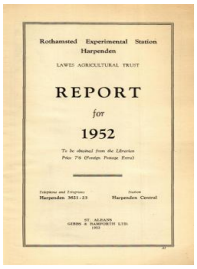
ROTHAMSTED RESEARCH

Report for 1952

Full Table of Content



Woburn Experimental Station

H. H. Mann

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WOBURN EXPERIMENTAL STATION

H. H. MANN

SEASON

The year 1952 is the third in succession at Woburn that has had a more than average fall of rain. The spring, till the middle of May, was wet, though the high rainfall did not interfere with agricultural operations as much as in 1951. From the middle of May, there was a period with little or no effective rainfall, and this lasted till the end of July, when grass almost completely dried up, crops wilted which had not got a good start in the spring, and a chance was given for irrigation to show its effect in combating drought conditions. At the beginning of August a complete change came over the scene and each month thereafter had more than an average rainfall, accompanied by low temperatures which interfered with the ripening and harvesting of some of the more delicate crops whose possibilities we are attempting to find out at Woburn. The meteorological records from October 1951 to the end of 1952 are shown below.

Meteorological records for 1951-52

Month	Rainfall Total fall	Rainfall No. of rainy days	Bright sunshine	Temperature Max.	Temperature Min.	Temperature 1 ft. in ground	Grass Min.
1951	ins.		hours	F.	F.	F.	F.
October	1·24	11	100·8	55·8	39·2	49·0	34·8
November	4·35	26	62·9	51·8	41·9	45·9	37·1
December	1·56	16	60·8	47·0	35·7	41·0	31·4
1952							
January	1·51	14	86·8	41·9	32·1	37·1	28·7
February	0·67	8	87·4	42·8	30·9	36·3	26·9
March	3·56	22	90·5	49·4	37·5	43·3	34·6
April	1·93	15	161·8	58·7	40·3	48·0	35·8
May	2·46	15	216·5	65·3	46·5	57·9	42·7
June	1·19	11	207·2	67·7	48·8	60·7	44·6
July	0·39	6	221·5	72·2	52·9	66·7	49·1
August	3·18	14	183·2	69·5	52·9	62·9	48·9
September	3·06	17	119·1	59·3	44·1	54·0	38·7
October	2·96	18	98·7	53·5	41·0	46·8	36·9
November	3·24	16	65·4	43·7	32·7	39·9	30·0
December	2·06	19	68·3	41·8	30·0	35·8	27·7
Total or mean for 1952	26·21	175	1606·4	55·5	40·8	49·1	37·1

FIELD EXPERIMENTS

The field experiments at Woburn are now conducted under the direction of the Field Plots Committee at Rothamsted, and that Committee will report separately on them. There are, however, a few points in connection with them which may be recorded here.

In the last report it was stated that in the Permanent Barley plots, where there has been, with various manuring, no other crop than barley since 1877, the land had become so foul with wild oats that these could only be got rid of after three years of fallowing, and

https://doi.org/10.23637/ERADOC-1-74

after these had been eliminated, the ground was still so badly affected with spurrey (*Spergula arvensis*) that it was impossible in 1951 to ripen a crop of spring barley and the whole had to be ploughed under while the barley was in the green stage. In view of the fact that, in any case, the yield of spring barley had been steadily going down on these plots in spite of heavy nitrogenous manuring, it was decided to see how a crop of winter barley would fare on each plot as against the usual crop of spring barley. The result was remarkable, for the winter barley flourished on the same plots that produced a small, miserable crop of the spring variety, and gave a better yield than we have had for many years. The actual yields of corn, on the average, for each set of plots with three variations of nitrogenous manuring, were as follows:—

	Winter barley (" Pioneer ")	*Spring barley* (" Plumage Archer ")
2 cwt. " Nitrochalk "	25·2 cwt. per acre	10·8 cwt. per acre
4 cwt. " Nitrochalk "	28·5 cwt. per acre	10·3 cwt. per acre
6 cwt. " Nitrochalk "	25·8 cwt. per acre	8·6 cwt. per acre

It will be seen that the yield of winter barley was exceptionally high while that of spring barley on the same plots with the same manuring practically amounted to a crop failure. The cause of this is quite unknown at present. By some it is put down to the relative absence of weeds in the winter barley : by others it is connected with the deeper-rooted system of the winter barley which taps a layer of soil which had not been reached by the long continued growth of spring barley. The experiment will be repeated in 1953, placing the winter barley where the spring barley was in 1952 and *vice versa*.

