The Bean Common Mosaic Virus Situation in Idaho in 1991

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Bean common mosaic virus (BCMV) has become a major concern in Idaho since the detection of strain NL-8 in 1989 (1). In 1991, an outbreak occurred in the Treasure Valley area (southwestern Idaho and the adjacent area in Oregon), but only a small amount of BCMV occurred in the Magic Valley (southcentral Idaho). This is in contrast to 1989 when both areas were affected, and 650 A of beans were rejected for certification due to BCMV.

The Idaho Crop Improvement Association inspects about 30,000-35,000 A of beans annually. In 1991, 32,729 A met certifcation standards and only 114 A were rejected due to BCMV. Thus, the overall incidence of BCMV in Idaho bean seed remains extremely low.

Limited field surveys in 1990 and 1991 in the Treasure Valley revealed that a strain or strains in serotype A (i.e., strains NL-3, NL-5, NL-8 and/or Tanzania-1) occurred frequently in BCMV-infected fields. Forty two leaf samples from four pinto bean fields were all serotype A positive. In addition, about 100 leaf samples were collected by the Idaho Crop Improvement Association in 1990, and the majority of those samples were also serotype A positive.

The 1991 survey also revealed a significant problem with black root in plants possessing the I gene. This in not unexpected, since BCMV strains in serotype A are referred to as temperature insensitive, necrosis-inducing strains and can cause black root in I gene plants at moderate temperatures. Nine fields in the 1991 survey had significant levels of black root in them (Table 1). It is noteworthy that, in most cases, these fields were not adjacent to other bean fields which could have served as a source of inoculum. This suggests that aphids carried the inoculum from fields at least 400 yards, and in some cases, perhaps one mile or more, away.

Aphid flights during July 1991 were very numerous as aphids emigrated from maturing cereal crops. More than 2800 aphids per week were collected in the suction trap at Parma, ID in the last half of July. Some of these aphids presumably served as vectors for the BCMV epidemic.

Black root presents the most significant threat to the Idaho bean industry since the halo blight epidemics of the early 1960's. Recommendations for control of BCMV and black root have been proposed and are aimed at barring the introduction of the pathogen in seed imported into Idaho and the planting of infected seedlots in the state.

Research Results

Two BCMV studies were completed in 1991. One study compared three breeder and foundation class seedlots of pinto UI 114 with a second generation seed increase of the same cultivar of seed stored in the National Seed Storage Laboratory (NSSL) for their reaction to infection by BCMV strains NL-8 (ID) and NY-15 (Zaumeyer). Results indicate that there are at least two populations of UI 114 in existence, and they differ in their reaction to these two strains. The "second generation" material is resistant to both strains, whereas the three breeder and foundation seedlots which currently are in commercial use in Idaho are susceptible to the two strains (2).

Another study evaluated seven pink bean cultivars for their resistance to strains NL-3, NL-8 (ID), NY-15 (Zaumeyer) and Mexican. Results indicate that cvs. Viva, Gloria, Victor, Yolano, and UI-537 possess only the bc 1^2 resistance gene, and ISB 462 possesses bc 1 and bc 2. It is noteworthy that several cultivars inoculated with NL-3 exhibited no mosaic symptoms but were strongly positive in the ELISA test.

Table 1. The incidence of black root in nine bean fields in the Treasure Valley (southwestern Idaho and eastern Oregon). Surveys were conducted August 8 and 27, 1991.

Field #	Cultivar	Acres	Black root incidence (%)	Yield (cwt/A)
1	Stinger	16	5	22.0
2	Midland	12	25 (80-90 in one corner of field)	17.2
3	Midland	22	20 (90 along one edge, 5 on one end).	28.5
4	Kentucky Wonder	15	60 (95 in one corner of field)	11.0
5	Kentucky Wonder	20	60	11.0
6	(unknown)	8	25	UA*
7	Aurora	7	90	0
8	Black Turtle Soup	15	50	**
9	(unknown)	15	70	UA

*UA = Unavailable
**estimated 60-70% yield reduction.

References

1. Forster, R.L., Myers, J.R., Mink, G.I., and Silbernagel, M.J. 1991. NL-8 Strain of Bean Common Mosaic Virus in Idaho Bean Seed Fields. Plant Disease 75:537.
2. Forster, R.L., Myers, J.R., Strausbaugh, C.A., Stewart-Williams, K., Mink, G.I., and Silbernagel, M.J. 1991. UI-114 Pinto Bean is Heterogeneous for Resistance to NL-8 and NY-15 Strains of Bean Common Mosaic Virus. Phytopathology 81:1218(Abstr.).