ROTHAMSTED RESEARCH

Report for 1958

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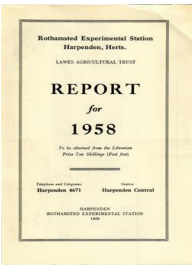

Summary of Cereal Variety Trials at Rothamsted and Woburn, 1955-58

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Implements

The policy over the past few years has been to replace, gradually, all the out-moded implements by modern equipment, and make Woburn independent of Rothamsted. In the past the conflicting machinery requirements of the two farms have caused much inconvenience to both, particularly at harvest. The usual difficulties were experienced with the 1958 harvest, but these should not recur, as a 10-foot self-propelled combine and a pick-up baler have been transferred permanently to Woburn from Rothamsted. The cereal acreage at Woburn is too small to justify these machines for normal farming, but they are well justified by their advantages when harvesting cereal experiments.

Summary of Cereal Variety Trials at Rothamsted and Woburn, 1955–58

M. J. Hill & J. R. Moffatt

Introduction

Variety trials with winter and spring wheat, spring oats and spring barley incorporating two levels of nitrogen manuring were made on the Rothamsted and Woburn farms between the years 1955 and 1958. Their primary object was to test the suitability of new varieties for use on experiments on the two very different soils, and to compare them with the standard varieties in use on the two farms, but information was also obtained on their response to nitrogen. Trials have not been done with all crops in all years, nor have the varieties grown, or the level of nitrogen used within each trial, been constant.

All the experiments were laid out in a simple randomized block, split plot, design with threefold replication.

Interest centred primarily in yield of grain, but observations were made on all the experiments at Rothamsted, particular attention being paid to lodging.

For the purpose of this summary most of the varieties which were included in only one of a series of trials have been omitted. There are yields for spring wheat and barley at Woburn for only 1 year.

Discussion

Spring wheats. Koga II usually outyielded all the other varieties (Table 1). In the mean yields over the three year period 1955–57 (Table 2) it heads the list at both the high and low levels of nitrogen, although at the high level it is closely rivalled by Svenno. Svenno is interesting because it responds to nitrogen much more than any of the other varieties, and at very high levels of nitrogen it can outyield Koga II, as it did in the 1958 trial. It is, however, somewhat weak in the straw. Atle, which has been replaced by Koga II as our standard variety, has been outyielded by all others, except for Svenno at the low level of nitrogen (Table 2).

In spite of the wet summer of 1958, all the varieties included in this review stood well and there was no sign of lodging at either level

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of nitrogen. In 1956, however, some of the varieties lodged badly and their placing, in order of strength of straw, was: (1) Peko; (2) Koga II; (3) Progress; (4) Atson; (5) Atle; (6) Svenno. Peko and Koga stood well, while Atle and Svenno were badly laid on both high and low nitrogen plots. Peko and Progress were on average 5 inches taller than Atle and Atson, and Atson itself was slightly taller than Atle. This indicates that strength is not necessarily associated with shortness of straw. Koga II was the only one successful in combining both these desirable features.

TABLE 1

Spring wheat varieties—mean yields in cwt./acre at Rothamsted and Woburn

Date	N, cwt./acre	Atle	Atson	Koga II	Peko	Pro-gress	Svenno	Mean N re-sponse	Previous crop
Rothamsted:									
1955 ...	0·3–0·6	34·7	33·9	40·8	38·1	37·7	36·6 *	−1·1	Potatoes
1956 ...	0·3–0·6	29·7	33·0	33·4	33·9	30·9	30·3	+1·1	Potatoes
1957 ...	0·4–0·8	24·8	26·7	28·8	25·2	25·1	24·5	−0·5	Potatoes
1958 ...	0·4–0·8	24·6	25·0	25·1	25·0	24·8	27·1	+4·1	Spring wheat
Mean ...		28·4	29·6	32·0	30·5	29·6	29·6		
Woburn:									
1958 ...	0·4–0·8	25·8	24·6	27·5	27·7	27·8	24·8	+3·6	Potatoes

* Estimated value. Variety not included in 1955 trial.

