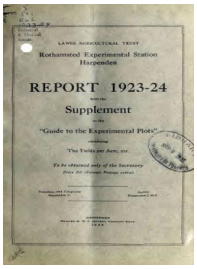
Report for 1923-1924 With the Supplement to the Guide to the Experimental Plots Containing the Yields per Acre Etc.



Full Table of Content

Rothamsted Experimental Plots

Rothamsted Research

Rothamsted Research (1925) *Rothamsted Experimental Plots ;* Report For 1923-1924 With The Supplement To The Guide To The Experimental Plots Containing The Yields Per Acre Etc., pp 72 - 129 **- DOI: https://doi.org/10.23637/ERADOC-1-116**

BOOKS PUBLISHED DURING 1923-4.

J. DAVIDSON. *"A List of British Aphides"* (including notes on their synonymy, their recorded distriution and food-plants in Britain, and a food-plant index). Longmans, Green & Co. (in the press).

This work has been prepared owing to the great economic importance of aphides in relation to farm, garden and orchard crops, and their possible association with so-called mosaic diseases. Buckton's *Monograph on British Aphides* was published about 45 years ago, and since that time many more species have been recorded and the nomenclature has undergone drastic changes.

In the present work the species are placed in accordance with the more recent nomenclature. It is divided into four sections. Section 1 deals with the species in alphabetical order together with their food-plants and distribution in Britain. Section 2 deals with the genera, including critical notes. Section 3 is a food-plant index, forming a key to Section 1, and Section 4 a bibliography of 360 titles.

The work is intended to be a reference list and to serve as a general guide to the identification of the species of aphides.

R. A. FISHER. *"Statistical Methods for Research Workers."* Oliver and Boyd, Edinburgh (in the press).

The wide increase in the employment of statistical methods, especially in scientific research, has been accompanied by exceptionally rapid progress in recent years in the solution of the mathematical problems which confront the statistician. Most of the mathetical problems which confront the statistician. Most of the mathematical researches of the author have been undertaken in direct response to the needs of the laboratory worker, and with a view to the development of statistical methods adequate to the practical requirements of biological and agricultural research.

The aim of the book is to provide the non-mathematical scientific worker with the detailed application of precise statistical methods, which have been available hitherto only in specialised mathematical publications. The methods are illustrated throughout with numerical examples, drawn from recent scientific literature, giving the methods of computation in detail. New mathematical tables have been specially calculated for rendering the crucial tests simple and exact.

THE CROP RESULTS.
OCTOBER, 1922, TO SEPTEMBER, 1923.

The outstanding features of the season October 1922 to September 1923, were the sunless spring and the earliness and severity of the autumn frosts of 1923.

The year commenced favourably; October was unusually dry; it had the lowest rainfall figures for this month (0.787in. against an average of 3.06in.) since our records began, so the ploughing and drilling were got well forward. The dry weather continued into November, and with the help of night frosts which

https://doi.org/10.23637/ERADOC-1-116

broke down the newly turned furrows, everything was in favour of winter sowing. December was fairly mild; the first part of the month was dry but the second half was very wet, there being nearly 3in. of rain during this period. This precipitation, although unwelcome at the time, added appreciably to the stores of underground water, which had been seriously depleted by the drought of 1921, and not restored by the rainfall of 1922. Winter corn looked well and the young clover still maintained a satisfactory plant. January 1923 was dry, only 1.50 in. of rain being registered against an average of 2.41in. for this month. The sunshine and mean air temperature were both above the average, but the ground temperatures were not, and seventeen ground frosts were experienced in this month.

A change came in February. There was more than double the normal rainfall and the month was practically lost as far as field work and threshing was concerned. The wet spell continued into March, and not until its last few days could work on the land be resumed. The weather had not been unduly cold; the mean air temperature was, in fact, above the average both for February and March. Wheat and oats had made no progress in the sodden conditions of the two months, but when the water got away, they tillered out rapidly. A dry and dull April saw most of the spring sowings made under favourable conditions, a warm spell at the end of the month giving the barley a good start. May was drier than usual, but cold sunless weather set in with occasional frosts. The barley kept going better than might have been expected, but clover coming into bloom was severely checked. June was a month of warm droughty weather although actually duller than either April or May—the hours of bright sunshine being no less than 86 below the monthly average. The deep rooting crops came on fairly well, but barley gave signs of needing rain before the month was out. For each of the five months, February-June inclusive, there had been a deficiency of sunshine which amounted on the average to no less than 1½ hours per day. Naturally the soil temperature was lower than usual, and although the rainfall had not been high, the evaporation was reduced because of the lack of sunshine, and this led to a slightly greater percolation ot water through the 60in. gauge. Warmer and much brighter weather came in July, the nights being for the first time warm. The striking feature of the month was the exceedingly heavy thunder showers on the night of the 9th, which, with the falls occurring on the following day, brought down 2¼ ins. of rain. Fortunately, our corn was not lodged, although elsewhere heavy crops of oats were badly laid over a wide area in the track of the storm. Hay was got in under good conditions and crops were satisfactory: the clover hay averaged 28 cwts. per acre over the farm and meadow hay yielded 35 cwts. on the manured land of Great Field. August was the best month of the year. The daily average of 11 hours of sunshine for the first fortnight caused some wilting of the shallow rooted crops, but refreshing rains came later in the month. The harvest weather was perfect for oats and wheat, but a little rain fell

https://doi.org/10.23637/ERADOC-1-116

before the barley was cut. The Broadbalk field was cleared by August 28th, and stubble cultivation was put in hand at once. Wheat yielded satisfactorily on Great Knott field, where it had been well done (37½ bu.), but on Great Harpenden field, where the record root crops of the previous year had exhausted the land, the yield was disappointing (24 bu.). Oats did fairly well and proved responsive to manures, a dressing of 1 cwt. of sulphate of ammonia and 2 cwt. of superphosphate increasing the crop from 26.4 bu. to 37.3 bu. per acre; while 2 cwt. sulphate of ammonia and 2 cwt. superphosphate pushed up the yield to 46.5 bu. The barley suffered from the drought in June, and the extraordinary lack of sunshine in spring and early summer: it yielded as well as could be expected—40 bu. on the better land, and 32 bu. on poorer tilths—while the quality was good and distinctly better than in 1922.

September was a favourable month, harvest was completed and ploughing continued. October set in wet, however, and 1¾in. of rain was recorded in excess of the average. Root lifting was badly hindered, and the hand digging of potato plots was exceptionally slow and difficult. November brought cold drying weather, and frosts occurred on 23 nights during the month. They were exceptionally severe on the nights of the 25th and 26th, when 18 and 19 degrees of frost respectively were recorded on the grass: practically all unharvested mangolds and potatoes were lost.

In spite of the lack of sunshine, the mangolds on Barn field did well and exceeded their average yield, but a large number of the plants rotted. Swedes, in spite of adequate manuring, were only a fair crop (14 tons); a good plant was obtained, but the bulbs failed to fill out. The sheep on the grazing plots did well; there was plenty of keep and bigger live weight increases per acre were obtained than in either of the previous seasons.

OCTOBER, 1923, TO SEPTEMBER, 1924.

The season 1923-24 was distinguished by its wetness and by one of the most protracted harvests of recent years. The rainfall of 36.51in. exceeded the average by 7.96in., only two wetter seasons (1903 and 1912) having been recorded since readings were commenced at this station in 1853. It is interesting to note that the twentieth century, though only in its early stages, has already produced three years that have been wetter than anything known to the Victorians—wetter even than the notorious year, 1879. Under the wet conditions, weeds got ahead, in many cases smothering the legitimate crop, and produced one of the foulest seasons for many years.

The season opened badly for farm work. October was very wet and drilling was hindered. The frosts and dry weather of November enabled all the winter corn to be sown by the 21st, but December and January were both difficult months for late sown cereals; very little flag was made and there was a loss of plant. The land was saturated with water and impossible to

https://doi.org/10.23637/ERADOC-1-116

work until the hard dry weather of February, with a rainfall of 0.714in. only, against the 71 year average of 1.889in. for this month, brought the furrow into a splendid condition for the spring working. The complete change in the soil condition effected by the February weather is well illustrated by a comparison of the drain-gauge figures for this month and January. In January the drainage through all three gauges was in excess of the rainfall in consequence of the saturated state of the soil in December and the early snow-drifts on the gauges in January: the rain was 2.90in. and the drainage (60in. gauge) 3.20in.; while the February rain was 0.71in. and the drainage (60in. gauge) only 0.09in. Only 12.2 per cent. of the rain had percolated in February against an average of 75 per cent. for this month. However, the dryness of the February brought no relief to the struggling cereal crops.

The weather in March was well suited to cultivation: there were long spells of brilliant sunshine (no less than 56 per cent. over the average), a low rainfall, but with ground frosts each night except for a period of six days towards the end. In consequence barley was drilled under particularly favourable conditions in the latter half of the month. This was a general experience, many heavy land farmers never having seen spring corn go in so well. The frosts continued beyond the middle of April, and made the spring one of the latest within living memory. Later in April came milder and better weather; clover began to fill up after the long winter, barley made a good start, but winter corn was still backward, and oats in particular had lost much plant. With May the ground became much warmer, and by the end of the month the 12in. soil thermometer had risen by 10° F. to 58.8° F. May was, however, persistently wet. There were only 7 days on which no rain fell, and the total fall of 4.63in. was 2.58in. in excess of the monthly average. Weeds grew fast in the corn, and barley was checked by the wet conditions and the lack of sunshine. Rain continued during the first half of June and seriously interfered with hoeing, the very foul condition of Broadbalk being largely due to this cause. The second half of the month was warm and less wet. Clover promised excellent crops all over the farm, but some had been laid by the storms. Grass was growing too fast for the sheep on the grazing plots, although the stocking was heavier than in previous years. The first half of July contained the only period during the whole year that could properly be described by the name of summer—the nine days, July 8th-16th. The backward plants of wheat came on surprisingly well and gave promise of a fair crop. Hay making proceeded without any serious check, the coming of the fine spell at hay time being one of the few good features of the season. Crops were large, the unmanured meadow hay on Great field yielding 32 cwt., while the clover on Long Hoos averaged 42 cwt. per acre.

With the passing of the 9 fine days wet weather set in again; the aftermaths freshened up rapidly and regular plants of swedes and mangolds showed excellent promise although the mangolds needed sun.

https://doi.org/10.23637/ERADOC-1-116

August, though not wetter than the normal, was showery and sunless; ripening of the cereals was slow and uneven and cutting was later than usual. Wheat continued to improve, but weeds got ahead and filled up the bottom of the crop. September did nothing to improve what promised to be a difficult harvest; the rainfall of 3.42in. was nearly 1in. in excess of the average and there was little sunshine or drying weather. The bulk of the harvest was secured during the month, but much was in bad condition for early threshing. October, with 4.28in. of rain, had more than the normal rainfall by 1.14in., and with the shortening days and damp misty weather the labour involved in securing the remainder of the harvest was excessive. Cutting finished on October 17th.

Although wheat and barley were not much below the average in yield, the quality was poor and much of the barley was fit only for feeding purposes. Winter oats had lost much plant in the severe weather; they became very foul in summer and yielded badly.

Swedes and potatoes promised big yields, and in spite of the dull weather, the mangolds on Barn field were up to the average. The digging of potatoes and the lifting of the roots was in no way helped by the weather, for both November and December were considerably wetter than the average. On the other hand the absence of serious frosts enabled the roots to be got in without loss. Swedes with complete artificials yielded 26 tons per acre, second only to the excellent crop of 1922. Potatoes yielded 9½ tons with dung and complete artificials, the crop being practically free from disease, although a rather large proportion of the produce was of seed size.

It was commonly complained that the year was sunless, but in this respect it was over its full course no worse than usual: for the whole of the calendar year the deficiency from the average was only 50 hours. The unfortunate character of the season was its persistent wetness. From July 17th to the end of the year there were only two occasions (August 10th and 11th) when the state of the ground at 9 a.m. was recorded as dry; on all other mornings it was wet or damp. The previous year was by no means sunny, yet the ground was recorded as dry on 24 occasions in the three months beginning on July 17th.

https://doi.org/10.23637/ERADOC-1-116

WOBURN EXPERIMENTAL FARM.

REPORTS FOR 1923 & 1924 BY Dr. J. A. VOELCKER.

Season 1923.

A late harvest made cultivation of the land backward, but open and fairly dry weather in October and November gave favourable conditions for sowing winter crops. This continued throughout December and January, rainfall not being excessive and frost nearly absent. The whole winter, 1922-3, indeed, was marked by absence of frost. February and March were wet months, and the soil was left in somewhat sticky condition for spring sowing. April, May and June were all cold and unseasonable, with absence of sunshine and late frosts in May, and crops made but little progress. About June 25th a spell of very hot and dry weather set in, giving good conditions for hay-making, though the yield was small. A violent thunderstorm in July with heavy rainfall saved the swede and other root crops, and also clovers and "seeds," which were beginning to show the effect of the drought; corn crops also grew rapidly. The fine weather continuing until August 14th, oats and wheat were safely reaped, and good crops of roots and aftermath (clover and "seeds") were promised. The drought had a bad effect on spring-sown corn crops, the first shoots ripening prematurely, and, when the rain came, fresh shoots were sent up which never developed properly. The general result was to give an exceedingly poor corn yield, and the weights at threshing were even less than the appearance in the field had indicated. The early-sown barley ripened well, but the late-sown was practically a failure. On August 14th there was a severe thunderstorm, during which 1½ inches of rain fell, and, the remainder of the month proving cold and showery, the harvesting of barley was delayed until August 31st.

The total rainfall for the 12 months to September inclusive was 23.2 inches, there being 175 rainy days. The heaviest rainfall was in July, viz., 3.53 inches, February giving 3.03 inches, August and September 2.94 and 2.48 inches respectively.

Season 1924.

The season 1923-4 was an altogether exceptional one. Heavy rainfall and long continued absence of sunshine and warmth combined to retard the growth of corn crops and to prevent their proper maturing. Weeds spread rapidly, and it was difficult to keep the land clean. Under these conditions only poor yields of low quality corn could be expected, especially as harvesting took place in bad weather.

The rainfall for the whole season, October 1923 to October 1924, was 30.30 inches as against 23.2 in 1923, with 201 rainy days (over .01 inch) against 175 in 1923. May—just the time when dryness and warmth were required—was by far the wettest month of the whole year, with 6.06 inches of rain, and 20 rainy days. On the other hand, February was the driest month, with only 0.48 inches of rain—in February, 1923, it was 3.03 inches.

https://doi.org/10.23637/ERADOC-1-116

The harvest months of July, August and September were alike wet, with 3.07, 2.32 and 3.17 inches of rain respectively.

The untoward weather influences were felt in very marked measure on the continuous wheat and barley plots, the returns for which were lower than for many years past. The highest yield of barley on the continuous plots was only 13 bushels per acre, whereas land close by in the same field gave, under rotation cropping, 27.3 bushels per acre where no nitrogen but only mineral manures had been applied.

Great difficulties also were experienced with the root crops, through the excessive washing of the soil and the floods that came in the latter part of May. One field was under water for some days, and in another the newly-planted potatoes were, in places, washed out and carried some distance away. The lucerne inoculation experiment was ruined by the flooding, and had to be abandoned. A great deal of the manure put in the land for the root crops must have been washed out, and so caused a diminution in the returns.

The one really good crop was hay—alike from rotation grasses, clover and from permanent pasture—and abundant crops were gathered in excellent condition.

FIELD EXPERIMENTS.

1. *Continuous Growing of Wheat* (Stackyard Field), 1923.

1923 (*47th Season*).

"Red Standard" wheat, 2½ bushels per acre, was drilled on October 26th, 1922, farmyard manure having been ploughed in on 11b on October 19th and 20th, while mineral manures (phosphates and potash) were applied just previously to the sowing of the wheat, and rape dust (plot 10b) on November 14th. Nitrogenous top-dressings of sulphate of ammonia and nitrate of soda were given on May 15th and June 20th, 1923.

The wheat was cut on August 13th, stacked August 21st, and threshed November 14th, 1923.

The yield was exceptionally poor, the unmanured produce averaging 5.6 bushels of corn and 7 cwt. of straw per acre, against 8.5 bushels and 7.25 cwt. in the previous year. One has to go back to 1914 to find so bad a yield on these plots, the return for these two years being, indeed, very similar. Added to the difficulties of season was the fact that the damage done by pheasants to some of the normally weak plots was so great that they had to be resown later with spring wheat. This never came up satisfactorily and, for purposes of comparison and comment, the ammonia plots must be left out of account.

1924 (*48th Season*).

"Red Standard" wheat, at the rate of 3 bushels per acre, was drilled on October 19th, 1923, plot 11b having received its farmyard manure and plot 10b its rape dust on October 16th, and mineral manures having been given to the other plots to receive them, on October 18th. The nitrogenous top-dressings were applied, the first halves on May 5th-6th, 1924, and the second

https://doi.org/10.23637/ERADOC-1-116

Continuous Growing of Wheat, 1923 (47th Season) and 1924 (48th Season).

(Wheat grown year after year on the same land, the manures being applied every year.)

Stackyard Field—Produce per acre.

Plot.	Manures per acre.	1923. Head Corn. No. of bushels.	1923. Head Corn. Weight per bushel.	1923. Tail Corn. Weight.	1923. Straw, Chaff, &c.	1924. Head Corn. No. of bushels.	1924. Head Corn. Weight per bushel.	1924. Tail Corn. Weight	1924. Straw, Chaff, &c.
			lb.	lb.	cwt. q. lb.		lb.	lb.	cwt. q. lb.
1	Unmanured	5·2	62·0	4	5 0 6	1·8	56·0	2	4 1 4
2a	Sulphate of Ammonia (=25 lb. Ammonia)	—	—	—	—	—	—	—	—
2aa	As 2a, with 5 cwt. Lime, Jan., 1905, repeated 1909, 1910, and 1911	6·0	61·5	8	8 2 0	3·6	55·0	4	9 0 0
2b	As 2a, with 2 tons Lime, Dec., 1897	2·0	60·0	10	2 0 24	2·7	56·0	2	5 1 4
2bb	As 2b, with 2 tons Lime repeated Jan., 1905	3·4	61·7	6	4 3 12	6·6	56·5	4	9 1 4
3a	Nitrate of Soda (=50 lb. Ammonia)	11·7	61·5	8	10 3 4	15·0	56·0	4	18 2 4
3b	Nitrate of Soda (=25 lb. Ammonia)	10·6	61·7	8	9 2 12	14·3	56·0	12	18 0 20
4	Mineral Manures (Superphosphate 3 cwt., Sulphate of Potash ½ cwt.)	8·9	61.0	4	9 2 4	3·5	57·0	4	5 3 14
5a	Mineral Manures and Sulphate of Ammonia (=25 lb. Ammonia)	1·5	60·0	4	2 0 24	4·0	56·0	4	7 3 20
5b	As 5a, with 1 ton Lime, Jan., 1905	6·4	61·5	8	7 1 16	6·4	55·5	2	10 0 0
6	Mineral Manures and Nitrate of Soda (=25 lb. Ammonia)	13·0	61·0	6	11 1 0	15·2	55·5	11	20 3 10
7	Unmanured	6·1	62·2	7	5 3 2	1·4	56·0	2	4 2 2
8a	Mineral Manures and, in alternate years, Sulphate of Ammonia (=50 lb. Ammonia)	1·5	62·0	8	2 0 8	—	—	—	—
8aa	As 8a, with 10 cwt. Lime, Jan., 1905, repeated Jan., 1918	2·8	61·5	8	5 1 12	6·8	56·0	4	16 3 12
8b	Mineral Manures, Sulphate of Ammonia (=50 lb. Ammonia) omitted in alternate years	1·2	62·0	4	2 8	—	—	—	—
8bb	As 8b, with 10 cwt. Lime, Jan.. 1905, repeated Jan., 1918	6·4	60·0	12	6 2 24	4·0	56·0	4	8 3 4
9a	Mineral Manures and, in alternate years, Nitrate of Soda (=50 lb. Ammonia)	10·0	60·5	10	9 4 24	14·5	56·7	12	21 3 20
9b	Mineral Manures, Nitrate of Soda (= 50 lb. Ammonia) omitted in alternate years	3·8	60·5	4	3 2 24	5·5	56·0	3	11 4 16
10a	Superphosphate 3 cwt., Nitrate of Soda (=25 lb. Ammonia)	11·9	61·5	8	12 1 20	16·7*	56·0	16	24 1 12
10b	Rape dust (=25 lb. Ammonia)	8·8	61·5	12	10 0 16	9·5	57·2	8	15 0 24
11a	Sulphate of Potash 1 cwt., Nitrate of Soda (=25 lb. Ammonia)	10·5	62·0	8	10 1 20	18·0*	54·5	18	31 2 0
11b	Farmyard Manure (=100 lb. Ammonia)	11·7	62·0	12	14 1 24	17·5	54·1	30	32 3 24

* Nitrate of Soda = 50 lb. Ammonia was, in error, applied in 1924 to plots 10a and 11a.

halves on June 18th. The wheat, though it came up quite well, was, for a considerable time afterwards, almost at a standstill, and was late in making a start. It looked better in January, 1924, but another period of stagnation occurred in March and April, and the crop moved but slowly. In June the farmyard manure plot (11b) looked the best; it was also specially noticeable that the nitrate of soda plots were better than the sulphate of ammonia ones, but much more weedy than any of the other plots. The crops being but small, stood up well and were cut on August 14th, carted on September 2nd and stacked, being threshed out the week before Christmas, 1924.

