ROTHAMSTED RESEARCH

Report for 1930

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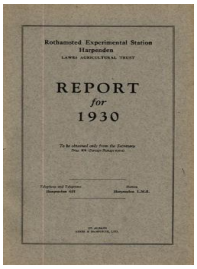

Wheat

Rothamsted Research

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Quality of Malt.

S/Am.	Extract, lb. per barrel, on dry matter.			Diastatic Power, Lintner.			Colour.		
	1927 Plots Malted	1928	1929	1927 Plots Malted	1928	1929	1927	1928	1929
None	(99.6)	95.8	98.8	(43.5)	59.0	38.5	4.2	5.4	4.8
1cwt/ac	(99.1)	95.0	98.7	(39.5)	64.0	38.0	4.0	3.9	4.8
2cwt/ac	(98.1)	94.2	98.8	(41.0)	69.0	41.0	4.7	5.2	4.8

Valuation of Barley and Malt.

S/Am.	Barley. Shillings per qr. of 448lb.			Malt. Shillings per qr. of 336lb.		
	1927.	1928.	1929.	1927.	1928.	1929.
None	38	37	35	68	(2)	54
1 cwt/ac.	41	37	35	68	(1)	54
2 cwt/ac.	39	37	42	68	(3)	54

Notes.—The bracketed Malt Extracts and Diastatic Powers refer to the results on single plot samples: others are means of replicates.

Diastatic Power is depressed with increasing colour.

The 1928 Malts were noted as "unsaleable" by the valuers, but placed in the relative order given in brackets.

WHEAT

No crop is more discussed than this. It is easy to grow and it is especially suited for the somewhat dry regions which in Australia, Canada and Russia are now being populated; hence a large increase in the amount grown and sent to these shores.

We could, however, grow much larger quantities ourselves if we desired. The present method of growing wheat gives about 33 bushels to the acre which is quite unprofitable. Considerably higher yields, however, are possible. Recent Rothamsted experiments have shown the remarkable effects of a summer fallow in raising the yield; where rents are low the cost is small, the necessary cultivations being done entirely by tractor. With the ordinary methods our highest yields, as shown in Table I (p. 22) were usually about 37 bushels per acre from 1920 to 1925 (excluding 1924); since then they have been 50 to 55 or more. The 1930 Great Knott crop yielded 27 cwt. of grain (50.5 bushels) per acre, and 54 cwt. of straw on the unmanured land; nitrogenous top dressings added nothing to the grain and 8 cwt. to the straw, which caused the crop to lodge. The preparation had been a fodder crop folded by sheep, which had paid for itself, then the summer fallow. In these circumstances one might expect damage from the wheat bulbfly (*Hylemya coarctata Fall*), and it was present and destroyed many tillers, but there still remained a good crop.

In another experiment, made in Long Hoos field, the wheat followed a seeds ley. The yield without nitrogen averaged only 15.2 cwt. of grain (28.4 bushels) and 21.9 cwt. of straw. There had been much loss of plant during the winter. Four varieties were tested: Square-Head's Master, Million III, Yeoman II and Swedish Iron; of these the Square-Head's Master gave the lowest yield, 13.1 cwt. of grain per acre, and Swedish Iron as in 1929 the highest, 18.5 cwt. per acre, but on all alike nitrogenous manuring, whether applied early or late, was almost ineffective. Muriate of ammonia applied late appeared somewhat to reduce the yield both of grain

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and of straw. Sulphate of ammonia applied late gave a better increase of straw, and possibly of grain, than when applied early, thus agreeing with the results of 1926 and 1928, but opposite to those of 1927 and 1929. In the Great Knott experiment the small differences in result, associated with differences in time of application of the fertilisers, were not in themselves significant but were in the direction of the 1927 and 1929 results.

On another experiment in Hoos field the unmanured wheat gave only 14 cwt. of grain per acre (26 bushels) and 22 cwt. of straw, but there was a considerable response to sulphate of ammonia (1.8 cwt. per acre) the yield rising to 20.5 cwt. of grain (38.2 bushels) and 29 cwt. of straw.

A new experiment in the management of the wheat crop was tried. Now that we have gone in extensively for sheep we are in constant need of fresh grazing land in spring. It is therefore important to know how far one can safely follow the old Hertfordshire custom and graze wheat in March or April. This was tried in 1930 on Long Hoos field ; part of the wheat was grazed on, part was left ungrazed. The ungrazed portion yielded 15.7 cwt. of grain per acre (29.3 bushels), and the grazed portion 13.5 cwt. (25.2 bushels), a loss of 4 bushels of grain and 4 cwt. of straw together worth 20s. at selling price ; the value as grazing was estimated by the farm manager at about the same price.

