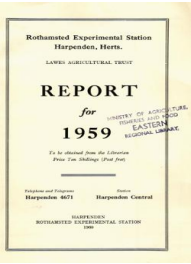
This work is licensed under a Creative Commons Attribution 4.0 International License.

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 1959

Full Table of Content


Rothamsted Experimental Station
Harpenden, Herts.

LAWES AGRICULTURAL TRUST

REPORT
for
1959

To be obtained from the Librarian
Price Ten Shillings (Post free)

Telephone and Telegrams: Harpenden 4671
Station: Harpenden Central

HARPENDEN
ROTHAMSTED EXPERIMENTAL STATION
1960

Woburn Experimental Station

C. A. Thorold

C. A. Thorold (1960) *Woburn Experimental Station ;* Report For 1959, pp 183 - 187 **- DOI: https://doi.org/10.23637/ERADOC-1-92**

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

WOBURN EXPERIMENTAL STATION

C. A. THOROLD

A combine-harvester was used for all the cereal plots, including the classical experiments (continuous wheat and barley). Combining began on 4 August and ended on 21 August, facilitated by dry weather which preceded, and lasted throughout, except for showers totalling less than 1 inch in the period 10–13 August.

Grain yields were generally satisfactory, but potatoes and carrots were poor; some good yields were obtained from sugar beet, because sugar percentages were relatively large (about 19%), but yield of roots was less than in 1958.

Table 1 shows that the mean temperatures and hours of sunshine from May to October exceeded the long-period means. Rainfall for the year (21·3 inches) was below the long-period mean (24·8 inches), and much below 1958 (29·2 inches).

TABLE 1

Monthly mean temperatures (means of maximum and minimum), total rainfall and daily means of bright sunshine for April to October 1959, with departures from long-period means in brackets

Month	Mean Temperature (° F.)	Rainfall (inches)	Bright sunshine (daily mean) (hours)
April	49·1 (+2·7)	2·42 (+0·49)	4·90 (−0·01)
May	53·3 (+1·3)	0·66 (−1·54)	7·01 (+0·97)
June	58·7 (+1·2)	0·99 (−0·71)	7·40 (+0·79)
July	63·3 (+1·9)	2·68 (+0·24)	8·35 (+2·31)
August	63·4 (+2·7)	0·95 (−1·38)	7·32 (+1·46)
September ...	57·9 (+1·2)	0·09 (−1·94)	5·72 (+1·09)
October ...	53·4 (+3·9)	1·92 (−0·38)	4·69 (+1·30)

1955 was also a dry year (20·3 inches), after a wet one (28·0 inches); H. H. Mann then drew attention to the good corn crops and poor roots and potatoes and pointed out that a moist subsoil underlies the light sandy loams, so that relatively deep-rooted crops can maintain fairly good growth (*Rep. Rothamst. exp. Sta.* for 1955, p. 175). Table 3 compares crop yields at Woburn in 1958 and 1959, and Table 4 shows soil-moisture depletion.

FIELD EXPERIMENTS

Continuous wheat and barley

The Report for 1957 (p. 214) says that observations were to be made in the area called "permanent wheat and barley" on the cropping of wheat on the barley land and of barley on the wheat land. Strips of winter wheat (Squareheads Master) were drilled across the "continuous wheat and barley" areas in December 1958, and spring barley (Plumage Archer) on the remainder of these areas in March 1959. Both crops developed well, except the stand was incomplete

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

in plots which had received sulphate of ammonia in the first 50 years of the experiment. Unsatisfactory growth on these plots has been noticed for a number of years and was commented on by H. H. Mann in 1946 (*Rep. Rothamst. exp. Sta.* for 1939–1945, p. 254). No sulphate of ammonia was applied from 1927 to 1940; in 1941 and 1942 top-dressings were given at 2 cwt./acre. Nitrogen was given as " Nitro-Chalk " in the periods 1944–46 and 1949–54, and " Nitra-Shell " was given at 4½ cwt./acre in March 1959. Since 1955, ground chalk has been applied to counteract acidity of the plots.