The produce, on account of the untoward conditions, was very poor—as low as any recorded during the whole 48 years. The unmanured produce was only 1.6 bushels of corn with 4 c. 1 qr. 17 lbs. of straw, etc., per acre; nitrate of soda was markedly superior to sulphate of ammonia throughout, but the heavier dressings were not better than the lighter ones. Lime still continued to show its influence, even in plot 2b (last limed in 1897).

The results for both years are given on page 79.

2. *Continuous Growing of Barley* (Stackyard Field).

1923 (*47th Season*).

Farmyard manure was applied (plot 11b) March 21st, 1923, mineral manures and rape dust on April 4th, and barley—"Plumage Archer"—at the rate of 2½ bushels per acre was drilled on April 5th. The first nitrogenous top-dressings were given on June 12th, the second on July 10th. On plot 2aa a further application of lime—10 cwt. per acre—was made in January 1923.

The season was very unfavourable for barley, and the crop was specially short in the straw. The farmyard manure plot (11b) was the only one to look even fair, and a small yield generally characterised the harvest which began on August 31st, the barley being stacked on September 1st and threshed November 11th, 1923.

The unmanured produce was only 3.9 bushels of corn with 6 cwt. 3 qrs. straw per acre, a yield below even the poor one of 1921. Nitrate of soda, both alone and with minerals, did much better than sulphate of ammonia, even when lime was given as well.

1924 (*48th Season*).

"Plumage Archer" barley, at the rate of 3 bushels per acre, was drilled on March 10th, 1924. Rape dust and farmyard manure had been previously (February 11th) applied to plots 10b and 11b. The barley was slow in coming up and was never more than a thin crop and not of good healthy colour; further, weeds were very abundant, especially on the nitrate of soda plots. The first top-dressings of nitrogenous salts were given on May 15th and 16th, the second on June 25th. A very poor crop only—as low as any during the whole 48 years' experiments—was obtained. This was cut on August 13th, carted and stacked on

https://doi.org/10.23637/ERADOC-1-116

Continuous Growing of Barley, 1923 (47th Season), and 1924 (48th Season).

(Barley grown year after year on the same land, the manures being applied every year.)

Stackyard Field—Produce per acre.

Plot.	Manures per acre.	1923. Head Corn. No. of bushels.	1923. Head Corn. Weight per bushel.	1923. Tail Corn. Weight.	1923. Straw, Chaff, &c.	1924. Head Corn. No. of bushels.	1924. Head Corn. Weight per bushel.	1924. Tail Corn. Weight.	1924. Straw, Chaff, &c.
			lb.	lb.	cwt. q. lb.		lb.	lb.	cwt. q. lb.
1	Unmanured	4·1	52·5	2	7 2 16	1·8	51·2	2	3 1 2
2a	Sulphate of Ammonia (=25 lb. Ammonia)	—	—	—	—	—	—	—	—
2aa	As 2a, with 5 cwt. Lime, Mar., 1905, repeated 1909, 1910 and 1912, and 10 cwt. Lime applied Jan., 1923	1·7	52·7	4	3 1 12	4·9	51·6	2	8 0 20
2b	As 2a, with 2 tons Lime, Dec., 1897, repeated 1912	3·2	52·0	4	5 2 8	4·1	51·0	4	5 2 12
2bb	As 2a, with 2 tons Lime, Dec., 1897, repeated Mar., 1905	3·3	51·0	2	6 0 0	3·6	49·8	2	6 1 12
3a	Nitrate of Soda (=50 lb. Ammonia)	11·1	51·5	12	14 0 0	5·0	50·5	4	8 3 20
3aa	As 3a, with 2 tons Lime, Jan., 1921	8·0	51·2	8	9 2 24	3·6	49·0	4	7 1 16
3b	Nitrate of Soda (=25 lb. Ammonia)	5·0	50·0	4	8 2 0	4·5	50·2	4	7 3 0
3bb	As 3b, with 2 tons Lime, Jan., 1921	4·8	51·0	2	8 1 8	4·6	50·0	4	8 2 12
4a	Mineral Manures[1]	5·8	50·2	4	5 2 10	2·1	49·8	2	3 1 6
4b	As 4a, with 1 ton Lime, 1915	6·1	51·2	6	8 0 12	4·6	50·0	4	3 2 4
5a	Mineral Manures and Sulphate of Ammonia (=25 lb. Ammonia)	2·2	51·7	4	3 1 12	—	—	—	—
5aa	As 5a, with 1 ton Lime, Mar., 1905, repeated 1916	6·2	51·5	8	8 1 4	10·8	50·5	8	10 3 8
5b	As 5a, with 2 tons Lime, Dec., 1897, repeated 1912	6·5	51·5	8	8 2 20	7·1	50·5	4	5 1 18
6	Mineral Manures and Nitrate of Soda (=25 lb. Ammonia)	8·5	50·5	4	10 3 10	13·0	49·4	12	9 3 2
7	Unmanured	3·7	52·0	4	6 0 10	1·6	50·5	2	3 1 25
8a	Mineral Manures and, in alternate years, Sulphate of Ammonia (=50 lb. Ammonia)	—	—	—	—	—	—	—	—
8aa	As 8a, with 2 tons Lime, Dec., 1897, repeated 1912	8·7	52·0	8	8 1 4	13·9	51·0	4	10 3 12
8b	Mineral Manures, Sulphate of Ammonia (=50 lb. Ammonia) omitted in alternate years	—	—	—	—	—	—	—	—
8bb	As 8b, with 2 tons Lime, Dec., 1897, repeated 1912	6·3	52·0	8	8 3 4	6·6	51·0	4	6 1 16
9a	Mineral Manures and, in alternate years, Nitrate of Soda (=50 lb. Ammonia)	13·1	52·0	4	16 0 20	8·5	51·5	6	7 0 24
9b	Mineral Manures, Nitrate of Soda (=50 lb. Ammonia) omitted in alternate years	5·9	52·5	2	9 0 0	5·7	51·0	6	4 3 6
10a	Superphosphate 3 cwt., Nitrate of Soda (=25 lb. Ammonia)	5·6	52·0	6	7 0 12	8·5	51·0	6	8 0 14
10b	Rape dust (=25 lb. Ammonia)	5·3	53·2	6	6 0 0	2·6	52·1	2	5 0 0
11a	Sulphate of Potash 1 cwt., Nitrate of Soda (=25 lb. Ammonia)	11·4	52·5	8	10 1 8	6·7	51·4	4	6 1 6
11b	Farmyard Manure (=100 lb. Ammonia)	21·8	53·0	8	18 0 0	13·0	52·0	6	9 0 18

[1] Superphosphate 3 cwt., Sulphate of Potash ½ cwt.

August 31st and September 1st, and threshed just before Christmas.

The unmanured produce was only 1.7 bushels of corn with 3 c. 1 qr. 14 lb. of straw, etc., per acre. Sulphate of ammonia by itself, or with minerals and no lime, as usual, gave no crop, but with lime gave marked increases, going up to a yield of 13.9 bushels per acre (plot 8aa). Nitrate of soda did not, on the whole, do as well as sulphate of ammonia with lime, the highest yield with it being 13 bushels (plot 6).

The heavier dressings of nitrate of soda had no advantage over the lighter ones, nor did the use of lime on the nitrate plots produce any benefit.

The results for both years are given on page 81.

3. *Rotation Experiments.*

The Unexhausted Manure Value of Cake and Corn (Stackyard Field).

1923. *Barley.*

(*a*) Series C.

As the swede crop of 1922 was quite small, mangels were carted on to augment the root supply. The sheep were on from December 20th, 1922, to February 7th, 1923. They consumed, on the corn plot (2 acres) 22 cwt. of oats and 10 cwt. of barley, equivalent to 29.25 lb. nitrogen per acre; on the cake plot (2 acres) 7 cwt. of linseed cake, 6 cwt. decorticated cotton meal and 14 cwt. 42 lb. of undecorticated cotton cake, equivalent to 67 lb. nitrogen per acre.

"Plumage Archer" barley, at the rate of 2½ bushels per acre, was drilled on March 28th, and a clover mixture—Red Clover 7 lb., Alsike 3 lb., Trefoil 3 lb. per acre—(red clover alone having been taken four years previously) was sown in the barley on May 1st, 1923. The barley grew fairly well in spite of the unfavourable season. The crop was cut on August 16th.

1924. *Clover.*

The clover grew well in 1924, promising an excellent crop. This was cut and gathered on June 27th—30th, 1924. The second growth was small and was ploughed in.

The results were :—

	Barley, 1923				Hay, 1924
	Head Corn		Tail Corn	Straw, Chaff, etc.	Yield per Acre
	Yield per Acre	Weight per bushel	Weight		
	bushels	lb.	lb.	cwt.	cwt.
Corn fed	14·2	55	21	9·7	38·7
Cake fed	16·2	55	28	10·1	37·1

Neither in the barley crop of 1923 nor in the succeeding clover of 1924 has there been anything to show the value of the richer cake-feeding as against that of corn. This result is

https://doi.org/10.23637/ERADOC-1-116

striking, as not only were the amounts of corn and cake much greater than previously used, but the margin between the cake and corn fed was nearly 38 lb. of nitrogen, equivalent to 2 cwt. of nitrate of soda per acre.

1923, *Clover*. 1924, *Wheat*.

(*b*) Series D.

Red clover had been sown in the barley crop of 1922 on May 22nd, and it looked very well through the winter. It was twice cut for hay in 1923, viz., on June 25th and on August 13th, and "Red Standard" wheat, 3 bushels per acre, was drilled October 18th. It came up fairly well, but was rather slow in growth. The cake-fed plot looked rather better than that corn-fed. The crop improved towards harvest and was cut August 26th and carted September 2nd. The results were :—

	Clover, 1923			Wheat, 1924			
	Yield per Acre			Head Corn		Tail Corn	Straw, Chaff, &c.
	1st Cut	2nd Cut	Total	Yield per acre	Weight per bushel	Weight	
	cwt.	cwt.	cwt.	bushels	lb.	lb.	cwt.
Corn fed	34·0	13·5	47·5	19·3	54·0	20	13·2
Cake fed	35·1	13·3	48·4	19·5	55·8	20	16·0

The differences are not significant, but it must be remembered that no cake or corn had been fed since 1916.

4. *Green-manuring Experiments.*

(*a*) Stackyard Field. Series A.

1923.

As noticed in the 1922 report, a change in these plots was introduced in 1922, they being now so arranged that every year there will be a corn crop on one-half of the area and a green-crop on the other half.

Upper Half.—The green crops grown and fed off by sheep in July and October, 1922—1½ cwt. of cotton cake per acre being given as well—were followed by wheat—"Red Standard"—which was drilled on November 9th at the rate of 2½ bushels per acre. On December 15th 3 cwt. per acre of superphospate were given to the wheat. It was never more than a poor crop, but now, for the first time, the wheat after tares seemed to be better than that after mustard. It was cut August 13th, stacked August 21st, and threshed November 15th.

The results were :—

Plot		Head Corn		Tail Corn	Straw, Chaff, etc.
		Yield per acre	Weight per Bushel	Weight	
		bushels	lb.	lb.	cwt.
1	After Tares fed off	8·0	62·3	9	9·3
2	After Mustard fed off ...	5·6	62·0	8	5·3

https://doi.org/10.23637/ERADOC-1-116

The crops were miserably small, and it is hard to understand how they came to be so, seeing that not only were two crops of tares and mustard respectively fed off on the land, but that 1½ cwt. of cotton cake per acre were given as well to the sheep. Yet a wheat crop of only 8 bushels per acre was the result. For the first time, however, in the history of the experiment, a slight superiority was shown with the tares as compared with the mustard, similarly fed.

Lower Half.—Here tares were drilled—2 bushels per acre—on November 3rd, 1922, and were fed off by sheep receiving also 3 cwt. cotton cake per acre (increased from the 1½ cwt. per acre of former years). It was only possible to take one crop of tares. Two crops of mustard, however, were grown, the seed being sown on May 4th, 1923, and on August 4th, at the rate of 20 lb. per acre. Each crop was similarly fed off with cake, and, after ploughing the land, wheat was sown.

1924.

On the upper half, green crops followed the wheat of 1923. Previous to their sowing, an application of two tons of lime per acre was given to one half of each acre plot—September 25th, 1923. Tares—2 bushels per acre were drilled on March 19th. 1924, and gave an excellent crop. Mustard—20 lbs. per acre—was sown broadcast on May 30th, and also grew well. Sheep were put on the mustard on July 22nd, and passed on to the tares on August 12th, consuming on each plot 3 cwt. per acre of cake (half linseed and half cotton cake). Only one green crop of each kind was grown, and after the sheep had eaten these off, the plots were ploughed up in October and wheat again sown.

On the lower half, wheat (" Red Standard ") was drilled on November 5th, 1923, at the rate of 3 bushels per acre. It showed about the middle of December and grew well right on to May, 1924, the wheat after tares looking decidedly better than that after mustard, and being as good as, or even better than, any other wheat plot on the field. After this however came the usual falling off, and by the middle of June the wheat looked poor and short in straw on both plots. It was cut on August 14th, carted September 2nd, and threshed just before Christmas.

The yields were :—

Plot		Head Corn		Tail Corn	Straw, Chaff, etc.
		Yield per Acre	Weight per bushel	Weight	
		bushels	lb.	lb.	cwt.
1	After Tares fed off	7·3	57·0	6·0	8·7
2	After Mustard fed off ...	9·1	57·7	6·5	9·5

Thus the old order of things—broken in 1923—was restored, the mustard once more showing itself the better preparation, though both crops were miserably and unaccountably poor, the wheat crop on Series D (Rotation) in the same field being 19.5 bushels per acre.

https://doi.org/10.23637/ERADOC-1-116

(*b*) *Lansome Field.*

On the extended area, now consisting of five plots, wheat followed the ploughing-in of the green crops, 5 cwt. of basic slag and 1 cwt. of sulphate of potash per acre having been previously (1921) given to these crops. "Red Standard" wheat—2½ bushels to the acre—was drilled on all the plots on October 25th, 1922. Throughout the period of growth the crop looked better on the tares plots than on the mustard ones, and these appearances were borne out at harvest. The crop was cut August 14th, stacked August 21st, and threshed November 12th, 1923.

The results were :—

		Head Corn		Tail Corn	Straw, Chaff, etc.
		Yield per Acre	Weight per bushel	Weight	
	Plot	bushels	lb.	lb.	cwt.
Old Plots	1. After Mustard ploughed in	6·9	63·0	8	8·9
	2. After Tares ploughed in ...	7·0	63·2	8	12·4
New Plots	3. After Mustard ploughed in	7·2	63·0	6	9·3
	4. After Tares ploughed in ...	7·2	63·2	6	13·9
	5. Control (no green crop) ...	5·7	63·2	4	8·6

The differences in weight of corn are but small, but the tares have, in each case, given appreciably more straw, and the general tendency is to confirm the results in Stackyard Field. At the same time, the crops are unaccountably small, and, following on work carried out with these soils in the Pot-culture Station, it was decided to lime one-half of each series in Lansome Field and Stackyard Field, and to see whether the small crops obtained might not be due to the poverty of the soils in lime.

1924.

Lime, as contemplated above, was given to one-half of all the plots on September 25th, 1923, at the rate of 2 tons per acre. Tares—2 bushels per acre—were sown on March 29th, 1924, and mustard—20 lb. per acre—on May 29th. The green crops were decidedly better on the new plots than on the old ones. They were ploughed in on July 31st and second crops sown on August 19th, these being, in turn, ploughed in green, September 26th-30th, and wheat sown.

5. *Malting Barley Experiments.*

1923.

The field chosen was Butt Close, a light sandy loam. The area used had previously carried a moderate crop of swedes, to which farmyard manure had been given.

The barley was drilled on April 10th at the rate of 2½ bushels per acre, the manures being put on the same day. The barley came up nicely and promised to be an excellent crop. Early in June the control, plot 1, looked a bit patchy, while plot 5 (no nitrogen) was much less vigorous than plots 2, 3 and 4. These appearances continued until July. The crop was cut and shocked August 30th-31st. Pots 2—5 were all dead ripe. Plot 1 had a fair proportion of green or only partially ripe straw.

https://doi.org/10.23637/ERADOC-1-116

1924.

The experiment of 1924 was in Stackyard Field, following oats. "Plumage Archer," as before, was drilled—3 bushels per acre—on March 11th, the various manures being applied at the same time. The barley grew well. The plot to ripen quickest was plot 2 (complete manuring), and the phosphate plot (3) ripened more quickly than the potash one (2).

The barley was cut on August 12th.

The yields generally were lower than in 1923 and the relative yields of the no-phosphate and no-potash plots are reversed in the two years. The results for the two years are given in the following table :—

Manures per Acre	1923				1924			
	Head Corn		Tail Corn	Straw, Chaff, etc.	Head Corn		Tail Corn	Straw, Chaff, etc.
	Yield per acre	Weight per bushel	Weight		Yield per acre	Weight per bushel	Weight	
	bushels	lb.	lb.	cwt.	bushels	lb.	lb.	cwt.
No Manure	35·1	53·3	9·5	21·0	22·5	52·9	22·0	11·2
Superphosphate 3 cwt., Sulphate of Potash 1½ cwt., Sulphate of Ammonia 1 cwt.	43·4	55·6	9·0	21 0	29 4	53·1	26·0	17·85
Superphosphate 3 cwt., Sulphate of Ammonia 1 cwt.	41·0	55·5	10·0	21·2	32 8	52·7	26·0	18·25
Sulphate of Potash 1½ cwt., Sulphate of Ammonia 1 cwt.	38·8	55·0	10·0	17·75	38·8	53·5	30·0	21·45
Sulphate of Potash 1½ cwt., Superphosphate 3 cwt.	31·9	53·5	6·0	14·4	27·3	53 7	18·0	15·6

6. *Experiments with Sulphate and Muriate of Ammonia.*

Comparisons of these two manures were carried out in 1923 on wheat and barley and in 1924 on wheat, mangolds and swedes. The details of cultivation, etc., follow. In each experiment 1 cwt. of sulphate of ammonia and the equivalent quantity of muriate were employed :—

Wheat, 1923 : Road Piece, thin light sandy loam. Drilled, 2½ bushels per acre, October 23rd, 1922. Top dressings applied May 31st. Cut August 10th, the previous crop being "seeds," ploughed in. No basal manuring was given.

Barley, 1923 : Butt Close, light sandy loam. Drilled, 2½ bushels per acre, April 10th. Top dressing applied June 2nd. Cut August 30th. Previous crop, swedes fed off with sheep.

Wheat, 1924 : Great Hill, light sandy loam. Drilled, 3 bushels per acre, November 1st-2nd, 1923. Top dressing applied June 3rd. Cut August 15th-18th. Previous crop, red clover (cut twice).

Mangolds, 1924 : Warren Field, Oxford clay. Dung, 8 tons per acre, April 26th. Super, 2 cwt. and Kainit 3 cwt. per acre, May 13th, seed drilled 6 lb. per acre, May 15th. Top dressings applied July 22nd-23rd. Roots pulled November 15th-25th.

https://doi.org/10.23637/ERADOC-1-116

Swedes, 1924: Warren Field, Oxford clay. Dung 12 tons per acre, May 10th-15th. Super 4 cwt. and Kainit 4 cwt., May 16th, seed drilled 5 lb. per acre, June 23rd. Roots pulled January 1st-23rd, 1925.

Note.—The swedes and mangolds experiments were subjected to heavy rainfall and flooding during May (p. 78).

The results follow :—

Crop	Plot	Produce per Acre			
		Head Corn		Tail Corn	Straw, etc.
		Yield per Acre	Weight per Bushel	Weight	
		bushels	lb.	lb.	cwt.
Wheat, 1923...	2. Control	15·6	61·0	17	11·3
	1. Sulphate of Ammonia ...	17·6	61·5	13	13·1
	3. Muriate of Ammonia ...	19·8	61·5	16	14·8
Barley, 1923...	2, 5 Control	36·6	53·5	6	17·0
		35·6	53·7	6	18·9
	1, 4 Sulphate of Ammonia ...	41·6	53·7	9	19·9
		40·0	53·8	10	19·4
	3, 6 Muriate of Ammonia ...	46·7	54·0	7	22·5
		45·5	53·9	8	21·1
Wheat, 1924...	1. Sulphate of Ammonia ...	43·0	57·3	20	32·2
	2. Muriate of Ammonia ...	45·8	56·8	22	34·4

		Mangolds	Swedes
		Tons	Tons
Mangolds and Swedes, 1924	1. Dung and Minerals only	11·85	14·56
	2. Dung and Minerals with Sulphate of Ammonia	14·07	17·21
	3. Dung and Minerals with Muriate of Ammonia	12·85	15·76
	4. Dung and Minerals with Muriate of Ammonia	12·87	16·80

Although the differences in some cases are small, it appears that for corn the muriate gives a bigger yield than sulphate of ammonia, while the reverse holds for roots.

