Soil sampling to determine bean root rot potential in field soils from the Central Sands of Wisconsin

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Over half of the total acreage used for snap beans for processing in Wisconsin is located in the irrigated Central Sands Region. Bean root rot has continued to be a problem on these soils. Currently bean root rot is thought to be caused by a complex of fungal pathogens which include Rhizoctonia, Pythium and most recently a bean strain of Aphanomyces euteiches, the pea root rot pathogen. At present, no commercial varieties tolerant to bean root rot or chemical control to the problem have been found. We sought to develop a test to determine bean root rot potential that would aid growers in determining which fields have high root rot potential so that these fields could be avoided for snap bean production thus reducing economic losses.

Soil samples collected from commercial fields in 1979, 1980, and 1981 were brought back to the greenhouse for assay. Soil for these tests was collected along an open square sampling pattern in which ten subsamples were collected per side, one subsample every 30 to 40 paces, for a total of 30 subsamples. These soil subsamples were bulked, air dried at room temperature, and thoroughly mixed before being placed in three 15 cm clay pots in a 24 C greenhouse. Each pot was then planted with 6 seeds of Early Gallatin, watered sparingly for 10-13 days and then generously watered until 30 to 40 days after planting. Disease severity of hypocotyls and roots was read on a scale from 0 (healthy) to 4 (dead). Disease severity ratings in the field and greenhouse were then converted to a disease index ranging from 0 (all healthy) to 100% (all severely diseased). In the field, plants were read at 20 different sites, 5 plants per site, along a diagonal transect across the field, for a total of 100 plants per field.

A high correlation existed between greenhouse disease indices and field disease indices. From the results of this test we believe fields indexing in the greenhouse above 70 should be avoided for snap bean production and fields indexing between 50 and 70 are questionable for snap bean production.

In a separate study, we examined what effects various sampling patterns would have on correlations between greenhouse disease indices and field disease indices. Sampling patterns consisting of a diagonal transect across the whole field, an open square, W with 9 subsamples, W with 30 subsamples were compared in the 1980 and the 1981 growing seasons. The highest correlations among greenhouse disease indices and field disease indices occurred with the W with 30 subsamples soil sampling pattern.