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ROTHAMSTED RESEARCH

Report for 1953

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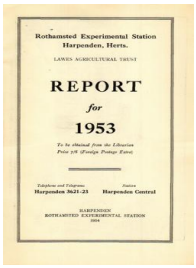

Field Experiments Section

Anon

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FIELD EXPERIMENTS SECTION

The following members of the staff, who constitute the Field Plots Committee, are responsible for planning and carrying out the programme of field experiments: E. M. Crowther (Chairman), H. V. Garner (Secretary), L. Broadbent, H. H. Mann, J. R. Moffatt, F. Raw, D. J. Watson and F. Yates.

The number of plots comprised in the field experiments at Rothamsted and Woburn in 1953 were:

	Grain	Roots	Hay	Grazing	Total
Classical experiments					
Rothamsted	131	72	47	—	250
Woburn	36	—	—	—	36
Long-period experiments					
Rothamsted	335	320	256	96	1,007
Woburn	133	314	55	12	514
Annual experiments					
Rothamsted	596	302	64	—	962
Woburn	—	64	—	—	64
Total	1,231	1,072	422	108	2,833

Some of these plots were put down on behalf of certain of the scientific departments for observation only, but 2,593 were carried through to the harvesting stage and weighed. In addition to the above, the farms accommodated some 600 microplots at Rothamsted and 100 at Woburn. Most of these were preliminary experiments carried out, observed and recorded by laboratory workers. In addition, the farm provided uniform areas of commercial crops, which were taken over, treated and intensively studied by the biological departments.

The weather conditions affecting agricultural operations are described in detail in the farm report; the following brief notes put on record the main features of the season 1953 to provide a general background for the year's experimental work.

Regarded from the point of view of the preparation of seedbeds and drilling of winter wheat and beans, the last two months of 1952 were distinctly unfavourable. November was 4° F. colder and also 1·2 inches wetter than average, and similar conditions persisted in December. The consequence was that on some fields drilling was late and seedbeds were rather poor. In these circumstances germination was slow, and very little growth occurred during the winter. Late drilled beans were badly damaged by birds; on the other hand, beans ploughed in earlier made good crops.

In the spring conditions improved. There were light showers, but practically no very heavy rain. Snow stood for ten days in mid-February, and then an unusually dry period set in, with practically a complete drought from the middle of February till the third week in March, with many ground frosts. The result was that the land worked down for spring seedbeds unusually well; even the deep-ploughed plots on the cultivation experiment gave mellow tilths. Sowing commenced at the end of February, and continued

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without a check under ideal conditions. In spite of an excellent start, early growth was somewhat slow, owing to cold nights and dry soil. Growth responded to the milder amd moister conditions in April and more so in May, which was warm, bright and rather dry. Thereafter followed a "roots and grass" summer. June was cool, very dull and drizzly rather than excessively wet; July was very wet, with 3·8 inches, and also deficient in sunshine, towards the end of the month there were heavy falls, which lodged some of the cereal plots, in particular the barleys in the Highfield experiment. The first fortnight of August was dry, and corn harvest made good progress in spite of some lodged crops, but before the end a wet spell set in which delayed operations considerably. Potato harvest commenced in the last week of September, and a heavy crop was lifted without a check under ideal conditions, with the soil much drier than usual at this time of year. A feature of the autumn was the warm growing weather, which enabled the roots to make considerable progress in October, and gave a remarkable germination of weeds and shed corn on the stubbles.