7. *The Relative Values of Lime and Chalk for Liming Purposes* (Stackyard Field). Series B.

1923.

This experiment—one conducted on the crops of an ordinary 4-course rotation—was started in 1919, when 12 plots in Stackyard Field, each one-sixth of an acre in extent, were set out in two series, the one consisting of plots to which caustic (burnt) lime was given in different quantities, the other of plots which received ground chalk in quantities supplying the same amount of lime (CaO) as given to the corresponding caustic lime plots. There were also two unlimed plots.

https://doi.org/10.23637/ERADOC-1-116

The lime and chalk were spread in January, 1919, and the land ploughed.

The crops were :—1919, barley; 1920, swedes; 1921, barley; 1922, tares followed by mustard; 1923, oats. The ordinary course of cultivation, manuring, etc., was followed over the whole area, the only difference being in the application of lime or of chalk.

It would naturally take some time for the lime and chalk to distribute themselves fairly over the soil; for the first few years there was little beyond the general indication that lime produced rather the better crop; this was the case with the swedes of 1920 and the barley of 1921; the tares of 1922 and subsequent mustard crop were fed off by sheep and not weighed. Black Winter oats followed as the crop of 1923, and were drilled on October 31st at the rate of 4 bushels per acre. The crop was cut August 2nd-3rd, stacked August 16th, and threshed November 12th and 13th, 1923.

The harvest results were as follows :—

Plot	Applications per acre	Head Corn		Tail Corn	Straw, Chaff, etc.
		Yield per acre	Weight per bushel		
		bushels	lb.	lb.	cwt.
1	No Chalk	22·1	38·0	3·5	8·5
2	Chalk = 10 cwt. Lime	19·9	39·0	2·5	7·3
3	,, = 1 ton Lime	20·6	37·5	3·0	7·6
4	,, = 2 tons ,, ...	24·9	37·2	3·5	8·7
5	,, = 3 ,, ,, ...	28·1	36·7	4·5	10·6
6	,, = 4 ,, ,, ...	26·2	36·5	3·5	9·0
7	No Lime	23·0	38·5	3·5	7·8
8	Lime, 10 cwt.	26·2	39·0	4·0	8·5
9	,, 1 ton	30·9	39·0	4·5	10·6
10	,, 2 tons	26·8	39·0	4·0	10·9
11	,, 3 ,, ...	31·1	38·5	3·5	11·1
12	,, 4 ,, ...	25·7	38·5	3·5	10·1

These results, taken as a whole, run very consistently, and point to what had been previously noticed, viz., that the lime series gave better crops than the chalk. Adding up the chalk series, a total of 141.8 bushels of corn is shown as against 163.7 bushels with the lime series. The duplicate unlimed plots are in very fair agreement. The lime series shows a more or less regular increase as more lime is added, up to 4 tons per acre, which latter amount would appear to be too much. With the chalk plots there is a similar, though not so marked, increase. The increase from lime is equally marked in the straw as in the corn.

It is worthy of remark that the exact duplicate of these observations is to be found in the pot-culture experiments on the same subject (see page 94).

Examining the stubble after harvest, it was noticed that, as the quantity of lime or chalk was increased, so the spurry became less and less prominent, and its absence was more marked on the limed plots.

https://doi.org/10.23637/ERADOC-1-116

1924.

After the oat crop of 1923 swedes were to follow. These were put in—June 12th—with 5 cwt. superphosphate and 1 cwt. sulphate of potash per acre, and came a fair plant. The lime plots looked, throughout, somewhat superior to the chalk ones. The roots will be weighed and then fed off on the land by sheep.

11. RAINFALL AT WOBURN EXPERIMENTAL FARM, 1923 and 1924.

(292 ft. above Sea Level.)

1922-23			1923-24		
Month	Total inches	No. of days with ·01 in. or more recorded	Month	Total inches	No. of days with ·01 in. or more recorded
1922			1923		
October	0·76	14	October	3·58	23
November	1·07	11	November	1·25	15
December	2·38	18	December	2·37	20
1923			1924		
January	1·28	13	January	2·25	21
February	3·04	25	February	0·48	12
March	2·10	17	March	0·69	9
April	1·50	12	April	2·71	13
May	1·63	17	May	6·05	20
June	0·53	10	June	2·33	15
July	3·52	12	July	3·06	17
August	3·02	12	August	2·31	17
September	2·48	12	September	3·17	19
Total	23·31	173	Total	30·25	201

POT-CULTURE EXPERIMENTS, 1923.

1. *The Hills' Experiments.* (*a*) Lead Chloride. (*b*) Uranium Compounds.

(*a*) Lead Chloride.

In 1922, work with different compounds of lead had shown that, for wheat, 1% of lead as the oxide, carbonate, or sulphate, was not toxic, but that with lead chloride, so soon as .25 per cent. of lead was exceeded, a toxic effect was produced. It was thought well to continue the lead chloride series for a second year. At the same time a fresh series was started, using lead chloride in smaller and intermediate amounts.

i—Old Series.

The quantities of lead used in 1922 were .25 per cent., .50 per cent., and 1 per cent., as chloride. The soil was from Stack-yard Field, and the salts were mixed with the whole of the soil

https://doi.org/10.23637/ERADOC-1-116

in a pot, each experiment being in duplicate. In 1922, .25 per cent. of lead had produced a crop somewhat in excess of the control, but with .50 per cent. only a few stunted plants were left, and with 1 per cent. everything was killed.

Wheat was sown again in the old pots on December 23rd, 1922, after the soil had been turned out, sieved, and replaced. The plants came up quite well with the .25 per cent. and .50 per cent., but with 1 per cent. only a few weak plants appeared, and these gradually died off. For a time the .25 per cent. and the .50 per cent. looked about as good as the control, but about July, 1923, the .50 per cent. began to show a marked toxic effect. The crops when reaped gave the following comparative results :—

Lead Chloride upon Wheat, 1923. (2nd year).

Treatment	Corn	Straw
Untreated	100	100
Lead Chloride ·25 per cent Lead	79	92
,, ,, ·50 ,, ,, ,, ...	3	37
,, ,, 1·0 ,, ,, ,, ...	—	—

From this it is clear that the toxic influence of 1 per cent. and .50 per cent. of lead used as chloride will continue for a second year, and that even .25 per cent. will show, in a second year, some ill effect. It is true that in the first year .25 per cent. gave some increase of crop, but it has to be remembered that then some of the plants were destroyed, while the rest, as is often the case with pot experiments, developed abnormally. In the form of chloride 0.25 per cent. of lead must, therefore, be considered harmful.

ii—New Series.

The quantities decided on were .20 per cent., .30 per cent., .40 per cent. and .50 per cent. of lead as chloride. The soil now used was from Lansome Field, and the salts were mixed with the whole soil; experiments were, as usual, in duplicate.

The wheat was sown on December 23rd, 1922, and came up well in all the pots, none of the plants being killed off. The .20 per cent. application, and possibly the .30 per cent., seemed to show an improvement on the control, but with the higher amounts there was a gradual diminution. The crops were cut on August 13th, when they gave the following comparative returns :—

Lead Chloride upon Wheat, 1923.

Treatment	Corn	Straw
Untreated	100	100
Lead Chloride ·20 per cent Lead	126	124
,, ,, ·30 ,, ,, ,, ...	129	119
,, ,, ·40 ,, ,, ,, ...	70	83
,, ,, ·50 ,, ,, ,, ...	14	37

https://doi.org/10.23637/ERADOC-1-116

The results in general were not as marked as in 1922 when, however, a different soil was used. But the results are in each case in the same direction and tend to show that lead as chloride will be toxic, and almost entirely destroy a crop at a concentration of .50 per cent. It was noticed after removal of the soil from the pots at the close of the experiment that, with the higher concentrations, viz., .50 per cent. and 1 per cent., a deposit of metallic lead formed round the edge of the soil on the inside of the pots.

(*b*) Uranium Compounds.

In 1919, experiments had been made with ores stated to be "radio-active," but no benefit was found from their use. As the activity of these ores was believed to be dependent upon the presence of compounds of uranium, experiments were made with salts of this metal. Wheat was used, and the soil was from Lansome Field. The oxide (as sodium diuranate) and uranyl chloride, sulphate and nitrate were tried, each concentration supplying .05 per cent. and .10 per cent. respectively of uranium. The quantities were mixed with the whole of the soil in each pot, these being filled on December 19th-20th, 1922, and sown with wheat on December 23rd.

Germination was quicker with the untreated pots. The poorest lots were those with the chloride and sulphate. About the end of April the treated pots improved. The absence of sun in May prevented any marked change, except that in some cases —chiefly with the sulphate and chloride—one or two plants developed abnormally. The wheat was cut on August 13th, and the comparative results obtained were :—

Uranium Compounds on Wheat, 1923.

Treatment	Corn	Straw
Untreated	100	100
Sodium diuranate containing Uranium ·05 per cent. ...	95	102
,, ,, ,, ,, ·10 ,, ...	126	120
Uranyl chloride ,, ,, ·05 ,, ...	78	88
,, ,, ,, ,, ·10 ,, ...	74	68
Uranyl sulphate ,, ,, ·05 ,, ...	76	84
,, ,, ,, ,, ·10 ,, ...	6	9
Uranyl nitrate ,, ,, ·05 ,, ...	96	99
,, ,, ,, ,, ·10 ,, ...	100	146

With the doubtful exception of the .1 per cent. dose of sodium diuranate, uranium had no good effect, and in most forms it was actually harmful.

2. *Green-manuring Experiments.*

New interest having been aroused in the subject of green-manuring, it was decided to revert to the experiments at the Woburn Pot-culture Station which had been previously carried on in conjuncion with the Field Experiments, but which had been temporarily suspended.

Briefly to recapitulate, field experiments conducted on Lansome Field since 1895, and on Stackyard Field since 1911, had shown that, without exception, better cereal crops (both of wheat

https://doi.org/10.23637/ERADOC-1-116

and of barley) followed the ploughing-in, or the feeding-off, of mustard than of tares, this being contrary to what would be expected from scientific considerations as to the power of tares to utilise atmospheric nitrogen, a power not possessed by the mustard crop.

Whether this unexpected result was due to the particular nature of the soil in question or to considerations of moisture, mechanical condition, etc., was unknown, though one set of experiments conducted at the Pot-culture Station seemed to point to the fact that if the tares were plentifully supplied with water all through the growing period, then they would give the better succeeding cereal crop. Such conditions, however, could not obtain in practice, and the experiments had no further interest beyond showing that the experience of the superiority of tares on a heavy soil, where moisture is better retained, may in this way be accounted for. Repeated analyses of the soils and of the crops grown and ploughed in or fed off had shown more nitrogen to accrue from the growing of tares than of mustard, and yet, for some reason, it could not be utilised for the following corn crop.

1923.

In renewing the enquiry by pot-culture methods, it was now determined to try the addition to the soils of the respective plots (the soil being taken direct from the plots in the fields), of materials such as lime, superphosphate, and sulphate of potash, and to see if these brought about any change.

The quantities so added were :—

Lime	... ...	at the rate of	2 tons	per acre.
Superphosphate (30%)	,,	,,	3 cwt.	,,
Sulphate of potash (90%)	,,	,,	1 cwt.	,,

These were used both singly and, in a fourth instance, all of them together. The additions were given to the soils previous to sowing of wheat, they being mixed with the whole of the soil, and wheat was sown on December 23rd, 1923.

In the case of Stackyard Field soil, the green crops had been fed off by sheep in 1922; in that of Lansome Field the green crop had been ploughed in. In each field wheat had been sown in November (1922), so that the crops in the field and at the Pot-culture Station were in the same stage.

(*a*) Stackyard Field Soil.

The plants grew satisfactorily, and up to the middle of February no changes were noticeable. Then, however, the tares series as a whole looked rather better than the mustard. Also the pots in which lime had been used, either alone or in conjunction with the two mineral manures, began to show to advantage, both with tares and with mustard; these differences remained more or less throughout the summer. The influence of superphosphate and of sulphate of potash was hardly apparent.

The weather was very unfavourable in June, and when warmer weather came in July it was almost too late to allow the plants to benefit fully.

It should be noted here that the entire Stackyard Field series was somewhat inferior to the Lansome Field series.

https://doi.org/10.23637/ERADOC-1-116

(*b*) Lansome Field Soil.

Much the same comparative observations as just recorded were made in this series, the crops being, however, as stated, slightly superior to the Stackyard Field soil ones.

After threshing in November, the following comparative results were obtained :—

Green-manuring Experiment—Wheat after green crops, 1923.

	(*a*) Stackyard Field Soil		(*b*) Lansome Field Soil	
	Corn	Straw	Corn	Straw
i. Wheat after Tares.				
Untreated	100	100	100	100
Lime—2 tons per acre	143	166	202	174
Superphosphate—3 cwt. per acre ...	97	96	91	92
Sulphate of Potash—1 cwt. per acre	99	96	83	96
Lime, Superphosphate and S/Potash	153	160	174	177
ii. Wheat after Mustard.				
Untreated	100	100	100	100
Lime—2 tons per acre	244	206	327	205
Superphosphate—3 cwt. per acre ...	99	133	125	91
Sulphate of Potash—1 cwt. per acre	101	117	128	103
Lime, Superphosphate and S/Potash	233	191	275	179

These results are most consistent and point clearly to the benefit resulting from the use of lime. This is the case with both soils and with both green crops. Superphosphate and sulphate of potash, on the other hand, produced no benefit in either, and the advantage obtained in the mixed dressing was clearly due to the lime.

Taking the actual crop returns and not those stated in the Table (given in percentages of the untreated produce), there was no very marked difference between the tares soil and the mustard soil. The actual weights for the untreated and limed pots were :—

	Stackyard Field Soil		Lansome Field Soil	
	Corn	Straw	Corn	Straw
i. Wheat after Tares.	grammes	grammes	grammes	grammes
Untreated	13·9	20·3	11·8	18.6
Limed	19·9	33·3	23·8	32·4
ii. Wheat after Mustard.				
Untreated	8·3	14·0	8.3	17·7
Limed	20·3	28·7	27·2	36·1

In pot-culture work, too much importance must not be attached to actual crop-weighings, and the above results must be taken purely as an indication, but a very clear one, as to the benefit likely to accrue from liming both lands and both sets of plots. Whether doing this will result in bringing out in practice differences between the two green crops, remains to be seen; but. acting upon the above results, it was determined to lime one half of each of the plots in Stackyard Field and Lansome Field in the winter of 1923, lime being put on at the rate of 2 tons per acre, the other halves being left unlimed.

https://doi.org/10.23637/ERADOC-1-116

1924.

The experiment was carried on for a second year, the green crops, tares and mustard, being grown, but no further manurial applications given. The green crops were sown on March 26th, and were cut June 23rd, the weights, both green and dry, being recorded. There is no occasion for dealing with these in detail, but it may be said generally that the differences were not marked; what indications of increased crop were given bore, as with the wheat of 1923, on the result of applying lime or a complete manure including lime.

3. *The Relative Values of Lime and Chalk.*

1923.

In previous experiments on this subject the soil had not had any applications given it beyond the lime and chalk respectively. The experiment was therefore repeated, with the addition of superphosphate and sulphate of potash, at the rates of 3 cwt. and 1 cwt. per acre respectively. The soil used came, not from Stackyard Field as usual, but from Lansome Field. The 40-lb. pots were filled with soil, the whole of which was previously mixed with lime or with chalk, so as to give the equivalent of 10 cwt., 1 ton, 2 tons, 3 tons and 4 tons of lime per acre. The superphosphate and sulphate of potash were added to the top 16 lb. of soil used, wheat being sown on December 22rd.

All the plants came up well. About the middle of March, both lime, and to a lesser extent chalk, showed a clear improvement over the control (unlimed) pots. In the case of the lime applications the improvement was greater with the heavier dressings. This held good until July, when the lime series showed a progressive increase of crop up to 3 tons, but with 4 tons the crop was shorter, though individual plants were greener and stronger. With chalk, however, though there was a general increase over the control, the heavier applications were not better than the 10 cwt. per acre. The crop was cut on August 13th, and the following comparative results were obtained :—

Lime and Chalk upon Wheat—Lansome Field Soil, 1923.

Treatment	Corn	Straw
No Lime	100	100
Lime (CaO) 10 cwt. per acre	129	125
,, ,, 1 ton ,, ,,	140	145
,, ,, 2 tons ,, ,,	191	183
,, ,, 3 ,, ,, ,,	228	225
,, ,, 4 ,, ,, ,,	207	254
Chalk = 10 cwt. CaO ,, ,,	137	128
,, = 1 ton ,, ,, ,,	126	135
,, = 2 tons ,, ,, ,,	139	132
,, = 3 ,, ,, ,, ,,	141	129
,, = 4 ,, ,, ,, ,,	157	141

The weights are in close accordance with the appearances already discussed, and with previous experiments made with the

https://doi.org/10.23637/ERADOC-1-116

soil of Stackyard Field, and show that the gains already recorded do not depend upon the presence or absence of phosphates and potash, but are the direct result of the applications of lime and chalk respectively.

1924.

A return was made in 1924 to Stackyard Field soil, phosphates and potash being used additionally as in 1923. The same amounts of lime and chalk were used as in 1923, and mixed, as then, with the top six inches of soil. An addition of ground limestone, at the rate of 1 ton and 2 tons per acre respectively, was, however, made this year. Wheat was sown on December 18th, 1923. It was noticed that the higher amounts of chalk retarded the germination, but eventually all plants came well. By April the lime pots showed an increasing improvement up to 3 tons per acre, a slight drop occurring with 4 tons. The chalk pots, on the other hand, were not so good, but more level, while limestone showed no increase.

These appearances were maintained more or less to the end of the growing period, and the crops were cut on August 18th. The recorded comparative results were :—

Lime and Chalk upon Wheat—Stackyard Field Soil, 1924.

Treatment	Corn	Straw
No Lime	100	100
Lime (CaO) 10 cwt. per acre	113	100
,, ,, 1 ton ,, ,, ...	136	133
,, ,, 2 tons ,, ,, ...	145	167
,, ,, 3 ,, ,, ,, ...	168	196
,, ,, 4 ,, ,, ,, ...	179	194
Chalk = 10 cwt. CaO ,, ,, ...	94	88
,, = 1 ton ,, ,, ,, ...	94	79
,, = 2 tons ,, ,, ,, ...	101	94
,, = 3 ,, ,, ,, ,, ...	99	93
,, = 4 ,, ,, ,, ,, ...	92	78
Ground Limestone 1 ton per acre	84	72
,, ,, 2 tons ,, ,, ...	85	76

The results again confirm the preceding ones, and also indicate that limestone is ineffectual in the first year.

4. *Magnesia and Magnesium Carbonate on Wheat,* 1924.

As a counterpart of the last-named experiment, a repetition of earlier experiments with magnesia and magnesium carbonate on Stackyard Field soil was made in 1924, phosphates and potash being given also, magnesium limestone also being added to the series. The applications were mixed, as before, with the top six inches of soil, and the respective quantities used were the same as in the lime and chalk experiment (3). Wheat was sown on December 18th, 1923.

From the beginning, magnesia in the higher amount exercised a bad effect upon the young plants, this not being apparent

https://doi.org/10.23637/ERADOC-1-116

with magnesium carbonate. By the end of May, 1924, all the plants in the 2, 3 and 4 tons per acre of magnesia lots were killed. One ton per acre showed some ill effect at first, but the crop recovered. With magnesium carbonate there was no failure, but, on the contrary, a slight proportional increase all round.

The crops were cut on August 18th, and the comparative results were :—

Magnesia and Magnesium Carbonate upon Wheat—Stackyard Field Soil, 1924.

Treatment	Corn	Straw
No Magnesia	100	100
Magnesia (MgO) 10 cwt. per acre	185	189
,, ,, 1 ton ,, ...	180	216
,, ,, 2 tons ,, ...	—	—
,, ,, 3 ,, ,, ...	—	—
,, ,, 4 ,, ,, ...	—	—
Magnesium Carbonate = 10 cwt. MgO per acre	148	158
,, ,, ,, = 1 ton	191	199
,, ,, ,, = 2 tons	201	230
,, ,, ,, = 3 ,, ...	226	240
,, ,, ,, = 4 ,, ...	191	235
Ground Magnesian Limestone = 1 ton per acre	108	108
,, ,, ,, 2 tons	108	108

The Table shows that an increase of crop is given with a half-ton and 1 ton of magnesia, but that 2 tons per acre or more will absolutely kill a wheat crop, whereas higher amounts of magnesia as carbonate will improve the crop. Magnesian limestone, however, is ineffective, at least in the first year.

