SPRAY FOR TOMATOES

By
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It pays to spray tomatoes. In trials conducted at the Experiment Station last year sprayed tomatoes produced somewhat larger yields than the non-sprayed and the quality of the fruit was improved, although it was not a year in which tomato blights were troublesome. In other years selected sprays have controlled destructive blights.

Some of the tomato diseases which are troublesome in this state and which may be controlled more or less successfully by spraying are listed:

Diseases Controlled by Spraying

Septoria blight is probably the most destructive disease of the tomato in North Dakota. The leaves become spotted with the first infection. The spots are small in the beginning, light in color, with dark centers. They soon enlarge and cover much of the foliage. Before the fruit ripens only a few or none of the leaves may be left on the plants.

Spraying will check the development of Septoria blight and, since the fungus also develops on a number of weeds, clean cultivation is recommended.

Late blight of the tomato is caused by the fungus which causes late blight of the potato*. The disease quickly dries up the leaves of plants and may decay the fruit. This blight has caused much damage in the tomato canning regions of other states during recent years, but has not developed so extensively in North Dakota because of the drier climate. Late blight may be controlled by spraying with copper fungicides or with one of the newer fungicides, Zerlate, Dithane Z-78 or Parazate.

Early blight sometimes becomes troublesome by causing dead spots on the leaves or fruits and cankers on the stems of tomato plants. The disease may be controlled by sprays.

Bacterial spot appears as small, dark spots, about 1/8 inch in diameter on the leaves and green fruits. This disease may be controlled somewhat by using copper sprays, together with seed treatments.

Bacterial speck resembles bacterial spot, but the spots on the fruit are much smaller and very numerous. This disease sometimes develops in the Red River Valley and losses from it may be reduced somewhat by treating the seed and spraying the plants.

Diseases Not Controlled by Spraying

Blossom-end rot, a very common and destructive disease, appears as a dark flat or sunken spot at the blossom end of the fruit. It is not caused by fungi or by bacteria and spraying is not effective. Too much nitrogen in the soil or irregular watering of the plants seem to bring on this disease.

Wilt, caused by the fungus **Fusarium,** is wide spread and destructive. The vines wilt, the leaves become yellow and dry. Dark streaks often may be found in the woody portion of the stems. No spots develop on the fruit. The disease develops most rapidly in warm weather. The fungus **Fusarium** lives in the soil and works from the roots upward through the stems. Spraying has no effect on wilt. Use disinfected seed and clean soil. Tomatoes should not be grown on the same ground year after year. Once in 4 or 5 years is recommended.

Spotted wilt, marked on the fruit by circular bands of red and yellow with centers of the spots raised, was found in North Dakota in 1947. It is caused by a virus, and like many other virus diseases spotted wilt is carried by insects. Spraying to destroy insects, especially thrips, may help

*Phytophthora infestans.

to control spotted wilt but the disease may be spread by mechanical means, while transplanting and cultivating. The virus affects a large number of vegetables and some ornamental plants. These should not be grown near tomatoes.

Sprays Used in the Experiments of 1947

Tomatoes did not respond very well to some of the treatments, especially strong Bordeaux mixture, used in earlier experiments. Sometimes it appeared that injury followed spraying with soluble copper and lime mixtures. We now have insoluble or fixed copper and a number of new fungicides. These appear to be less injurious to the tomato plant and more effective for control of diseases.

The 1947 tomato spraying experiment included five fungicides*:

1. Zerlate, zinc dimethyldithiocarbamate, 2 lbs. in 100 gallons of water.
2. Tribasic copper sulphate, 4 lbs. in 100 gallons of water.
3. Dithane Z-78, zinc ethylene bisdithiocarbamate, 2 lbs. in 100 gallons of water.
4. Phygon, wettable, 2, 3 dichloro—1, 4 naphthaquinone, 1 lb. in 100 gallons of water.
5. Yellow cuprocide, cuprous oxide. 2.4 lbs. in 100 gallons of water.

The tomato plants were set out in the field on June 2. The first sprayings were applied July 2, and these were repeated about every 10 days until 7 sprayings had been made. The rate of application varied from 150 to 200 gallons of spray per acre.

On July 11 flea beetles were observed. They had increased sufficiently to cause considerable damage if immediate control measures had not been taken. None of the five sprays listed above appeared to prevent their development but one application of 5 per cent DDT dust gave almost a complete kill of the flea beetles.

The yields of No. 1 tomatoes and of cull fruits in tons per acre are shown in Table 1.

Table 1. Showing the effects of fungicidal sprays on the yield of tomatoes in 1947, (a year in which blight and other diseases were not important). Fargo, N. Dak.

