Recent Advances in Fungicides for Vegetable Disease Control

A number of new fungicides are now being tested for use in vegetable disease control. Some are broad-spectrum protectant materials, but many are systemic with a narrow range of efficacy within a small group of pathogenic fungi. One material receiving a great deal of attention is metalaxyl (Ridomil). This material, previously code-named CGA-48988, is a systemic acylalanine with efficacy against phycomycetes. It has been tested widely against downy mildew fungi as well as Physiophthora and Phytophthora. The largest number of tests in 1981 were with potatoes (Solanum tuberosum) for control of Phytophthora infestans. Tests in Wisconsin, Maine, and North Carolina using metalaxyl tank-mixed with maneb or mancozeb on a 14-day schedule gave good control, while those in New York and Ohio were less successful. Data on metalaxyl alone, applied on a 14-day schedule, indicate that rates being tested are on the borderline of efficiency. Tank-mixing metalaxyl with maneb or mancozeb seems to improve efficacy, but use of low rates may encourage development of resistance, especially when EBDC residues decline in the second week of the spray interval. Lack of activity of metalaxyl against Alternaria solani further complicates its use on potatoes. Studies in Delaware indicated that a single application of metalaxyl applied at flowering, or a smaller dose applied biweekly beginning at flowering, gave good control of potato pink rot (Phytophthora erythrophthora). Soil applications at sowing, flowering, and 2 weeks before harvest were also successful. Soil applications tests in New Jersey showed that a trench of metalaxyl over the row, after the setting of pepper (Capsicum annuum) transplants, gave good control of crown rot caused by Phytophthora capsici.

Foliar applications of metalaxyl controlled downy mildew (Phytophthora parasitica) on turnip (Brassica rapa) in Ohio and Pseudomonospora cubensis on cucumber (Cucumis sativus) in North Carolina. In Delaware, a metalaxyl seed treatment was ineffective against downy mildew (Phytophthora phaseoli) of beans (Phaseolus vulgaris) while soil treatments at planting were only slightly effective. In North Carolina, a single application at early bloom effectively controlled cottony leaf (Pythium aphanidermatum) of cucumber.

Unless resistance problems develop, metalaxyl should be a major asset in control of downy mildews and related diseases.

Much interest has been shown in the sterol inhibitors, especially for control of tree fruit diseases. In vegetables, interest is primarily in control of powdery mildews. Triadimefon (Bayleton, Bay MEB 6447) is a systemic material with efficacy primarily against powdery mildews and rusts. Bitertanol (Baycor, Bay KGW 0599) is a protectant with some systemic activity against a range of phycomycetes and basidioymycetes. Tests with triadimefon in Utah in 1981 indicated that application every 14 days to tomato (Lycopersicon esculentum) gave excellent control of powdery mildew that increased with Leveillula taurica. Studies in New Jersey and Virginia showed that applications every 7 days gave excellent control of powdery mildew (Erysiphe cichoracearum) of cucumber and lettuce but little or no control of anthracnose (Colletotrichum lagenarium). Similar results were observed with bitertanol. In Nebraska and Idaho, studies with bitertanol applied once at bloom gave only poor to moderate control of white mold (Sclerotinia sveciorum) on dry beans (Phaseolus vulgaris).

Two other sterol inhibitors available for testing are propiconazole (Tilt, CGA-64250) and etaconazole (Vanguard, CGA-64251), similar systemic materials with a wide spectrum of activity against many fungi outside the phycomycetes. In 1981 in Utah, propiconazole showed excellent control of tomato powdery mildew when applied every 14 days, but a study in New Jersey again showed no efficacy against A. solani, Septoria lycopersici, or Colletotrichum lagenarium. A Virginia study using this material on a 7-day schedule showed excellent control of cucumber powdery mildew. A single application of propiconazole to cucumbers just before vine running gave fair control of powdery mildew (Bactrocera cucurbitae) on cucumbers and beans, respectively, in a greenhouse.

In New Jersey, weekly applications of etaconazole gave excellent control of cucumber powdery mildew. A study in New York utilized the vapor activity of this material to provide complete control of powdery mildew caused by Sphaerotheca fuliginea and Erysiphe polygoni on cucumber and bean, respectively, in a greenhouse.

Although these sterol inhibitors show great promise for control of powdery mildews, none is labeled for use on vegetable crops. Because of undesirable growth-regulator activities on solanaceous crops, it is unlikely either propiconazole or etaconazole will be developed for use on potatoes or tomatoes.

Vinlozoil (Ronilan, BAS 352) is a wide-spectrum, nonsystemic protectant fungicide active against Botrytis, Monilinia, and Sclerotinia. Work with vegetables in 1981 centered on uses on onions, lettuce, and beans. In Oregon, furrow application at planting provided effective control of Sclerotium cepivorum on onion (Allium cepa), while application at bolting was less effective. A similar test in New Jersey indicated good control on fall-seeded onions with application of vinlozoil in both fall and spring. In another New Jersey test, drop (Sclerotinia minor and S. sclerotiorum) was controlled on lettuce (Lactuca sativa) with three applications of vinlozoil at 10-day intervals. Four studies were reported on white mold (S. sclerotiorum) on bean. A test in Nebraska on dry beans showed moderate control with a single application at bloom in mid-July. An Idaho test gave similar results with applications at early and full bloom. Two tests with snap bean in Oregon and New York, with applications at early and full bloom, gave nearly complete control of white mold. Vinlozoil is now reesterified as a surfactant, and applications at bloom were somewhat less effective. In New York, applications in both spring and fall to fall-seeded onions gave good control of this disease. In a New Jersey lettuce drop test, application of iprodione three times, at 10-day intervals, gave fair control. A dry bean test in Idaho resulted in poor control of white mold with a single application at full bloom. In snap bean tests with white mold, applications at early and full bloom gave good control in both New York and Oregon. Iprodione is not labeled for use on vegetable crops.