These experiments on lime and magnesia (3 and 4), confirmed, as they have been, on different soils of the farm, and with and without mineral manures, leave no doubt that there is a very marked difference between the effect of caustic lime and that of carbonate of lime, and again, between lime and magnesia. Caustic lime has clearly been proved to be a far more active form than chalk, and, while its addition, within reason—say up to 2 and 3 tons per acre—will produce much benefit on land requiring lime, magnesia, in the caustic state, will in that amount prevent the growth of the crop. The further information is now given that ground limestone, be it magnesian or not, exercises no influence, for a time at least.

These experiments have now been, in the main, so frequently repeated, and with like general results, as to leave practically no room for doubt as to their bearing on agricultural practice, and on the respective use of caustic lime, chalk, caustic magnesia or carbonate of magnesia. Incidentally, as I have pointed out elsewhere, they have a marked bearing on the practical treatment of land which contains magnesia in excess of the lime present.

https://doi.org/10.23637/ERADOC-1-116

5. *Sulphate of Ammonia and Muriate of Ammonia Compared.*

Along with the field experiment on this subject (see page 86) a similar one was carried out at the Pot-culture Station. The soil was from the headland of Stackyard Field, the crop, wheat. A dressing of superphosphate and sulphate of potash was given to each lot at sowing time, and the ammonia salts were given later as top-dressings. These latter consisted of sulphate of ammonia, 1 cwt. per acre, and muriate of ammonia equivalent in ammonia to 1 cwt. per acre of sulphate of ammonia.

Wheat was sown on December 23rd, 1922; the top-dressings were given on June 11th. Towards the end of July the muriate pots looked the better, though the ripening of the crops was retarded.

The crops were cut on August 14th and gave the following comparative returns :—

Sulphate of Ammonia and Muriate of Ammonia, 1923.

Applications per acre	Corn	Straw
Superphosphate 3 cwt. + S/Potash 1 cwt.	100	100
Superphosphate 3 cwt. + S/Potash 1 cwt. + S/Amm. 1 cwt.	145	131
Superphosphate 3 cwt. + S/Potash 1 cwt. + M/Amm. = 1 cwt. of S/Amm.	171	138

The results were confirmatory of the field ones, and indicated the superiority of the muriate in the case, at least, of corn crops.

https://doi.org/10.23637/ERADOC-1-116

ERRATA

Page 100. Harvest 1924, line 5, for 28 tons read 8 tons.

Page 102. Conversion Table, line 2, for 0.346 Hectolitre (36.346 litres) read 0.364 Hectolitre (36.364 litres).

Page 114. Malting Barley, 1923, line 4, column 5, for 1265 read 1625.

Page 122. Clover, 1924, in last six columns for cwt. read lb.

https://doi.org/10.23637/ERADOC-1-116

DATES OF SOWING AND HARVESTING (Harvest 1923).

Field.	Crop.	Variety.	Sowing began.	Sowing finished.	Cutting began.	*Carting began.	*Carting finished.	Yield per Acre.
Great Knott, east ...	Fallow	... ...	... ...	... ...	... ...	... ...	... ...	... ...
,, west ...	Wheat	Red Standard	Oct. 27, '22	Oct. 30, '22	Aug. 10	Aug. 22	Sept. 3	37·5 bush.
Little Knott	Potatoes	Kerr's Pink	May 11, '23	May 17, '23	... ...	Oct. 29	Oct. 29	see p.118
Foster's, east	Mangolds* ...	Prizewinner Yellow Globe ...	May 2, '23	May 10, '23	... ...	frosted		... ...
,, west	Swedes	Hurst's Monarch	May 15, '23	May 23, '23	... ...	Oct. 20	Nov. 8	14·3 tons.
West Barnfield	Oats	Grey Winters ... ... White Winters	Oct. 12, '22	Oct. 13, '22	Aug. 2	Aug. 13	Aug. 14	48·0 bush.
Long Hoos, east ...	Barley	Plumage Archer	Apr. 18, '23	Apr. 18, '23	Aug. 16	Sept. 3	Sept. 6	32·0 bush.
,, west ...	Clover	Red	May 10, '22	May 10, '22	July 2	July 13	July 14	1·4 tons.
New Zealand	Clover	Red	May 2, '22	May 4, '22	June 25	July 3	July 18	
Stackyard	Clover	Red	May 5, '22	May 16, '22	June 29	July 9	July 19	
Great Harpenden ...	Wheat	Red Standard	Nov. 16, '22	Nov. 30, '22	Aug. 13	Aug. 22	Aug. 29	24·0 bush.
Sawpit	Oats	Black Winters ... ... Grey Winters	Oct. 10, '22	Oct. 12, '22	July 27	Aug. 10	Aug. 11	42·5 bush.
Sawyers	Barley	Plumage Archer	Apr. 18, '23	Apr. 19, '23	Aug. 21	Sept. 6	Sept. 7	40·0 bush.
	Potatoes ...	Kerr's Pink	May 4, '23	May 5, '23	... ...	Nov. 1	Nov. 17	see p.121
	Fallow	... ...	... ...	... ...	... ...	... ...	... ...	... ...
Broadbalk	Wheat	Red Standard	Oct. 31, '22	Nov. 1, '22	Aug. 15	Aug. 27	Aug. 28	see p.108
Little Hoos	Clover	Red ... ... 1st Crop	May 8, '22	May 9, '22	June 28	July 6	July 7	,, 112
		2nd Crop	... ...	... ...	Aug. 25	Sept. 5	Sept. 5	,, 112
Hoos	Barley	Plumage Archer	Apr. 20, '23	Apr. 20, '23	Aug. 22	Sept. 3	Sept. 6	,, 110
Barnfield	Mangolds ...	Prizewinner Yellow Globe ...	Apr. 30, '23	Apr. 30, '23	... ...	Nov. 17	Dec. 15	,, 103
Agdell	Wheat	Red Standard	Oct. 30, '22	Oct. 30, '22	Aug. 9	Aug. 17	Aug. 18	,, 102
Great Field	Grass	... ...	... ...	... ...	July 17	July 21	July 23	,, 124
Park	Grass	... 1st Crop	... ...	... ...	June 16	June 22	June 23	,, 104
		2nd Crop	... ...	... ...	Dec. 20	Jan.15'24	Jan.17'24	,, 104

* In the case of roots, the dates given are those on which lifting began and finished.

DATES OF SOWING AND HARVESTING (Harvest 1924).

Field.	Crop.	Variety.	Sowing began.	Sowing finished.	Cutting began.	*Carting began.	*Carting finished.	†Yield per Acre.
Great Knott, east ...	Oats	Black Winter	Oct. 16, '23	Oct. 17, '23	Aug. 5	Aug. 23	Aug. 25	16 bush.
,, west ...	Oats	Grey Winter	Nov. 5, '23	Nov. 7, '23	Aug. 8	Aug. 25	Aug. 27	14 ,,
Little Knott	Barley	Plumage Archer	Mar. 14, '24	Mar. 17, '24	Aug. 20	Sept. 8	Oct. 17	28 ,,
Foster's, east	Swedes	Hurst's Monarch	May 28, '24	May 30, '24	... ...	Nov. 5	Nov. 28	25 tons
,, west	Potatoes ...	Kerr's Pink	May 6, '24	May 10, '24	... ...	Oct. 1	Nov. 4	28 ,,
	Mangolds ...	Prizewinner Yellow Globe ...	May 27, '24	May 28, '24	... ...	Nov. 17	Nov. 21	27 ,,
West Barnfield	Wheat	Red Standard	Nov. 1, '23	Nov. 3, '23	Sept. 4	Sept. 19	Sept. 22	24 bush.
Long Hoos, east ...	Clover	Broad Red	Apr. 18, '23	Apr. 19, '23	June 23	July 2	July 4	2.5 tons
,, west ...	Wheat	Red Standard	Oct. 19, '23	Oct. 20, '23	Aug. 22	Sept. 3	Sept. 5	28 bush.
Great Harpenden ...	Barley	Plumage Archer	Mar. 18, '24	Mar. 21, '24	Aug. 15	Aug. 28	Oct. 15	26 ,,
New Zealand	Wheat	Red Standard	Nov. 19, '23	Nov. 21, '23	Sept. 3	Sept. 18	Oct. 10	25 ,,
Stackyard	Wheat	Red Standard	Nov. 12, '23	Nov. 15, '23	Sept. 2	Sept. 16	Oct. 10	20 ,,
Sawpit	Barley	Plumage Archer	Apr. 4, '24	Apr. 5, '24	Sept. 1	Sept. 19	Oct. 7	26 ,,
Sawyers	Clover	Broad Red	Apr. 24, '23	Apr. 24, '23	June 24	July 5	July 8	1.5 tons
	Barley	Plumage Archer	Mar. 31, '24	Mar. 31, '24	Sept. 1	Sept. 24	Sept. 24	20 bush.
Broadbalk	Wheat	Red Standard	Nov. 9, '23	Nov. 12, '23	Sept. 5	Sept. 25	Oct. 3	see p. 109
Little Hoos	Wheat	Red Standard	Nov. 21, '23	Nov. 22, '23	Sept. 3	Sept. 22	Sept. 24	,, 112
Hoos	Barley	Plumage Archer	Mar. 17, '24	Mar. 18, '24	Aug. 26	Oct. 3	Oct. 10	,, 110
Barnfield	Mangolds ...	Prizewinner Yellow Globe ...	Apr. 25, '24	Apr. 25, '24	... ...	Oct. 27	Nov. 17	,, 103
Agdell	Turnips	Aberdeen Yellow	July 19, '24	July 19, '24	... ...	Nov. 28	Dec. 5	,, 102
Great Field	Hay	... ...	... ...	... ...	June 26	June 30	June 30	,, 124
Park	Grass	1st crop	... ...	... ...	June 24	June 27	June 28	,, 104

* In the case of roots, the dates given are those on which lifting began and finished. † Estimates of standing crops.

METEOROLOGICAL RECORDS, 1923 and 1924.

	Rain.		Drainage through soil.			Bright Sunshine.	Temperature (Mean).				
	Total Fall. $\frac{1}{1000}$ Acre Gauge.	No. of Rainy Days. (0·01 inch or more) $\frac{1}{1000}$ Acre Gauge.	20 ins. deep.	40 ins. deep.	60 ins. deep.		Max.	Min.	1 ft. in ground.	Solar Max.	Grass Min.
1923	Inches.	No.	Inches.	Inches.	Inches.	Hours.	°F.	°F.	°F.	°F.	°F.
Jan. ...	1·500	12	1·269	1·449	1·296	59·8	46·1	34·7	38·4	70·0	29·2
Feb. ...	3·914	23	3·510	3·598	3·346	53·5	46·0	36·8	40·6	77·7	32·4
Mar. ...	2·481	16	1·584	1·754	1·620	75·9	48·4	36·7	41·3	86·9	31·6
April ...	1·480	12	0·371	0·434	0·401	115·3	52·3	38·0	45·1	103·9	32·4
May ...	1·681	14	0·177	0·180	0·179	166·2	56·7	42·0	50·4	115·8	37·8
June ...	0·617	9	0·003	0·045	0·047	116·1	60·7	46·8	53·6	111·3	42·2
July ...	3·871	12	1·380	1·395	1·355	223·8	72·5	55·1	63·1	127·3	50·2
Aug. ...	2·329	11	0·342	0·375	0·295	256·9	68·5	51·1	60·7	124·1	44·8
Sept. ..	2·541	12	1·009	1·023	0·891	189·1	62·9	46·1	54·4	114·1	39·2
Oct. ...	4·974	23	3·691	3·691	3·452	98·3	55·4	43·9	50·0	96·1	39·0
Nov. ...	1·648	14	1·083	1·147	1·068	103·9	42·2	31·0	40·4	77·6	26·3
Dec. ...	2·932	19	2·630	2·592	2·467	42·3	42·6	31·4	37·0	60·5	28·1
Total or Mean	29·968	177	17·049	17·683	16·417	1501·1	54·5	41·1	47·9	97·1	36·1
1924											
Jan. ...	2·898	19	3·024	3·199	3·196	58·1	43·5	34·8	38·1	64·1	31·2
Feb. ...	0·714	12	0·045	0·097	0·087	54·8	40·2	31·5	36·9	67·3	28·4
Mar. ...	1·138	10	0·379	0·390	0·364	174·2	47·1	31·3	37·1	92·4	25·0
April ...	3·182	14	1·358	1·324	1·281	157·5	52·4	37·2	42·6	102·4	31·3
May ...	4·628	21	2·208	2·228	2·201	190·9	61·0	45·3	52·2	117·9	41·9
June ...	1·974	11	0·666	0·823	0·733	199·6	65·2	50·2	59·3	126·1	46·2
July ...	4·533	16	1·763	1·801	1·670	236·1	68·3	51·0	61·1	127·6	45·3
Aug. ...	2·551	22	0·080	0·095	0·056	169·0	64·8	50·5	58·7	121·6	46·6
Sept. ...	3·417	19	1·312	1·265	1·105	118·4	61·4	50·8	56·6	110·9	46·7
Oct. ...	4·279	21	3·549	3·494	3·333	89·9	55·3	45·3	51·3	89·9	40·3
Nov. ...	3·271	12	2·749	2·789	2·651	36·1	48·1	39·6	45·2	70·4	35·9
Dec. ...	3·920	20	3·637	3·742	3·638	42·5	46·4	37·8	42·7	63·3	34·2
Total or Mean	36·505	197	20·770	21·247	20·315	1527·1	54·5	42·1	48·5	96·2	37·8

RAIN AND DRAINAGE.

MONTHLY MEAN FOR 54 HARVEST YEARS, 1870-1—1923-4.

	Rainfall.	Drainage.			Drainage % of Rainfall.			Evaporation.		
		20-in. Gauge	40-in. Gauge	60-in. Gauge	20-in. Gauge	40-in. Gauge	60-in. Gauge	20-in. Gauge	40-in. Gauge	60-in. Gauge
	Ins.	Ins.	Ins.	Ins.				Ins.	Ins.	Ins.
September	2·348	0·762	0·727	0·666	32·5	31·0	28·4	1·586	1·621	1·682
October ...	3·143	1·793	1·749	1·624	57·0	55·6	51·7	1·350	1·394	1·519
November	2·724	2·053	2·086	1·965	75·4	76·6	72·1	0·671	0·638	0·759
December	2·851	2·426	2·511	2·397	85·1	88·1	84·1	0·425	0·340	0·454
January ...	2·374	1·922	2·104	2·024	81·0	88·6	85·3	0·452	0·270	0·350
February	1·995	1·468	1·569	1·496	73·6	78·6	75·0	0·527	0·426	0·499
March ...	2·076	1·125	1·257	1·188	54·2	60·5	57·2	0·951	0·819	0·888
April ...	2·043	0·666	0·736	0·703	32·6	36·0	34·4	1·377	1·307	1·340
May ...	2·048	0·488	0·548	0·515	23·8	26·8	25·2	1·560	1·500	1·533
June ...	2·270	0·564	0·586	0·565	24·8	25·8	24·9	1·706	1·684	1·705
July ...	2·713	0·718	0·743	0·691	26·5	27·4	25·5	1·995	1·970	2·022
August ...	2·683	0·706	0·707	0·664	26·3	26·4	24·7	1·977	1·976	2·019
Year ...	29·268	14·691	15·323	14·498	50·2	52·4	49·5	14·577	13·945	14·770

Area of each gauge $\frac{1}{1000}$th acre.

G

https://doi.org/10.23637/ERADOC-1-116

CROP YIELDS ON THE EXPERIMENTAL PLOTS.

NOTES.—In each case the year refers to the harvest, *e.g.*, Wheat harvested in 1924.
In the tables, total straw includes straw, cavings and chaff.

CONVERSION TABLE.

1 acre ... ... =	0·404 Hectare	0·963 Feddan.
1 bushel (Imperial) =	0·346 Hectolitre (36·346 litres) ...	0·184 Ardeb.
1 lb. (pound avoirdupois) =	0·453 Kilogramme	1·009 Rotls.
1 cwt. (hundredweight) =	50·8 Kilogrammes	113·0 Rotls. 1·366 Maunds.
1 metric quintal ... =	100·0 Kilogrammes ... ... 220·46 lb.	
1 bushel per acre ... =	0·9 Hectolitre per Hectare ...	0·191 Ardeb per Feddan.
1 lb. per acre ... =	1·12 Kilogramme per Hectare ...	1·049 Rotls per Feddan.
1 cwt. per acre ... =	125·60 Kilogrammes per Hectare or 1·256 metric Quintals per Hectare	117·4 Rotls per Feddan.

In America the Winchester bushel is used = 35·236 litres. 1 English bushel = 1·032 American bushels.

CROPS GROWN IN ROTATION. AGDELL FIELD.

PRODUCE PER ACRE.

Year.	CROP.	O. Unmanured. 5. Fallow.	O. Unmanured. 6. Clover or Beans.	M. Mineral Manure. 3. Fallow.	M. Mineral Manure. 4. Clover or Beans.	C. Complete Mineral and Nitrogenous Manure. 1. Fallow.	C. Complete Mineral and Nitrogenous Manure. 2. Clover or Beans.
AVERAGE OF THE FIRST NINETEEN COURSES, 1848–1923.							
	Roots (Swedes) cwt.*	32·7	11·2	175·7	195·9	355·3	302·0
	Barley—						
	Dressed Grain bush.	22·7	20·9	23·8	27·9	32·2	36·8
	Total Straw ... cwt.	13·9	13·7	14·0	16·0	19·5	22·6
	Beans—						
	Dressed Grain bush.	—	13·1	—	18·2	—	22·3
	Total Straw ... cwt.	—	9·2	—	13·2	—	15·3
	Clover Hay ... cwt.	—	28·3	—	54·1	—	55·0
	Wheat—						
	Dressed Grain bush.	24·2	22·8	28·5	31·2	29·5	31·2
	Total Straw ... cwt.	23·7	21·7	29·0	30·3	31·4	30·4
NINETEENTH COURSE, 1920–23.							
1920	Roots (Swedes) ... cwt.	20·5	2·1	163·9	270·0	262·1	56·4‡
1921	Barley—						
	Dressed Grain bush.	13·0	2·4†	12·8	26·3	10·9	25·7
	Offal Grain ... lb.	57·0	42·0	45·0	58·0	39·0	65·0
	Straw ... ... lb.	891·0	601·0	596·0	1124·0	444·0	1444·0
	Total Straw ... cwt.	10·9	7·8	7·9	14·2	6·3	17·7
	Wt. of Dressed Grain per bush. lb.	55·1	51·0	56·5	56·8	56·4	56·7
	Proportion of Total Grain to 100 of Total Straw	63·0	19·0	86·3	97·5	92·2	77·1
1922	Clover Hay ... cwt. (1 crop only)	—	4·4	—	9·7	—	3·5
1923	Wheat—						
	Dressed Grain bush.	18·0	25·2	20·3	28·3	19·7	22·9
	Offal Grain ... lb.	174·0	206·0	190·0	221·0	205·0	220·0
	Straw ... ... lb.	2019·0	2575·0	2590·0	2975·0	2363·0	2390·0
	Total Straw ... cwt.	20·6	26·5	26·9	30·7	24·3	24·5
	Wt. of Dressed Grain per bush lb.	63·6	63·4	63·5	64·3	64·3	64·6
	Proportion of Total Grain to 100 of Total Straw	57·0	60·7	49·0	59·4	54·0	61·9
PRESENT COURSE (20th), 1924.							
1924	Roots (Turnips) ... cwt.	2·9	0·7	42·8	31·5	127·4	104·7

* Plots 1, 3 and 5 based upon 18 years. Plots 2, 4 and 6 based upon 17 years.
† Plot 6 was more badly attacked by Gout Fly than the other plots.
‡ The roots on this plot were badly attacked by finger and toe disease in 1920. In 1920 Rape Cake was omitted from plots 1 and 2.

https://doi.org/10.23637/ERADOC-1-116

MANGOLDS, BARN FIELD, 1923 and 1924.

Roots since 1856. Mangolds since 1876.

Produce per Acre.

