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ASSESSMENT OF ROOT ROT POTENTIAL OF WHITE BEAN FIELDS IN SOUTHWESTERN ONTARIO

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During the growing season of 1984, the root rot potential of fifty-four southwestern Ontario bean fields was determined using the technique developed by Kobriger and Hagedorn (1983) and Kobriger et al. (1983).

In late May soil was collected from each field from seventeen sites in a W-shaped pattern and bulked to a final volume of about 8 L. Samples were air dried and put into 11.5 cm diameter plastic pots, three pots per sample. The soil was brought to saturation and ten treated white bean seeds (cv. Seafarer) were planted per pot. When plants reached the first trifoliolate leaf stage, they were thinned to six plants per pot. Pots were randomly arranged in the growth room and soil was kept moist by regular watering from the bottom. After forty days, soil was washed from the roots and hypocotyl and plants were rated for disease on a scale of 0 (no disease) to 4 (dead or dying plants). A root rot index (RRI) was calculated, with 0 indicating no diseased plants and 100% indicating all plants with severe root rot. All disease categories were observed in pot grown plants and the pot RRI ranged from 0 to 80%.

In late July, fifty to sixty days after planting, fifty plants were collected from each field in the same area as the soil samples were taken. These plants were rated for root rot using the same disease severity scale and an RRI was calculated for each field. Disease severity in the field ranged from 0 to 3 (ie. there were no dead or dying plants counted). The field RRI values were from 1 to 38%. Hypocotyl pieces from the plants collected were surface sterilized and plated out on a medium selective for Fusarium solani f.sp. phaseoli (Fsp), one of the major incitants of root rot. Fsp was isolated from seventy-three percent of the fields surveyed.

Fifty-plant samples were collected just prior to harvest from each field. Seed was bulked and weights for each field were determined at 18% moisture.

The correlation between pot RRI and field RRI was 0.45 (P=0.01). Pot RRI values of 0 to 40 were 73% successful in predicting mild root rot (RRI = 0 to 18) in the field. Pot RRI values greater than 40 were 76% successful in predicting more severe disease (RRI = 19 to 38) in the field.

A highly significant correlation (r=0.65, P=0.001) between field RRI and % hypocotyl pieces yielding Fsp indicated the importance of Fusarium in the root rot complex.

Neither pot nor field RRI were closely correlated with fifty-plant seed yield (r=-0.23, n.s. at P=0.1, and r=-0.31, P=0.05, respectively). Kobriger and Hagedorn (1983) reported that snap bean fields in Wisconsin with a greenhouse (pot) index below 50 could be safely planted with cultivars susceptible to root rot without concern for severe disease development or great economic loss. Indices between 50 and 65 indicated fields should be used only if absolutely necessary or should be planted with a root rot tolerant cultivar. Fields where soils give a pot RRI of greater than 65 should be avoided for snap bean production altogether. In our study the mean fifty-plant seed yields of fields with pot RRI's of 0 to 50, 51 to 65, and greater than 65 (692.33 kg., 629.15 kg., and 661.28 kg., respectively) were not significantly different. Thus, the pot RRI could not be used to predict yield losses.

Prediction of field root rot from pot root rot was moderately successful. However, possibly because of environmental conditions, we could not show a relationship between yield and pot or field root rot indices in white bean fields in southwestern Ontario in 1984.

References

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A SIMPLE TECHNIQUE TO ISOLATE BEAN RUST SPORES FROM SINGLE PUSTULES

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During a race survey of the bean rust fungus in Jamaica, a technique was developed to isolate and increase spores from single pustules. Spores collected from bean fields were first increased in the greenhouse, by spraying a spore suspension on healthy plants which were then kept in a moist chamber for 12-15 hours and then placed in the greenhouse. A weak inoculum was used to produce pustules far apart from each other in order to facilitate isolation of single pustules. Pustules were isolated a day before the rupture of epidermis and extrusion of the uredospores which was usually between 6 to 8 days after inoculation. A 3mm-diameter cork borer was used to cut a leaf disk bearing a single pustule while supporting the leaf from below with a sterile glass slide. Only one pustule was removed from a given leaf or leaflet in order to reduce the risk of contamination. After each pustule was cut out, the cork borer was sterilized over an alcohol burner before isolating another pustule.