There is a double interest in the results from the cropping of the wheat and barley areas in 1959. The yields are to be considered in relation both to the preceding fallow and to the particular crop area. The beneficial effect of previous fallow was brief, and conclusions from this experiment must be deferred for a few years, because yields in the first year after fallow may be exceptional. However, it is of interest now to consider the " continuous wheat " and " continuous barley " area, the yields from the two unmanured plots (Numbered 1 and 7), and from the single plot which received dung (Numbered 11b) from 1877 to 1906 (giving 200 lb. ammonia/acre), and from 1907 to 1926 (giving 100 lb. ammonia/acre). The unmanured plots received nothing from 1877 to 1940, and the dung plots nothing from 1927 to 1940. Nitrogen has been given since 1940, as explained above. For a comparison with yields in the recent pre-fallow period, it seems desirable to use the mean of the four years 1951–54 with wheat, and the mean of the years 1951–53 and 1955 with barley, omitting 1954, when results were incomplete because of weeds. Although the wheat and barley areas were cropped in 1949 and 1950, the results were also unsatisfactory.

TABLE 2

Mean yields (4 years) of grain (cwt./acre) in Plots 1, 7 and 11b of " continuous wheat " and " continuous barley " areas, before fallow periods in 1955–58 (wheat) and 1956–58 (barley), compared with mean yields of grain (cwt./acre) for the same plots in 1959 when both wheat and barley were grown in both areas

	Continuous wheat area		Continuous barley area	
	Wheat	Barley	Wheat	Barley
Mean yield before fallow (1951–55)	9·3	—	—	11·8
Mean yield after fallow (1959)	20·5	23·1	26·1	21·6

The 1959 mean yield of wheat in the " continuous wheat " area, and of barley in the " continuous barley " area was about double the yield before fallowing. Table 2 also shows that wheat yielded more in the barley area (26·1) than in the wheat area (20·5), whereas barley yielded more in the wheat area (23·1) than in the barley area (21·8).

Green manuring experiment

Early potato yields averaged only 4·3 tons/acre, compared with 10 tons/acre in 1958 when May and June had more than average

https://doi.org/10.23637/ERADOC-1-92

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

rain. Despite the differences between 1958 and 1959, some treatments gave responses in both years; potatoes after trefoil undersown in the preceding crop of barley, and after ryegrass both yielded more than after fallow. The 1958 season favoured the growth of green manures in barley for testing in 1959.

The times of ploughing in green manures before barley affected yields more in 1958 than in 1959. Ploughing in during spring, gave average barley yields of 28·4 cwt./acre in 1959, compared with 23·2 cwt./acre with ploughing in during autumn; in 1958 the yields were 30·9 and 22·8 cwt./acre.

Six-course rotation experiment

In this experiment, using mineral fertilisers only, crops developed satisfactorily, except for clover, which became weedy and was ploughed in in June.

In April 1959 the barley on some plots became yellow, which was found to be associated with soil acidity (about pH 5). Hydrated lime at 1 ton/acre was immediately added. Since 1955 the original liming procedure has been changed, with lime given only once in 6 years. We shall now revert to the original scheme of giving 23 cwt./acre of ground chalk after potatoes for rye, and after sugar beet for barley.

Mean grain yields of barley were 28·6 cwt./acre, and of rye 27·1 cwt./acre, compared with 26·1 cwt./acre and 25·2 cwt./acre in 1958. Winter wheat (16·2 cwt./acre) in 1959 yielded less than in 1958 (20·6 cwt./acre). Main crop potatoes averaged 8 tons/acre, 1½ tons above 1958 when there was an early outbreak of blight. Sugar beet yielded over 12 tons/acre of roots and 46½ cwt./acre of sugar.

Ley and arable rotations experiment

Table 3 shows the mean yields for crops in this experiment in 1959 when there was a rainfall deficit (—3·46 inches) and sunshine excess (+0·65 hour/day), and in 1958 when there was a rainfall excess (+4·46 inches) and a sunshine deficit (—0·56 hour/day).

TABLE 3

Crop production (tons/acre) in the Ley and Arable Rotation Experiment in the years 1958 and 1959

Crop	1958	1959
Barley (grain)	1·4	1·7
Barley (straw)	1·5	1·3
Sugar beet (roots)	16·8	13·6
Sugar beet (sugar)	2·9	2·4
2nd year lucerne (85% DM)	1·6	2·4
Potatoes (total tubers)...	14·0	12·2
Carrots (roots)	7·3	6·1

Although sugar beet yielded less in 1959 than in 1958, the yield was satisfactory and greater than in the Six-Course Rotation Experiment. Lucerne is a deep-rooted crop which was presumably able to reach moisture at greater depths than the more shallow-rooted crops (potatoes and carrots), which yielded better in 1958.

The relatively large yield of lucerne in 1959 is remarkable in view

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

of the persistence of lucerne-stem eelworm (*Ditylenchus dipsaci*) in this area. The 3-year lucerne plots were fallow during 1959, in an attempt to prevent the eelworms developing further.