TABLE 2

Spring wheat varieties—mean yields in cwt./acre 1956–58 at Rothamsted

Date	N, cwt./acre	Atle	Atson	Koga II	Peko	Progress	Svenno
1956	0·3	26·2	27·8	29·0	27·7	26·5	25·5
1957–58	0·4						
1956	0·6	26·5	28·7	29·2	28·4	27·4	29·1
1957–58	0·8						
Mean response		+0·3	+0·9	+0·2	+0·7	+0·9	+3·6

Barley. Two new varieties, Domen and Ingrid, were tried in 1957 and 1958 alongside the two standard varieties grown on the farm, Herta and Proctor. Plumage Archer was included, as it is grown on Hoosfield and some of the older rotation experiments. Neither at Rothamsted nor at Woburn, with the high or the low levels of nitrogen, were the standard varieties outyielded (Tables 3 and 4). Varieties other than those shown in the tables were included in some years, notably Rika in 1958, and Carlsberg, Maythorpe, Piroline, Provost and Research in 1955. All yielded substantially less than either Herta or Proctor in the one year in which they were tried, and many had other undesirable features.

All plots were scored in 1958, a particularly testing year, for stiffness of straw (Table 8). In 1957 the order was different in so far as both Herta and Ingrid stood better than Proctor, which was more than 50 per cent laid on all high-nitrogen plots. It is disappointing that Domen, which has exceptionally stiff straw, responded so poorly to nitrogen (Table 4).

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TABLE 3

Spring barley varieties—mean yields in cwt./acre at Rothamsted and Woburn

Date	N, cwt./acre	Domen	Herta	Ingrid	Plumage Archer	Proctor	Mean N response	Previous crop
Rothamsted:								
1955 ...	0·23–0·46	40·8 *	47·0	42·1 *	36·7	45·4	−1·8	Potatoes
1957 ...	0·3 –0·6	37·0	40·1	37·8	33·7	40·5	−0·5	Potatoes
1958 ...	0·3 –0·6	28·2	33·5	30·0	27·8	33·6	+5·4	Spring wheat
Mean ...		35·3	40·2	36·6	32·7	39·8		
Woburn:								
1958 ...	0·4 –0·8	31·7	31·9	33·4	28·1	35·6	−0·9	Fallow

* Estimated value. Variety not included in 1955 trial.

TABLE 4

Spring barley varieties—mean yields in cwt./acre 1957–58 at Rothamsted

N, cwt./acre	Domen	Herta	Ingrid	Plumage Archer	Proctor
0·3	32·1	35·3	32·3	29·7	35·2
0·6	33·2	38·3	35·4	31·7	38·9
Mean response	+1·1	+3·0	+3·1	+2·0	+3·7

Oats. The harvesting of this experiment was always delayed until all the varieties were ripe, which meant some shedding with the earlier ripening ones, and particularly with Pendek.

In 1958 all varieties lodged at the high rate of nitrogen (Table 9); Flamande and Palu stood well at the lower level.

Oats are not important at Rothamsted or Woburn, either experimentally or commercially; Sun II has been the standard variety, and the results summarized in Tables 5 and 6 show that it should now be replaced. Both Sun II and Blenda showed large negative responses to nitrogen.

TABLE 5

Spring oat varieties—mean yields in cwt./acre at Rothamsted

Date	N, cwt./acre	Blenda	Deva	Flamande	Palu	Pendek	Sun II	de Wattines	Mean N response	Previous crop
1956 ...	0·0 –0·36	23·2	24·9	26·9	27·9	24·2 *	25·3	28·2	+1·6	Barley
1957 ...	0·36–0·72	31·6	31·0	30·0	31·1	30·7	30·9	29·0	+1·4	Wheat
1958 ...	0·36–0·72	32·9	27·5	30·9	35·3	27·9	31·3	33·1	−3·0	Potatoes
Mean		29·2	27·8	29·3	31·4	27·6	29·2	30·1		

* Estimated value. Variety not included in 1956 trial.

