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Report for 1962

Full Table of Content

ROTHAMSTED
EXPERIMENTAL STATION
REPORT FOR 1962

The Farms

Rothamsted Research

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THE FARMS

J. R. MOFFATT

ROTHAMSTED

The 1961/62 season got away to an excellent start. The 1961 root crops were removed in good time, and conditions for autumn ploughing and drilling were generally good. The drilling of winter wheat and beans was finished by mid-November, and it was even possible to cart and spread dung on a 12-acre field. Wintry weather started before the end of the year and continued well into spring. Strong, drying winds enabled spring land work to start early, but this was abruptly halted by more wintry weather. The spring was dry and cold, with strong, drying north-easterly winds which retarded germination and growth of all crops. An early summer drought was followed by wet, sunless weather which delayed the ripening of crops, and harvest.

In a fine spell in autumn most of the root crops were harvested in good conditions, and some of the winter corn was sown early. Wintry weather set in early, and the year ended with a long, unbroken spell of frost which culminated in a blizzard on 30 December. At the end of 1962 there were still a few beet to be harvested, and ploughing and other land work was far behind schedule.

The Effect of Weather on Crops

Autumn ploughing and winter wheat and bean drilling were done in favourable weather in early autumn 1961. Most of the 3·29 in. of rain in October fell in the last week, but conditions improved so rapidly in November that winter drilling was finished by the middle of the month, and most of the winter ploughing was finished by the end of November. December brought very mixed weather; spells of hard frost and heavy rain were interspersed with very mild spells; rain totalled 4·35 in., 1·74 in. above the mean. Two weeks of continuous frost culminated in a 20° frost and a blizzard on New Year's eve, when 14 in. of snow fell. Fortunately the last of the cattle were brought into covered yards the day before. Mild weather followed, with heavy rain and gales; rain in January was 4·11 in., 1·58 in. above the mean. Only 1 day's land work was possible between 23 December 1961 and 19 January 1962, and most of the time was spent on potato sorting and mechanical hedge cutting.

The weather improved in February, and strong winds dried out the ground rapidly. Seedbed preparations for spring corn started on 19 February, about 2 weeks earlier than usual, and most of the non-experimental barley and beans were drilled before frost and snow stopped the work. Frosts made the ground very friable, and good seedbeds were obtained with very little working. Except for two short mild spells, March was very cold. There were ground frosts on 27 days, the most severe being 19° of frost on 17 March, and in addition there was snow, sleet and hail.

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Winds were strong and keen, mostly from the north-east. The soil, when not frozen, broke down readily to good seedbeds, but, as the ground about 4 in. deep remained frozen, deep cultivations were impossible. All spring corn and beans, except one area where drilling was purposely delayed, were sown by the end of March, when potato planting and sugar-beet drilling had also started.

A spell of damp weather in early April prevented field work for 13 days, but by the end of the month all crops, except kale, swedes and mangolds, were sown, and all fertilisers applied. The cold and winds delayed the germination of spring-sown crops, and autumn-sown crops were retarded. Cold persisted throughout May; one spell at the end of the month was the coldest on record for that time of the year, the maximum temperature of 46° F being about 15° F below the average. Crops and grass were very backward, and sheep could not be grazed on the experimental plots until 3 weeks later than usual. Rain followed the drilling of kale, swedes and mangolds and encouraged quick and even germination. Strong winds and rain interfered with the spraying of herbicides on cereals, especially on experimental plots. Many crops were sprayed at a late stage, but some were left unsprayed.

June was cool and blustery, with few really warm spells, and only 0·28 in. of rain. Some of the barley looked rather uneven, but most of the cereals seemed to thrive under these conditions. Silage and hay was made in excellent condition in the dry weather, which continued until the middle of July, after which it became wet and cool. Heavy storms late in the month laid quite a lot of the promising winter wheat and some of the barley. Potatoes grew rapidly, and were sprayed early against blight. The cool, wet weather delayed the cereal harvest, which started on 24 August and continued intermittently in the damp weather of early September. It ended on 25 September, at the end of a spell of better weather which started about the middle of the month. Most of the corn was very wet when cut, and nearly all needed drying. Wet weather delayed the cutting of the late silage until early October, but there was then 3 weeks of fine weather during which most of the potatoes were lifted.

