SOME OBSERVATIONS ON THE INCIDENCE OF ROOT ROT IN BARLEY GROWN UNDER VARIOUS CULTURAL PRACTICES

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It is well known that the root-rot diseases of wheat and barley caused by soil-inhabiting pathogens such as Bipolaris sorokiniana (Sacc.) Shoemaker and Fusarium culmorum (W. G. Sm.) Sacc. are favored more by certain crop sequences than by others.

Crop sequences determine the type and amount of organic matter introduced into the soil, which, in turn, influences the types and numbers of pathogenic and nonpathogenic soil microorganisms. Chemical nutrients also influence the types of microorganisms found (2).

An examination of barley in fields in the Lacombe, Alberta, area in the summer of 1967 suggested that there was more root rot than there had been in the previous two years. Not knowing the reason for this increase in root rot, we decided to make observations on the incidence of root rot in 'Jubilee' and 'Gateway' barley grown in plots for experiments designed to test the effects of various rotations and fertility treatments on grain yields and maturation rates. Although these trials have been in progress since 1911, reference will be made only to the previous treatment in 1966.

The rotations included barley, oats, hay grasses, wheat or corn in 1966. Fertilizers were applied at the rate of 50 lb/acre of 11-48-0 (monammonium phosphate) and 150 lb/acre of 33-0-0 (ammonium nitrate) on stubble or 50 lb/acre of 11-48-0 on fallow land.

Over 100 barley plants in the heading stage were sampled at random from each treatment, and the amount of tissue disintegration and discoloration of the subterranean portions of the plant was noted. On our scale maximum discoloration was rated 5, a trace of infection was rated 1, and no visual infection was rated 0.

The data in Table 1 contradict the general belief that root rot is more common on barley following barley **(3).** The lower incidence of root rot in 'Gateway' barley growing on barley stubble is hard

Table 1. Incidence of root rot in 1967 on two barley cultivars grown in various rotations, with and without fertilizer

Barley cultivar	Previous treatment	Disease index*	
		With fertilizer**	Without fertilizer
Gateway	Gateway stubble	1.50	2.00
Gateway	fallow	3.46	4.08
Jubilee	fallow	1.00	1.56
Jubilee	breaking (hay)	1.01	1.56
Jubilee	Jubilee stubble	0. 89	1.31
Jubilee	wheat stubble	0.90	1.20
Jubilee and bromegrass	wheat stubble	1.83	2.55

* Where 5 represents severe disease and 0 no symptoms.

** On stubble: monoammonium phosphate (11-48-0), 50 lb/acre and ammonium nitrate (33-0-0), 150 lb/acre; on fallow: monoammonium phosphate (11-48-0), 50 lb/acre.

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to explain. Microbial activity in the barley stubble, which received extra nitrogen, may have adversely affected the pathogenic microflora (1).

The beneficial effects of fertilizer in reducing root rot of barley was demonstrated in all the experiments. The effect may have been due to increased vigor of the host, though the effect of mineral fertilizers on the soil microflora must not be ignored. Guillemat and Montégut *(2)* found an appreciable increase in the growth of soil fungi in fertilized plots when compared with growth in non-fertilized soil.

A generally higher disease index for 'Gateway' barley than for 'Jubilee' might suggest that the former cultivar is more susceptible to root rot. The high disease index of 'Jubilee' barley undersown with bromegrass could be due to the weakening of the barley in competition with the grass for limited moisture. As the summer of 1967 was drier and warmer than usual, these conditions may have predisposed the plants to attack by soil-borne pathogens.

Literature cited

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