New Crops

In previous reports I have noted the successful growing of some of the early varieties of hybrid maize, obtained from the United States, with an annual yield of well over 30 cwt. of dry grain per acre in three successive years. This year two such hybrids have been compared with a large selection of maize types developed in Europe. Up to the end of July conditions were eminently favourable for a semi-tropical crop like maize, except that at the end of the period it appeared affected to a small extent by the continued drought. After the beginning of August, conditions were not so good. It was damp and cold, and, while the maize continued to grow, the ripening was slow and the tips of the ears tended not to fill. This applied to all the varieties grown, whether the hybrids had been developed in America or Europe. The yields were in all cases, nevertheless, quite high and in one case over 50 cwt. of dry grain per acre were reaped. This was with Wisconsin 275, which gave 92 per cent ripe ears, after being sown on 1st May and reaped finally on 10th October. This was nearly approached by Wisconsin 240, which planted on the same date as the above gave a yield of over 38 cwt. per acre. All varieties were manured with 3 cwt. " Nitrochalk " per acre.

Two things have been made clear by this year's work. The first is that while too early sowing is not advisable, for maize germinates poorly if the temperature in the soil is lower than 50°F, yet delay

https://doi.org/10.23637/ERADOC-1-74

beyond this point is disastrous. The difference between the crop sown on 1st and 16th May was 6 cwt. per acre with Wisconsin 240 and 12 cwt. per acre with Wisconsin 275, and in the last case, the later sown seed only ripened 80 per cent of the grain. It is evident that the choice of the date of sowing is very vital in the growing of hybrid maize in Britain. The second matter is connected with the wet weather usual at the time of ripening of maize in this country. This means that it will be necessary to make provision for the drying of the maize ears much more elaborate than those which are usual in most maize growing countries.

Fodder Crops for Semi-acid Soils

For some years we have been trying to find suitable fodder crops for our semi-acid soils, which could be planted, say in May, and which would give a large amount of green forage about the end of August, when the ordinary grass pasture is beginning to show signs of slowing down in growth. Several of these have given good results in 1952. Perhaps the most notable of these is the sweet lupin, which grows well in acid soil and of which some very productive types now exist. The most notable of these is " Weiko " a yellow-flowered kind, which has now for several years given us very large yield of green stuff in August or September, which, though not very readily taken by farm animals, forms a good feedingstuff. For the last two years, the actual weight of green fodder obtained on or about 20th August from seed sown early in May, was as follows :—

Year	Weight of green stuff per acre tons	Dry matter in green per cent.	Hay equivalent per acre tons
1951	14·1	12·6	2·09
1952	15·7	12·1	2·24

The two seasons were both wet ones, except for the months of June and July in 1952, and the lupin grew vigorously and well. By 20th August it had podded well but the pods remained green. After this date the pods rapidly ripened, and a new green growth appeared on the plants. The seed obtained on the area left for the purpose was abundant and it was taken in a rather wet condition in the latter half of October, but was immediately dried, as lupin seed cannot be stored unless in a very dry condition. The utility of sweet lupins as a fodder crop under the conditions specified seems now proved and it only needs an available supply of seed to make it a valuable additional asset to stock farmers on suitable land.

