NEW FUNGICIDES

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Control of the major diseases which attack vegetables in Florida is essential for the profitable production of truck crops. Disease control should begin with the seed and continue until harvest. Good farming methods essential to the production of good crops are an aid in disease control. Use of disease free seed and disease resistant varieties when obtainable, chemical seed treatment to prevent seed decay and pre-emergence damping-off (8) and prompt plowing under of diseased crop refuse at the end of the harvesting season are practices which will help prevent maximum losses from diseases.

Post-emergency damping-off of seedlings in plant beds (9) and foliage disease of vegetables are the most difficult to control. More time and money are spent in combatting foliage diseases than any others. Their control consists of keeping the leaves, branches, and stems of the plants coated with fungicides which are applied as sprays or dusts.

CONTROL OF DISEASES OF VEGETABLES WITH NEW FUNGICIDES

Within the last few years many new chemical compounds have become available for testing for the control of diseases, and some have given good control of various diseases at different stations throughout the United States. Results of testing some of the new compounds on vegetables in Florida have been reported in the Proceedings of the Florida State Horticultural Society (1, 3, 4) and other publications (2, 5, 6, 7).

Experiments conducted at the Vegetable Crops Laboratory (4) and the Sub-Tropical Station (3, 5, 6, 7) have demonstrated that Dithane-zinc sulfate-lime, Parzate, Dithane Z 78 and Phygon-zinc sulfate-lime sprays are superior fungicides for control of late blight and early blight of potatoes and tomatoes.

New chemicals are being tested at different testing stations in Florida as soon as they become available. For example, during the last 7 years, 35 different formulations of sprays and dusts made of 17 different fungicides have been tested for control of downy mildew of cabbage in plant beds at the Potato Investigations Laboratory. Results of tests conducted in 1946 are shown in Table 1. None of the fungicides tested thus far have proved as effective as Spergon for control of downy mildew, but the search for something better than Spergon will be continued.

It is necessary to test each fungicide to determine its effectiveness in controlling different diseases. The proper amount of the active ingredient needed in a spray or dust to control a disease without injuring the plants on which it is used must be worked out for each fungicide. The amount of spray or dust required to cover plants at different stages of growth, and the number of applications and frequency of treatment needed to control the disease also must be determined.

Combining an insecticide and a fungicide and applying them as a single spray or dust is desirable as that eliminates the expense of applying them separately. However, it is necessary to mix the materials properly, apply them to the plants and note their effectiveness in controlling the disease and insects which are attacking the crop before reaching final conclusions regarding their compatibility and use as an insecticide-fungicide.

TABLE 1—CONTROL OF DOWNY MILDEW OF CABBAGE IN PLANT BEDS WITH DIFFERENT FUNGICIDES IN 1946*

Treatment**	Plants***				
	Percent Foliage Killed by Mildew	Number			Total Weight Grams
		Large	Small	Total	
Spergon Wettable 4 lbs.-100 gals.	5	1,218	1,307	2,525	8,413
Spergon Dust containing 12% of active ingredient	5	1,238	1,510	2,748	7,784
Dithane D 14 2 qts.-zinc sulfate 1 lb.-lime 1/2 lb.-100 gals.	10	562	1,772	2,334	6,934
Parzate 1 1/2 lbs.-100 gals.	20	776	1,882	2,658	6,473
Dithane Z 78 dust, 6%	20	553	1,493	2,046	3,688
Manganese ethylene bisdithiocarbamate 1 1/2 lbs.-100 gals.	30	262	1,757	2,019	3,695
Check (None)	50	106	1,288	1,394	1,780

*Seed planted 10/16; mildew appeared 10/28; plants pulled 11/20.

**Made October 24, 28 and 30, and November 1, 4, 6, 8, 11, 13, 15, and 18.

***Pulled from 25 feet of a 2-row plant bed.

TABLE 2—Some New Fungicides Which are being Tested for Control of Diseases of Vegetables

Trade Name	Active Ingredient	Company
Carbide and Carbon 341A	2 heptadecyl-glyoxalidine	Carbide and Carbon Chem.
Carbide and Carbon 169	Zinc-copper-chromate	Carbide and Carbon Chem.
Copper A Compound	Tetra copper calcium oxychloride (45% metallic Cu.)	Dupont
Dithane D 14	25% Disodium ethylene bisdithiocarbamate	Rohm and Haas
Dithane Z 78	65% Zinc ethylene bisdithiocarbamate	Rohm and Haas
Fermate	70% Ferric dimethyl-dithiocarbamate	DuPont
Karbam (Black)	70% Ferric dimethyl-dithiocarbamate	Sherwin-Williams
Karbam (White)	70% Zinc dimethyl-dithiocarbamate	Sherwin-Williams
Methasan	70% Zinc dimethyl-dithiocarbamate	Monsanto Chemical
Parzate	65% Zinc ethylene bisdithiocarbamate	DuPont
Phygon	87% 2, 3, dichlor—1, 4 napthoquinone.	U. S. Rubber
Spergon	98% Tetrachloro-para-benzoquinone	U. S. Rubber
Spergon Wettable	48% Tetrachloro-para-benzoquinone	U. S. Rubber
Tersan (Thiosan)	50% Tetramethyl-thiuram-disulfide	DuPont-Semesan
Tribasic Copper Sulfate	Tribasic copper sulfate (53% metallic Cu.)	Tennessee Copper
Zerlate	70% Zinc dimethyl-dithiocarbamate	Dupont

A recent survey of the work in progress at the Florida Agricultural Experiment Stations show that one or more of the fungicides listed in Table 2 are being tested for control of the following diseases: Alternaria leaf spot, damping-off, downy mildew and wire stem of cabbage and other crucifers; downy mildew of cantaloupes; Alternaria leaf spot of carrots; Cercospora (early) blight, damping-off and Septoria blight of celery; downy mildew of cucumbers; Alternaria leaf spot of lettuce and escarole; Alternaria blight, bacterial blight and Cercospora leaf spot of peppers, late blight and early blight of potatoes; late blight, early blight, and Stemphylium spot of tomatoes; Anthracnose of strawberries, and downy mildew and anthracnose of watermelon.

Dithane D 14 is already being used extensively for control of late blight and early blight of potatoes and tomatoes. Parzate, Dithane Z 78 and Phygon probably will be used for control of the same diseases when supplies of these materials become more plentiful. Spergon is used generally for control of downy mildew of cabbage in plant beds.

Preliminary tests have shown that Zerlate may be useful for the control of several diseases. Information and recommendations on the use of Zerlate and other new fungicides will be released as soon as repeated tests have demonstrated their effectiveness.

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