EFFECT OF PLANTVAX EMULSIFIABLE CONCENTRATE ON STEM AND CROWN RUSTS OF OATS'

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Abstract

Plantvax E. C. failed to provide effective control of either crown rust or stem rust in oat plots artificially inoculated with these rusts.

The periodic shortage of genetic resistance to stem rust, Puccinia graminis Pers. f. sp. avenae Eriks. and E. Henn., and crown rust, P. coronata Cda. f. sp. avenae Eriks., in oats (Avena sativa L.) had led to the search for chemicals that can be used as stopgap control measures until resistant varieties are developed. Maneb has proven highly effective in the control of both rusts (Fleischmann et al. 1968), but it has poor tenacity and it is subject to weathering effects and so must be applied several times during the growing season, particularly after rains. The systemic oxathiin derivatives showed some promise of controlling the wheat leaf and stem rusts (Hagborg 1970; Rowell 1967, 1968) but field trials on oat rusts (Hagborg, unpublished data) with the original formulation were disappointing. Hagborg (1971) found that a more water soluble emulsifiable concentrate (E.C.) formulation of Plantvax was more effective against wheat rusts, and further tests with oat rusts seemed desirable.

Materials and methods

The oat cultivar Eagle was planted on June 3, 1970, in a randomized 8-replicate experiment; each plot consisted of 4 rows 5.6 m long, spaced 30 cm apart. Four buffer rows of the cultivar Pendek were planted between plots. The plants were inoculated at the 5-6 leaf stage by injecting 1 or 2 plants at each end. of each buffer row with a water suspension containing urediospores of both stem rust (race 1) and crown rust (races 264, 295, and 326). The test plots of Eagle were infected by secondary spread of rust from the artificially inoculated buffer rows1 between plots. Dithane M22 (maneb, 80%w/w; Rohm & Haas Co. of Canada Ltd., West Hill, Ont.) was applied weekly or after heavy rains at the rate of 3 liters of 0.331 active solution (w/v) per plot for each application. Plantvax E.C. (5,6-dihydro-2-methyl-1,4-oxathiin-3-carboxanilide-4, 4-dioxide, 12% w/v, Uniroyal (1966) Ltd., chemical Division, Elmira, Ontario) was applied twice, 10 and 24 days after inoculation, at the rate of 3 liters of 0.1% active emulsion (w/v) per plot for each application. The two center rows of each plot were harvested for yield and quality determinations.

Results

The five maneb treatments gave almost complete control of both stem rust and crown rust (Table 1). Severe infections of *both* rusts developed in both the control and the Plantvax E.C. treated plots, although the latter showed slight retardation of rust development. The Plantvax E.C. treatment also increased the yield and quality measurements slightly, but *the* benefits did not economically justrify the effort and expense of treatment, particularly in view of the heavy rates of chemical used. Chemical control of rusts in commercial oat fields must await the development of a more effective compound.

Table 1. Effect of Plantvax E.C. and Dithane M-22 on rust infection, and on yield and quality of oats inoculated with stem rust and crown rust

Category	Control	Plantvax E.C.	Dithane M-22
Stem rust % infection			
August 10	67.5	51.3	0
August 19	95.0	90.0	0
Crown rust % infection			
August 10	57.5	37.5	0
August 19	72.5	51.3	tr
Yield (kg/ha)	1592	2057	3687
% loss	56.8	44.2	
Thousand kernel wt (g)	17.0	17.1	28.4
% reduction	40.2	39.8	
Liter weight (g)	340	381	494
% reduction	31.2	22.9	
Hull content (%)	38.7	34.7	23.9
% increase	61.9	45.2	

[1] Contribution No. 496, Research Station, Canada Department of Agriculture, Winnipeg, Manitoba R3T 2M9.

Literature cited

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