

RESEARCH NOTES

Termination Difficulties With Tendercrop Beans

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Tendercrop failed to give satisfactory germination in experiments to compare hand harvested seed of 23 varieties when germination tests were conducted in perlite but in soil the germination was normal. The poor germination was due to a necrotic band about 1/8 inch wide which developed around the hypocotyl shortly after the radicle emerged from the seed. This necrotic area generally severed the stem so that the primary root was lost.

Since the abnormality did not occur in soil, this may be a problem only in germination tests. Preliminary experiments indicate that no pathogens were involved and abnormality was possibly due to nutritional factors. Normal germination was obtained when soil was mixed with quartz sand or perlite or if perlite or rolled towels were irrigated with water leached through soil. Germination was normal in steam sterilized soil, indicating that the factors preventing the development of the necrotic area were heat stable.

Experiments have been conducted with lots of seed produced in Idaho in 1960, in New York in 1961 and in California in 1963. All three lots reacted similarly but the germination depression varied between the three samples. Twenty three varieties and breeding lines have been tested and although the abnormality was found in practically every variety, the reduction of germination in all the other varieties tested amounted to only 1 or 2 per cent. White seeded Tendercrop seed produced in the same trial as very susceptible Tendercrop seed was very resistant.

The following tables give results of germination tests on one lot of Tendercrop seed.

Table 1 (Tap water used in all treatments)

<u>Treatment</u>	<u>Per Cent Germination</u>
Paper towels (slant roll test)	69.0
Pure quartz sand	11.0
Perlite	19.5
Pasteurized soil	94.8
4 parts perlite to 1 part pasteurized soil by volume	90.2
4 parts quartz sand to 1 part pasteurized soil by volume	91.8

Table 2

Paper towels (slant roll test)	
Wet with tap water	72.0
Wet with water leached through soil	90.0

<u>Treatment</u>	<u>Per Cent Germination</u>
Perlite	
Irrigated with tap water	20.5
Irrigated with water leached through soil	88.5

Work on this problem is being continued to determine the actual cause of the abnormality and to determine if standard germination procedures should be modified to provide a more accurate measurement of the planting value of Tendercrop seed.

A Promising Method of Testing Beans for Tolerance
To Fusarium Root Rot Under Natural Field Conditions

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Fusarium root rot of beans is a complex problem. In the field, a variety of organisms and conditions strongly influence the incidence and severity of the disease. Therefore, it is possible that screening of beans for resistance only to selected isolates of Fusarium solani f. phaseoli under selected conditions may not be valid. Ultimately, acceptable beans must be capable of performing in the complex of naturally-infested fields. However, field tests of segregating material frequently are not satisfactory because of variations in disease exposure.

During the summer of 1963, we used a method of testing segregating hybrid lines in naturally -infested fields which gave more precision than is usually attained in field tests. Susceptible varieties of beans were planted thickly (100 lbs. per acre in rows spaced 22 inches apart) in fields naturally-infested by Fusarium solani f. phaseoli and other root pathogens. Seeds of F₃ hybrids (PI 203958 x virus-resistant snap beans and dry beans) were than "squeezed" into the same furrows at a rate of 25 lbs. per acre. Thus, the known-susceptible beans were spaced 1 to 3 inches apart in the row and the hybrids 6 to 12 inches apart. To facilitate seed separation at harvest time, black red, buff, and white-seeded hybrid lines were planted with susceptible Columbia Pinto. Pintos and other variegated hybrid seeds were planted with susceptible Red Mexican beans.

By this method of mixed planting hybrid segregants could be compared more closely with the susceptible variety than if the hybrids and controls had been planted in separate rows. Furthermore, the thick population of plants increased the severity and uniformity of the disease to an extent greater than is obtained with lower rates of planting.

Most of the known-susceptible plants were severely damaged and stunted by root rot, while plants of many hybrid lines had uniformly less root damage and greater plant vigor than the susceptibles among which they were planted. Furthermore, other direct comparisons of hybrids and commercial controls were made. For instance, in one field the root-rot tolerant hybrids frequently displayed a greater ability for quick emergence in soil of low moisture content than did the susceptible beans. In another field, where seedlings were stunted by cold, wet soil conditions, some hybrids recovered to a greater extent than the control plants among which they were planted.