Two other leguminous fodder crops have been again tested in 1952. These are serradella and birdsfoot trefoil. We have now grown the former of these for three years, when we have obtained yields as follows :—

Year	Weight of green stuff per acre tons	Dry matter in green per cent.	Hay equivalent per acre tons
1950	11·6	15·7	2·14
1951	6·8	16·6	1·33
1952	16·3	14·8	2·84

The fodder, when cut on 20th August, was greedily taken by all forms of livestock, and it is evident that we have a new crop in England which may have considerable possibilities for the future.

https://doi.org/10.23637/ERADOC-1-74

At present the seed is difficult to get, and in a wet season like 1952 I was not able to save more than a very small amount, whereas in the dry season of 1950 the seed yield was considerable.

As regards birdsfoot trefoil, which is supposed to be a fodder crop which will flourish on land which is too poor to give a normal growth of clover, and which has the advantage of being a perennial and so can be kept for at least two years, one difficulty we have found is the slowness with which the growth starts. When sown at the beginning of May, it has in the last two years shown little growth till after the end of July, but later in the season it flourished exceedingly, and at the end of September gave a large yield of good fodder. The narrow leafed variety, in fact, gave 12·5 tons of green fodder per acre, equivalent to 2·8 tons of hay per acre. The area has been left for a second season, and it will be remembered that, on a previous occasion, birdsfoot trefoil gave 19·4 tons of green fodder at the end of July in the second year.

Irrigation Experiments

The general results of the irrigation field experiments which have been carried on at Woburn during the last two seasons will be described by Dr. Penman, who is in general charge of them, but there are at least two points which we have noticed and which seem worthy of record in this report.

First with regard to the grass crop and the effect of irrigation on the proportion of clover and grass in the product from the various plots, both with low and high nitrogenous fertilization. In all cases and at every level of irrigation, the proportion of clover in cuttings made throughout the season, is (as would be expected) far smaller when the nitrogenous manure added is large than when it is small. The plots with the larger amounts of irrigation water have always given a bigger proportion of clover than where no irrigation was used. The figures obtained in a botanical analysis of the cut grass with no watering and with the largest amount of water given are as follows :—

	Grass crop cut on dates given— Percentage of clover in produce			
	14th June	*11th August*	*9th September*	*3rd October*
	per cent.	per cent.	per cent.	per cent.
No watering	4·6	4·8	22·4	11·6
Maximum watering	13·7	30·5	32·3	25·3

This agrees with what was found with these plots in the first year after sowing, and would suggest that irrigation not only increases the yield of a grass ley but also tends to increase the proportion of clover and hence the feeding value of the grass cut from it.

With regard to the barley section of the experiment a test was made as to the effect of irrigation on the percentage of nitrogen contained in the grain. Even if the yield was little affected by the irrigation it would be of importance to know whether the nitrogen content was altered to any considerable extent by the use of irrigation water. As a result of analyses of the grain in two successive years, it seems, however, clear that there is little difference as the following figures show.

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Nitrogen in barley grain

	1951	1952	Mean of two years
	per cent.	per cent.	per cent.
No watering	1·52	1·37	1·45
Maximum watering	1·44	1·46	1·45

Clover Sickness

The year has been employed in clearing up some doubtful points in connection with the study of clover sickness which has occupied us at Woburn for so many years, and with a final effort in 1953 we hope to be able to propound with some certainty a general explanation of the phenomenon. The provisional conclusions stated in last year's report seem to be substantially confirmed. We have still not been able to isolate the toxic material in the soil which causes the clover failure, as it appears to be practically insoluble in water and also in alcohol, and such isolation must remain a problem for the future. But in the meantime, it seems clear that it is sensitive to heat, that its influence can be reduced by the addition of certain forms of colloid material, and that it gradually, though only gradually, disappears if clover or a similar crop is not grown on the soil.

Laboratory Work

Both work in the plot culture station and in the laboratory at Woburn has been restricted in 1952 by the demands of the irrigation experiments for attention, and has hence been almost entirely concerned with what was necessary in connection with the field experiments. Most of this falls on Mr. Barnes and his staff, and they have been fully employed in these directions during the past year.

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