Strip.	Strip Manures.	Cross Dressings. O. None.	N. Nitrate of Soda	A. Ammon. Salts.	A.C. Ammon. Salts and Rape Cake.	C. Rape Cake.
	1923†.	Tons.	Tons.	Tons.	Tons.	Tons.
1	Dung only	R. **16·55**	**32·69**	**23·67**	**21·63**	**22·29**
		L. 2·20	3·70	3·78	4·15	4·18
2	Dung, Super., Potash ...	R. **18·92**	**37·38**	**30·40**	**29·64**	**29·96**
		L. 2·16	4·48	4·64	5·23	4·11
4	Complete Minerals ...	R. **4·72**	*a* R. **22·04*** L. 3·69	**19·18**	**25·28**	**20·85**
		L. 0·92	*b* R. **19·18** L. 3·70	2·82	5·12	2·96
5	Superphosphate only ...	R. **5·22**	**19·09**	**8·48**	**6·16**	**6·59**
		L. 1·23	2·92	3·54	3·15	3·21
6	Super. and Potash ...	R. **4·25**	**19·73**	**16·08**	**18·39**	**16·48**
		L. 1·06	2·56	2·65	4·50	2·72
7	Super., Sulphate of Mag., and Sodium Chloride	R. **4·71**	**21·92**	**19·82**	**17·53**	**15·44**
		L. 1·11	2·86	2·78	4·62	2·69
8	None	R. **3·63**	**11·05**	**5·90**	**4·71**	**3·47**
		L. 1·14	2·72	2·80	2·49	1·92
9	Sodium Chloride, Nit. Soda, Sulph. Potash, and Sulph. Mag. ...	R. **24·73**	—	—	—	—
		L. 3·03				
	1924.					
1	Dung only	R. **14·49**	**23·99**	**20·75**	**28·38**	**24·80**
		L. 3·83	6·11	6·43	6·77	5·29
2	Dung, Super., Potash ...	R. **18·61**	**25·08**	**23·28**	**34·17**	**32·15**
		L. 3·86	5·68	5·52	7·20	6·13
4	Complete Minerals ...	R. **3·15**	*a* R. **14·34** L. 4·55	**14·42**	**34·16**	**20·91**
		L. 1·06	*b* R. **11·15** L. 4·19	3·50	5·62	3·66
5	Superphosphate only ...	R. **3·31**	**14·92**	**11·47**	**15·81**	**15·31**
		L. 1·03	3·76	3·61	4·83	3·54
6	Super. and Potash ...	R. **3·16**	**12·58**	**16·40**	**29·40**	**20·55**
		L. 1·12	3·52	2·96	5·73	2·73
7	Super., Sulphate of Mag., and Sodium Chloride	R. **3·42**	**17·28**	**18·34**	**28·91**	**20·18**
		L. 1·11	3·94	3·29	5·24	3·05
8	None	R. **2·14**	**11·70**	**10·18**	**13·35**	**11·55**
		L. 1·87	3·62	3·18	4·32	3·49
9	Sodium Chloride, Nit. Soda, Sulph. Potash and Sulph. Mag. ...	R. **20·46**	—	—	—	—
		L. 3·51				

R. = roots. L. = leaves.

* From 1904 onwards plot 4 N has been divided, 4*a* receiving Sulphate of Potash, Sulphate of Magnesia, Sodium Chloride and Nitrate of Soda; 4*b* receiving Calcium Chloride, Potassium Nitrate and Calcium Nitrate.

† In 1923 plot 4 in series A, N, AC and C were lifted on Nov. 22nd in good condition. The remainder of the plots were lifted Dec. 10th—15th after several severe frosts.

https://doi.org/10.23637/ERADOC-1-116 *pp 33*

HAY. THE PARK GRASS PLOTS. 1923, 1924.

Plot	Manuring per acre.		1923. Yield of Hay per acre. 1st Crop.	2nd Crop.	Total.	1923. Dry Matter per acre. 1st Crop.	2nd Crop.	Total.	1924. Yield of Hay per acre.	Dry Matter per acre.	Plot.
			cwt.	cwt.	cwt.	lb.	lb.	lb.	cwt.	lb.	
1	Single dressing Amm. Salts (=43 lb. N.); (with Dung also 8 years 1856-63)	not limed	23·8	16·2	40·0	1917	310	2227	29·0	2667	1
		limed ...	21·1	9·8	30·9	1732	199	1931	28·1	2551	
2	Unmanured; (after Dung 8 years, 1856-63)	not limed	17·4	6·1	23·5	1297	102	1399	18·1	1518	2
		limed ...	18·0	2·6	20·6	1426	48	1474	23·8	1804	
3	Unmanured	not limed	15·0	5·7	20·7	1165	98	1263	15·8	1383	3
		limed ...	14·9	2·9	17·8	1142	66	1208	17·6	1445	
4-1	Superphosphate of Lime	not limed	20·8	4·4	25·2	1435	83	1518	23·0	1944	4-1
		limed ...	18·7	4·1	22·8	1444	83	1527	20·9	1818	
4-2	Superphosphate of Lime and double dressing Amm. Salts (=86 lb. N.)	not limed	45·5	4·8	50·3	3210	77	3287	27·7	2478	4-2
		limed ...	38·9	21·3	60·2	3135	358	3493	46·4	4319	
5-1	(N. half) Unmanured; following double dressing Amm. Salts (= 86 lb. N.) 1856-97	not limed	20·3	9·9	30·2	1405	191	1596	15·2	1390	5-1
5-2	(S. half) Super., Sulphate of Potash; following double dressing Amm. Salts (= 86 lb. N.) 1856-97	not limed	21·3	20·4	41·7	1593	438	2031	27·3	2287	5-2
6	Complete Mineral Manure as plot 7; following double dressing Amm. Salts (= 86 lb. N.) 1856-68	not limed	23·0	27·3	50·3	1838	507	2345	36·0	3166	6
7	Complete Mineral Manure	not limed	23·0	20·8	43·8	1806	402	2208	36·1	3123	7
		limed ...	38·3	21·3	59·6	2838	438	3276	54·0	4851	
8	Mineral Manure without Potash	not limed	21·3	8·7	30·0	1505	151	1656	21·3	1854	8
		limed ...	19·1	8·7	27·8	1513	200	1713	17·4	1539	
9	Complete Mineral Manure and double dressing Amm. Salts (= 86 lb. N.)	not limed	57·5	17·3	74·8	4009	287	4296	32·9	2946	9
		limed ...	59·9	22·7	82·6	4488	443	4931	66·2	5600	
10	Mineral Manure (without Potash) and double dressing Amm. Salts (= 86 lb. N.)	not limed	45·2	8·3	53·5	3210	132	3342	31·5	2970	10
		limed ...	46·7	28·9	75·6	3197	577	3774	49·1	4744	
11-1	Complete Mineral Manure and treble dressing Amm. Salts (=129 lb. N.)	not limed	72·0	55·5	127·5	4559	779	5338	39·9	3267	11-1
		limed ...	75·8	34·0	109·8	5184	586	5770	73·4	6467	
11-2	As plot 11-1 and Silicate of Soda	not limed	77·4	55·0	132·4	5472	831	6303	50·5	4502	11-2
		limed ...	75·7	33·7	109·4	5219	666	5885	70·8	5957	

12	Unmanured	not limed	19·8	6·0	25·8	1415	147	1562	16·7	1403	12
13	Dung in 1905, and every fourth year since (omitted in 1917). Fish Guano in 1907 and every fourth year since	not limed	60·6	29·2	89·8	4015	535	4550	41·2	3668	13
		limed ...	47·5	29·0	76·5	3264	540	3804	38·1	3392	
14	Complete Mineral Manure and double dressing Nitrate of Soda (=86 lb. N.)	not limed	53·2	26·6	79·8	4298	493	4791	63·7	5142	14
		limed	45·9	17·5	63·4	3400	375	3775	57·4	4854	
15	Complete Mineral Manure as plot 7; following double dressing Nitrate of Soda (= 86 lb. N.)	not limed	28·5	10·6	39·1	2443	203	2646	45·4	3615	15
		limed ...	24·4	10·2	34·6	2091	221	2312	42·7	3539	
16	Complete Mineral Manure and single dressing Nitrate of Soda (= 43 lb. N.)	not limed	41·5	8·1	49·6	3150	142	3292	47·2	3820	16
		limed ...	42·5	16·9	59·4	3303	345	3648	52·2	4376	
17	Single dressing Nitrate of Soda (= 43 lb. N.)	not limed	31·6	5·8	37·4	1979	105	2084	33·0	2498	17
		limed ...	30·3	6·4	36·7	2293	119	2412	33·7	2769	
18	Potash, Sulphate of Soda, Magnesia and double dressing Sulphate of Amm. (= 86 lb. N.) 1905 and since; following Minerals and Amm. Salts, supplying the constituents of 1 ton of Hay, 1865-1904	not limed	38·3	26·3	64·6	2550	589	3139	28·0	2600	18
		limed (6788 lb.)	48·1	9·0	57·1	3541	231	3772	29·5	2547	
		limed (3951 lb.)	40·0	11·8	51·8	2953	283	3236	32·5	2688	
19	Farmyard Dung in 1905 and every 4th year since (omitted in 1917); following Nitrate of Soda (= 43 lb. N.) and Minerals, 1872-1904	not limed	25·3	27·4	52·7	1943	525	2468	25·3	2392	19
		limed (3150 lb.)	21·6	31·1	52·7	1842	775	2617	27·4	2717	
		limed (570 lb.)	19·1	27·0	46·1	1621	653	2274	24·2	2411	
20	Farmyard Dung in 1905 and every 4th year since (omitted 1917); each intervening year, plot 20 receives Sulphate of Potash, Superphosphate and Nitrate of Soda (=26 lb. N.); following Nitrate of Potash and Superphosphate, 1872-1904	not limed	35·6	28·3	63·9	2857	625	3482	31·7	2984	20
		limed (2772 lb.)	36·2	26·1	62·3	2814	558	3372	35·8	3347	
		limed (570 lb.)	42·6	19·1	61·7	3192	429	3621	51·0	4790	

Ground lime was applied to the Southern portion (limed) of the plots at the rate of 2,000 lb. to the acre in the Winter of 1903-4, 1907-8, 1915-16, 1923-24, and at the rate of 2,500 lb. to the acre in the Winter of 1920-21, except where otherwise stated.

Up to 1914 the limed and unlimed plot results were not separately given in the Annual Report, but the mean of the two was given. From 1915 onwards the separate figures are given.

The 2nd Hay Crop, 1923, was carted in very bad condition as the plots could only be cut when the frost was on them. The Dry Matter figures give a truer indication of the relative yields of the different plots.

The Park Grass Plots.

BOTANICAL COMPOSITION, PER CENT. 1921, 1st Crop.

Plot.	Manuring.	Liming.	Graminеæ.	Leguminosæ.	Other Orders.	"Other Orders" consist largely of	Plot.
3	Unmanured	Limed ...	68·4	10·5	21·1	Plantago lanceolata	3
		Not limed	73·1	4·7	22·2	Plantago lanceolata	
5-1	Unmanured, following double Amm. Salts, 1856-97	Not limed	86·8	1·1	12·1	Centaurea nigra	5-1
5-2	Super. and Sulph. Potash following double Amm. Salts, 1856-97 ...	Not limed	72·5	9·2	18·3	Rumex acetosa	5-2
7	Complete Mineral Manure	Limed ...	66·1	22·0	11·9	Heracleum sphondylium	7
		Not limed	68·9	13·5	17·6	Achillea millefolium	
9	Complete Mineral Manure and double Amm. Salts	Limed ...	96·3	—	3·7	Rumex acetosa; Heracleum sphondylium	9
		Not limed	99·0	—	1·0	Rumex acetosa	
14	Complete Mineral Manure and double Nitrate of Soda	Limed ...	95·5	3·0	1·5	Taraxacum vulgare	14
		Not limed	97·4	0·2	2·4	Taraxacum vulgare	
15	As plot 7 following double Nitrate of Soda, 1858-75	Limed ...	70·6	18·2	11.2	Plantago lanceolata	15
		Not limed	76·2	8·8	15·0	Plantago lanceolata	
17	Single Nitrate of Soda	Limed ...	74·1	0·9	25·0	Plantago lanceolata	17
		Not limed	65·3	0·2	34·5	Plantago lanceolata	
18	Potash, Sulphate Soda, Magnesia, and double Sulphate of Amm. 1905 and since	limed 6788 lb.	82·6	—	17·4	Rumex acetosa	18
		,, 3951 lb.	86·0	—	14·0	Rumex acetosa	
		Not limed	91·2	—	8·8	Rumex acetosa	
19	Farmyard Dung in 1905 and every 4th year since (omitted in 1917)	limed 3150 lb.	92·3	4·0	3·7	Conopodium denudatum	19
		,, 570 lb.	92·3	2·3	5·4	Rumex acetosa	
		Not limed	88·8	5·1	6·1	Rumex acetosa; Centaurea nigra ...	
20	Farmyard Dung in 1905 and every 4th year since (omitted 1917), each intervening year Sulphate Potash, Super., and Nitrate of Soda ...	limed 2772 lb.	20·2	3·8	6·0	Rumex acetosa; Conopodium denudatum; Ranunculus spp.	20
		limed 570 lb.	91·0	4·8	4·2	Rumex acetosa	
		Not limed	90·2	4·0	5·8	Rumex acetosa	

https://doi.org/10.23637/ERADOC-1-116 pp 36

The Park Grass Plots—*contd.*

BOTANICAL COMPOSITION, PER CENT. 1922, 1st CROP.

Plot.	Manuring.	Liming.	Gramineæ.	Leguminosæ.	Other Orders.	"Other Orders" consist largely of	Plot.
3	Unmanured	Limed ...	51·0	7·6	41·4	Centaurea nigra	3
		Not limed	60·5	4·6	34·9	Plantago lanceolata	
5-1	Unmanured, following double Ammonium Salts 1856-97	Not limed	57·2	2·1	40·7	Centaurea nigra	5-1
5-2	Super. and Sulph. Potash following double Ammonium Salts 1856-97 ...	Not limed	71·8	6·1	22·1	Rumex acetosa	5-2
7	Complete Mineral Manure	Limed ...	61·3	29·6	9·0	Heracleum sphondylium	7
		Not limed	69·7	12·7	17.5	Centaurea nigra	
9	Complete Mineral Manure & double Ammonium Salts	Limed ...	99·2	0·3	0·5	———	9
		Not limed	99·1	0·1	0·8	———	
14	Complete Mineral Manure & double Nitrate of Soda	Limed ...	92·5	1·1	6·4	Taraxacum vulgare	14
		Not limed	96·4	0·2	3·4	Taraxacum vulgare	
18	Potash, Sulphate Soda, Magnesia, and double Sulphate of Ammonia, 1905 and since.	limed 6788 lb.	82·3	1·4	16·3	Rumex acetosa	18
		,, 3951 lb.	87·5	—	12·5	Rumex acetosa	
		Not limed	80·7	—	19·3	Centaurea nigra	
19	Farmyard Dung in 1905 and every fourth year since (omitted in 1917)	limed 3150 lb.	86·2	7·2	6·6	Conopodium denudatum	19
		,, 570 lb.	88·1	5·9	5·9	Rumex acetosa; Ranunculus spp. ...	
		Not limed	85·8	7·5	6·7	Rumex acetosa	
20	Farmyard Dung in 1905 and every fourth year since (omitted in 1917), each intervening year Sulphate Potash, Super. and Nitrate of Soda	limed 2772 lb.	85·6	4·6	9·8	Conopodium denudatum	20
		,, 570 lb.	86.8	7·9	5·3	Conopodium denudatum	
		Not limed	90·9	1·0	8·1	Conopodium denudatum; Achillea millefolium	

WHEAT. BROADBALK FIELD, 1923.

Plot.	Manurial Treatment.	Top Portion.						Bottom Portion.						71 year Average 1852—1922.	
		Dressed Grain.		Offal Grain per Acre.	Straw per Acre.	Total Straw per Acre.	Proportion of Total Grain to 100 of Total Straw.	Dressed Grain.		Offal Grain per Acre.	Straw per Acre.	Total Straw per Acre.	Proportion of Total Grain to 100 of Total Straw.	Dressed Grain per Acre.	Total Straw per Acre.
		Yield per Acre.	Weight per Bushel.					Yield per Acre.	Weight per Bushel.						
		bush.	lb.	lb.	lb.	cwt.		bush.	lb.	lb.	lb.	cwt.		bush.	cwt.
2A	Farmyard Manure	12·5	63·4	124	1718	20·3	40·4	20·4	63·2	206	2470	29·2	45·7	28·4*	32·8*
2B	Farmyard Manure	13·5	63·3	155	2751	32·9	27·4	21·2	63·8	328	3060	37·5	40·0	34·3	34·6
3	Unmanured	3·8	62·8	27	332	3·7	65·4	4·2	62·9	37	298	3·7	71·6	12·1	9·9
5	Complete Mineral Manure	3·1	61·5	29	264	3·1	63·3	4·4	62·8	56	430	5·3	56·6	13·9	11·7
6	As 5, and Single Amm. Salts	6·2	62·0	61	813	9·9	40·0	7·9	63·1	69	828	9·7	52·2	22·3	20·7
7	As 5, and Double Amm. Salts	10·2	62·6	109	1824	20·9	31·8	15·8	63·5	300	2808	32·4	35·9	30·9	32·2
8	As 5, and Treble Amm. Salts	12·4	62·5	142	2708	30·2	27·1	17·8	63·3	388	3312	38·6	35·0	35·1	40·2
9	As 5, and Single Nitrate of Soda	8·3	62·0	81	1302	14·6	36·3	9·3	62·8	150	1924	23·0	28·5	24·5†	24·7†
10	Double Amm. Salts alone	7·6	62·0	84	1174	14·1	35·2	7·5	63·5	194	1396	19·8	30·1	19·1	18·0
11	As 10, and Superphosphate	6·5	62·2	100	1472	18·5	24·4	8·4	63·3	225	1902	24·1	28·0	21·5	21.7
12	As 10, and Super. and Sulph. Soda	7·8	62·4	108	1396	17·6	30·1	11·1	63·6	250	2096	25·3	33·8	27·6	27·2
13	As 10, and Super. and Sulph. Potash	12·2	63·3	113	1816	21·8	36·2	12·3	62·6	216	2748	30·3	29·0	29·8	31·0
14	As 10, and Super. and Sulph. Magnesia ...	10·5	63·3	135	1714	20·5	34·7	11·3	63·4	300	2270	27·6	32·9	27·3	27·2
15	Double Amm. Salts in Autumn and Minerals ...	17·4	63·3	126	1896	22·2	49·5	13·3	63·5	168	1972	23·4	38·6	28·4	28·7
16	Double Nitrate and Minerals	16·9	63·3	167	2224	26·5	41·7	11·8	61·0	275	2958	33·1	26·8	30·7†	35·8†
17	Minerals alone, or Double Amm. Salts alone in	2·9	61·5	39	356	4·7	40·9	5·0	62·4	76	698	9·2	37·6	28·6	28·6
18	alternate years	11·7	63·9	201	1620	20·0	42·3	11·8	63·4	192	2232	25·9	32·4	14·3	12·4
19	Rape Cake alone	13·6	63·4	232	1664	20·5	47·6	12·2	63·9	229	1918	24·4	36·8	22·0‡	22·7‡
20	Mineral Manure (without Super.) and Amm. Salts	8·6	63·0	122	1443	17·9	33·0	—	—	—	—	—	—	18·6§	19·8§

* 23 years only, 1900-1922. † 38 years only, 1885-1922. ‡ 30 years only, 1893-1922. § 15 years only, 1906-1922 (no crop in 1912 and 1914)

WHEAT. BROADBALK FIELD, 1924.

