

THE EXPERIMENTAL APPROACH IN ASSESSING DISEASE LOSSES IN CEREALS: ASTER YELLOWS IN BARLEY

*P. H. Westdal*¹

In the field, a barley plant infected with aster yellows virus (AYV) is usually somewhat stunted and yellowed and is characterized by the formation of one or more "sterile" heads. Usually one or more heads that appear normal are also formed on the plant. The sterile heads produce no seed; the other heads produce fewer kernels than do those of healthy plants and the kernels are usually shrivelled and discolored.

The following is a summary of results obtained in an assessment of losses from a natural infection of AYV in barley in 1966. The details of this work will be published elsewhere.

A comparison of yields of paired samples of healthy and AYV-infected plants showed that healthy plants yielded almost three times as much as infected plants, although almost one-half of the heads from the infected plants appeared normal. In practice much of the seed of infected plants would be lost during harvest.

A comparison of yields of paired samples of barley from one foot of row in which one sample of

each pair had an AYV-infected plant showed that there was no compensation in yield by adjacent plants. This is presumably because a barley plant infected with AYV continues to grow and utilize moisture and soil nutrients.

In two separate tests, in which percentage yield was plotted against percentage sterile heads, the regression of yield on disease intensity agreed closely with that expected on the basis of the other yield comparisons. In both tests the percentage loss in yield was almost twice the percentage of sterile heads in the samples. The fact that AYV-infected plants produce heads that appear normal but contribute little or nothing to yield explains earlier work where the percentage loss in yield was two to three times greater than the percentage of sterile heads.

More work is required to establish the validity of the relationship between percentage sterile heads and yield loss, but once established it should prove useful in surveys designed to determine loss in yield due to AYV. For example, a survey of commercial barley fields in Manitoba in 1966 showed that from a trace to 6.5% (mean 3.5%) of barley heads were sterile due to AYV infection. On the basis of the relationship between percentage sterile heads and loss in yield, involving a factor of 2, the loss in barley yield in 1966 would have ranged from trace to about 13%, with a mean of about 7%.

¹ Research Station, Canada Department of Agriculture, Winnipeg, Manitoba.