The Classical Experiments

Owing to persistent wet weather, Broadbalk was not sown till 11th November on a seedbed that barely covered the seed, and it was mid-January before the rows were visible. Section I nearest the farm, carrying the second crop after fallow, was a good plant, and looked well throughout the season, but on the remaining sections the plant was much thinner than usual, and poppies, buttercup and bent grass were conspicuous. On Section II, first crop after fallow, the stand was particularly thin, so much so that the south side of the section from Plot 10 onwards when inspected in April could for all practical purposes be classed as a failure. In this badly affected area the only plot which appeared to be rather less damaged than the rest was Plot 15, which received all its nitrogen in the autumn. The cause of the damage was wheat bulb fly, a pest that had been noticed on several occasions on Broadbalk since fallowing started, and was very prevalent indeed in the Eastern Counties in 1953. In spite of the miserable appearance of the after fallow section in spring, the surviving plants tillered out and made a remarkable recovery in summer, and by harvest there was the promise of a fair crop.

Wild oats appeared to be diminishing slightly, thanks to the careful and systematic hand-pulling that has been carried out on Broadbalk for several seasons. On the other hand, leguminous weeds, chiefly trefoil and vetches, were particularly bad on Plot 5, minerals only, where the wheat was practically choked out by them. These weeds are beginning to spread to the neighbouring Plot 6, which receives only a small dressing of ammonium sulphate in addition to the mineral manures.

Hoosfield

The classical barley ground broke down in early spring to give an excellent seedbed, but in view of the very heavy infestation of wild oats in the previous year it was decided to leave the land unsown as long as possible in order that some wild oats might

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germinate and be destroyed by cultivation. This was done, and the barley was not sown till 9th April. A good plant was obtained on all plots, but seedling growth was slow owing to low temperatures. Later wild oats appeared in quantity, and by the beginning of July they had topped the crop and spoiled the appearance of the field. The state of the plots was carefully considered. It was clear that the yields would have little value, so the most useful course would be to cut and cart the whole crop green before any oats had time to shed. This was done in mid-July. The spread of acidity in Hoosfield is becoming still more noticeable. In particular Plots 5A (complete fertilizer with sulphate of ammonia) and 3A (complete fertilizer without phosphate) show extensive central areas dominated by wild oats. The soils of these areas have been sampled in detail, and are under examination.

Barnfield

The season was particularly favourable for roots, and the field was sown on 10th April, on what, by Barnfield standards at any rate, would be called an excellent seedbed. The plant came well, and was kept growing by well-distributed summer rainfall. At lifting time the crop looked heavier than for many years, the completely manured plots carrying some very large roots indeed. The plant population, while fairly good, varied considerably from plot to plot, the thinnest plants being found on areas receiving ammonium sulphate, and probably now becoming acid in patches. The field has been thoroughly sampled in order to determine the pH distribution by individual plots. Judged by the appearance of the plants when in full growth, the superiority of nitrate of soda over the corresponding sulphate of ammonia plots was not striking, the nitrate plots being poorer and the ammonia plots better than usual, an effect probably related to the wet summer. In the matter of disease, the main pest, both in mangolds and sugar beet, was mangold fly, but the damage, though widespread, was scarcely enough to be serious.

Park Grass

Growth was late to start, owing to the dry cold weather in spring, when only Yorkshire Fog on the acid plots was at all conspicuous. Later the weather was much more favourable, and the yields promised to be above average. A feature of the season was the appearance of Yorkshire Fog in quantity on the limed ends of Plots 11_1 and 11_2; this had been gradually building up for several years, but was most noticeable this summer, rendering the contrast in species between the limed and unlimed ends of these plots very much less striking than usual.

Owing to showery weather, the plots were not cut till mid-July and baled under rather bad conditions. The second growth was lighter than usual.

Agdell

This field was drilled with barley in 1953 according to the standard rotation, but the plots were very exhausted, having received their last manuring in 1948. It was originally intended to harvest the barley in a large number of small plots to test the

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uniformity of the various sections in preparation for a new long-period experiment based on the former treatments. As it turned out, the growth of barley was so poor that this scheme was abandoned and the usual six plots were harvested. There was a uniform plant over the whole area in the seeding stage, but by early May the side after clover was showing phosphate-deficiency symptoms, but these did not appear on the side following bare fallow, which was at this stage a better green colour and showed stronger growth. A month later the position of the two halves was reversed: the fallow side showed extreme nitrogen starvation, while the clover side was a much better colour, except in one corner of Plot 2, where extreme acidity had stunted the crop. Later the barley on the acid areas was largely suppressed by weeds and worse than the unmanured. A detailed soil examination of this field has been put in hand.

