

WINDELS, CAROL E. and RITA A. KUZNIA. Northwest Experiment Station, University of Minnesota, Crookston, MN 56716. - Relationship of soil temperature to Pythium seedling diseases.

ABSTRACT

Pythium cultures were collected over several years in Minnesota and North Dakota from field-grown diseased sugarbeets and from seedlings grown in field soil in the greenhouse. Of 37 isolates randomly selected from a collection of 130, 28 were identified as P. ultimum var. sporangiiferum, 7 were P. aphanidermatum, and there was one each of P. acanthicum and P. irregulare.

Pathogenicity was tested in a one-way thermogradient plate composed of 96 cells (16 x 6); each cell measured 4 x 11 x 4.5 cm. Two isolates of P. ultimum var. sporangiiferum were selected to represent the frequent isolation of this species, while a single isolate of the other three species was tested. Inoculum was grown on oat grains for 2 wk at 24 C. Two oat grains were placed next to 10 nonfungicide-treated seeds of Maribo Ultramono per cell. Thermocouples placed at seed depth measured a soil temperature range between 14 to 31 C from the bottom to the top of the plate, respectively.

Emergence in the uninoculated control 10 days after planting (DAP) was 90-95% for soil temperatures from 14 to 31 C. Maximum sugarbeet emergence was between 23 and 29 C. Maximum emergence in soil inoculated with both isolates of P. ultimum var. sporangiiferum at 14 C was 10% 7 DAP. At 23 C, emergence was 55% 6 DAP, but by 8 DAP nearly all seedlings died. At 31 C, emergence was 60% 6 DAP and a few seedlings died. Maximum emergence in soil inoculated with P. aphanidermatum at 14 C was 65%. At 23 C, emergence was 55% by 5 DAP, but by 8 DAP all of the seedlings died. At 31 C, emergence was 10% 4 DAP and then all seedlings died. Emergence was unaffected and no seedlings died in soil inoculated with P. irregulare or P. acanthicum.

P. ultimum var. sporangiiferum and P. aphanidermatum were reisolated from all diseased seedlings collected from soil inoculated with these species. P. irregulare was reisolated from 40% of apparently healthy seedlings while P. acanthicum was not reisolated.

Thus, the two species most frequently isolated from dying sugarbeets were pathogenic, with P. ultimum var. sporangiiferum causing maximum seed rot at 14 C and P. aphanidermatum at 31 C.