In late November wintry weather set in; 14 ground frosts and a fall of snow delayed the harvesting of the mangolds and sugar beet. This weather lasted well into December, and one 8-day spell included one day with 18° of frost and four others with 12° or more. The mangolds on the field were severely damaged, as were the crowns of the unlifted sugar beet. However, in a fine spell in the middle of the month wheat sowing and mangold pulling were completed, but carting was delayed by more snow on 23 December and frost. The frosts became more severe and continued to and beyond the end of 1962. Snow on 26 December and a blizzard on 30 December together gave 11 in., and there were deep drifts.

Field Experiments

The number of field plots to be harvested increased by 505 to a total of 2,820, and there were also several hundred microplots. The large

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programme fully extended the resources of the Farm, especially as fewer staff were employed than for many years past. In the dry spring there were few interruptions, and all crops were sown in reasonable time. Germination and early growth was slow in all crops, but by late summer all experiments looked well. Cereals were lodged only where much nitrogen was given, and harvest, though protracted, presented no great problems. The potato and sugar-beet plots were lifted under good conditions.

A late-sown winter bean experiment had to be abandoned because of damage by rooks after sowing, but otherwise losses from birds and other vermin were slight.

On Broadbalk Black Grass (*Alopecurus myosuroides*) germinated well by the end of October 1961, so drilling was done early in November in perfect conditions. The permanent wheat section was sprayed with MCPA/TBA, which gave excellent weed control, especially of corn buttercup (*Ranunculus arvensis*). Several patches of creeping thistle (*Cirsium arvense*) were hand-pulled; there were few wild oats (*Avena ludoviciana*), and pulling on two occasions took only 34 hours; weeds were very prevalent on Section 5. Yields were well above normal, and the dung plot on Section 1 B, carrying its first crop after fallow, gave an unexpectedly high yield of almost 41 cwt/acre. Section 1 A, the permanent wheat area, outyielded all other sections. The autumn ploughing was interrupted by bad weather, and the ground dried out so hard in October 1962 that disc harrows were needed to produce a tilth suitable for the germination of weed seeds. Drilling was done in fair conditions at the end of November, and as Squarehead's Master 13/4 could not be bought, seed from several plots on Broadbalk in 1962 was used.

The Hoosfield Half Acre yielded above average. It was sown in autumn 1962 partly with Squarehead's Master 13/4 grown on Broadbalk and partly with new Cappelle seed to compare the two in conditions of low fertility.

Hoosfield barley plots were sprayed with 2,4-D ester in autumn 1961 to control coltsfoot (*Tussilago farfara*), and spots with twitch (*Agropyron repens*) were treated with dalapon. The initial germination of wild oats (*Avena fatua*) was destroyed before the barley was sown, and it took only 7 hours to hand-pull the weeds on two occasions; a routine spraying was given against other weeds. In June some plots looked uneven, but later became uniform. Only the dung plot lodged, but it yielded well above average; other plots yielded slightly below average.

Parts of the Exhaustion Land were treated with dalapon against twitch in autumn 1961, and were sown with Plumage Archer barley. They had a routine spraying against weeds, and the few wild oat plants were hand pulled.

The dry spring retarded the growth of grass on the Park Grass plots, and the first cut yielded much less than usual. The second cut, taken slightly later than usual, gave a very heavy yield. Moles were active on plots 1, 2, 3, 4 and 20, and were poisoned on several occasions.

The plots on Barnfield, the classical mangold experiment, were divided to grow both mangolds and potatoes after the 2-year fallow. The frost tilth broke down easily to give a friable surface seedbed for mangolds,

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but the lower soil remained very intractable, and even in the very favourable spring, conditions were quite unsuitable for potatoes. At planting many sets were left uncovered, and the whole area had to be reridged. Rubbed and graded mangold seed was used for the first time, and drilling was done by individual seeder units mounted on the toolbar of a market-garden crawler tractor. After a slow start both crops grew rapidly, and yielded well. Potato lifting was done towards the end of a long dry spell, and conditions were excellent. The lifting of mangolds was interrupted by a spell of severe frost, and the roots still in the field, both growing and heaped, were severely damaged. Carting did not finish until the end of December, and for the first time mangold leaves were carted off instead of being ploughed in.