Long-Period Experiments

The long-period experiments were continued. The four-course rotation started in 1930 to test the residual values of organic manures and phosphatic fertilizers completed its twenty-year cycle in 1953, and is being worked up and summarized. A modified scheme of treatments for the continuation of this experiment is being worked out.

Deep-cultivation rotation

This experiment, testing the cumulative effects of deep and shallow ploughing, was continued for the tenth season. The deep-ploughed plots have now been moved to full depth on five occasions, but the light colour and lumpy tilth of these plots after deep ploughing is still noticeable. All the cereals looked better in spring on the shallow-ploughed land, but on wheat and barley the position was reversed by harvest-time, while on oats the superiority of shallow ploughing persisted. The effect of dung applied to the previous root crop was clearly seen in the vegetative growth of oats and barley. The deep-ploughed land lay very rough for sugar beet, but the clods crumbled down very well in spring and produced a finer and cleaner seedbed than the shallow-ploughed land. In the end there was an advantage of over 2 tons of roots per acre for deep ploughing. Dung was the most effective of the manures tested, although superphosphate showed a visible effect in the early stages of growth, which, however, was barely reflected in the final yield. The one-year seeds were good, and dung applied to sugar beet two years before raised the yield by 10 cwt. of hay per acre, and also clearly increased the proportion of clover in the mixture. The potatoes looked best on the shallow ploughing, and showed great improvement for dung and some benefit from phosphate. The haulm on plots receiving only nitrogen and superphosphate died back by the middle of August, particularly on the half-plots on which the phosphate was applied in the ridges.

Ley-arable experiments, Highfield and Fosters

There were two tests crops grown in 1953 to assess the effects of the different three-year leys: wheat for the first-year effects, and

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potatoes for the residual effects after one wheat crop had been grown. The third test crop, barley, had not yet come into cycle, and merely showed the effect of extra nitrogen and of the residues of dung applied to the previous potato crop.

A good plant of wheat was obtained on both fields. On Highfield in early spring there was a visible difference between the tilth after cut grass and after arable cropping: the former was fibrous and fluffy, while the latter had been beaten down by winter rains. In mid-season, however, the crop looked much better on the old arable tilth than after cut grass, where the growth was noticeably patchy and irregular, at harvest the yield was 12·9 cwt. greater on the old arable land. Extra nitrogen had little visible effect on the crops at any stage, and the grain yield was actually decreased. Wheat after lucerne was judged in the field to be slightly better than wheat after arable crops, but at harvest the position was reversed, and as in the previous year the arable land yielded best. On Fosters lucerne gave about 4 cwt. grain more than the other treatments. Extra nitrogen to the wheat was more effective on Fosters than on Highfield, for it gave an increase of 1·9 cwt. per acre. Potatoes looked well on both fields and produced a heavy crop, differences between the various grass pre-treatments followed a somewhat similar pattern to the wheat, old arable giving the best yield on Highfield and lucerne on Fosters. Direct manurial effects were conspicuous, dung increased growth by 3·7 tons in Highfield and 2·8 tons in Fosters and lightened the leaf colour on both fields, high nitrogen gave rather small increases in yield, deepening the colour and if anything restricting the leaf growth. The barley was a heavy crop on both fields, and showed the usual effects from high nitrogen, but dung residues from the previous potatoes were also visibly beneficial. By 10th June the crop was badly lodged on Highfield, the severity depending closely on the manurial treatment, but a month later practically the whole area was flat and producing a strong growth of erect late tillers. The undersown seeds for next year's hay were killed out, and had to be resown in autumn. Conditions were similar, but much less severe, on Fosters. The main effects of the different cropping systems are given on p. 142.