The quality of the wheat is assessed by Dr. E. A. Fisher of the Research Association of British Flour Millers, St. Albans. He finds that the Rothamsted wheats are all somewhat poor in quality, the Broadbalk wheats especially so. None of the methods of increasing the yield has improved the quality.

Another important investigation has been begun, thanks to the co-operation of the Dunn Nutritional Laboratory at Cambridge. Dr. Harris and Dr. Moore propose to examine samples of our various wheats for vitamin content. The results promise to be of great interest, and they may open out entirely new lines of work.

THE FALLOWING OF BROADBALK WHEAT FIELD

The year 1929-30 was the first in which the whole of Broadbalk wheat field was again under wheat after the four years in which parts had been fallowed. The crop was harvested in five portions :

1 and 2	The upper two fifths (west end) fallowed 1925-1927, then cropped.
3	The middle fifth, fallowed 1925-1929, then cropped.
4 and 5	The lower two fifths (east end) fallowed 1927-1929, then cropped.

We therefore had in 1930 a crop grown after two years' fallow, another after four years' fallow, and a third after two previous wheat crops. The yields are given on pp. 122-3.

The first crop after the fallow was exceptionally high, with a ratio of grain to straw well up to the average. The effect of the fallow, however, was only transient ; both yield and Grain/Straw ratio rapidly fell ; in the second year the yield was approximately equal to the average and in the third year after fallow it was well below. The weeds are rapidly coming back. *Alopecurus agrestis* is already established.

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Dr. Brenchley's observations show that the value of bare fallowing for weed eradication depends largely upon the species it is desired to eliminate. Some species, as Shepherd's Purse (*Capsella Bursapastoris*), which germinate and flower throughout the year, are not reduced by fallowing, because they grow and form seed so quickly that they re-stock the ground in the interval between autumn ploughing and the first spring cultivation. Others, as Poppy (*Papaver sp.*), have so long a period of natural dormancy, that they leave enough viable seeds in the soil to yield a big crop even after the fallowing. On the other hand, Black Bent (*Alopecurus agrestis*) and others with a short period of dormancy, are so reduced by fallowing that they can be kept within bounds; sufficient viable seeds are, however, left in the ground to recolonise the land rapidly unless adequate cultivation be given.

Fallowing also improves the physical condition of the soil. It had so marked an effect on the tilth that we were able in the first year of cropping to obtain a seed-bed with no more cultivation than harrowing. However this effect soon passed away, and in the second year the seed-bed was no more easy to obtain than usual; it was less fine than in the first year.

It is proposed in future to continue the separate harvestings and to continue the fallowing indefinitely but in a somewhat different way. In 1930-31 Strip 1 is being fallowed (the west end); in 1931-32 Strip 2 will be fallowed, and so throughout. In each year, therefore, one-fifth of the field will be under fallow and four-fifths under crop, of which one-fifth is in the first year after fallow, another in the second year, and the others in the third and fourth years respectively. This will give opportunities of studying the effects of fallowing and also of keeping the field clean.

POTATOES

The variety planted was again Ally. It yields less on our land than Kerr's Pink, which we grew from 1921 till 1926, but it matures earlier and fits in better with our programme of autumn work.

There were two sets of experiments, both in the same field and with the same variety; in one the maximum yield was 11 tons, in the other with equally efficient mixtures of artificial fertilisers, it was 7 tons only. The heavy yielding crop had had farmyard manure, the other had not. In general one would not have expected so marked a difference[1], but in 1930 the crop receiving farmyard manure continued growing well throughout the latter part of the season, while the crop without it weakened early and became smothered in weeds, mainly chickweed (*Stellaria media*); no fertiliser scheme helped much, although no fewer than 13 were tried; the yield without nitrogen, like that without potash, was 4 tons per acre; this was raised to 7 by the heaviest dressings of artificials. The number of plants per acre averaged 14,760. In the other set the crop gave a yield of 7.5 tons from farmyard manure without any artificials. One cwt. sulphate of ammonia gave an additional 30 cwt. of potatoes as also did 1.6 cwt. sulphate of potash so long as sufficient superphosphate was given, otherwise the increase was only 24 cwt. Superphosphate (3 cwt. per acre)

1 See Report for1923-24, pp. 120, 121, for and 1921-22, p. 98

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