

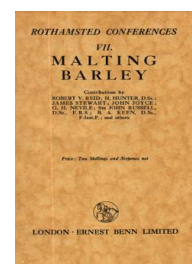
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## Malting Barley

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### General Summary of Papers and Discussion

#### B. A. Keen

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There was a general impression that the grain in this country is rarely dry enough to allow the use of these machines. To test this point, last year samples of wheat and barley were taken from ripe standing crops, and tested for moisture-content in the laboratory at the Institute of Agricultural Engineering. In both crops it was found that once the grain was really ripe the moisture-content on any dry day was below 20 per cent., and the grain accordingly threshable. Some of the tests gave figures as low as 17 per cent. moisture-content.

In such a season as last it is probable that some subsequent drying would be necessary, but that presents no special difficulty, and in ordinary seasons it appears that the combine harvester could be used, and would deliver a dry sample.

The Institute is importing a combine for use next harvest, and it is intended to try it on barley as well as the other main crops.

Sir JOHN RUSSELL, in summing up the discussion, emphasized the fact that there was no such thing as a best barley, since maltsters and brewers' requirements varied somewhat from one district to another, and, in addition, the effects of soil and climate—and, to a lesser extent, manuring—were themselves variable, as appeared both from Mr Stewart's paper and the results obtained at Rothamsted. In manurial treatment it seemed clear that it was essential for phosphate in some form to be present in the soil; an absence of any increase in yield or improvement in quality, resulting from the addition of phosphate manure, was not a safe guide that phosphate was not needed. There was no danger from the use of ammonium chloride in place of ammonium sulphate; the amount of chlorine released was very little, and this was rapidly washed out of the soil. Finally, he stressed the importance of all cultivation operations if a uniform crop was to be secured.

## GENERAL SUMMARY OF PAPERS AND DISCUSSION

By DR KEEN, D.Sc., F.Inst.P.

(1) In the past seven years the area under barley has decreased by 760,000 acres, representing about 2,850,000 quarters. In 1927, 1,250,000 acres were under barley. In 1913, 6,000,000 quarters were malted, and the figure steadily fell to about 3,500,000 in 1926—of this less than 2,750,000 was home-grown. The average yield in a good year is about 4,000,000 quarters.

(2) The grower of malting barley is concerned with both yield and quality, while the maltster and brewer are concerned with the quality only.



*Factors affecting Yield*

(3) *Soil*.—As with nearly all other crops, the effect of soil is very marked. Moist sands give the largest yield, followed in order by light loams, heavy loams, and dry sandy soil.

*Season*.—Wet seasons appear to give an increased yield; abnormally wet years and dry seasons reduce the yield. Sunshine is relatively unimportant until the ripening period begins, and excess rainfall in August produces much damage. Rain in May and June largely offsets the damage from spring drought.

*Fertilizers*.—An application of 1 cwt. of sulphate of ammonia gives an increase of about 6 bushels in almost all conditions, while muriate of ammonia gives somewhat more. The increase is due to the greater number of grain-bearing heads and not to the greater number of grains per head. The effect of potassic fertilizers depends on weather conditions: they are most useful in the years when ripening is delayed. A surprising result was obtained in 1924, when the yield was lowered by potassic fertilizers. The effect of phosphatic manures is complex. In some cases the yield was reduced on light soils, due, possibly, to too-rapid ripening.

*Factors affecting Quality*

(4) The outstanding factor of quality is the percentage of nitrogen in the grain. In general, the quality falls off with increasing nitrogen-content. Values in excess of 1.5 to 1.6 per cent. are undesirable.

*Soil*.—Heavy and rich soils give, in general, higher percentages of nitrogen than the lighter soils, on which the results are more variable.

*Season*.—This affects particularly the lighter soils. Prematurely ripened barley—the effect of drought—has low moisture-content (13 per cent. instead of the usual 16 per cent.), and nitrogen-content usually above 1.7 per cent. A wet period in May results in a low nitrogen percentage. In prematurely ripened grain the basal bristle is often not attached to the corn, the skin is open at the base, and absence of this natural protection results in lower vitality, and in mould development in malting. Unduly wet seasons produce both unripe and overripe, or “washed,” barley. The latter is black and weathered in appearance, the skins are slack, and the nitrogen-content may range from 1 per cent. in the “washed” grain to 2 per cent. in the unripe grain.