TABLE 6

Spring oat varieties—mean yields in cwt./acre 1956–58 at Rothamsted

N, cwt./acre	Blenda	Deva	Flamande	Palu	Pendek	Sun II	de Wattines
0·36	33·0	29·2	30·6	33·1	31·0	30·8	31·6
0·72	31·5	29·3	30·3	33·3	30·9	27·8	30·7
Mean response	−1·5	+0·1	−0·3	+0·2	−0·1	−3·0	−0·9

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Winter wheat. As the nitrogen levels differed greatly in the two trials, mean yields and nitrogen responses are not given, and the results are set out in full in Table 7.

TABLE 7

Winter wheat varieties—mean yields in cwt./acre at Rothamsted

Date	N, cwt./acre	Banco	Cappelle	Heine 7	Hybrid 46	Leda	Minister	Squarehead's Master 13/4	Yeoman	Previous crop
1957	0·4	30·5	40·3	34·3	38·2	42·3	36·7	29·4	22·7	Beans
	0·8	33·7	42·4	40·5	42·4	44·1	38·5	33·8	26·6	
N response		+3·2	+2·1	+6·2	+4·2	+1·8	+1·8	+4·4	+3·9	
1958	0·7	38·8	47·3	44·2	47·0	43·1	46·0	—	—	Beans
	1·2	33·3	48·2	41·7	43·5	34·6	43·3	—	—	
N response		−5·5	+0·9	−2·5	−3·5	−8·5	−2·7	—	—	
Mean 1957–58		34·1	44·5	40·2	42·8	41·0	41·1	—	—	

Yeoman and Squareheads Master 13/4 were grown only in 1957, but the results are included because these varieties are still grown on some of the older experiments. Cappelle, which is the standard variety used at Rothamsted, has consistently outyielded all others except for Leda in 1957. Leda, although excellent for land of low to medium fertility, will not stand high levels of nitrogen, as is shown by the negative response of 8·5 cwt./acre to the higher level in 1958.

Lodging was severe in 1958, and all varieties (with the notable exception of Cappelle) gave a negative response to nitrogen. The plots were scored for strength of straw (Table 10).

TABLE 8

Spring barley varieties—resistance to lodging 1958 *

N, cwt./acre	Domen	Herta	Ingrid	Plumage Archer	Proctor
0·3	9	8	8	7	9
0·6	8	6	5	3	7
Mean	8·5	7	6·5	5	8

TABLE 9

Spring oat varieties—resistance to lodging 1958 *

N, cwt./acre	Blenda	Deva	Flamande	Palu	Pendek	Sun II	de Wattine
0·36	3	4	8	6	3	4	6
0·72	1	1	3	2	1	2	2
Mean	2	2·5	5·5	4	2	3	4

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TABLE 10

Winter wheat varieties—resistance to lodging 1958 *

N, cwt./acre	Banco	Cappelle	Heine 7	Hybrid 46	Leda	Minister
0·7	5	8	4	8	6	7
1·2	3	5	2	4	3	5
Mean	4	6·5	3	6	4·5	6

* *Scoring:* 10 Uniform appearance. Every straw erect.
9, 8 } Leaning but not lodged.
5 50% lodged.
1 100% lodged.

Differential nitrogen responses. The experiments were not designed specifically to measure these effects. Varieties and rates of nitrogen application were changed from year to year, the levels of the basal dressings of nitrogen were high, and the sites chosen in the early years were in a good state of fertility. In spite of this, however, three varieties have always given exceptional nitrogen responses. Svenno (Table 2) gave a response of 2·5 cwt./acre greater than the mean, Domen (Table 4) one of 1·5 cwt./acre less than the mean, and Sun II (Table 6) gave a negative response of 2·3 cwt./acre greater than the average of the other varieties.

These experiments suggest that complete freedom from soil-borne cereal diseases is not of the paramount importance that it was thought to be at the start of the series, and that the second white straw crop after a break of 1, or preferably 2, years is a suitable place in a rotation for this type of experiment.

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