The grazing plots had a favourable season. On Highfield grazing was started on 14th April and continued till 15th September. The teams of sheep were six for the permanent grasses, where the interval between successive grazing was fourteen to twenty-two days and four for the rotation grasses, where the interval was only eight to twelve days. At midsummer the stocking had to be reduced to three sheep per team, but the plots were continually grazed throughout the season. The three-year leys were particularly good on this field, the second- and third-year grasses having eleven grazing circuits and giving over 3 tons of dry matter per acre. On Fosters field the grasses were not quite so early nor the leys so productive as on Highfield, but the rate of stocking and the course of grazing was much the same. The season extended from 2nd May to 2nd October, and there was always some stock on the plots. The cut-grass plots grew well, and averaged 68 cwt. dry matter in five cuts on each field during the season, with a response to extra nitrogen of about 9 cwt. dry matter. Lucerne became very grassy in its third year on Highfield, but was much better on Fosters, where the third-year

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Ley-arable experiments, Rothamsted, 1953

Effects of previous leys and arable cropping measured in two test crops

Mean yields : wheat cwt./acre, potatoes tons/acre

	After three years' cropping with :				
	Lucerne	Ley	Cut grass	Arable crops	Mean
	First test crop				
Highfield					
Wheat, grain	41·8	38·6	31·6	44·5	39·2
Effect of extra N ..	−2·2	−1·6	−4·9	−0·5	−2·3
Fosters					
Wheat, grain	41·3	37·2	37·4	36·3	38·0
Effect of extra N ..	4·8	−0·3	0·2	2·9	1·9
	Second test crop				
Highfield					
Potatoes	14·54	15·41	14·30	16·26	15·13
Effect of dung	4·54	2·82	5·14	2·41	3·72
Effect of extra N ..	1·05	0·97	−0·08	−0·60	0·34
Fosters					
Potatoes	12·05	11·58	10·16	11·46	11·31
Effect of dung	4·11	2·28	2·89	1·91	2·80
Effect of extra N ..	0·84	0·82	0·67	−0·23	0·53

plots gave no less than 113 cwt. dry matter during the season. In its second and third years it was the most productive herbage crop on both fields. The yields of the various preparatory crops in 1953 are given below :

Yield of herbage crops, Highfield and Fosters, 1953

Dry matter, cwt./acre

	Old grass		Reseeded grass		Three-year ley			One-year ley hay
	Hay	Grazed	Hay	Grazed	Grazed	Cut grass	Cut lucerne	
			Highfield					
Blocks :								
First year ..	—	36·8	—	46·6	44·3	75·9	58·9	59·5
Second year	—	42·5	—	56·4	63·8	73·1	103·1	—
Third year	37·6	36·4*	55·3	32·4*	62·4	68·2	84·7	—
			Fosters					
Blocks :								
First year ..	—	—	—	40·0	31·5	46·5	43·9	34·0
Second year	—	—	—	40·5	57·3	77·2	107·3	—
Third year	—	—	40·4	31·1*	51·4	67·0	113·2	—

* aftermath grazing.

Short-Period and Annual Experiments

These experiments fall into several sections : (1) Experiments on special fertilizer problems, where the Rothamsted trials are part of a series carried out at a number of outside centres. Fertilizer placement studies fall in this group. (2) Those in which the primary purpose is to provide data for the scientific departments, as for example the spread of virus or fungus diseases in the field in

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relation to various agricultural factors. (3) Other Rothamsted experiments on general fertilizer or cultivation problems. Experiments in the first two groups are observed and reported by the scientific departments primarily concerned, and are listed below merely to indicate briefly their general scope.