		YIELDS IN TONS PER ACRE								
		Replications						Total Yields		
Treatment	Grade	1	2	3	4	5	6	No. 1 Fruit	Culls	Total
1. Zerlate	No. 1	16.29	15.12	16.31	19.57	17.60	13.64	98.53		
	Culls	.23	.29	.35	.57	.23	.24		1.91	
	Total	16.52	15.41	16.66	20.14	17.83	13.88			100.44
2. Tribasic	No. 1	14.47	16.40	20.97	13.34	14.18	14.91	94.27		
	Culls	.24	.41	.38	.30	.16	.24		1.73	
	Total	14.71	16.81	21.35	13.64	14.34	15.15			96.00
3. Dithane Z-78	No. 1	13.36	12.28	13.29	13.18	20.44	10.65	83.20		
	Culls	.24	.43	.27	.21	.19	.39		1.73	
	Total	13.60	12.71	13.56	13.39	20.63	11.04			84.93
4. Phygon	No. 1	13.31	18.05	11.71	17.35	12.54	13.68	85.64		
	Culls	.30	.20	.19	.23	.50	.15		1.57	
	Total	13.61	18.25	11.90	17.58	13.04	12.83			87.21
5. Zerlate Alternated with Tribasic copper.	No. 1	13.89	18.24	17.45	14.46	14.49	13.63	92.16		
	Culls	.18	.22	.27	.24	.26	.54		1.71	
	Total	14.07	18.46	17.72	14.70	14.75	14.17			93.87
6. Cuprocide	No. 1	13.64	16.86	18.78	11.38	13.16	14.17	87.99		
	Culls	.20	.29	.15	.23	.24	.11		1.22	
	Total	13.84	17.15	18.93	11.61	13.40	14.28			89.21
7. Control No fungicide used.	No. 1	16.05	18.51	19.09	11.22	15.86	10.16	90.89		
	Culls	.23	.27	.27	.42	.64	.50		2.33	
	Total	16.28	18.78	19.36	11.64	16.50	10.66			93.22

*These fungicides were donated by:
E. I. DuPont de Nemours
The Tennessee Corporation
Rohm and Hass Co.
Naugatuck Chemical, a division of the U. S. Rubber Co.

The test was not a complete success because none of the major blights, such as septoria leaf blight and late blight developed, neither in the non-sprayed nor in any other of the 42 plots. If it had been a year in which these destructive blights developed, as they often do, some of the sprays no doubt would have proved even more valuable. With only minor diseases to deal with the best spray, Zerlate gave an increase in yield of about 7 per cent. The next best spray, as shown by this test, was tribasic copper sulphate with an increase of about 3 per cent. The test does not indicate which fungicide would be most effective for the important tomato blights when the season is favorable for their development.

THE STATE VETERINARY DIAGNOSTIC LABORATORY

By

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One of the functions of the Department of Veterinary Science of the North Dakota Agricultural Experiment Station is to act as a veterinary diagnostic laboratory. When use is made of this laboratory by veterinarians and farmers our reports furnish information which may be used by the state Livestock Sanitary Board in formulating policies as well as by the veterinarians and farmers in solving their immediate problems. It is more or less the general policy of the department to conduct research projects that fit into a study of the types of diseases most frequently encountered in diagnostic work. It is more or less an established fact that once an entirely satisfactory method has been developed for the control of a certain disease that this disease ceases to be one of major importance.

The report of diagnostic work here presented includes those specimens submitted in the period July 1, 1945, to June 31, 1947. There are certain advantages in making a biennial report in that direct comparisons of certain diseases can be made and the yearly incidence compared.

Since the Brucellosis testing laboratory is located at Bismarck our report contains only those tests made in diagnosing acute conditions which have arisen in certain instances where actual abortions have occurred or where some practitioner has erroneously submitted blood samples. The possibility of trichomoniasis, vibrio fetus, and listerellosis abortions arising in sheep and cattle make it necessary to conduct the Brucellosis agglutination test as a routine in differential diagnosis. For the most part these tests are not recorded in the tables presented.

This report is confined to those diagnostic services exclusive of poultry.

A comparison of the incidence of some of the diseases encountered show certain trends. In 1945-46 there were 110 cases of swine diseases investigated. The diseases most frequently encountered were erysipelas 18, ascariasis 21, necrotic enteritis 9, and poisoning 8. During 1946-47 there were 127 cases of swine disease investigated; of these 47 had erysipelas, 15 necrotic enteritis, 11 parasites, and 10 poisoning. If we compare the two years we find as the four most common diseases:

	% 1945-46	% 1946-July 1947
Erysipelas	16.4	37.0
Parasitism	19.0	8.6
Necrotic Enteritis	8.1	11.8
Poisoning	7.2	7.9

This information would suggest that there is a definite decrease in parasitism and more or less constant number of cases of poisoning but that swine erysipelas and necrotic enteritis are increasing in frequency in North Dakota.

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