

OAT YIELD LOSSES DUE TO CROWN RUST

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Abstract

Four applications of Daconil 2787 at weekly intervals to oat plants naturally infected with crown rust largely controlled the disease. Untreated plants yielded approximately 20% less than treated plants, indicating the magnitude of the losses caused by crown rust. There was no apparent reduction in kernel weight due to crown rust.

Introduction

The control of cereal diseases with foliar applications of chemicals has been investigated for many years (3). The need for frequent chemical applications and the incomplete disease control achieved with chemicals have made their general use impractical. However, they have been used for cereal disease yield loss studies, where they have provided striking evidence of the losses caused by some diseases (1, 2, 4). More effective and more specific chemicals would provide additional information in this regard.

The fungicide Daconil 2787 has been found to have a wide spectrum of activity and has been effective against certain rusts (5). Its usefulness in controlling septoria leaf blotch, rusts, and other diseases of oats was investigated in field trials in 1967.

Methods

One-acre blocks of the oat varieties 'Stormont', 'Rodney', and 'Garry' were planted with a 7-inch drill for seed increase. A 3-m square plot within each of these blocks was treated with Daconil 2787 (75% tetrachloroisophthalonitrile) at the rate of 2 lb wettable powder per 100 gal water. It was applied four times at weekly intervals, and the first spray was applied on July 20, when the oat plants were heading. Disease initiation was dependent on natural inoculum in all cases. Oats were harvested on August 24 from four 3m-long rows picked at random in each of the treated plots and from a similar number of adjacent untreated rows. Yield and 1000 kernel weight data were obtained for each of the treated and untreated samples.

Results and discussion

The septoria disease caused by *Leptosphaeria avenaria* Weber f. sp. *avenaria* was of minor importance on these plants in 1967. Because of the light infection, little difference in the prevalence of septoria was evident between the treated and untreated oats, and an accurate assessment of the effect of Daconil 2787 on this disease was not possible.

Crown rust caused by *Puccinia coronata* Cda. f. sp. *avenae* Eriks. & E. Henn was prevalent on oats in the Ottawa Area in 1967. A trace to light infection of crown rust was present on 10% of the oat plants at the time of the first application of the fungicide. By maturity the rust had developed on the untreated oats to a severe infection on 100% of the plants and many of the red pustules had changed to the black telial stage. Only a very light infection was present on about 25% of the treated plants at maturity, pustules were small and few telia had formed. At the time the oats ripened, the appearance of the treated plants was markedly better than that of the untreated ones because of freedom from rust. Treated plants, however, required a longer period to complete the ripening process. There was little evidence of difference in rust development on the varieties as all three were quite susceptible. The treated oat plants of the three varieties yielded considerably more than the untreated ones (Table 1) but their 1000 kernel weights were almost the same.

Daconil 2787 effectively controlled crown rust under the present conditions. Further tests are required to determine the most efficient rates and the number of applications needed to control the various

Table 1. Yields and 1000 kernel weights of seed from untreated crown-rust infected oat plants and from plants sprayed with Daconil 2787

Variety	Treatment*	Yield (g)	1000 kernel weight (g)
Stormont	untreated	123.6	30.0
	treated	149.8	29.6
Rodney	untreated	144.5	25.8
	treated	171.5	25.8
Garry	untreated	187.8	24.7
	treated	218.5	25.1

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* Four sprays at weekly intervals of Daconil 2787 at 2 lb 75% W. P./100 gal water.

levels of rust development encountered. The heavy natural infection of crown rust reduced yields by approximately 20%. This reduction compares favorably with results reported previously (4). Since there was practically no other disease present on oats in 1967, the results emphasize the importance of crown rust in oat production. The indication that crown rust does not affect kernel weight is not in agreement with previous findings (4, 6). The small differences in kernel weight between the treated and untreated samples may have resulted because of the loss of light seed during machine threshing.

Acknowledgments

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Literature cited

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