Fertilizer placement experiments (G. W. Cooke, Chemistry Department)

(1) Barley—Highfield V, a comparison of British "nitrophosphate" and equivalent nutrients in standard forms, broadcast or combine drilled.
(2) Spring beans—Sawyers I, decalcic phosphate and superphosphate, broadcast or placed.
(3) Broad beans—Sawyers I, two levels of compound fertilizer, broadcast or placed.
(4) Lucerne—Highfield V, second year: residuals of fertilizer treatments applied in spring 1952: superphosphate, muriate of potash, broadcast or ploughed in, with and without a superphosphate application placed beneath the seed.

Experiments on eyespot (Cercosporella herpotrichoides) *in wheat* (M. D. Glynne and G. A. Salt, Plant Pathology Department)

(1) Rotation experiment—Little Knott, fourth year: wheat crop testing thirty-two different crop sequences on the incidence of eyespot.
(2) Wheat—Great Field I, second year: testing two varieties; two seed rates; two levels of nitrogenous manuring; four times of application of nitrogen; spraying in early spring with sulphuric acid.
(3) Wheat—Great Field I: testing four varieties; two seed rates; two levels of nitrogenous manuring; spraying with sulphuric acid.

Control of late blight on potatoes (J. M. Hirst, Plant Pathology Department)

Deacon's Field; effect of copper and sulphuric acid sprays.

Virus yellows experiment on sugar beet. (J. W. Blencowe, Plant Pathology Department)

Long Hoos VII; effect of three sowing and three singling dates.

Virus spread experiments (L. Broadbent, Plant Pathology Department)

(1) Potatoes—Long Hoos II, effect of repeated sprayings against aphids with five insecticides on spread of two viruses from infector plants.
(2) Broccoli—Stackyard Field, effect of dung and hoof at two rates on incidence of cauliflower mosaic virus.

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Experiments on powdery midlew (F. T. Last, Plant Pathology Department)

(1) Wheat—Long Hoos III, time of application and quantity of nitrogenous fertilizer on winter- and spring-sown wheats.
(2) Barley—Little Knott I, two varieties; two times of spring sowing; effect of lime sulphur sprays.

Wireworm experiments (F. Raw, Entomology Department, and C. Potter, Insecticides Department)

Wheat—Geescroft Field, 2nd year: residual effect of five soil insecticides applied in autumn 1951 for the wheat of 1952.

Control of bean aphis (M. J. Way, Insecticides Department)

Beans—Long Hoos V; test of four spray treatments on winter and on spring sown beans.

Wild oats germination and growth studies (J. M. Thurston, Botany Department)

Cereal crops—Great Hoos; effect of autumn sown wheat, rye, barley and spring-sown barley on growth of wild oats.

Other Annual Experiments

Wheat, residual effect of dung

A heavy crop of wheat averaging 40·8 cwt./acre was grown on land that had carried in 1952 a test of farmyard manure on potatoes. The residual effect of dung was roughly proportional to the rate of dressing applied, and amounted to 1·6 cwt. of grain for each 5 tons of dung given to the previous crop. The manner of applying the dung to potatoes, whether ploughed in in winter or in spring or placed in the ridges, had no significant effect on its residual value.

Cereals, late nitrogen experiments

This is the fourth season in which dressings of "Nitro-Chalk" have been applied to cereals at the end of June when the crops were in ear. The experimental crops had all received fairly generous applications of nitrogenous fertilizer either in the seedbed or as spring top dressing, the object of the experiment being to ascertain whether late nitrogen would increase the protein content of a crop already adequately manured. The agricultural details may be summarized as follows:

		Basal manuring			Late N applied	Date of cutting	Interval, days	Rainfall application to cutting, inches
Wheat	Cappelle	29 Apr.	3½ cwt.	S/A	29 June	19 Aug.	51	4·5
Barley	Herta	9 Mar.	2½ ,,	,,	25 June	13 Aug.	50	3·9
Oats	Marne	26 Feb.	2 ,,	N/C	26 June	10 Sept.	76	5·6