Plot.	Manurial Treatment.	Top Portion.						Bottom Portion.					
		Dressed Grain.		Offal Grain per Acre.	Straw per Acre.	Total Straw per Acre.	Proportion of Total Grain to 100 of Total Straw.	Dressed Grain.		Offal Grain per Acre.	Straw per Acre.	Total Straw per Acre.	Proportion of Total Grain to 100 of Total Straw.
		Yield per Acre. bush.	Weight per Bushel. lb.	lb.	lb.	cwt.		Yield per Acre. bush.	Weight per Bushel. lb.	lb.	lb.	cwt.	
2A	Farmyard Manure	10·3	60·3	142	1047	18·6	36·7	16·6	60·5	156	1417	22·2	46·5
2B	Farmyard Manure	10·4	59·5	158	1181	19·3	35·8	14·6	60·5	137	1367	22·4	40·6
3	Unmanured	2·1	58·9	25	188	3·6	36·4	2·2	58·9	23	136	2·8	47·3
5	Complete Mineral Manure	4·4	58·8	29	270	4·0	64·6	3·9	58·3	25	220	3·7	60·0
6	As 5, and Single Amm. Salts	10·2	60·0	52	827	11·2	52·7	9·1	60·5	43	554	7·6	69·9
7	As 5, and Double Amm. Salts	19·3	60·7	160	2182	28·9	41·2	24·1	60·9	136	1898	24·9	57·5
8	As 5, and Treble Amm. Salts	23·2	60·5	174	2826	35·8	39·4	23·7	60·0	148	2578	33·1	42·4
9	As 5, and Single Nitrate of Soda	12·9	59·6	107	1268	18·6	42·0	12·6	59·6	69	1012	13·5	54·1
10	Double Amm. Salts alone	4·9	59·0	72	532	11·4	28·2	5·4	58·9	85	434	8·3	43·1
11	As 10, and Superphosphate	5·5	58·3	111	944	16·6	23·1	4·6	58·0	109	632	12·8	26·3
12	As 10, and Super. and Sulph. Soda	9·1	59·4	128	910	15·7	38·0	9·3	58·5	129	1008	17·0	35·3
13	As 10, and Super. and Sulph. Potash ...	15·0	60·2	118	1420	21·2	42·9	11·0	60·0	85	1234	17·6	37·7
14	As 10, and Super. and Sulph. Magnesia ...	9·9	58·8	159	1260	18·0	36·6	8·6	58·8	129	948	14·8	38·3
15	Double Amm. Salts in Autumn and Minerals	7·9	59·0	91	836	14·0	35·7	4·6	58·1	66	532	10·9	27·3
16	Double Nitrate and Minerals	22·1	60·0	146	2168	32·8	40·0	19·3	59·5	156	1648	25·6	45·3
17 }	Minerals alone, or double Amm. Salts alone in	7·8	59·8	68	722	11·1	42·8	7·4	58·0	58	556	9·6	45·0
18 }	alternate years	7·8	59·5	39	480	6·7	67·4	8·4	59·0	46	560	7·8	61·7
19	Rape Cake alone	6·2	58·8	90	822	14·0	29·1	4·5	57·8	98	666	12·1	26·4
20	Mineral Manure (without Super.) and Amm. Salts	2·7	56·8	41	510	8·5	20·5	—	—	—	—	—	—

PERMANENT BARLEY PLOTS. Hoos Field, 1923, 1924.

PRODUCE PER ACRE.

Plot.	Manuring.	1923. Dressed Grain. Yield per Acre.	1923. Dressed Grain. Weight per Bushel.	1923. Offal Grain per Acre.	1923. Straw per Acre.	1923. Total Straw per Acre.	1923. Proportion of Total Grain to 100 of Total Straw.	1924. Dressed Grain. Yield per Acre.	1924. Dressed Grain. Weight per Bushel.	1924. Offal Grain per Acre.	1924. Straw per Acre.	1924. Total Straw per Acre.	1924. Proportion of Total Grain to 100 of Total Straw.	70 years Average Yield 1852—1922.† Dressed Grain per Acre.	70 years Average Yield 1852—1922.† Total Straw per Acre.
		bush.	lb.	lb.	lb.	cwt.		bush.	lb.	lb.	lb.	cwt.		bush.	cwt.
1 O	Unmanured	11·4	53·0	84	690	8·2	74·7	1·7	44·3	72	217	2·7	47·8	14·0	8·0
2 O	Superphosphate only	19·9	54·8	69	927	10·8	96·1	7·5	45·4	107	410	5·3	75·6	19·6	9·9
3 O	Alkali Salts only	13·6	52·1	54	916	11·1	61·5	1·7	44·0	72	195	3·0	44·3	15·0	8·8
4 O	Complete Minerals	17·2	53·6	66	996	11·4	77·0	2·5	44·8	101	289	4·7	40·5	19·8	11·1
5 O	Potash and Superphosphate ...	10·4	54·4	62	655	8·3	67·0	3·2	47·5	96	347	4·9	45·3	16·2	9·6
1 A	Ammonium Salts only	13·4	53·5	144	858	10·5	73·3	4·1	48·1	196	490	7·2	48·8	24·8	14·1
2 A	Superphosphate and Amm. Salts	23·3	54·3	108	1232	14·1	87·4	33·5	48·9	336	1680	18·6	95·0	37·0	20·9
3 A	Alkali Salts and Amm. Salts ...	16·5	54·3	149	1213	15·7	59·1	7·0	44·9	153	583	8·0	52·1	27·0	16·3
4 A	Complete Minerals and Amm. Salts	33·0	55·9	98	1598	18·2	95·3	28·4	49·0	343	1744	20·3	76·1	40·6	24·0
5 A	Potash, Super. and Amm. Salts ...	25·3	56·0	76	1336	15·6	85·7	28·4	49·0	216	1650	18·6	77·0	34·9	22·2
1 AA	Nitrate of Soda only	18·1	53·0	122	1320	15·1	64·0	5·7	48·3	227	699	10·5	42·8	25·3*	15·6*
2 AA	Super. and Nitrate of Soda ...	32·1	54·9	102	1656	18·4	90·4	32·0	47·8	342	1832	20·3	82·1	39·9*	23·5*
3 AA	Alkali Salts and Nitrate of Soda	17·0	54·3	123	1408	17·0	55·0	6·0	44·6	157	627	9·2	41·3	25·9*	16·8*
4 AA	Complete Minerals and Nitrate of Soda	31·2	56·1	107	1562	18·2	91·3	24·3	46·7	337	1700	21·3	61·7	39·2*	23·9*
1 AAS	As Plot 1 AA and Silicate of Soda	21·4	55·0	133	1397	16·5	71·1	10·0	48·3	221	908	11·8	52·9	31·6*	18·7*
2 AAS	,, ,, 2 AA ,, ,,	35·3	55·0	100	1711	18·8	96·9	26·3	48·3	278	1518	17·6	78·3	41·0*	24·5*
3 AAS	,, ,, 3 AA ,, ,,	23·3	54·3	107	1749	19·7	62·2	9·7	49·5	188	858	12·3	48·5	32·9*	20·4*
4 AAS	,, ,, 4 AA ,, ,,	36·0	55·9	96	1898	21·0	89·5	21·2	46·4	250	1469	17·9	61·4	41·5*	26·0*
1 C	Rape Cake only	28·1	54·9	78	1507	17·3	83·6	22·6	45·2	257	1287	15·1	75·7	36·5	20·9
2 C	Superphosphate and Rape Cake	36·0	55·8	89	1471	16·7	112·2	30·8	44·7	284	1612	18·3	80·9	38·8	22·3
3 C	Alkali Salts and Rape Cake ...	27·9	55·3	65	1474	17·2	83·6	17·9	45·0	219	1125	13·5	67·7	35·0	20·9
4 C	Complete Minerals and Rape Cake	35·2	54·9	65	1765	19·5	91·4	27·0	47·7	278	1689	19·5	71·8	38·5	22·9
7—1	Unmanured (after dung 20 years, 1852—71)	17·6	54·9	81	1106	12·7	73·5	2·2	46·5	107	297	4·7	39·7	24·0‡	14·1‡
7—2	Farmyard Manure	30·6	56·1	68	1856	19·3	82·3	28·4	49·9	212	2034	23·8	61·1	46·0	28·5
6—1	Unmanured	8·7	53·1	82	628	8·2	59·2	—	—	42	102	1·6	36·8	15·4	8·9
6—2	Ashes from Laboratory furnace ...	12·3	54·8	87	704	9·4	72·0	2·0	44·0	91	234	3·2	49·8	16·3	9·5
1 N	Nitrate of Soda only	18·3	54·0	144	1320	15·9	63·6	4·4	44·0	169	479	7·4	43·8	30·0§	18·3§
2 N	,, ,, ,, ...	23·1	55·0	119	1463	17·4	71·3	11·7	44·4	215	847	11·3	58·1	33·8§§	20·4§§

† 1912, all plots were fallowed. * 54 years, 1868—1922. ‡ 50 years, 1872—1922. § 69 years, 1853—1922. §§ 63 years, 1859—1922.

RED CLOVER grown year after year on rich Garden Soil, Rothamsted Garden.

Hay, Dry Matter, and Nitrogen per Acre, 1923 and 1924.

Year.	No. of Cuttings.	As Hay.	Dry Matter.	Nitrogen.	Seed Sown.
		lb.	lb.	lb.	
1923	2	1477	1231	37	1923 May mended
1924	2	794	663	20	1924 April mended
Averages:					
25 years, 1854—1878		7664	6387	179	
25 years, 1879—1903		3924	3270	101	
20 years, 1904—1923		2640	2200	65	

WHEAT AFTER FALLOW (without Manure 1851, and since).

Hoos Field, 1923 and 1924.

	1923.	1924.	Average 67 years 1856-1922.
Dressed Grain { Yield per Acre—bushels	2·8	1·6 lb.	15·22
Dressed Grain { Weight per Bushel—lb.	62·0	—	59·6
Offal Grain per Acre—lb.	42·0	1·5	52·0
Straw per Acre—lb.	459·0	18·0	—
Total Straw per Acre—cwt.	5·4	0·9	13·1
Proportion of Total Grain to 100 of Total Straw	35·9	3·1	—

AVERAGE WHEAT YIELDS *of* VARIOUS COUNTRIES.

Country.	Mean Yield per Acre 1901-10. bushels.	Country.	Mean Yield per Acre 1901-10. bushels.
Great Britain	31·6	Denmark	41·3
England	31·7	Argentine	10·6
Hertfordshire	30·5	Australia	10·1
France	20·2	Canada	19·5
Germany	29·1	United States	14·3
Belgium	35·1	Russia—European	10·0

NOTE.—Figures for Great Britain, England and Hertfordshire are taken from the Board of Agriculture's "Agricultural Statistics," Vol. 46. Other figures from "Annuarie International de Statistique Agricole," 1910-12, and converted at the rate of 60 lb. per bushel.

https://doi.org/10.23637/ERADOC-1-116

ROTATION PLOTS.

Little Hoos Field, 1923 and 1924.

Arranged to test the VALUE of VARIOUS MANURES in year of application and their RESIDUAL VALUE one, two, and three years after.

Produce per acre.

Plot.	Manure per Acre from 1919 onwards.	Season of Last Dressing.	1923 (20th Season), Clover.						1924 (21st Season), Wheat.					
			Yield per Acre.			Dry Matter per Acre.			Dressed Grain.		Offal Grain per Acre.	Straw per Acre.	Total Straw per Acre.	Proportion of Total Grain to 100 of Total Straw.
			1st Crop	2nd Crop	Total	1st Crop	2nd Crop	Total	Yield per Acre.	Weight per Bush.				
			cwt.	cwt.	cwt.	lb.	lb.	lb.	bush.	lb.	lb.	lb.	cwt.	
A 1	Control	—	*24·0*	*26·1*	*50·1*	*2578*	*2163*	*4741*	*12·8*	*58·9*	*146*	*676*	*11·0*	*72·8*
2	Ordinary Dung, 16 tons	1920	41·2	34·9	76·1	4002	2814	6816	46·2	60·0	190	3008	36.6	72·1
3		1921	41·3	32·1	73·4	4312	2572	6884	39·0	60·8	197	2772	33·9	67·6
4		1922	43·2	30·7	73·9	4564	2495	7059	36·7	60·0	175	2416	28·9	73·3
5		1924	34·9	28·1	63·0	3605	2371	5976	**47·8**	**60·3**	**149**	**3248**	**37·5**	**72·2**
B 1	Cake fed dung, 16 tons	1920	40·6	34·1	74·7	4068	2702	6770	43·0	60·0	216	3016	36·1	68·9
2	Control	—	*26·4*	*27·6*	*54·0*	*2694*	*2148*	*4842*	*19·9*	*58·2*	*177*	*1180*	*16·1*	*73·7*
3	Cake fed dung, 16 tons	1921	44·4	34·4	78·8	4420	2716	7136	40·4	60·4	201	2728	32·5	72·4
4		1922	42·1	34·7	76·8	4345	2690	7035	40·7	59·9	189	2720	33·9	69·2
5		1924	38·4	30·1	68·5	3866	2453	6319	**43·6**	**60·8**	**215**	**3260**	**39·7**	**64·4**
C 1	Shoddy; Superphosphate; Sulphate of Potash ...	1920	26·1	26·4	52·5	2540	2144	4684	14·6	59·0	120	916	13·1	66·6
2		1921	17·7	28·1	45·8	1788	2258	4046	16·7	59·0	141	1052	15·0	66·7
3	Control	—	*16·6*	*28·0*	*44·6*	*1668*	*2235*	*3903*	*16·9*	*58·6*	*125*	*1004*	*13·8*	*72·3*
4	Shoddy; Superphosphate; Sulphate of Potash ...	1922	28·1	33·3	61·4	2837	2820	5657	20·1	58·5	132	1252	17·0	68·5
5		1924	20·3	27·1	47·4	1985	2178	4163	**33·4**	**59·7**	**135**	**2180**	**26·0**	**73·1**

D 1	Guano; Sulphate of Ammonia; Sulphate of Potash	1920	27·1	28·1	55·2	2762	2298	5060	20·3	59·8	160	1148	15·5	79·3
2		1921	21·6	23·0	44·6	2179	1900	4079	16·8	59·3	156	1000	16·0	64·3
3		1922	*25·7*	26·9	52·6	2644	2228	4872	18·3	58·3	124	1112	14·9	71·4
4	Control	—	*24·3*	*27·9*	*52·2*	*2303*	*2278*	*4581*	*17·7*	*59·8*	*148*	*1112*	*16·7*	*64·6*
5	Guano; Sulphate of Ammonia; Sulphate of Potash	1924	25·7	27·6	53·3	2600	2247	4847	**22·9**	**60·1**	**164**	**1416**	**20·8**	**66·2**
E 1	Rape Dust; Superphosphate; Sulphate of Potash	1920	25·5	27·1	52·6	2626	2070	4696	16·1	58·5	160	820	12·5	78·8
2		1921	25·4	27·0	52·4	2598	2158	4756	21·1	59·4	174	1148	17·6	72·3
3		1922	22·6	25·9	48·5	2298	2131	4429	18.2	59·0	161	1000	15·3	71·9
4		1924	23·5	27·9	51·4	2397	2213	4610	**29·2**	**60·0**	**206**	**1912**	**27·6**	**63·3**
5	Control	—	*31·4*	*31·6*	*63·0*	*3072*	*2520*	*5592*	*24·0*	*59·7*	*168*	*1408*	*20·4*	*70·3*
F 1	Control	—	*17·6*	*26·1*	*43·7*	*1825*	*2029*	*3854*	*7·8*	*58·0*	*129*	*444*	*10·2*	*50·7*
2	Superphosphate; Sulphate of Ammonia; Sulphate of Potash	1920	20·1	24·1	44·2	1934	1875	3809	17·2	59·0	147	932	13·5	76·9
3		1921	20·7	25·0	45·7	1945	1840	3785	20·3	59·8	162	1104	14·7	83·4
4		1922	25·3	29·3	54·6	2454	2286	4740	19·9	60·0	133	1120	15·2	78·0
5		1924	26·6	26·7	53·3	2667	2144	4811	**30·1**	**60·2**	**209**	**2176**	**28·1**	**64·4**
G 1	Bone Meal; Sulphate of Ammonia; Sulphate of Potash	1920	20·4	24·4	44·8	1982	2060	4042	11·3	60·1	133	648	11·6	62·1
2		1921	18·1	25·6	43·7	1791	2083	3874	21·7	60·3	130	1296	18·3	70·4
3	Control	—	*20·1*	*23·0*	*43·1*	*1932*	*1896*	*3828*	*20·3*	*60·2*	*118*	*1244*	*15·8*	*75·6*
4	Bone Meal; Sulphate of Ammonia; Sulphate of Potash	1922	25·6	24·4	50·0	2503	1918	4421	21·7	60·5	104	1432	17·1	74·0
5		1924	18·1	22·3	40·4	1777	1833	3610	**20·8**	**59·9**	**156**	**1560**	**22·0**	**56·9**
H 1	Basic Slag; Sulphate of Ammonia; Sulphate of Potash	1920	31·2	26·9	58·1	3113	2199	5312	29·1	60·8	156	1980	25·4	67·6
2		1921	25·3	27·6	52·9	2426	2258	4684	32·6	60·6	181	2140	26·2	73·4
3		1922	32·6	28·9	61·5	3178	2341	5519	32·8	60·2	184	2092	24·4	79·2
4		1924	31·8	25·0	56·8	3146	2055	5201	**34·0**	**60·1**	**260**	**2952**	**33·4**	**61·6**
5	Control	—	*27·9*	*22·0*	*49·9*	*2725*	*1778*	*4503*	*18·2*	*60·5*	*128*	*1416*	*17·3*	*63·2*

NOTES.—Since 1919 the manure for each plot (except of series A and B) has been rationed at 40 lb. Nitrogen, 100 lb. Calcium Phosphate and 50 lb. Potash per acre. Each plot has been supplied with as much of its particular manure (shoddy, guano, &c.) as possible without exceeding the receipt in any of the three rationed ingredients. Any deficit in either of these three has then been made good by adding the necessary quantity of Sulphate of Ammonia, Superphosphate, or Sulphate of Potash. No manure was applied for 1923 crop.

Figures in italics denote unmanured plots. The yields on the plots to which the manure was applied in a given season are printed in heavy type.

NITROGENOUS TRIALS.

Analyses of Manures used, 1923† and 1924.

Description.	% Nitrogen.
Sulphate of Ammonia	20·72
Muriate of Ammonia	24·75
Urea	46·65
Phosphazote (Tricalc. Phosphate 26·2%)	11·65

Except Top Dressing Oats, 1923.

MALTING BARLEY EXPERIMENTS.

Malting Barley (Plumage Archer). Long Hoos Field, 1923.

Manures per Acre.	Dressed Grain.		Offal Grain per Acre.	Straw per Acre.		Proportion of Total Grain to 100 of Total Straw.
	Yield per Acre.	Weight per Bushel.		Straw.	Total Straw.	
	bushels	lb.	lb.	lb.	cwt.	
Super. 3 cwt., Sul./Pot. 1½ cwt., Sul./Amm. 1 cwt.	32·5	56·4	78	1762	19·9	85·7
Super. 3 cwt., Sul./Pot. 1½ cwt., Mur./Amm. 104 lb.	35·6	56·1	91	1787	19·9	93·6
Super. 3 cwt., Sul./Pot. 1½ cwt. ...	19·9	55·0	59	1212	15·2	67·6
Super. 3 cwt., Sul./Amm. 1 cwt. ...	34·2	55·5	69	1265	17·4	100·8
Super. 3 cwt., Sul./Amm. 1 cwt., Mur./ Pot. 1½ cwt.	37·2	56·1	95	1787	19·7	98·9
Sul./Amm. 1 cwt., Sul./Pot. 1½ cwt.	34·4	54·9	84	1675	18·4	96·1
No Manure	22·2	54·1	81	1288	14·5	79.2

Clover (after Malting Barley). Long Hoos Field, 1924.

Manures per Acre. Applied in 1923.	Yield per Acre.			Dry Matter per Acre.		
	1st Crop.	2nd Crop.	Total Crop.	1st Crop.	2nd Crop.	Total Crop.
	cwt.	cwt.	cwt.	lb.	lb.	lb.
Super. 3 cwt., Sul./Pot. 1½ cwt., Sul./Amm. 1 cwt.	52·0	20·3	72·3	4796	1464	6260
Super. 3 cwt., Sul./Pot. 1½ cwt., Mur./Amm. 104 lb.	47·1	16·5	63·6	4149	1260	5409
Super. 3 cwt., Sul./Pot. 1½ cwt. ...	49·2	12·3	61·5	4439	936	5375
Super. 3 cwt., Sul./Amm. 1 cwt. ...	46·4	11·6	58·0	4207	875	5082
Super. 3 cwt., Sul./Amm. 1 cwt., Mur./Pot. 1½ cwt.	50·2	15·4	65·6	4344	1120	5464
Sul./Amm. 1 cwt., Sul./Pot. 1½ cwt.	49·3	16·9	66·2	4493	1250	5743
No Manure	47·8	9·6	57·4	4226	734	4960

Manures applied April 17th, 1923.

https://doi.org/10.23637/ERADOC-1-116

Clover (after Malting Barley). Long Hoos Field, 1923.

Manuring per Acre, applied Spring 1922.	Yield per Acre. cwt.
Super. 3 cwt., Sulphate Potash 1½ cwt., Sulphate Ammonia 1 cwt.	36·8
Super. 3 cwt., Sulphate Potash 1½ cwt., Muriate Ammonia 93 lb.	37·1
Super. 3 cwt., Sulphate Potash 1½ cwt.	35·3
Super. 3 cwt., Sulphate Ammonia 1 cwt.	23·7
Super. 3 cwt., Sulphate Ammonia 1 cwt., Muriate Potash, 1½ cwt.	39·1
Sulphate Ammonia 1 cwt., Sulphate Potash 1½ cwt.	35·1
No Manure	31·0

Manures applied March 24th, 1922.

Malting Barley (Plumage Archer). Great Harpenden Field, 1924.

