BEAN (BABY LIMA) (*Phaseolus lunatus* 'Eastland')

Downy Mildew; *Phytophthora phaseoli* race E

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Evaluation of fungicides for the control of downy mildew of baby lima bean, 2007.

Fungicides were tested for control of downy mildew of baby lima bean at the University of Delaware's Experiment Station Farm in Newark, DE. The baby lima bean cultivar Eastland was planted on 18 Jul with a commercial four-row Monosem planter. Dual Magnum 7.62E (1.75 pt/A) and Pursuit 2SC (1.0 oz/A) were applied pre-emergence for weed control. The soil type was a Matapeake silt loam soil and nitrogen (30 lb/A) was side-dressed after seedling emergence on 3 Aug. Seeding rate was 4-5 seeds/ft but the final stand was 19 plants/ 10 ft. This stand was half of the recommendation for commercial fields, but like soybeans, lima beans will compensate for reduced plant numbers without yield loss. Treatments were arranged in a randomized complete block design with four replications. Each plot consisted of three sprayed rows, 20 ft long and spaced 30 in. apart. A single border row separated each plot. On 7 and 17 Sep each 20 ft row was inoculated with 100 ml of a sporangial suspension (10^3/ml) of *Phytophthora phaseoli*, race E, in the evening using a Solo backpack sprayer. After the first inoculation the plots were misted daily with a low pressure misting system equipped with low volume misting nozzles. The system was operated intermittently from 4 PM until nightfall daily to increase leaf wetness duration and favor infection. Supplemental drip irrigation was provided when needed throughout the growing season. Fungicides were applied five times on 6, 14, 24 Sep and 1, 8 Oct using a backpack CO_2 pressurized sprayer that delivered 30 gal/A at 52 psi. Applications were made with a broadcast boom equipped with four hollow cone nozzles (D4 disks, no. 45 cores) spaced 18 in. apart. On 16 and 17 Oct, the middle 10 ft of the center row of each plot was hand pulled and evaluated for percentage of infected plants (presence of infection on the raceme, petiole or pod). Pods were removed from those plants and the percentage of infected pods, total number of pods/10 ft, and yield were determined. Yield was determined by measuring the fresh weight of harvested pods that had harvestable seed or would have had harvestable seed. Shriveled infected pods without seeds that would have been shelled were discarded before weighing.

The disease severity in the field was high and uniform this season due to ideal temperatures after inoculation plus added misting and irrigation. The best control of downy mildew was provided by the fungicides Revus, Revus plus Ridomil Gold/Copper, MetaStar plus Kocide 3000, Phostrol, and Fungi-Phite and the calcium product Calci-Phite. All the copper hydroxide treatments provided better control of downy mildew on the pods than the control. The top fungicides for downy mildew control also had the highest fresh weights, followed by the copper fungicides (Kocide 101, Kocide 2000, Kocide 3000 and Champ DP), which were significantly better than the control. Phytotoxicity was observed at harvest on all the copper treatments as dark mottling of foliage especially on the oldest leaves.

Treatment and rate/A	Incidence (%) of downy mildew[z]		No. pods/10 ft	Wt. of pods/10 ft (grams)
	Plants	Pods		
Untreated control	100.0 a [y]	78.50 a	732 f	1062 e
Kocide 2000 54 DF 2.0 lb (A,B,C,D,E[x])	97.8 a	25.87 bc	963 e	3023 d
Kocide 3000 46 DF 1.3 lb (A,B,C,D,E)	96.6 a	28.75 b	1014 cde	3375 d
Kocide 101 77W 2.4 lb (A,B,C,D,E) . . .	89.5 b	14.22 d	991 de	3341 d
Champ DP 2.0 lb (A,B,C,D,E)	100.0 a	21.02 c	1062 bcde	3555 cd
Revus SC 5.5 fl oz + 16 fl oz NIS (A,B,C,D,E)	7.4 ef	0.40 gh	1182 abcd	4751 ab
Revus SC 5.5 fl oz + 16.0 fl oz NIS (A,C,E), Ridomil Gold/Cu 65WP 2.0 lb (B,D)	17.4 de	0.70 gh	1210 abc	4651 ab
MetaStar 2 EC 6.4 fl oz + Kocide 3000 1.3 lb (A,B,C,D,E)	45.1 c	3.65 e	1215 ab	4873 ab
Fungi-Phite 2.0 qt (A,B,C,D,E)	1.2 g	0.05 h	1331 a	5234 a
Calci-Phite 4 qt (A,B,C,D,E)	25.6 d	2.52 ef	1095 bcde	4212 bc
Fungi-Phite 2 qt (A), Calci-Phite 4.0 qt (B,C,D,E)	15.3 de	0.85 fg	1312 a	5212 a
Phostrol 6.69L 2.0 pt (A,B,C,D,E)	3.8 fg	0.25 gh	1258 ab	4870 ab

[z] Data were transformed from percentages by arcsin√, analysis of variance was performed and means were converted back to the percentages which are represented in the table.

[y] Application timings. A= 6 Sep, B=14 Sep, C=24 Sep, D= 1 Oct and E= 8 Oct

[x] Means followed by the same letter are not statistically different from each other (Fisher's Protected LSD, *P*=0.05).