Comparison between *in vitro* and field screening methods for resistance to *Sclerotinia sclerotiorum* in *Phaseolus vulgaris* genotypes.

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Two *in vitro* methods for determining resistance to white mold were evaluated. They included a lesion length assay on excised stems and a fresh weight assay of tissue culture callus grown on medium amended with a culture filtrate of *S. sclerotiorum*. The excised stem method used was similar to that described by Chun et al. (1987), and consisted of cutting the main stem at its base from 28 day old greenhouse grown plants and trimming all lateral branches and leaves from that main stem. Just prior to inoculation, the main stem was cut below the 6th node. The newly cut apice of the main stem was then inoculated with mycelium of *S. sclerotiorum* growing on a tissue paper medium (B. Nelson, 1985). Inoculated stems were incubated for seven days in the dark at 18°C, then lesion lengths were measured. The experimental design was a randomized complete block (RCBD) with 9 replications and 36 treatments. Treatments were an isolates (3) X genotypes (12) factorial. The tissue culture method was similar to that described by Hartman et al. (1989), and consisted of growing callus from cut leaf squares of greenhouse grown plants and transferring one month old callus to filtrate amended media. Fresh callus weight was measured 38 days later and was expressed as a percentage of the control (callus placed on the non-filtrate amended media). The experimental design was an RCBD with 11 replications and 28 treatments. Treatments were an isolates (3 filtrates) and control (no filtrate) X genotypes (7) factorial.

The field study was conducted at two locations in 1988. Each location had sclerotia collected from bean elevators incorporated into the soil prior to planting. Both locations were irrigated throughout the season. Even with irrigation, however, one location was eliminated because there was no disease due to extreme drought conditions. The experimental design was an RCBD with four replications and 12 genotypes. One plot of each genotype constituted one replication. A plot consisted of a single row 4 m long and seeded at a rate of 60,000 seeds/A. Row width was 22 inches. A row of UI-114 was planted every two plots so that each plot would have one common border. Disease severity was reported as an index [index = visual rating (0-5 score, 0=no disease, 5=100% infected plants) + number of infected pods + number of infected branches]. Number of infected pods and branches were averaged over 10 plants selected randomly from each plot and, as dictated by residual plot analyses, these data were transformed using a square root transformation.

There was an effect due to genotypes in each of the three methods studied (F-test p values of <.001, .07, and <.001, for excised stem, tissue culture, and field methods, respectively), suggesting that genotypes could be separated based on their resistance. Correlation coefficients among the means of genotypes obtained across replications for the field method and across replications and isolates for the *in vitro* methods were determined. The only statistically significant correlation coefficient (r=.64, p=.025, 10 df) was between the excised stem and field method, however the other coefficients, between excised stem and tissue culture (r=-.50, p=.225, 5 df) and tissue culture and field (r=-.43, p=.34, 5 df), suggest further investigation. This experiment will be repeated in 1989.

Chun, D., L. B. Kao, and J. L. Lockwood. 1987. Laboratory and field assessment of resistance in soybeans to stem rot caused by *S. sclerotiorum*. Plant Dis. Rep. 71: 811-815.

Hartman, C. L., G. A. Secor, D. A. Albaugh, and J. R. Venette. 1989. Using cell culture to identify bean resistance to *Sclerotinia sclerotiorum*. Phytopathology Z. (submitted).

Nelson, Berlin. 1985. Inoculum preparation of *Sclerotinia sclerotiorum* for infection of sunflower and other hosts. Phytopathology 75: 1333.