No. of Plot.	Manuring. Quantities per Acre.	Dressed Grain. Yield per Acre. bush.	Dressed Grain. Weight per bushel. lb.	Offal Grain per Acre. lb.	Straw per Acre. Straw. lb.	Straw per Acre. Total Straw. cwt.	Proportion of Total Grain to 100 of Total Straw.
1A	No Manure	27·2	53·8	172	1112	14·1	103·8
5B		22·6	52·6	200	863	12·1	102·8
6C		27·5	53·5	144	988	12·5	115·4
2A	Superphosphate 3 cwt., Sulphate of Potash 1½ cwt., Sulphate of Ammonia 1 cwt.	33·7	52·6	345	1575	18·5	102·0
6B		29·0	52·0	344	1338	16·4	100·7
4C		26·6	52·3	289	1188	14·6	102·5
3A	Superphosphate 3 cwt., Sulphate of Ammonia 1 cwt.	38·9	51·9	275	1663	19·1	107·1
7B		31·5	53·3	289	1388	17·0	103·4
2C		32·7	52·9	325	1575	19·5	94·0
4A	Sulphate of Potash 1½ cwt., Sulphate of Ammonia 1 cwt.	32·4	52·4	247	1438	17·2	101·0
1B		30·8	52·8	369	1525	17·9	99·8
7C		28·7	53·4	291	1300	15·4	105·6
5A	Superphosphate 3 cwt., Sulphate of Potash 1½ cwt.	25·6	51·8	184	988	12·3	109·8
2B		22·7	51·8	211	938	12·3	100·6
5C		17·9	51·8	228	738	9·7	106·0
6A	Superphosphate 3 cwt., Muriate of Potash 136 lb., Sulphate of Ammonia 1 cwt.	30·6	53·3	328	1400	17·3	100·9
3B		27·4	51·4	369	1288	15·8	100·2
3C		28·0	52·3	366	1338	16·4	99·5
7A	Superphosphate 3 cwt., Sulphate of Potash 1½ cwt., Muriate of Ammonia 94 lb.	24·1	51·8	325	1138	14·2	99·0
4B		29·8	53·0	372	1450	18·1	96·3
1C		35·2	53·4	347	1663	20·2	98·5

Manures sown March 17th, 1924.

https://doi.org/10.23637/ERADOC-1-116

NITROGENOUS FERTILISER EXPERIMENTS, 1923 AND 1924.

Oats (Black Winter). Sawpit Field, 1923.

Treatment of Plots and Quantities per Acre.	Date of Application of Top Dressing.	Dressed Grain. Yield per Acre. bushels.			Dressed Grain. Weight per Bushel. lb.			Offal Grain per Acre. lb.			Straw per Acre. Straw. lb.			Straw per Acre. Total Straw. cwt.			Proportion of Total Grain to 100 of Total Straw.		
		Plot A	Plot B	Plot C	Plot A	Plot B	Plot C	Plot A	Plot B	Plot C	Plot A	Plot B	Plot C	Plot A	Plot B	Plot C	Plot A	Plot B	Plot C
No Manure	——	27·3	29·4	22·4	44·3	42·8	43·0	300	288	241	1500	1600	1350	18·1	19·9	16·1	74·5	69·4	66·8
No Manure	——	27·7	33·1	24·9	42·0	43·5	43·5	284	350	231	1600	1875	1525	19·0	21·7	17·2	68·1	73·7	68·2
Superphosphate, 2 cwt.	——	28·5	34·0	25·0	43·3	42·5	42·8	256	234	244	1700	1875	1325	19·0	21·7	16·7	70·0	69·3	70·0
Sulphate of Ammonia, 1 cwt. ...	April 23rd	36·3	38·9	34·0	42·4	42·3	41·5	331	337	319	2200	2325	2075	25·0	25·9	23·9	66·7	68·3	64·7
Superphosphate, 1 cwt., Sulphate of Ammonia, 1 cwt.	April 23rd	37·1	38·2	32·9	42·0	42·0	42·0	300	347	266	2250	2275	2025	25·7	25·0	22·8	64·6	69·8	64·6
Superphosphate, 2 cwt., Sulphate of Ammonia, 1 cwt.	March 28th	39·8	33·5	38·7	44·3	42·9	43·3	400	294	366	2375	2000	2525	27·2	23·0	28·3	70·9	67·2	64·3
Superphosphate, 2 cwt., Sulphate of Ammonia, 1 cwt.	April 23rd	38·8	34·7	39·7	43·5	43·4	43·6	416	372	356	2375	2150	2450	27·2	25·4	28·3	69·0	65·9	65·7
Superphosphate, 2 cwt., Muriate of Ammonia, 103 lb....	April 23rd	41·4	44·9	49·0	44·1	43·3	43·5	419	353	372	2550	2775	2750	28·1	30·1	31·0	71·2	68·0	72·0
Superphosphate, 2 cwt., Sulphate of Ammonia, 1 cwt.	May 22nd	29·2	37·4	37·2	42·1	43·8	42·3	338	394	350	1700	2075	2025	20·1	24·8	23·4	69·7	73·2	73·2
Superphosphate, 4 cwt., Sulphate of Ammonia, 2 cwt.	March 28th	44·1	52·1	43·1	43·5	43·8	42·9	456	406	394	3050	3450	2725	35·5	37·3	31·3	59·7	64·4	64·1
Superphosphate, 2 cwt., Sulphate of Ammonia, 2 cwt.	March 28th	44·5	54·0	40·9	43·5	44·9	43·5	406	597	375	3125	3750	2725	35·0	41·3	30·6	59·7	65·3	62·9
Superphosphate, 2 cwt., Sulphate of Ammonia, 2 cwt.	April 23rd	40·7	48·0	47·4	44·3	43·8	43·5	372	506	397	2475	3350	2775	27·9	37·3	31·0	69·5	62·4	70·8
Superphosphate, 2 cwt., Muriate of Ammonia, 208 lb....	April 23rd	49·7	47·1	53·2	43·8	43·5	43·9	544	425	441	3250	2800	3325	36·6	32·4	37·1	66·3	68·3	66·9
Superphosphate, 2 cwt., Sulphate of Ammonia, 2 cwt.	May 22nd	54·5	49·4	57·3	42·0	40·8	41·9	606	500	513	3050	2575	3100	34·8	31·0	35·7	74·2	72·3	72·8

Barley (Plumage Archer). Long Hoos Field, 1923.

Manuring per Acre.	Dressed Grain. Yield per Acre. bushels. 1st Plot.	Dressed Grain. Yield per Acre. bushels. 2nd Plot.	Dressed Grain. Weight per Bushel. lb. 1st Plot.	Dressed Grain. Weight per Bushel. lb. 2nd Plot.	Offal Grain per Acre. lb. 1st Plot.	Offal Grain per Acre. lb. 2nd Plot.	Straw per Acre. Straw. lb. 1st Plot.	Straw per Acre. Straw. lb. 2nd Plot.	Straw per Acre. Total Straw. cwt. 1st Plot.	Straw per Acre. Total Straw. cwt. 2nd Plot.	Proportion of Total Grain to 100 of Total Straw. 1st Plot.	Proportion of Total Grain to 100 of Total Straw. 2nd Plot.
Super. 2 cwt., Sulphate of Ammonia 1 cwt. ...	22·7	22·9	56·0	55·5	100	94	1550	1500	18·6	17·1	65·7	71·2
Super. 2 cwt., Sulphate of Ammonia 2 cwt. ...	27·5	27·6	56·0	56·3	119	84	1925	1675	21·0	18·6	70·5	78·3
Super. 2 cwt., Muriate of Ammonia 93¾ lb. ...	25·4	24·9	56·3	55·5	88	84	1500	1450	17·5	16·2	77·2	80·8
Super. 2 cwt., Muriate of Ammonia 187½ lb. ...	23·5	34·3	55·5	55·9	116	97	1700	1950	19·6	21·1	64·6	85·2
Super. 2 cwt., Urea 49¾ lb.	26·8	22·5	56·1	56·0	103	72	1500	1325	16·6	15·5	86·2	76·6
Super. 2 cwt.	18·0	24·3	56·0	55·3	78	103	1200	1375	14·0	15·6	69·4	82·5
Control—No Manure	19·6	20·1	56·5	55·8	94	88	1275	1325	15·7	15·2	68·1	71·1

Barley (Plumage Archer). Great Harpenden Field, 1924.

Basal Manure (= Superphosphate 2 cwt., S/Pot., 1 cwt.)	22·2	25·5	52·0	52·8	197	169	1225	1200	14·1	14·1	85·9	96·2
Basal Manure, Sulphate of Ammonia 1 cwt. ...	29·7	37·8	50·8	51·9	272	234	1650	1875	18·8	20·5	84·7	95·5
Basal Manure, Sulphate of Ammonia 2 cwt. ...	45·4	40·1	52·5	52·3	247	322	2350	2200	25·7	23·7	91·4	91·2
Basal Manure, Muriate of Ammonia 94 lb. ...	36·3	33·4	52·8	52·3	212	281	1825	1675	20·8	19·0	91·4	95·3
Basal Manure, Muriate of Ammonia 188 lb. ...	47·2	43·3	53·0	52·5	256	338	2375	2050	26·1	22·8	94·2	102·5
Basal Manure, Urea 50 lb.	30·4	27·7	51·8	51·0	297	253	1750	1550	19·6	17·2	85·1	86·5
	41·2	31·8	52·0	52·0	222	241	2150	1700	22·8	18·8	92·8	90·2
Control—No Manure	22·5	24·3	52·0	53·0	212	175	1225	1200	13·8	14·1	89·3	92·9

1923, Nitrogenous Manures applied as top dressing on May 19th.

1924, Nitrogenous Manures applied with seed on March 15th.

Potatoes (Kerr's Pink).

Treatment of Plots and Manuring per Acre.	Produce per Acre. 1st Plot. Tons.	2nd Plot. Tons.
Little Knott Field, 1923.		
Superphosphate 4 cwt., Sulphate of Potash 1½ cwt., Sulphate of Ammonia 3 cwt.*	15·6	14·9
Superphosphate 4 cwt., Sulphate of Potash 1½ cwt., Sulphate of Ammonia 1½ cwt.	14·4	13·0
Superphosphate 4 cwt., Sylvinite 273½ lb., Sulphate of Ammonia 1½ cwt.	14·8	12·6
Superphosphate 4 cwt., Sylvinite 273½ lb.	12·8	10·8
Superphosphate 4 cwt., Sulphate of Potash 1½ cwt.	12·0	12·0
Superphosphate 4 cwt., Sulphate of Potash 1½ cwt., Muriate of Ammonia 2½ cwt.	14·0	13·9
Superphosphate 4 cwt., Sulphate of Potash 1½ cwt., Sulphate of Ammonia 3 cwt.	15·4	14·9
Superphosphate 4 cwt., Sulphate of Potash 1½ cwt., Sulphate of Ammonia 4½ cwt.*	14·9	14·7
Superphosphate 8 cwt., Sulphate of Potash 3 cwt., Sulphate of Ammonia 3 cwt.	16·6	14·9
Superphosphate 8 cwt., Sulphate of Potash 3 cwt., Sulphate of Ammonia 4½ cwt.*	16·3	16·0
Foster's Field, 1924.		
Control. No Manure	5·4	7·5
Superphosphate 4 cwt., Sulphate of Potash 1½ cwt.	8·3	7·8
Superphosphate 4 cwt., Sulphate of Potash 1½ cwt., Sulphate of Ammonia 1½ cwt.	9·0	10·0
Superphosphate 4 cwt., Sulphate of Potash 1½ cwt., Sulphate of Ammonia 3 cwt.	10·2	8·6
Superphosphate 4 cwt., Sulphate of Potash 1½ cwt., Sulphate of Ammonia 3 cwt.*	8·4	9·9
Superphosphate 4 cwt., Sulphate of Potash 1½ cwt., Sulphate of Ammonia 4½ cwt.*	10·0	9·9
Superphosphate 4 cwt., Sulphate of Potash 1½ cwt., Muriate of Ammonia 2½ cwt.	8·6	10·2
Superphosphate 8 cwt., Sulphate of Potash 3 cwt., Muriate of Ammonia 5 cwt.	11·7	10·3
Superphosphate 8 cwt., Sulphate of Potash 3 cwt., Muriate of Ammonia 7½ cwt.†	10·3	10·7

* 1½ cwt. given as Top Dressing. † 2½ cwt. given as Top Dressing.

Date of application of Manures:—1923, May 12th and 14th; Top Dressings July 14th. 1924, May 9th; Top Dressings, July 9th.

https://doi.org/10.23637/ERADOC-1-116

Swedes (Hurst's Monarch). Foster's Field.

Treatment of Plots and Manuring per Acre.	Produce per Acre.			
	Roots.		Leaves.	
	1st Plot. Tons.	2nd Plot. Tons.	1st Plot. Tons.	2nd Plot. Tons.
1923.				
Superphosphate 5 cwt., Muriate of Potash 1 cwt., Dung 10 tons	14·2	14·4	1·5	1·3
Superphosphate 5 cwt., Muriate of Potash 1 cwt., Dung 10 tons, Sulphate of Ammonia 2 cwt.* ...	17·1	16·4	1·8	1·6
Superphosphate 5 cwt., Muriate of Potash 1 cwt., Sulphate of Ammonia 2 cwt.*	16·0	15·4	1·6	1·5
Superphosphate 5 cwt., Muriate of Potash 1 cwt. ...	13·5	12·9	1·3	1·2
1924.				
Control. No Manure	24·3	23·0	3·3	2·9
	20·5	28·5	2·1	3·5
Superphosphate 5 cwt., Sulphate of Potash 1 cwt. ...	27·5	26·2	3·0	3·2
	22.0	27·0	2·3	3·1
Superphosphate 5 cwt., Sulphate of Potash 1 cwt., Sulphate of Ammonia ¾ cwt.§	27.2	25·0	3·0	2·9
Superphosphate 5 cwt., Sulphate of Potash 1 cwt., Sulphate of Ammonia 1½ cwt.§	28·8	27·6	3·3	3·2
Superphosphate 5 cwt., Sulphate of Potash 1 cwt , Sulphate of Ammonia 1½ cwt.†	26·0	28·7	3·3	3·3
Superphosphate 5 cwt., Sulphate of Potash 1 cwt., Sulphate of Ammonia 2¼ cwt.‡	28·2	28·7	3·8	3·5
Superphosphate 5 cwt., Sulphate of Potash 1 cwt., Sulphate of Ammonia 2¼ cwt.†	26·4	28·2	3·6	3·6
Superphosphate 5 cwt., Sulphate of Potash 1 cwt., Sulphate of Ammonia 2¼ cwt.§	27·3	27·6	3·4	3·5

* Applied as top dressing. July 14th, 1923.
§ Applied as top dressing. July 9th, 1924.
† ¾ cwt. applied as top dressing. July 9th, 1924.
‡ 1½ cwt. applied as top dressing. July 9th, 1924

https://doi.org/10.23637/ERADOC-1-116

POTASSIC TRIALS.

Analyses of Manures, 1923 and 1924.

Description.	% K_2O 1923	% K_2O 1924
Sulphate of Potash	51·90	47·55
Muriate of Potash—High Grade	62·85	—
Muriate of Potash—Low Grade	56·35	51.36
Potash Manure Salts 30%	31·35	30·33
Potash Manure Salts 20%	21·35	22·21
Sylvinite	17·20	18·13
Kainit	13·45	—

Potatoes (Kerr's Pink). Foster's Field, 1924.

* Farmyard Manure Series (15 tons per Acre).

Manures per Acre.	Produce per Acre in Tons. Series D.	Series E.	Series F.	Series G.
Control. Farmyard Manure 15 tons	7·2	8·2	8.4	7·6
Basal Manure (Superphosphate 4 cwt., Sulphate of Ammonia 1½ cwt.)	9·7	9·9	9·2	7·9
Sulphate of Potash 191 lb., Basal Manure	8·8	8·6	8·8	9·1
Muriate of Potash 177 lb., Basal Manure	9·1	8·6	8·7	8·4
20% Potash Manure Salts, 408 lb., Basal Manure	9·4	9·5	8·6	9·4
Sylvinite 566 lb., Basal Manure	8·5	9·1	9·5	9·9

† No Farmyard Manure Series.

Manures per Acre.	Produce per Acre in Tons. Series W.	Series X.	Series Y.	Series Z.
Control. No Manure	5·0	4·7	5·5	5·2
Basal Manure (Superphosphate 6 cwt., Sulphate of Ammonia 2 cwt.)	7·9	6·1	6·0	4·8
Sulphate of Potash 255 lb., Basal Manure	7·6	8·2	6·7	6·6
Muriate of Potash 234 lb., Basal Manure	7·8	7·4	6·2	7·2
20% Potash Manure Salts 544 lb., Basal Manure	7·4	8·8	7·0	7·9
Sylvinite 6¾ cwt., Basal Manure	7·8	8·0	8·1	7·6
Sulphate of Potash 255 lb., Sulphate of Soda 830 lb., Basal Manure	8·2	7·0	7·5	7·9
Muriate of Potash 234 lb., Calcium Chloride 525 lb. Basal Manure	7·7	7·5	7·9	8·2

§ Potatoes (Kerr's Pink). Foster's Field, 1924.

Manures per Acre.	Produce per Acre in Tons. Series 1.	Series 2.	Series 3.
Control. No Manure	6·7	6·8	6·4
Sulphate of Potash 256 lb., Superphosphate 6 cwt., Sulphate of Ammonia 226 lb.	10·5	9·9	7·6
Superphosphate 6 cwt., Sulphate of Ammonia 226 lb.	10·0	8·1	3·4
Sulphate of Potash 512 lb., Superphosphate 12 cwt., Sulphate of Ammonia 452 lb.	11·9	9·3	10·5
Sulphate of Potash 125 lb., Superphosphate 3 cwt., Sulphate of Ammonia 113 lb.	9·1	8·1	6·2

* Manures applied, May 5-6th. † Manures applied, April 29th—May 5th.
§ Manures applied, May 15th.

https://doi.org/10.23637/ERADOC-1-116 *pp 50*

Potatoes (Kerr's Pink). Sawyer's Field, 1923.

Manuring per Acre.	Yield per Acre. 1st Plot.	2nd Plot.	3rd Plot.
With Dung, 15 tons per Acre.			
	Tons.	Tons.	Tons.
Basal Manuring (Superphosphate 4 cwt., Sulphate of Ammonia 1½ cwt.)	11·2	12·6	11·3
Muriate Potash 144 lb., Sul./Mag. 171 lb., Salt 452 lb., Basal	12·0	11·8	12·2
Muriate Potash 144 lb., Sul./Mag. 171 lb., Basal	12·6	12·3	14·2
Muriate Potash 144 lb., Salt 452 lb., Basal	10·6	11·7	12·4
Muriate Potash (High Grade) 144 lb., Basal	12·0	14·5	12·6
Muriate Potash (Low Grade) 161 lb., Basal	13·0	13·9	13·0
Potash Manure Salts 30% 290 lb., Basal	11·1	13·0	12·1
Potash Manure Salts 20% 424 lb., Basal	12·3	12·6	10·9
Sulphate Potash 178 lb., Basal	11·1	12·9	13·4
Sulphate Potash Mag. 328½ lb., Basal	12·1	12·1	14·5
Kainit 682 lb., Basal	12·4	10·3	12·2
Sylvinite 527 lb., Basal	9·8	9·7	11·9
No Artificial Manure	10·3	9·1	12·0
Without Dung.			
Basal Manuring (Superphosphate 6 cwt., Sulphate of Ammonia 2 cwt.	9·9	12·1	7·2
Muriate Potash 192½ lb., Sul/Mag. 228 lb., Salt 602½ lb. Basal	12·6	12·0	11·5
Muriate Potash 192½ lb., Sul/Mag. 228 lb., Basal	13·2	12·2	14·2
Muriate Potash 192½ lb., Salt 602½ lb., Basal	12·1	11·9	11·8
Muriate Potash (High Grade) 192½ lb., Basal	11·5	13·0	11·5
Muriate Potash (Low Grade) 215 lb., Basal	11·9	14·1	12·9
Potash Manure Salts 30% 386 lb., Basal	11·3	13·0	10·0
Potash Manure Salts 20% 565 lb., Basal	11·0	13·0	9·7
Sulphate Potash 237 lb., Basal	12·7	12·3	11·7
Sulphate Potash Mag. 438 lb., Basal	12·5	12·4	13·3
Kainit 908 lb., Basal	12·7	10·9	10·2
Sylvinite 702 lb., Basal	10·1	11·5	10·2
No Manure	6·9	8·4	8·6

NOTE: The potatoes when lifted were wet and dirty. Manures applied May 2nd, 3rd and 4th.

PHOSPHATIC TRIALS, 1923 AND 1924.

Analyses of Manures used.

