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BARLEY STAINING


GRAIN discolouration or "staining" is a quality defect in W.A. barley which substantially reduces the marketable value of the crop. It also causes heavy losses to individual growers whose grain is docked or rejected.

The common symptoms of staining and the sections of the agricultural areas in which staining occurs are outlined in this article. In an effort to help farmers reduce the effects of staining, chemists, plant pathologists and plant breeders at the Department of Agriculture are working on the problem and a description of the work in progress is included.

Effects of staining

Sellers of barley, including the W.A. Barley Marketing Board, know from experience that buyers prefer clean bright grain. If Western Australian barley growers wish to have their grain sold on overseas, selective, quality-conscious markets, it is imperative for them to produce a clean bright sample and to co-operate fully with the Board in whatever receival arrangements may be necessary to market suitable categories of barley.

There is evidence that the malting properties of barley are affected by staining. No maltster would be happy about the occurrence in his material of moulds, originating from stained barley, which could grow during the malting process and introduce an unknown element into a closely controlled operation.

With regard to feed barley, up to the present time there have been no toxicity problems in this State in feeding stained barley to stock.

Susceptible areas

The map showing susceptible areas has been compiled from the results of Department of Agriculture variety trials over the period 1965 to 1970. Note that the heaviest staining occurs in the high rainfall region.

It may only be possible to grow high quality barley in rather restricted areas. If growers wish to chance growing barley in wet areas liable to staining, they must be prepared to accept a comparatively high proportion of reject or feed classifications. The article "Grow Barley for Malt or Feed", in this issue, will help farmers decide which type of barley they will grow.

Types of staining

Two types of staining are most widespread; in one there is a marked discolouration at the germ end which tends to be confined to the area of the husk adjacent to the embryo.

In the second type, there is an overall staining of the whole husk. This type of staining varies with moisture conditions from a barely perceptible lack of brightness to a deep brownish colouration with obvious development of mould on the outside of the grain in severe cases. External signs of mould are not usually found with staining and mould may be seen in some cases when little staining has occurred.

Causes of staining

Staining of barley is a world-wide problem and the cause is unknown. Some evidence obtained in our laboratory indicates that water
alone may be a major factor. However, field collections of stained grain, when compared with bright samples, show a much higher incidence of fungi, mostly *Alternaria* species, within the grains.

Studies of barley grown in variety trials in this State have shown that variation in staining is mostly due to the site and year in which samples were grown. Varietal differences are small and the application of nitrogen fertilisers does not affect staining.

Other field trials have shown that late planting reduces staining at the cost of substantial yield reductions.

In the U.S.A., research workers are looking at the problem from two main aspects: (1) to see if features of the barley ear, such as awns, laxness of the head, and the two-row versus the six-row habit, cause high humidity around the ear, favourable to the growth of fungi; (2) to attempt to find sources of resistance to the various fungi found on stained grain.

**Current work on staining**

Work in progress in the Department at present consists of:

1. A farm survey to examine the effectiveness of changing planting dates (and, consequently, maturity dates). Another purpose is to determine the extent of yield losses in relation to delayed planting.
2. Field trials which are being carried out to determine the value of late planting as a control measure.
3. Field trials to assess the effect of fungicides.
4. Further investigations in the glasshouse to determine how staining develops under various moisture conditions such as dew at night and long periods of rainy weather. The roles of various fungi are also being examined.
5. Introduction of overseas varieties which may be resistant to staining. As yet no varieties have been found which have a definite resistance to staining.
6. Breeding of later-maturing strains which may escape staining.