Market-garden experiment

Leeks were harvested between 4 March and 15 April, before the dry spell, and yielded 5½ tons/acre, similar to 1958. Early potatoes gave only 5½ tons/acre, compared with over 7 tons/acre in 1958. Globe beet gave 7·8 tons/acre in 1959, and 7·9 tons/acre in 1958.

Irrigation experiment

Soil moistures at three depths (0–3 inches; 3–9 inches; 9–18 inches) were measured on one irrigated grass plot and one nearby unirrigated grass plot at intervals from March to September. Table 4 shows the results at 9–18 inches, where moisture changes are particularly interesting.

TABLE 4

Soil moisture as percentage of the weight of samples taken at 9–18 inches, in irrigated and unirrigated plots carrying Cocksfoot grass

Sampling date	23 March	7 May	28 May	15 July	12 August	10 September
Irrigated	11·2	10·8	10·4	9·6	8·4	7·2
Not irrigated ...	11·2	10·8	8·0	6·4	5·2	3·6

The control plot received 8·1 inches of rain during the sampling period, and the irrigated plot had this plus the equivalent of 6·8 inches of rain as irrigation. On 10 September the moisture in the surface soil (0–3 inches) was 2·0% in the control and 4·8% in the irrigated plot, which had the equivalent of 0·5 inches on 1 September. Without irrigation the mean yield of dry grass was 31½ cwt./acre and 65 cwt./acre with.

Table 5 summarises the analyses for nitrogen made on samples of dry Cocksfoot grass from all (24) plots on each of the six cutting dates.

TABLE 5

Weights of dry grass (G) and of nitrogen (N) removed (cwt./acre) at each cutting, with and without irrigation, and at different rates of nitrogen application, in 1959

	Without irrigation				With irrigation			
	0·3 cwt.		0·6 cwt.		0·3 cwt.		0·6 cwt.	
Date of cut	G	N	G	N	G	N	G	N
6 May	7·1	0·2	11·0	0·4	7·8	0·2	11·4	0·4
27 May	6·8	0·2	7·7	0·3	11·5	0·4	14·3	0·6
22 June	1·6	0·1	2·0	0·1	10·0	0·3	12·8	0·5
14 July	2·0	0·1	2·2	0·1	9·2	0·3	11·3	0·4
11 August	8·1	0·4	9·6	0·4	12·0	0·4	16·5	0·6
9 September ...	2·3	0·1	2·6	0·1	6·6	0·2	6·5	0·3
Total	27·9	1·1	35·1	1·4	57·1	1·8	72·8	2·8

Nitrogen was applied 6 times, at 0·3 and at 0·6 cwt./acre.

Irrigation amounted to 1·8 inches in May, 2·5 inches in June, 1·5 inches in July, 0·5 inches in August and 0·5 inches in September (total 6·8 inches).

https://doi.org/10.23637/ERADOC-1-92

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

The mean yield with irrigation in 1959 (65 cwt./acre) was less than in 1958 when irrigation produced no response (81 cwt./acre with irrigation; 80 cwt./acre without irrigation). The low yield in 1959 can be attributed to the Cocksfoot sward deteriorating, for it contained much *Poa annua*. This weed constituted about 10% by weight of the " Cocksfoot grass " samples taken from two plots on 27 May. Because of this permanent grass was ploughed and resown with ryegrass in the autumn. Since the Cocksfoot S37 was sown in April 1954, it has given an annual mean yield of about 3 tons/acre (dry matter).

Jerusalem artichoke

Table 6 shows the weight of tubers lifted in February from the land where some of the tops were cut in October, 1958 (*Rep. Rothamst. exp. Sta.* for 1958, p. 189).

TABLE 6

Weight of Topine and of Jerusalem artichoke tubers (tons/acre) obtained when tops were cut green (October 1958), and when tops remained until lifting (February 1959)

	Tops cut	Tops not cut
Topine	6·6	8·0
Artichoke	14·4	15·3

Removing the top decreases the tuber yield of both Topine and Jerusalem artichoke but only little compared with the 20 and 11 tons/acre of green matter that was removed. The tops when cut in autumn may not make satisfactory fodder, because about 30% of the dry matter was " crude fibre ", so an experiment was started to see how earlier cutting of tops affects yield of tubers. The tops from part of an area planted in April 1959 were cut in July, and from another part in November. In July both artichoke and Topine gave about 8 tons/acre of tops: in this dry year the plants did not grow again, and a second cut could not be taken in the autumn as planned. The fresh weights cut in November were 5·4 tons/acre (Topine) and 6·8 tons/acre (Jerusalem artichoke), but many leaves had fallen before this. (Mann & Barnes.)