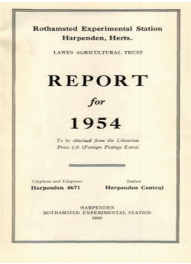
This work is licensed under a Creative Commons Attribution 4.0 International License.

Thank you for using eradoc, a platform to publish electronic copies of the Rothamsted Documents. Your requested document has been scanned from original documents. If you find this document is not readible, or you suspect there are some problems, please let us know and we will correct that.

Report for 1954

Full Table of Content


Rothamsted Experimental Station
Harpenden, Herts.

LAWES AGRICULTURAL TRUST

REPORT
for
1954

To be obtained from the Librarian
Price 7/6 (Foreign Postage Extra)

Telephone and Telegrams: Harpenden 4671
Station: Harpenden Central

HARPENDEN
ROTHAMSTED EXPERIMENTAL STATION
1955

Woburn Experimental Station

H. H. Mann

H. H. Mann (1955) *Woburn Experimental Station ;* Report For 1954, pp 167 - 171 **- DOI: https://doi.org/10.23637/ERADOC-1-76**

This work is licensed under a Creative Commons Attribution 4.0 International License.

WOBURN EXPERIMENTAL STATION

H. H. MANN

SEASON

The year 1954 will be remembered as one of the most unusual that Woburn has had, in that it was, for almost all the season, cold, wet and with an unusual absence of sunshine. In fact, every month from May to September had rainfall above the average, was less sunny than expected (except September), while the maximum temperature was below the average by 2–3 degrees every month. This has meant that all agricultural operations have been late, that certain crops, like sugar beet, have been far below expectation, and that, even on a light-land farm, the year can only be classed as a very poor one. The meteorological records from October 1953 to the end of 1954 are shown below.

Meteorological Records for 1953–54

Month	Rainfall: Total fall, inches	Rainfall: No. of rainy days	Bright sun-shine, hours	Temperature: Max., °F.	Temperature: Min., °F.	Temperature: 1 ft. in ground, °F.	Grass min., °F.
1953							
October ..	2·13	13	68·4	55·8	42·3	51·1	37·4
November ..	1·31	10	55·2	50·9	42·0	46·1	37·3
December ..	0·58	13	32·2	47·9	39·9	45·0	30·4
1954							
January ..	0·91	9	62·4	40·9	31·2	37·6	27·0
February ..	2·22	17	68·5	41·6	30·3	35·9	25·6
March ..	2·38	13	100·6	48·6	35·4	41·3	32·1
April ..	0·23	7	174·8	53·9	34·4	46·8	28·3
May ..	2·61	16	132·5	60·3	43·4	52·7	39·1
June ..	3·03	17	132·4	63·6	49·2	58·6	45·1
July ..	2·47	20	135·4	65·1	51·1	60·2	45·5
August ..	3·50	20	119·6	65·9	51·2	59·2	46·9
September ..	1·99	20	166·1	63·2	47·8	56·3	43·2
October ..	2·28	21	99·6	59·3	47·6	52·8	43·6
November ..	4·17	23	55·3	50·3	37·6	44·6	32·5
December ..	2·24	15	61·4	48·1	42·4	41·6	33·5
Total or mean for 1954 ..	28·03	198	1,308·6	55·1	41·8	49·0	36·9

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 that may be recorded here.

Continuous wheat and barley

There is no doubt that there has been a general tendency for the crops of wheat and barley to fall off in the experiments where no other crop than wheat or barley respectively have been grown since

https://doi.org/10.23637/ERADOC-1-76

This work is licensed under a Creative Commons Attribution 4.0 International License.

1877. This has been traced, at least in part, to the tendency of the land to become acid, especially where the soil was poor in lime from the beginning. The result has been, in the case of barley, an increasing failure of the crop, or, where it did not entirely fail, a remarkable stunting of what survived. With wheat, though the tendency has been similar, the reduction in yield has not gone so far and it has been possible to get reasonable crops, though far less than was obtained in the early days of the experiment. The difficulty of the increasing acidity of the land is not, however, the only factor in causing the reduction in yield. There is also the great difficulty in keeping down weeds. Perennial grass weeds, such as *Holcus mollis* and *Agrostis gigantea*, can only be kept in check by frequent fallowing, and the same method has been used in getting rid of serious infestations of wild oats. As far as annual weeds are concerned, most of these can now be checked by chemicals such as dinitro-ortho-cresol (DNOC) or by hormone weed killers. The chief weeds, however, in this area, namely spurrey and chickweed, are little affected by either type of weed killer, though others, such as mayweed, have been almost completely eliminated.

