

EVALUATION OF FUNGICIDES FOR MANAGING PHYTOPHTHORA CROWN ROT AND FRUIT ROT IN PUMPKIN, 1993: The experiment was conducted at the Long Island Horticultural Research Laboratory in Riverhead, NY, in a field (Riverhead sandy loam soil) where Phytophthora fruit rot of pumpkin developed in 1992. On 23 Jun 93, 1000 lb/A of 10-10-10 fertilizer was broadcast and incorporated. Pumpkin seed were planted on 25 Jun at 24-in. within row plant spacing and 68-in. between row spacing. Plots were thinned manually to obtain 44 plants in four 25-ft rows. There were 4 replications in a randomized block design. Weeds were controlled by applying Amiben 2S (1.5 pt/treated A) in a 12-in. band over the row immediately after planting, mechanically cultivating, and hand-weeding. Cucumber beetles and aphids were managed by applying the following insecticides: Metasystox-R 2SC (2 pt/A) on 6 Aug, Phoscrin 4EC (1 pt/A) on 26 Jul, Sevin 4F (1 qt/A) on 15 Jul, and Thiodan 3EC (2 pt/A) on 15 Jul and 20 Aug. The fungicides Bravo 720 (3 pt/A) and Bayleton 50DF (4 oz/A) were applied on 6 and 20 Aug to suppress powdery mildew. Average monthly high and low temperatures (F) and total rainfall (in.) were 80, 58, and 2.42 in Jun; 87, 65, and 2.36 in Jul; 84, 63, and 1.24 in Aug; and 76, 57, and 7.61 in Sep, respectively. The field was irrigated (0.5-1.0 in.) 3 times on 28-30 Jun after Ridomil 2E applications; 8-9, 12-13 Jul; and 21-23 Jul (several days were required to cover the field). It was irrigated excessively (1.5-2.0 in.) on 23-24 Aug and 2-3 Sep in an effort to stimulate disease development by saturating the soil. Soil moisture was measured with a Neutron Probe. Treatments were applied on 5, 12, 19 and 28 Aug; 31 Aug or 2 Sep; 11, 20 and 28 Sep; and 6 Oct with a tractor-mounted boom sprayer equipped with no. 3 hollow cone nozzles that delivered 40 gal/A at 68 psi. The first treatment was made at the start of fruit formation: most of the largest fruit were about 0.75 in. long and these flowers had not opened. The canopy had closed within rows but not between rows. On 31 Aug the 7 treatments with Ridomil/Copper or Aliette were applied, which was 2 days ahead of the scheduled 14-day interval, because rain was forecasted; the 2 treatments on a 7-day interval were applied on 2 Sep. Four treatments included a systemic fungicide (either Ridomil/Copper or Aliette) applied on a 14-day schedule while the plants were actively growing and Kocide applied weekly thereafter. These Kocide applications were initiated on 11 Sep when fruit were turning orange and leaves were starting to senesce. The pH of spray solutions was 6-7 as determined with indicator paper. Number of symptomatic and apparently healthy (nonsymptomatic) fruit were counted in each plot on 30 Sep - 1 Oct, 7 and 14 Oct. Sensitivity to metalaxyl, the active ingredient in Ridomil, was determined for isolates collected on 19 Oct from control plots and plots treated with Ridomil 2E + Ridomil/Copper by R. J. McGovern, University of FL, using amended media.

Disease development was extremely limited during most of the growing season because of the unusually hot and dry conditions. The 2 excessive irrigations had little impact, although soil moisture in the top 12 in. exceeded field capacity afterwards both times. The moisture level changed negligibly over 2 days after the first irrigation period. Saturated soil is required for release of zoospores from sporangia and their dispersal. Perhaps soil conditions before and after irrigation were too dry and too wet, respectively, for sporangial formation. Two affected fruit were observed in a Kocide-treated plot on 23 Aug. This was the only plot with Phytophthora fruit rot on 8 Sep. Affected fruit were found in the adjacent nontreated plot on 16 Sep and in other plots in this section of the field on 23 Sep. Symptoms were not found throughout the field until 28 Sep. Rain occurred on more days in Sep (13 days; total of 7.61 in.) than in Aug (5 days; total of 1.24 in.), which probably accounts for the late-season disease development. In 1992, Phytophthora fruit rot began to develop in Aug when there were 12 days with rain and a total of 6.92 in. of rain. Although disease onset was late in the growing season, disease pressure was severe in 1993 most likely because inoculum was abundant due to high incidence of Phytophthora fruit rot in this field in 1992. There were no significant differences amongst treatments. The proportion of affected fruit on 14 Oct was lowest for the Bravo C/M + Fluazinam treatment. Fluazinam has been shown to be effective against other soil-borne diseases, especially when there is sufficient water to move this fungicide to the soil. No phytotoxicity was observed. *Phytophthora* often infects the part of the fruit touching the ground, which is a difficult part to protect with contact fungicides. Since the last applications of Ridomil/Copper and Aliette were made 4 weeks before symptoms were first seen throughout the field, there may have been insufficient quantity of these systemic fungicides in the fruit to provide disease control. *Phytophthora* isolates from this field were sensitive *in vitro* to metalaxyl at 10 ppm or less, which is at least 10-fold more sensitive than isolates from FL.

Treatment and rate/A (application time ¹)	Fruit with rot due to Phytophthora (%)		
	30 Sep	7 Oct	14 Oct
Control (No Fungicide).....	65	73	80
Kocide 50DF 2 lb (1-4, 6-10) ²	36	55	63
Ridomil/Copper 70WP 2.5 lb (1,3,5).....	21	41	54
Ridomil/Copper 70WP 2.5 lb (1,3,5) + Kocide 50DF 2 lb (7-10) ²	43	68	74
Ridomil 2E 2 qt ³ + Ridomil/Copper 70WP 2.5 lb (1,3,5) + Kocide 50DF 2 lb (7-10) ²	22	51	73
Aliette 80WG 2 lb + Potassium carbonate 100WG 1.2 lb (1,3,5).....	22	43	53
Aliette 80WG 3 lb + Potassium carbonate 100WG 1.8 lb (1,3,5).....	35	61	67
Aliette 80WG 2 lb + Pot. carb. 100WG 1.2 lb (1,3,5) + Kocide 50DF 2 lb (7-10) ²	47	56	63
Aliette 80WG 2 lb + Pot. carb. 100WG 1.2 lb (1,3,5) + Kocide 50DF 2 lb (1,3,5, 7-10) ²	16	48	57
Bravo C/M 6 lbs + Fluazinam 500F 10 oz. (1-4, 6-10).....	26	42	50
P-value	.079	.358	.416

¹ Application times were: 1=5 Aug, 2=12 Aug, 3=19 Aug, 4=28 Aug, 5=31 Aug, 6=2 Sep, 7=11 Sep, 8=20 Sep, 9=28 Sep, and 10=6 Oct.

² Applications of Kocide alone included the spreader/sticker Stik at 10 oz/A.

³ Ridomil 2E was applied after planting at 2 qt/treated A in a 7-in. band over the rows, then irrigated in. This was done over 3 days (28-30 Jun).