

CONTROL OF RHIZOCTONIA STEM ROT IN COLORADO

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Rhizoctonia stem rot is not usually associated with carnations in Colorado. Occasionally cuttings shipped into the state have been infected, however, and significant losses occur. In many of these instances symptoms develop within a few weeks after transplanting and the grower wishes to know whether control measures can be applied with satisfactory results. There is no simple answer to this question. A single Terraclor drench is usually sufficient for control (4), however, carnations are known to become resistant as they mature (3). Thus, is it worthwhile to go to the expense and trouble of an application of Terraclor if the plants are already resistant? Has the fungus already spread so far in the bench that penetration of numerous plants has already occurred, thus nullifying the protective action of Terraclor? The experiment described below was set up primarily to answer these questions.

In addition the value of aerated steam (1,2) in control was assayed. Also, because Terraclor is fairly immobile in soils, a drench does not insure even distribution of the fungitoxin at all depths. Thus in one treatment the chemical was thoroughly mixed into the soil.

Treatments were applied to bench plots measuring 40'' x 48'' x 6''. These were separated to prevent cross contamination of the soils. Plots were steamed at 180° F for at least one half hour. After cooling, approximately 1500 cc of aerated steamed soil (160° F for one half hour) was mixed in certain plots. The soil was incubated at greenhouse temperatures for three days to allow residual organisms in the aerated steamed soil to establish in these plots. All plots were then planted with rooted carnations at a 3'' x 4'' spacing. A sand cornmeal mixture containing *Rhizoctonia solani* was placed against the plant in the corner of each plot. A Terraclor drench was immediately applied to certain plots at the rate of 1 lb. of 75% active in 100 gallons of water, one quart per square ft. After symptoms had appeared in the inoculated plants in the controls (14 days after transplanting), a Terraclor drench was applied to other previously nontreated plots. At this time one half of the plants were cultured from each plot to determine the incidence of *Rhizoctonia*, leaving the 30 remaining plants in a 6'' x 8'' spacing. These were grown and flowered in conventional culture. Rooted cuttings were trans-

Table 1. Number of plants dead approximately six months after inoculation in plots treated in various ways for control of *Rhizoctonia* stem rot of carnations.^a

Treatment	Replications			
	I	II	III	Average
Aerated steamed	4	13	0	6
Terraclor mix	0	1	1	1
Terraclor drench	0	0	0	0
Terraclor drench delayed 14 days	1	1	1	1
Inoculated control	15	6	11	9
Noninoculated control	0	0	0	0

^aEach replication per treatment contained 30 plants.

planted December 24, 1965, and final readings on disease incidence were taken June 15, 1966.

Data on disease incidence in the three replications are given in Table 1. A Terraclor drench applied when inoculation occurred insured complete control of *Rhizoctonia* stem rot--even plants in contact with the inoculum did not die in treated plots. Applications 14 days after inoculation were also effective. No increase in control resulted from mixing Terraclor in the soil.

The data are given in detail listing replications to show the variation in control in the aerated steamed plots. The procedure for aerated steaming of soil is conventionally applied to the whole soil volume to be used ultimately. It was not practical to do this in this experiment since adequate equipment was not available. Thus, the results recorded here should be interpreted with this in mind. They would indicate, however, that the use of aerated steam was not as efficient in control as application of Terraclor and that there was considerable variability.

The "pattern of spread" was as might be expected. The inoculated plant developed symptoms first, followed by adjacent plants. Typical data recorded at intervals during the experiment are given in Table 2 for the inoculated controls.

The fungus was not recovered very frequently on the 14th day after transplanting; even from plants 3-4' from inoculated plants. Indeed there were only two plants (in inoculated control plots) from which the fungus was recovered. This indicates that spread and penetration of the hosts by the pathogen had not

Table 2. Number of plants dead over successive intervals in the inoculated control plots. One plant in the corner of each plot was inoculated. Spacing was approximately 6' x 8'.

Date losses were recorded	Replications		
	I	II	III
February 15, 1966	2	1	1
February 25, 1966	3	2	3
March 25, 1966	7	3	5
June 15, 1966	15	6	11

been accomplished to any great extent during this period.

Thus we can conclude that application of Terraclor even after symptoms are apparent (at least if they develop before 14 days after transplanting) will check the spread of Rhizoctonia from infected plants and is financially warranted. The experiment described above does not tell us how long after transplanting Terraclor can be applied with favorable results. This will have to await further experimentation.

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