There is a third possible factor in the steady reduction of yield in these areas, particularly with barley : namely the possibility that the continuous growth of any crop, even of the cereals and particularly on light soils, may have made the land unsuitable for the further growth of the same crop. This happens quite soon with certain crops, notably with clover or lucerne, but has not been noticed with cereals. If this occurs, it is much more likely to be found in the lime-deficient, sandy loam at Woburn than in other areas.

On the whole, therefore, it has been decided to lime the whole of the continuous wheat and barley areas to a pH value of about 6·0, and then, possibly, to study the effect of weeds on part of each plot. The investigation of these points will greatly increase the value of the wheat and barley plots at Woburn in future.

Green manuring experiment

The scheme of this experiment, which was started in 1936, was changed in the present year, and details of these changes will be found elsewhere. The combined results of the experiment will shortly be published, but there are one or two points of immediate interest. These deal with the question of the importance of organic matter in the soil in increasing the crops which follow its application. The general result of many years of experiment seems to be that the crop-producing power of organic materials used as manures depends, in the main, on two factors, namely the length of time they have been in contact with the soil before the plant makes use of them, and on the percentage of nitrogen which they contain on a dry basis. With materials containing a large percentage of nitrogen, the maximum effect is obtained after very short contact with the soil, and the efficiency falls off substantially when the interval before they can be utilized increased. The time of contact which gives maximum efficiency increases as the nitrogen in the manurial material decreases.

Effect of irrigation on a new grass ley

In the irrigation experiment started at Woburn in 1951 under the general supervision of H. L. Penman, a new area of grass was laid

This work is licensed under a Creative Commons Attribution 4.0 International License.

down in 1954, with pure cocksfoot grass. Little or no effect of irrigation on the yield of grass this year was shown, on account of the wetness of the summer, but in the autumn it was possible to estimate how far the cocksfoot grass had remained pure and how far the all but worthless *Poa annua* (which is of universal occurrence) had come in to replace it. The actual determinations were made by D. J. Watson and showed that the addition of irrigation water seemed to have doubled the percentage of this worthless grass. How far this is the result of the wet season, and possibly of the presence of an excess of water in the highly irrigated soil, is not yet known, but it is hoped to repeat the tests in the middle of 1955.

New Crops

The exceptionally wet, sunless and cold summer has enabled us to observe how rather delicate crops like maize behaved under these conditions, and in that sense 1954 has been a very useful season.

Maize

We have now several early-ripening hybrid varieties of maize from Wisconsin and also from Holland which have given very good results in the last 4 or 5 years when the seasons were more normal, so that their behaviour in 1954 was of particular importance. Apart from the usual trouble with rooks in the early stages (where we have found that the plants are not really safe until they are at least 6 inches high), it seemed, up to the middle of August, as if the the summer would be too cold for maize and that the crops would never ripen. From this time, however, the maize plants seemed to recover tone and ultimately ripened a month late, so that it was possible to harvest practically ripe ears from 25 October to the middle of November. At this time of year the grain would not be much use, except for immediate consumption by pigs or chickens, without a corn drier, but, when dried, the yield of grain was very satisfactory. Wisconsin 240, the variety which has given the most consistently good results, gave an average yield of dried grain (for a full plant) of 36 cwt. of grain per acre when sown on 23 April, 33 cwt. when sown on 4 May and 23 cwt. when sown on 12 May. Even better results were obtained with a Dutch variety (Goudster), which gave over 40 cwt. of dried grain per acre from seed sown on 4 May, when calculated for a full area without rook damage.

Fodder crops for semi-acid soils

(1) *Jerusalem artichokes.* Perhaps the most interesting work in this connection in 1954 has been the testing, for the first time, of a specially luxuriant strain which has been developed in Germany in recent years and is now on the market under the name "*topine*". This has been developed, so far as the parts above ground are concerned, chiefly for silage making, the tubers being used for pig feeding in the following spring. This strain was sown on 26 April in a soil prepared and manured as for potatoes, the tubers being planted in rows 2 feet apart and 8 inches between the tubers in the rows. They grew well and steadily, reaching a height of 8–9 feet by the middle of October, and forming an almost impenetrable mass of vegetation. The crop was cut on 20 October at 12 inches above the ground, and gave a yield of green stuff and stalks of from 17 to 18½

This work is licensed under a Creative Commons Attribution 4.0 International License.

tons/acre. The dry-matter content of this varied from 18·4 to 21·3 per cent, and the crude fibre content (on the dry matter) was 31·0 per cent. There are at Woburn no facilities for making silage experimentally, but some of the material was given to store cattle in the field. They ate the leafy part greedily, but would hardly touch the stalks. On the other hand, both leafy parts and stalks were eaten keenly by pigs. The proportion of leaves to whole produce was about 35 per cent. The dry matter of the green stuff had a nitrogen content of 1·67 per cent, equal to a crude protein figure of 10·4 per cent. The tubers cannot be pitted like potatoes, but are left in the ground until February, when they can be dug and used for pig feeding. The yield of tubers will be at least 8 tons/acre, but the exact figure will be ascertained at lifting time. The crop, in the specially luxuriant "topine" strain, seems promising, and should receive more widespread tests in 1955.

