 days (when first trifoliolate begins expansion)

Type of Inoc. Zoospore suspension or comminuted mycelium

Production Zoospores are produced as per;⁽²⁾ or 9-day-old V-8 agar cultures of mycelium may be chopped in a blender for 10 seconds

Concentration Approximately 50 zoospores⁽³⁾ or 1 ml chopped mycelium per seedling; mycelium prepared as: 1 culture (9 cm diameter) in 1 L water

Concentration For zoospores: Presaturate the soil mix and drench inoculum over the seedlings;⁽⁴⁾ For mycelium: drench inoculum into shallow trench and then saturate the soil with water⁽¹⁾

INCUBATION

Location Moderate greenhouse or growth chamber

Plant Counts Count at full emergence (7-8 days after seeding)

Culture Maintain flooded conditions for 2 days; keep moist until rated

Age at Rating Rate when nearly all Saranac plants are stunted and dying, i.e. for zoospores: 10-12 days after inoculation, for mycelium: 14 days after inoculation

RATING

Resistant Vigorously growing plants with only slight to no necrosis of tap and secondary roots; hypocotyl area sound with slight to no chlorosis of cotyledons

Susceptible Stunted or dead plants with moderate to severe necrosis of roots, hypocotyls and cotyledons

CHECK CULTIVARS

| | Approximate Expected Resistance (%) | Acceptable Range of Reaction (%) |
|-------------------------|-------------------------------------|----------------------------------|
| Highly Resistant | | |
| WAPH-1* | 55 | 50-60 |
| Resistant | | |
| MNP-D1 ^b | 46 | 38-54 |
| Agate* | 33 | 25-40 |
| Susceptible | | |
| Saranac | 1 | 0-5 |

*WAPH-1 and/or Agate must be included for varieties with fall dormancy rating 1-5.

^bMNP-D1 must be included for varieties with fall dormancy rating 6-9.

**Checks used by AOSCA Alfalfa and Miscellaneous Legumes Variety Review Board for variety certification.

REFERENCES

1. Horhein, B. A., Bean, G. A., and Graham, J. H. 1983. Greenhouse technique to evaluate alfalfa resistance to *Phytophthora megasperma* f. sp. *medicaginis*. Plant Disease 67:1332-1333.
2. Miller, S. A. and Maxwell, D. P. 1984. Light microscope observations of susceptible, host resistant, and nonhost resistant interactions of alfalfa with *Phytophthora megasperma*. Can. J. Bot. 62: 109-116.
3. Nygaard, S. L. and Grau, C. R. 1989. *Phytophthora megasperma* virulence to alfalfa measured using single-isolate zoospore suspensions. Can. J. Plant Pathol. 11 :101-108.
4. Nygaard, S. L. and Grau, C. R. 1991. Aphanomyces Root Rot Resistance. Ln: Standard Tests to Characterize Alfalfa Cultivars. North American Alfalfa Improvement Conference (<https://www.naic.org/stdtests/updated/pdfs/AphanomycesRootRot.pdf>).



(Click to see larger photo.)
Symptoms of susceptible plants.

SOURCE OF INOCULUM AND EXPERTISE

Deb Samac

USDA-ARS PSRU

1991 Upper Buford Circle

495 Borlaug Hall

St. Paul, MN 55108

(612) 625-1243

debby.samac@usda.gov