No.	Description.	Total Phosphate as Tricalcic Phosphate.	Solubility %
Slag 1	Open Hearth Low Grade, High Sol.	25·0	90·4
,, 2	Open Hearth Low Grade, Low Sol.	18·0	35·7
,, 8	Open Hearth L. G. and Nauru Mineral Phosphate	53·1	25·5
,, 9	Open Hearth L. G., H. S. and Precipitated Bone Phosphate (4 : 1)	31·5	92·8
,, 10	Open Hearth L. G., H. S. and Gafsa Mineral Phosphate (3 : 7)	47·0	35·0
,, 12	Talbot Process H. G., H. S.	37·0	80·7
,, 13	Open Hearth L. G., H. S.	22·7	91·5
,, 14	Open Hearth L. G., L. S.	22·6	29·0
,, 20	Open Hearth L. G., H. S.	17·2	78·8
,, 21	Open Hearth L. G., L. S.	21·3	31·4
,, 22	Open Hearth L. G., H. S.	24·4	95·4
,, 23	Open Hearth H. G., L. S.	30·3	20·3
,, 24	Open Hearth H. G., H. S.	29·6	92·1
,, 25	Talbot Process H. G., H. S.	37·1	—
Mineral Phosphates.	Gafsa (1921—1923 Expts.)	62·9	—
	Gafsa (1924 Expts.)	55·0	—
	Nauru	83·0	—
	Tunisian	64·8	—
	Florida	74·8	—

https://doi.org/10.23637/ERADOC-1-116

SLAG APPLIED IN SEASON OF GROWTH.

Clover. Long Hoos Field, 1924.

Manuring Per Acre.*	Produce Per Acre.						Dry Matter per Acre.					
	1st Crop.			2nd Crop.			1st Crop.			2nd Crop.		
	A Series cwt.	B Series cwt.	C Series cwt.	A Series cwt.	B Series cwt.	C Series cwt.	A Series cwt.	B Series cwt.	C Series cwt.	A Series cwt.	B Series cwt.	C Series cwt.
Slag No. 21, 100 mesh, 1028 lb. ...	40·7	49·0	50·0	22·6	17·3	12·1	3956	4628	4513	1845	1484	1025
Slag No. 22, 100 mesh, 896 lb. ...	41·4	48·8	48·8	19·8	20·2	11·9	3963	4686	4570	1693	1696	1047
Superphosphate 596 lb.	42·6	49·2	60·4	21·8	13·5	11·1	3869	4667	5350	1828	1160	931
Gafsa Phosphate 398 lb.	43·8	48·0	48·9	23·8	15·9	11·9	3973	4556	4372	2037	1346	1014
Sulphate of Potash 1 cwt. (= Basal) ...	42·7	46·3	50·0	18·6	21·3	11·1	4065	4273	4447	1624	1764	950
Control: No Manure	40·9	46·2	40·0	17·6	21·0	13·4	3333	4415	3642	1515	1770	1157

* All plots (except Control) received a basal dressing of 1 cwt. Sulphate of Potash per acre. Phosphate Dressings are at the rate of 100 lb. P_2O_5 per acre.

Slags applied January 24th, 1924.

Swedes (Hurst's Monarch). Foster's Field 1924.

Produce per Acre.

Manurial Treatment. Quantities per Acre.	Roots.			Leaves.		
	A Series. Tons.	B Series. Tons.	C Series. Tons.	A Series. Tons.	B Series. Tons.	C Series. Tons.
Control: No Manure	17·0	18·6	16·2	2·9	3·5	3·0
Basal Manure (Sulphate of Ammonia 186 lb., Sulphate of Potash 93 lb.) ...	18·7	19·3	19·3	3·2	3·9	3·8
Slag No. 21, 100 mesh, 772 lb., Basal Manure	19·5	19·5	17·0	3·7	4·1	3·3
Slag No. 22, 100 Mesh, 672 lb., Basal Manure	19·5	19·5	18·2	3·4	3·6	3·7
Gafsa Phosphate 248 lb., Basal Manure	19·9	19·2	18·7	3·5	4·0	3·6
Superphosphate 3½ cwt., Basal Manure...	20·9	21·6	19·2	3·8	4·4	3·6

Slags applied June 18th, 1924.

Barley (Plumage Archer). Great Harpenden Field, 1924.

Manurial Treatment. Quantities per Acre.	Dressed Grain. Yield per Acre in bushels.			Dressed Grain. Weight per Bushel in lb.			Offal Grain per Acre. lb.			Straw per Acre. Straw. lb.			Straw per Acre. Total Straw. cwt.			Proportion of Total Grain to 100 of Total Straw.		
	1st Series.	2nd Series.	3rd Series.	1st Series.	2nd Series.	3rd Series.	1st Series.	2nd Series.	3rd Series.	1st Series.	2nd Series.	3rd Series.	1st Series.	2nd Series.	3rd Series.	1st Series.	2nd Series.	3rd Series.
Control: No Manure ...	16·1	24·5	22·9	50·0	50·6	51·8	158	170	210	1000	1240	1160	12·5	15·0	13·4	68·8	83·9	93·0
Basal Manure (Sulphate of Potash, 1 cwt.; Sulphate of Ammonia, 107 lb.) ...	31·5	25·7	31·0	51·5	52·9	52·3	185	315	215	1500	1420	1640	16·8	17·9	18·4	96·0	83·8	89·0
Slag No. 21, 100 mesh, 514 lb.; Basal Manure ...	26·8	41·5	25·3	50·5	51·8	52·0	315	265	273	1560	1840	1640	17·3	20·5	17·3	86·1	104·8	81·8
Slag No. 22, 100 mesh, 447 lb.; Basal Manure ...	24·7	41·3	27·3	51·5	51·8	49·8	280	215	328	1420	1960	1500	17·1	22·0	18·4	80·7	95·5	81·9
Superphosphate, 298 lb.; Basal Manure	—	33·6	—	—	52·3	—	—	220	—	—	1720	—	—	19·3	—	—	91·4	—
Gafsa Phosphate, 157 lb.; Basal Manure	27·7	29·9	26·7	50·5	50·9	51·0	255	263	280	1500	1480	1500	16·1	17·0	17·1	91·9	93·8	85·4
Control. No Manure ...	14·7	24·3	13·8	49·3	50·5	51·0	220	212	223	840	1180	880	12·0	14·8	11·1	70·5	86·7	74·8
Basal Manure (Sulphate of Potash 1 cwt., Sulphate of Ammonia 107 lb.) ...	34·8	27·1	29·4	50·4	50·9	49·8	308	293	283	1640	1440	1660	19·8	16·6	18·4	92·9	89·9	84·6
Slag No. 23, 100 mesh, 360 lb., Basal Manure ...	23·2	24·3	20·0	49·5	50·3	49·0	325	348	345	1380	1500	1280	15·9	17·5	15·0	82·9	80·0	78·9
Slag No. 24, 100 mesh, 370 lb., Basal Manure ...	24·2	21·9	27·0	49·0	49·5	51·5	328	398	245	1400	1200	1420	15·9	14·1	16·6	85·0	93·8	87·9

Slags applied December 21st, 1923.

RESIDUAL EFFECT OF PHOSPHATES.

Hay. Great Field,* 1923.

No. of Plot.	Treatment of Plot and Quantities per Acre.	Yield per Acre. cwt.		Dry Matter per Acre. lb.	
		Series A.	Series B.	Series A.	Series B.
1	High Grade Slag No. 12, 1170 lb.	33·0	35·0	2755	2929
2	Open Hearth Slag No. 13, 1925 lb. (High Soluble)	28·3	36·0	2382	2948
3	Open Hearth Slag No. 14, 1930 lb. (Low Soluble)	30·9	39·6	2518	3219
4	Gafsa Phosphate, 750 lb.	33·6	37·4	2733	3036
C	No Manure	31·2	39·5	2686	3218
C 1	High Soluble Slag No. 1, 872 lb.	31·5		2570	
2	Low Soluble Slag No. 2, 1225 lb.	38·3		3011	
3	Gafsa Phosphate, 347 lb.	39·9		3051	
4	Tunisian Phosphate, 336 lb.	37·8		2782	
5	Florida Phosphate, 292 lb.	35·5		2911	
7	Nauru Phosphate, 263 lb.	35·2		2829	
D 7	Nauru Phosphate, 263 lb.	36·4		3058	
C 8	Slag Phosphate, Low Grade No. 8, 411 lb. ...	36·6		3042	
D 8	Slag Phosphate, Low Grade No. 8, 411 lb. ...	41·1		3215	
C	Control. No Manure	28·0		2284	
D	Control. No Manure	38.4		3059	

* Manures on the A and B series applied in January, 1921.
Manures on the C and D series applied in December, 1921.

Hay. Great Field, 1924.

Plot.	Manurial Treatment. Quantities per Acre.	Yield per Acre.		Dry Matter per Acre.	
		No Potash. cwt.	With Potash. cwt.	No Potash. lb.	With Potash. lb.
1 A	High Grade Slag, No. 12, 1170 lb.	30·4	29·5	2807	2661
1 B		34·3	30·5	3082	2717
2 A	Open Hearth Slag, No. 13, 1925 lb.	25·7	28·2	2365	2555
2 B		33·9	26·6	2965	2406
3 A	Open Hearth Slag, No. 14, 1930 lb.	31·4	27·5	2794	2422
3 B		28·2	26·1	2454	2399
4 A	Gafsa Phosphate 750 lb.	39·6	29·1	3400	2598
4 B		29·3	29·3	2625	2578
A C	Control. No Manure	27·7	30·0	2587	2658
B C		36·8	30·4	3132	2651
7 C	Nauru Phosphate 263 lb.	30·5	31·6	2759	2884
7 D		30·5	30·5	2855	2670
8 C	Nauru Slag Phosphate, No. 8, 411 lb. ...	29·6	30·4	2727	2778
8 D		25·5	27·9	2341	2523
1 C	High Soluble Slag, No. 1, 872 lb.	28·4	30·5	2519	2647
2 C	Low Soluble Slag, No. 2, 1225 lb.	29·8	32·0	2723	2886
3 C	Gafsa Phosphate, 347 lb.	29·1	32·7	2672	2839
4 C	Tunisian Phosphate, 336 lb.	29·1	33·6	2408	2936
5 C	Florida Phosphate, 292 lb.	30·2	31·6	2767	2777
C C	Control. No Manure	27·5	32·0	2454	2827
D C		27·0	26·6	2455	2404

Kainit at 4 cwt. per acre, applied January 28th, 1924.

https://doi.org/10.23637/ERADOC-1-116

Clover. New Zealand Field, 1923.

No. of Plot.	Treatment of Plot and Quantities per Acre.	Yield per Acre. cwt.	Dry Matter per Acre. lb.
8	Slag Phosphate, No. 8, 376 lb.	34·1	3502
10	Slag Phosphate, No. 10, 424 lb.	34·0	3461
12	Low Grade, No. 20, 1176 lb.	32·6	3241
2	Open Hearth Slag, No. 2, 1100 lb.	29·3	2967
9	Slag, No. 9, 636 lb.	31·0	3099
C	Control. No Manure	32·0	3273

Clover. Stackyard Field, 1923.

5	Florida Phosphate	24·8	2431
3	Gafsa Phosphate	22·9	2145
11	Phosphate, No. 25, 540 lb.	20·3	2073
4	Constantine Phosphate, 308 lb.	22·1	2253
7	Nauru Phosphate, No. 7, 241 lb.	21·5	1951
C	Control. No Manure	23·7	2411

Slags applied January 25th, 1923.

Clover (after Barley 1922.) Long Hoos Field, 1923.

Treatment of Plots in Spring 1922.	Yield per Acre. cwt.			Dry Matter per Acre. lb.		
	Slag No. 20.	Slag No. 2.	Slag No. 1.	Slag No. 20.	Slag No. 2.	Slag No. 1.
Basal Manuring, Slag, full quantity ...	36·4	36·4	36·4	3648	3553	3532
	44·6	38·8	42·2	4376	3736	4098
Basal Manuring, Slag, half quantity; Gafsa Phosphate, 87 lb.	38·6	35·9	41·5	3747	3508	4100
	37·1	43·8	41·7	3169	4234	4064
Basal Manuring, Gafsa Phosphate, 174 lb.	37·1	33·5	40·0	3630	3235	3964
Basal Manuring only	34·6	40·9	45·5	3423	3959	4392
No Manure	42·2	35·1	36·8	4123	3471	3531

Basal Manuring is 1 cwt. Sulphate of Potash; 1 cwt. Sulphate of Ammonia. Full Quantity Slag represents 636 lb. Slag No. 20, 602 lb. Slag No. 2 and 436 lb. Slag No. 1 per acre.

Date of application of Slags { No. 20, March 24th. / Nos. 2 and 1, March 26th.

https://doi.org/10.23637/ERADOC-1-116

Oats (Grey Winters). West Barnfield, 1923.

No. of Plot.	Treatment of Plots in Season 1921 and Qauntities per Acre.	Dressed Grain. Yield per Acre. Bushels.		Dressed Grain. Weight per Bushel. lb.		Offal Grain per Acre. lb.		Straw per Acre. Straw. lb.		Straw per Acre. Total Straw. cwt.		Proportion of Total Grain to 100 of Total Straw.	
		Series A.	Series B.	Series A.	Series B.	Series A.	Series B.	Series A.	Series B.	Series A.	Series B.	Series A.	Series B.
1	High Grade Slag No. 12, 1170 lb. ...	48·2	53·1	42·0	39·9	401	549	2740	3195	31·6	36·9	68·6	64·5
2	Open Hearth, High Soluble Slag No. 13, 1925 lb.	52·9	51·1	39·5	40·2	400	475	3200	3255	36·9	35·9	60·3	62·8
3	Open Hearth, Low Soluble Slag No. 14, 1930 lb.	52·7	54·1	41·9	40·4	543	525	3090	3210	33·9	34·8	72·4	69·5
4	Gafsa Phosphate, 750 lb.	52·5	50·9	41·3	39·7	548	568	3090	2770	33·8	29·5	71·9	78·4
C	No Manure	47·2	54·0	41·0	39·7	539	554	3075	2990	35·8	32·3	61·7	74·5
C	No Manure	55·8		40·8		448		3020		31·9		76·3	

Slag applied, January 14th, 1921.

Wheat (Red Standard) after Swedes. Great Harpenden Field, 1923.

Manuring per Acre. (applied in Spring, 1922).	Dressed Grain. Yield per Acre. Bushels.			Dressed Grain. Weight per Bushel. lb.			Offal Grain per Acre. lb.			Straw per Acre. Straw. lb.			Straw per Acre. Total Straw. cwt.			Proportion of Total Grain to 100 of Total Straw.		
	Slag No. 20.	Slag No. 2.	Slag No. 1.	Slag No. 20.	Slag No. 2.	Slag No. 1.	Slag No. 20.	Slag No. 2.	Slag No. 1.	Slag No. 20.	Slag No. 2.	Slag No. 1.	Slag No. 20.	Slag No. 2.	Slag No. 1.	Slag No. 20.	Slag No. 2.	Slag No. 1.
Sulphate Ammonia 2 cwt., Sulphate Potash 1 cwt., Slag full quantity ...	19·4	25·5	21·1	64·0	63·6	63·6	272	228	222	2200	2738	2125	23·6	28·3	22·0	57·5	58·4	63·5
	20·9	24·6	22·9	60·3	63·8	63·0	177	300	211	2000	2288	2425	20·8	22·8	25·4	61·6	73·1	58·1
Sulphate Ammonia 2 cwt., Sulphate Potash 1 cwt., Slag half quantity, Gafsa Phosphate 175 lb.	18·2	22·7	21·7	63·0	63·0	63·5	217	228	214	2025	2538	2262	21·1	26·5	23·9	57·7	55·8	59·3
	23·5	22·5	23·4	62·8	62·6	62·8	208	187	219	2388	1888	2225	24·3	19·3	24·3	61·6	73·8	62·0
Sulphate Ammonia 2 cwt., Sulphate Potash 1 cwt., No. 7 Nauru Phosphate 262½ lb.	19·7	22·7	23·8	62·8	63·8	62·9	284	231	212	2125	1975	2575	23·0	20·6	27·4	58·9	72·8	55·6
Sulphate Ammonia 2 cwt., Sulphate Potash 1 cwt., No. 3 Gafsa Phosphate 350 lb.	22·9	21·1	24·6	62·8	59·1	63·8	284	122	252	2750	1925	2225	29·0	20·4	25·2	53·0	59·8	64·4
Sulphate Ammonia 2 cwt., Sulphate Potash 1 cwt.	26·0	23·9	20·7	63·9	63·4	63·1	186	241	202	2600	2163	2338	27·0	22·2	25·1	61·1	70·6	53·7
No Manure	22·8	19·2	23·0	64·3	63·0	63·0	294	208	217	2550	1950	2012	26·5	20·5	20·8	59·4	61·5	71·5

NOTE.—"Full Quantity" Slag is: No. 20, 1275 lb. per Acre. No. 2, 1225 lb. per Acre. No. 1, 875 lb. per Acre.
Date of application of Slags, May 8th, 1922.

MISCELLANEOUS EXPERIMENTS.

ORGANIC MANURE. GREEN MANURING.

Oats (Black Winter). Produce per Acre. Great Knott Field, 1924.

GREEN MANURING	No. of Plot.	Basal Manuring. Quantities per Acre. Applied August 13th, 1923.	Dressed Grain. Yield per Acre. bushels.		Dressed Grain. Weight per Bushel. lb.		Offal Grain per Acre. lb.		Straw per Acre. Straw. lb.		Straw per Acre. Total Straw. cwt.		Proportion of Total Grain to 100 of Total Straw.	
			Plot 1.	Plot 2.	Plot 1.	Plot 2.	Plot 1.	Plot 2.	Plot 1.	Plot 2.	Plot 1.	Plot 2.	Plot 1.	Plot 2.
Mustard.*	M 1&4	10 Tons London Refuse ...	51·5	47·0	36·0	36·9	100	95	2840	2500	33·2	30·4	52·6	53·8
	M 2&5	5 Tons London Refuse ...	48·9	54·7	37·1	35·9	90	95	2300	2800	28·2	33·6	60·3	54·9
	M 3	Control. No Manure	43·3	—	36·8	—	120	—	2200	—	28·9	—	52·8	—
No Green Manuring.	C 1&4	10 Tons London Refuse ...	31·8	33·8	36·0	37·3	88	80	2080	1840	27·7	25·5	39·8	46·9
	C 2&5	5 Tons London Refuse ...	25·8	32·8	36·0	37·1	83	88	1560	1900	21·8	25·7	41·5	45·3
	C 3	Control. No Manure	27·5	—	37·5	—	80	—	1520	—	20·4	—	48·7	—
No Green† Manuring.	H 1&4	10 Tons London Refuse ...	30·1	26·8	36·8	36·9	75	73	1860	1500	23·4	20·7	45·0	45·7
	H 2&5	5 Tons London Refuse ...	25·3	24·4	36·5	36·8	70	83	1420	1480	18·6	20·7	47·8	42·2
	H 3	Control. No Manure	22·5	—	36·8	—	65	—	1200	—	17·5	—	45·4	—

* The Mustard crop was sown August 20th, 1923, and ploughed on October 18th, 1923.

† Hubam Clover was sown on this series for Green Manure, but the plant failed.

TOWN REFUSE EXPERIMENT.

Mangolds (Prizewinner Yellow Globe). Fosters Field, 1923.

Treatment of Plots and Manuring per Acre.	Yield per Acre.	
	Roots.	Leaves.
	Tons.	Tons.
Control. No Manure	9·6	3·2
Dung, 15 tons...	13·2	3·9
Hampstead Refuse, 15 tons...	14·0	3·4
Walworth Refuse, 15 tons	13·9	3·5

Manures applied May 4th.

PHOSPHAZOTE EXPERIMENT.

Potatoes (Kerr's Pink). Little Knott Field, 1923.

Manuring per Acre.	Yield per Acre.		
	1st Plot.	2nd Plot.	3rd Plot.
	Tons.	Tons.	Tons.
Control. No Manure	10·8	9·4	8·2
Sulphate of Potash 1¼ cwt.	12·4	9·8	10·1
Sulphate of Potash 1¼ cwt., Superphosphate 3 cwt., Sulphate of Ammonia 266½ lb.	14·2	13·8	13·9
Sulphate of Potash 1¼ cwt., Phosphazote 4¼ cwt.	12·8	13·2	12·7

Manures applied, May 12th-14th.

EFFECT OF STRAW AND MINERALS ON LEGUMINOSAE.

Produce per Acre. Little Hoos Field, 1923 and 1924.

Manures per Acre. Applied in 1923.	1923. Beans and Straw.			1924. Wheat and Straw.		
	1st Series.	2nd Series.	3rd Series.	1st Series.	2nd Series.	3rd Series.
	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.
5 tons Chaff	29·9	25·9	33·5	27·2	21·4	29·5
400 lb. Superphosphate	24·1	25·9	24·6	17·9	25·0	23·7
5 tons Chaff, 400 lb. Superphosphate ...	34·8	28·1	29·9	29·9	24·4	30·8
400 lb. Superphosphate, 200 lb. Sulphate of Potash	32·1	37·0	29·0	20·5	32·1	25·9
Control	25·0	26·3	26·8	18·8	21·9	21·0
	24·6	—	—	27·2	—	—

https://doi.org/10.23637/ERADOC-1-116