(2) *Sweet Lupins.* Experiments carried out for several years showed that sweet lupins might be a very valuable addition to our fodder resources on semi-acid land; but the crops of 1953 showed such a large amount of inedible stalk that an attempt was made in 1954 to see whether a more edible material could be obtained by growing the crop later in the season and reaping it at an earlier stage of growth. Two varieties, Neven and Weiko, were sown on 29 June, and in spite of the chilly weather, they both grew well, though not so luxuriantly as in warmer years. When cut in full flower on 13 October, the two varieties gave yields as follows:

Variety	Yield of green fodder per acre, tons	Dry matter, %	Dry matter per acre, tons	Edible, %
Weiko ..	16·1	9·6	1·55	72·2
Neven ..	13·9	10·1	1·40	83·3

Thus, by sowing late, i.e., at the end of June, there has been produced a much smaller total crop of green stuff, but the percentage of edible matter has been very much increased. The nitrogen content of the dry matter was, respectively for the two varieties, 4·26 and 3·69 per cent, equal to 26·6 and 23·1 per cent of crude protein. This amount of valuable feeding matter was obtained in an unfavourable year 3½ months after sowing. There should be no difficulty in ensiling this material.

(3) *Serradella.* The growth of serradella was not so vigorous as in previous warmer seasons, and 1954 would seem to have reached the temperature limit for profitable growth.

The crop was sown on 7 May and had a bad start, but it grew very well from July onwards, and by 17 September gave 14·7 tons of green fodder per acre, containing 11·5 per cent dry matter. This represents a yield of 1·99 tons of hay per acre. We have thus a 5-year record of 2·14, 1·33, 2·84, 3·09, and 1·99 tons of excellent high-protein feed, or an average of 2·28 tons of hay equivalent per acre. The nitrogen in the dry fodder amounted to 2·78 per cent, equal to 17·8 per cent crude protein.

It seems clear that if seed is available, serradella is a reliable and excellent high-protein fodder. It should be sown at the beginning of May on well-drained, preferably light soil, which is in good heart, though not necessarily highly manured. Treated in this way it should become available early in September.

This work is licensed under a Creative Commons Attribution 4.0 International License.

(4) *Birdsfoot trefoil.* This is a fodder which is supposed to be suitable for the class of land which is found at Woburn, and it will grow under conditions too poor for clover. It is perennial, but how long it will last and how far it will resist the competition of weeds and grasses after the first year is not known. The present small area was sown at the beginning of May 1952; it grew very slowly at first, and gave a moderate crop of clover at the end of September. The area was left for the third year, and again grew slowly in the spring, and the crop (especially the narrow-leafed variety) was rapidly becoming overgrown with grass. It came away ultimately, and was cut on 3 August. The actual yields were as follows:

Variety	Greed fodder per acre, tons	Dry matter, %	Hay equivalent per acre, tons	Crude protein in dry matter, %
Narrow leafed ..	7·25	18·2	1·55	14·7
Broad leafed ..	14·43	16·3	2·77	14·7

Laboratory Work

The year 1954 saw the completion of a study of the changes in the sulphur content of soils variously manured for continuous barley for a period of 50 years. This has now been written up and is in the press. The work makes it clear that under normal conditions the sulphur received from rain and other atmospheric sources is amply sufficient to maintain the sulphur content of the soil. This applies whether the soil is unmanured or has an application of ammonium salts, of nitrate of soda alone, or of superphosphate, potash or other mineral salts. During the 50 years when the application of fertilizers was made every year without any organic manures the carbon content of the soil was reduced and the amount of total and of organic sulphur was reduced almost to the same extent, but the humus sulphur was very much more steady. In free-draining soil, like that at Woburn, there is no evidence of a tendency of the sulphur to be carried down and remain in the subsoil within the range of barley roots.

Work in the pot-culture station and in the laboratory has been again restricted in 1954 by the demands of the irrigation experiments, and has hence been almost entirely concerned with what was necessary for the field experiments. Most of this work falls on T. W. Barnes and his staff, and they have been fully employed in these directions during the year.

https://doi.org/10.23637/ERADOC-1-76