There was ample moisture to carry the late top-dressings into the soil, and in this respect the season was similar to 1950, when the experiments were started and gave rather promising results. At harvest the wheat was all standing, the barley leaning but not badly

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laid, but the oats were completely lodged, and were harvested by combine fitted with a sheet to catch the straw. The mean yields of grain and straw, the amount of crude protein and the percentage recovery of added nitrogen are given below :

Late nitrogenous top-dressings on cereals, Rothamsted, 1953

"Nitro-Chalk", cwt./acre	Wheat		Barley		Oats	
	Grain	Straw *	Grain	Straw *	Grain	Straw *
	Yield, cwt./acre					
0	31·8	44·6	38·6	39·8	42·1	42·4
1·5	32·2	43·3	40·3	39·3	41·5	43·7
3	31·8	43·3	42·0	40·8	40·9	42·0
	Increase in crude protein, cwt./acre					
1·5	0·12	−0·05	0·52	0·16	0·11	0·23
3	0·09	0·04	0·89	0·42	0·16	0·28
	Percentage uptake of added nitrogen					
1·5	8	−3	36	11	8	16
3	3	1	31	14	5	9

* Adjusted to 85 per cent dry matter.

All the cereals gave good yields without additional nitrogen in 1953, especially the barley and oats. Usually in these experiments the increase in yield of grain and straw following the late dressings has been negligible. This was so for wheat and oats in 1953, but the barley gave fairly large and highly significant increases in yield of grain but not of straw. There was the usual increase in nitrogen content of the barley grain and straw, and the final result was a gain of 0·68 cwt. of crude protein from the single top dressing of "Nitro-Chalk" and 1·31 cwt. for the double dressing, amounting to a recovery of about 45 per cent of the nitrogen added. This was the best result so far recorded in this series of experiments.

Oats with the extraordinary yield of 42 cwt. grain per acre without the late top dressing gave only 0·44 cwt. extra protein per acre and a recovery of 14 per cent of the added nitrogen for the highest level of manuring. In contrast to barley, the nitrogen tended to accumulate in the straw rather than the grain. In spite of the favourable season, late nitrogen gave negligible responses in wheat either in yield or nitrogen content. So far barley has been the most consistent crop in its utilization of late nitrogen.

Potatoes

A simple experiment testing farmyard manure, the three standard fertilizers and their interactions was begun in 1953, and will be continued yearly. There was a good crop showing large fertilizer effects. A dressing of 10 tons of dung gave an increase of 4·65 tons of potatoes in the absence of potash, but only 2·75 tons when muriate of potash was present. Superphosphate depressed the crop in the absence of dung and potash, but increased the yield in their presence, thus showing the positive PK interaction observed in many other experiments. Nitrogen increased the yield significantly, and was practically unaffected by any of the other manures. The residuals of the fertilizers applied to potatoes will be followed up in wheat in 1954.

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Potatoes, method of planting and location of fertilizer

Continuing experiments on this question, a simplified scheme was adopted in 1953. Planting with a hand-dropping machine fitted with a fertilizer attachment was compared at two rates of compound fertilizer with the traditional method of broadcasting fertilizer over open ridges, hand planting in the furrows and splitting the ridges back over the seed.

Potatoes, method of planting and location of fertilizer, Rothamsted, 1953

Mean yield : tons/acre

		Compound fertilizer, 7 : 7 : 10½, cwt./acre ± 0·379		
Method of planting	Fertilizer applied	0	7½	15
By hand, in freshly open ridges	Broadcast, over ridges	6·78	9·44	11·30
By hand, in ridges exposed for eight days	Broadcast, over ridges	6·17	9·58	10·81
By machine, from flat	Broadcast, on flat	6·66 *	8·60	10·90
,, ,,	Placed near seed		8·69	11·01

* ± 0·268.

