FUSARIUM WILT OF BEANS IN 1989 IN THE U.S. MIDWESTERN STATES

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The recent report by Schwartz et al. (1989) of Fusarium wilt of pinto beans in Colorado during the 1987 and 1988 growing seasons, was the first time the disease had been recognized as causing an economic problem of beans, in the Midwest. Fusarium wilt, also referred to as Fusarium yellows of beans is incited by Fusarium oxysporum Schlecht. f. sp. phaseoli Kendrick and Snyder. Fusarium wilt differs from the common root rot of beans caused by Fusarium solani (Mart.) Appel. & Wr. f. sp. phaseoli (Burkh.) Snyd. & Hans., but they may be easily confused since they often occur together. Basically the common root rot incitant invades the outer cortical root tissues, and is confined to the underground portions of the plant. In contrast, the Fusarium wilt pathogen typically penetrates through root hairs into the vascular system of the plant, and can be found both inside the roots and in the above ground parts of the lower stem, sometimes up to the 4th or 5th node. Common root rot restricts root development from the outside and is usually seen as a rusty red exterior discoloration which may eventually also involve the stele. Fusarium wilt develops primarily inside the vascular system where it appears as a yellow to orange to purplish discoloration with very little tissue rot as such. In areas such as Colorado and Idaho where the two pathogens frequently overlap, symptom expression also overlaps and may be difficult to clearly ascribe to one or the other. Since both pathogens interfere with a plant's ability to meet optional water consumption requirements, the effects are particularly severe during hot-dry growing seasons. Parts of the midwestern bean producing areas have been under varying degrees of drought stress for the past three seasons. In August 1989, I toured some of the dry bean production areas of Colorado, Nebraska, North Dakota, and Idaho, and found Fusarium wilt occurring in all of those states in pinto, great northern, or navy beans. The exact extent of the damage in any field or state is hard to assess, since losses are never complete. The primary effect is reduction in yields which may often be attributed to heat or drought. In addition to direct yield reductions, the forced early maturation also results in smaller seed size and an increase of shrivelled seed or low bushel weights.

Very few cultivars have been developed with resistance to common root rot, and very little is known about the sensitivity of current dry bean cultivars to Fusarium wilt.

Preliminary work at CSU has indicated there may be some Fusarium wilt tolerance in the USDA-ARS pinto 'Othello', which was bred by Dr. D. W. Burke for virus resistance and common root rot tolerance. More work needs to be done to compare Fusarium wilt isolates found in the different production areas, and to test the currently grown commercial cultivars against those isolates to identify any potentially useful genetic tolerance or resistance.

Literature cited: