

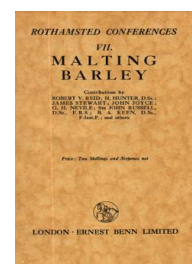
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# Malting Barley

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## Account of the Discussion

### Rothamsted Research

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The justification for paying so much attention to the nitrogen-content of the grain is that it is closely related to valuation. The higher the nitrogen-content of the grain the less the buyer will pay for it, and a comparison of the analytical figures with the valuation shows that the buyer may deduct as much as 2s. 9d. per quarter for an additional 0.1 per cent.—one-tenth of 1 per cent. The high nitrogen barley has the disadvantage of giving a low extract in the malt, and also of leading to certain fermentation troubles; hence the brewer prefers a grain with lower nitrogen-content.

## THE DISCUSSION

LIEUT.-COL. SIR ARCHIBALD WEIGALL, Chairman of the Conference, in opening the proceedings, stated that the barley crop, if successful, was one of the most profitable crops for an arable farmer. It was most essential that growers and buyers should come to a thorough understanding with one another, and this especially applied to districts, since the requirements of buyers in one district differed from those of another. Any information therefore which could be given, both with regard to the cultivation and manuring of the crop, would prove of the utmost value. In referring to land under cultivation for barley, Sir Archibald remarked that it was a significant fact that the average return of sugar-beet was increasing each year.

Dr E. S. BEAVEN (Warminster), in referring to phosphatic and potassic fertilizers, said that it was not the usual practice of growers to apply these to their barley, for the reason that they had in all probability given the root crop a good dressing of both. What they more often did apply was either sulphate of ammonia or nitrate of soda. The results of the manurial experiments described by Sir J. Russell had been generally confirmatory of the conclusions drawn by Munro and himself thirty years ago, which were based on examination of Rothamsted samples grown in Agdell field. The permanent plots on Hoos Field at Rothamsted were primarily a demonstration of the effects on the crop of phosphatic starvation, and showed clearly that such starvation was inimical to malting quality. With reference to the experiments on the use of ammonium chloride, he wondered whether there would be any deleterious effect after a certain time. The general effect of acid-soil conditions on barley was such that he felt more attention should be given to the study of the effects of lime and chalk. Locality and climate were probably the two most important factors in the growing of barley. There was no such thing as a best barley, but some varieties responded better on some soils.

Mr F. RAYNS (Norfolk Agricultural Station) stated that on his farm, and also on many farms in Norfolk, the application of phosphatic

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fertilizer resulted in a distinct increase in yield. There were, however, certain areas on which phosphatic manure seemed to have very little effect, but a marked benefit resulted from the application of potash. There were many farmers who advocated the dressing of barley-land with potash on account of the benefit which occurred to the following hay crop. Too much importance could not be attached to all operations of cultivation, and to the uniformity with which they are carried out. Some farmers ploughed their barley-land three times in order to ensure, as far as possible, a uniform seed-bed. The distribution of the seed was another important factor, and this distribution was often made more even when sainfoin was undersown, since this necessitated drilling in two directions.

His objection to autumn sowing of barley was that one had not the same opportunity for cleaning the land prior to sowing the seed, as in the case of spring-sown barley.

The cutting of barley was always a most vexing question, and he doubted if more than a small percentage of growers were always sure in their own minds when to cut the crop. It was a matter in which experience and local climatic conditions were the predominating factors. The tendency was, however, to cut too early.

A. CHASTON CHAPMAN, F.R.S. (London): I should like to raise the question of the character of much of the barley produced in the present day in relation to the yeast-feeding properties of the malts made from it. As compared with the barleys grown years ago the amount of total nitrogen in the bulk of the malting barley now produced is small, and the same, of course, applies to the amount of soluble non-coagulable nitrogenous matters communicated to the wort, on which the yeast has to rely for its nitrogen nutrition. For nearly thirty years I have been in the habit of making this estimation in the case of every sample of malt submitted to me for analysis, and the estimations therefore amount to many thousands. I was induced to do this in the early days because I felt convinced that the numbers ought to be of some value, and as time went on I began to see that they did, as a matter of fact, furnish additional information as to the actual brewing-value of samples of malt. It is clear that without an estimation of the different forms of nitrogen occurring in the wort it is impossible to say with certainty what proportions of these substances are available for purposes of yeast nutrition. With existing methods, such differentiation is at present impossible in technical analysis, but my very extensive experience over many years has shown me that in the main the total soluble nitrogen percentage does afford an indication of the yeast-feeding properties of the malt.

I should, perhaps, say in passing that the relative importance of the different classes of nitrogen is at present receiving attention under the Institute of Brewing Research Scheme. When the percentage is low

—say 3 per cent.—the yeast-feeding properties of the malts in question are found in practice to be poor, whereas when the percentage is higher —say, in the neighbourhood of 4 per cent.—much better results from the point of view of yeast nutrition are obtained in the brewery.

The present lower original gravities naturally make matters worse, and my wide experience has convinced me that many of the brewers' worst troubles arise from the under-nutrition of the yeast. I think it is a question for serious consideration whether the barley breeder and the farmer have not already unconsciously gone too far in respect of nitrogen reduction. The complaints made years ago that the barleys were too nitrogenous were frequently exaggerated, and would scarcely have been made to-day with our better understanding of brewing science. In brewing everything depends on the vigour and proper nutrition of the yeast, and this naturally can be secured only if the wort contains a sufficient quantity of nitrogen of the right kind.

Mr STANLEY TAYLOR (Bath) said that he did not agree with Mr Reid in considering the Chevallier type the best barley for maltsters; he preferred Archer or Archer-Spratt. Neither could he agree that foreign barley was essential for drainage purposes. He maintained that the six-rowed winter barley which is used could be improved upon by plant breeders, so that it would give the drainage required. He would like to ask Mr Joyce which rotation produced the best quality barley—after ley, straw, or roots? Mr Taylor said that in his opinion the sum-total in the poundage of brewers' extract had been considerably increased, due, he thought, to the production of the Archer types of barley, and that the farmer has produced more barley from the same number of acres. He did not think that increase in extracts was due entirely to an improvement in the maltster's art.

Mr REID, in replying to Mr Stanley Taylor, said that as Archer was an ancestor of Spratt-Archer, there could not be any conflict of opinion. With regard to foreign barley for drainage purpose, Mr Reid said that he quite agreed that such barley should be grown here, and pointed out that experiments were in progress having as their object the possibilities of opening up the new field.

Mr JOYCE (Somerset) said, in reply to Mr Stanley Taylor's question, he had found that on his land the quality of the barley after roots folded with sheep was not so good as after ley or cereals.

Mr NEWMAN (Institute of Agricultural Engineering, Oxford) suggested that the use of a combine harvester would not only reduce the cost of harvesting, but would also diminish the risk of weather damage when the crop is ripe—the most serious and the most annoying risk to which the barley grower is liable.

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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.