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CONTROL OF STORAGE ROT OF STRAWBERRY PLANTS~

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Abstract

A five-minute dip in the commercial fungicide Thylate (tetramethyl-thiuram disulphide), at a dosage of 1 oz per gallon of water, was sufficient to keep strawberry plants of the varieties Redcoat and Grenadier free from fungal decay during a period of six months in storage at 28°F. Dyrene (2-4-dichloro-6-0-chloroanilino-S-triazine) was not quite as effective when the 50% wettable powder was used at the same dosage. Erad (phenyl mercuric acetate) was severely phytotoxic at 10 ml per gallon although it also completely eliminated fungi from the roots. Profuse growth of fungi was observed on the water-immersed controls, An undetermined species of low-temperature Rhizoctonia was consistently associated with the storage rot.

Introduction

On the Eastern seaboard of the U.S. and Canada the placing of strawberry plants in cold storage for spring planting is a common practice. The advantages of this procedure are three-fold: plants can be dug late in the fall when farm work is not pressing; plants are available at any time during spring when the weather becomes favourable €or setting them out; the stored plants are not retarded after planting as is often the case with plants dug late in spring. Plants are usually dug after dormancy begins in late October or November. They are packed in bunches of 25 plants each and wrapped in polyethylene and stored for a period of six months at temperatures of from 28-30°F.

Losses due to rot during storage may be as high as 10 per cent. A number of fungi may be associated with root lesions. Plants dug earlier in September break down in storage apparently much more readily than those dug in late November just before the first snowfall.

The purpose of this investigation was to develop a pre-storage treatment which would reduce or eliminate losses due to the action of fungi and secondary organisms.

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Materials and Methods

On November 29, 1961, 200 freshly-dug plants of each of the varieties Redcoat and Grenadier were obtained from the propagation plots of the Horticulture Branch, N. B. Department of Agriculture. These were tied by elastic bands in bundles of 25 plants and treated in lots of 50 plants by a 5-minute total immersion in the following:

1. Thylate (tetramethylthiuram disulphide): 1 *oz* per gallon of water.
2. Dyrene (2,4-dichloro-6-0-chloroanilino-S-triazine): 1 *oz* per gallon of water.
3. Erad (phenyl mercuric acetate): 10 ml per gallon of water.
4. Water.

These fungicidal preparations were made up at twice the recommended concentrations in the hope of obtaining a heavy residue and an eradicant action on any fungi present on the surface of the leaves and roots of the plants.

After treatment the bundles were allowed to drain and each of them was placed in a polyethylene sleeve which was then tied at both ends with "Twist-ems" and stored immediately at **28°F.**

On May **24,** 1962, approximately six months after the plants had been put into storage, they were thawed at **38°F** and examined for the presence of fungus growth. They were then transplanted to flats of unsterilized soil and left for one month outside the greenhouse, A final count of the survivors was taken on June **27,** 1962.

Results and Discussion

Table **1.** Effect of fungicidal treatment on growth of fungi on strawberry plants stored for 6 months at **28°F.**

Variety	Treatment	No. of mouldy plants out of total of 50	No. of survivors* out of total of 50
Grenadier	Thylate	**3**	42
"	Dyrene	**7**	28
"	Erad	**0**	**0**
"	Water	50	17
Redcoat	Thylate	8	46
"	Dyrene	40	47
"	Erad	0	2
"	Water	50	37

* The numbers of survivors were counted 1 month after they had been taken out of storage and planted in flats of unsterilized soil.

Table 1 shows the number of mouldy plants in each treatment and also the number of survivors of each treatment after the plants had grown in unsterilized soil for 1 month subsequent to storage. The plants subjected to treatment by Thylate had the best appearance. The leaves were green and turgid, the roots bore only a trace of fungus growth and the laterals were intact. Those treated with Dyrene also appeared to be quite viable. Treatment with Erad apparently killed the roots and the leaves and petioles were also quite brown although fungus growth was not observed. Profuse growth of fungi was present on the water-dipped controls.

The number of survivors of each treatment could, in the case of the variety Grenadier, be correlated with the number of plants free from mould upon coming out of storage. However, Redcoat, a more robust variety, showed equal survival rates in the Dyrene and Thylate treatment although the number of mouldy plants in the Dyrene treatment was 5 times that in the Thylate,

The use of twice the recommended quantity of fungicides in making up the preparations was perhaps excessive but it does point up the relative innocuity of Thylate and Dyrene in comparison to the phytotoxicity of Erad. In justice to the latter fungicide, further trials should be conducted with lower concentrations.

The fungus growth on the water-immersed controls was examined and isolations were attempted. A species of Rhizoctonia capable of growing at temperatures below the freezing point was apparently dominant. Two strains isolated were both capable of growing over the surface of frozen rye-meal agar. One also made considerable growth at room temperature (70-75°F) while the other ceased vegetative growth a.t 70°F. and formed only sclerotia. Other fungi identified in the lesions on strawberry crowns and roots were species of Botrytis, Fusarium, Cylindrocarpon and Gloeosporium. All isolates were capable of good growth at 35-40°F. It would be of interest to assess their pathogenicity at temperatures approximating those of the soil during the winter.

It has been estimated that 1000 fall-dug plants could be treated with the most efficient fungicide Thylate at a cost of 60 cents. If the percentage of survival of plants is increased to the extent of 10%, then this expense would not he excessive. Further refinements of the storage process, such as the prevention of drying of crowns before they are placed in storage and better packaging may reduce losses even further.

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