*Fertilizers*.—Contrary to earlier ideas, moderate top-dressings of nitrogen fertilizers—about 1 cwt. of sulphate of ammonia or its equivalent—have little or no effect on nitrogen-content. The top-dressing can be further increased if phosphatic and potassic fertilizers are also given, and the minerals also prevent any fall in quality.



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### *Cultural Practices*

(5) The details of farmers' practices in growing malting barley vary greatly according to soil, district and rotation, and cannot be summarized. Great importance is attached to a good tilth in the seed-bed. Although both heavy seeding and fairly deep sowing are general—on the grounds that tillering and second growth is discouraged and the seed is protected against weather and birds—shallow and thin sowing is also advocated. It is claimed that the early and extensive tillering which results, gives more uniformly ripened grain and a stronger straw; its possible disadvantages are bird depredations and damage from frost or drought in the early stages. The value of autumn sowing needs further investigation. In general, delay in sowing affects the quality more than the yield. Early-sown crops also escape the gout-fly. Uniformity in all stages of growth is important, and can be largely secured by adequate seed-bed preparation, and uniform distribution of seed and manures.

There is evidence from Lincolnshire that the quality of barley grown on the light land is improved if the seed is obtained from the crop grown on adjacent colder heavy land.

Barley is commonly cut too soon; if ripening has been uneven it is better to wait, even at the risk of losing ears or shed corn. Great care is necessary in harvesting.

### *Varieties of Seed*

(6) The famous improved narrow-eared barley named after Chevallier appeared about a century ago. It was later eclipsed by Archer, which gave a high yield, with a short, strong straw and a short neck, so that ears did not break off. Its grain was inferior in appearance to Chevallier, but malted well.

Of the broad-eared varieties that suit rich heavy soils the ancient Spratt form is still grown in the Fens. They tiller abundantly and have strong straw. Goldthorpe, found in a field of Chevallier in 1889, proved a high yielder of excellent quality and ripened about ten days earlier than Archer, but its brittle neck was a drawback.

These original forms have been eclipsed by two hybrids now in very general use, Plumage-Archer and Spratt-Archer.

Plumage-Archer is a broad-eared type, resembling Goldthorpe, but with stronger neck. It does well on heavy soil.

Spratt-Archer was developed for wet and sunless conditions. It has a strong straw and ripens early.

Both forms are high yielders of excellent malting quality. Spratt-Archer is slightly better in yield, and Plumage-Archer in malting quality.

It appears that 60 to 70 per cent. of seed is home-grown, or sold from farmer to farmer, and the question arises whether, in the farmers' interests, some form of regulation to ensure a certified seed-supply is desirable.



*The Buyer's Requirements*

(7) In attempting to estimate quality buyers have developed certain standards of judging. In the present state of knowledge these standards are stated to be : barley of Chevallier class, grown on barley-land, well ripened, sound and uniform, of good shape, carefully threshed and free from weed contamination, with nitrogen-content not exceeding 1.6 per cent. Undesirable features are : hard, steely and heated grain, badly threshed, skinned and broken corns, grown corns, and high nitrogen-content. The valuation seems to depend more on soil and climate than on the cultural practices of the power.

The nitrogen-content is the most important single factor. High nitrogen barley gives a low extract in the malt and leads to fermentation troubles in the brewery. There is evidence, however, that the yeast-feeding properties of malts from low nitrogen barleys are poor, and as the vigour and proper nutrition of the yeast is of prime importance in the brewery, especially with the present lower specific gravities, the significance of the nitrogen-content needs further investigation. In this connexion the kinds and amounts of soluble non-coagulable nitrogenous compounds communicated to the wort constitute an important field of study.

It is stated that to secure a bright and clear bottled beer a certain small proportion of foreign sun-dried barley is desirable, and, further, that a small amount of foreign husky barley is useful in the brewers' mash for drainage.

Correspondence between sample and deliveries is essential. The best method of sampling is to place, in a spare sack, a handful out of each sack as it is filling. The sample is then thoroughly mixed. If the whole consignment is sent off as sacked, without mixing and winnowing, the sample sack, although fairly representing the purchase in bulk, will not correspond with each individual sack. To avoid misconception the buyer should be informed which method has been adopted.

The value of the grain will be diminished if, in threshing, the "ile" or beard is cut too short, as the adjacent skin is liable to be stripped off. If too much of the beard is left, however, the grain looks less plump, and this may adversely affect the valuation, although its actual malting-value is not affected.

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