Responses to fertilizer were good at both levels. At the early stages of growth potatoes planted with placed fertilizer looked more vigorous than those put in by the standard method, but later the position was reversed. In the end the yield obtained from 15 cwt. of placed fertilizer was practically the same as that given by the standard procedure, a result in line with previous experiments, but at the 7½-cwt. level the advantage appeared to lie with the standard procedure. Moreover, in the present season placed fertilizer did not show its usual advantage over broadcast fertilizer, the two methods giving practically the same results at both levels. Exposing the ridges for eight days before planting, instead of planting and covering immediately, reduced the crop by only 0·3 tons per acre, a non-significant amount. During the period of exposure the weather was cool and overcast, and there was no severe drying out. The experiment also included a test of late top dressings of sulphate of ammonia and muriate of potash. These treatments were applied on 30th June before earthing-up to see whether they could maintain active growth in late summer and early autumn. No advantage was obtained this season from either fertilizer used in this way. Some burning occurred where the late top dressings had touched the leaves; this was appreciable where potash was used alone, but much worse where sulphate of ammonia was also present. The late nitrogen darkened the foliage slightly.

Experiments on soil conditioners

Four full-scale plot experiments, laid down in April 1952 at Rothamsted and Woburn, were cropped with carrots in 1953 to test the residual effects of a synthetic soil conditioner supplied as "Krilium CRD-189". The original treatments in 1952 had consisted of 0, 3 and 6 cwt./acre of the soil conditioner broadcast and 3 cwt./acre raked into the soil surface. The carrot crop of 1953 showed only small yield differences, except in an experiment of heavy soil in Warren Field, Woburn, where the yield was only 6·4 tons/acre on

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plots with the surface applications in 1952 as compared with 8·2 tons on plots without soil conditioners.

In the spring of 1953 soil conditioners were available in mixtures with inert substances for more convenient application. Four small-scale experiments on carrots were laid out, two at Rothamsted and two at Woburn, in 4 × 4 Latin squares with dressings at the rate of of 10 cwt. active ingredient per acre in the following forms :

" Krilium 931 " (or " CRD-189 "), containing 25 per cent of the material used alone in the 1952 experiments;
" Merloam " (or Krilium 631 or CRD-186) containing 25 per cent of active material;
" Aerotil " (dry form), 40 per cent active material.

The conditioners were applied between 20th and 25th March, and incorporated by two rotary hoeings. Seedbed conditions were favourable in three experiments, but the heavy soil of Warren Field, Woburn, was rather hard.

Carrots, yields of total crop, tons/acre

Conditioner	None	" Krilium 931 "	" Merloam "	" Aerotil "	S.E.
Rothamsted					
Long Hoos ..	28·3	28·9	27·1	29·1	0·61
Stackyard ..	23·8	24·9	21·6	23·1	0·76
Woburn					
Stackyard ..	8·7	9·7	9·4	9·6	—
Warren ..	11·8	12·3	13·8	13·4	0·41
Mean of four experiments ..	18·1	19·0	18·0	18·9	—

The conditioners had no appreciable effect on yield at Rothamsted, and gave moderate increases at Woburn.

On several occasions there were clear effects of the conditioners on the physical state of the soil. At Rothamsted on 7th April the " Merloam " plots were dry and powdery on top after heavy rain on the previous day, while the untreated and " Krilium 931 " plots were quite moist, with the " Aerotil " plots intermediate. On 5th June the " Merloam " plots on Long Hoos field were dry on top with small hard clods, while the rest of the plots were moist, with clods that crumbled easily. After lifting the carrots in the Long Hoos experiment, the " Merloam " plots retained a more crumbly tilth than the other plots. The " Merloam " plots dried up more quickly and were less weedy than the other plots in the experiment in Warren field, Woburn; the " Krilium 931 " plots were the most weedy.

It is proposed to recrop the experiments started in 1953 to assess the extent of any residual effect from heavy dressings of soil conditioners.

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