Cropping

Of the 463 acres farmed, 297 were under arable crops or fallow, 103 under short-term leys or lucerne–grass mixtures and 62 were under permanent grass. The main arable crops were wheat (98 acres), barley (100 acres), oats (7 acres), beans (30 acres), potatoes (36 acres), and kale, sugar beet and swedes (7 acres). 15 acres were fallowed.

The basic three-course rotation of wheat, barley and either roots or beans was varied to provide sites for current and future field experiments. Potatoes were the main root crop, as only a little kale was needed, and sugar beet is unsuited to our heavy land. The balance of the root break was sown to beans, which make little demand on labour and are harvested with normal cereal-harvesting machinery. Some arable fields were rested under grass or lucerne–grass mixtures. Several fields are being kept acid or deficient in phosphorus or potash to provide sites for fertiliser experiments. Some of these do not give worthwhile arable crops and are kept under long-term leys or fallow. Experiments needing fertile ground were sited in fields normally in the three-course rotation. As many experiments as possible on one crop were fitted into a field to keep them uniformly cropped.

Crops

Wheat. The season seemed to suit this crop. Cappelle, with Squarehead's Master 13/4 on the classical plots, were the only varieties of winter wheat, other than those in a variety trial. In this three of the four varieties with 0·9 cwt/acre nitrogen gave over 50 cwt/acre. The winter wheat plants suffered from the drying winds in spring, but recovered well. Heavy rain in late July lodged the more highly fertilised crops and brought the average yield down to 38 cwt/acre. The Jufy I spring wheat benefited from good tilth and early sowing; 0·9 cwt/acre nitrogen gave a yield of over 40 cwt/acre in one experiment, and the average of 40 acres was over 35 cwt/acre. None of the spring wheat lodged.

Barley. The Proctor barley seemed more affected than wheat by the dry spring, and most areas looked rather uneven during the growing season.

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The crops became more even later, but the average yield of 30 cwt/acre was less than average. The largest plot yield was nearly 47 cwt/acre with 0·9 cwt/acre nitrogen.

Oats. The small area of Condor spring oats yielded 28 cwt/acre.

Herbicide Sprays

Herbicide spraying was delayed by strong winds and rain, which prevented the work being completed before the crops became too tall. The last sprayings left pronounced wheel marks, but these were preferable to the weedy crops on some of the unsprayed areas. As red shank (*Polygonum persicaria*), knotgrass (*Polygonum aviculare*) and black bindweed (*Polygonum convolvulus*) were the predominant weeds, the main herbicides used were MCPA/MBA and MCPA/2,4-DP. These proved very effective.

Beans. The early sown winter beans escaped bird damage, and neither the hard winter nor the dry season seemed to harm them. In one experiment the average yield was over 29 cwt/acre, with a top yield of almost 34 cwt/acre. Spring beans did surprisingly well in the dry season and averaged about 28 cwt/acre. As there were very few aphids, only a few experimental plots of winter beans and only the headlands of spring beans were sprayed with insecticides. The whole bean area was sprayed with simazine, which controlled weeds well; three sprayed areas were each given one inter-row cultivation, but the rest had none.

Sugar beet, kale and swedes. Only a small area of each of these crops was grown. The first sowing of beet was made on 21 March, and rain capped the soil, which made germination irregular and gave a gappy stand. The plants drilled on 11 April almost caught up with the early sowing, and both areas were singled at the same time. The drought and cold weather in spring gave far more bolters than usual, but though they looked very numerous, the percentage did not exceed 12. As there were very few aphids, only experimental plots were sprayed with insecticide. Lifting was almost finished by the end of December. Despite their poor start, the beet yielded very well, the main area averaging 22 tons/acre of unwashed beet, with a sugar content of about 16%.

Both swedes and kale grew well, and weeds were easily controlled in the dry summer. Yields were good.

Potatoes. In 1962, for the first time, all non-experimental and some experimental areas for potatoes were rotary cultivated direct from the ploughing, and the fertilisers were applied after rotary cultivating. This gave excellent tilths and accelerated the preparation of the land. The planting of maincrops started towards the end of March and finished on 4 May. King Edward VII and Majestic were the main varieties, though some Ulster Supreme were grown. They grew very slowly at first, and the ground was very dry when they were earthed up. Growth was rapid after mid-July. All varieties were sprayed in July against late blight (*Phytophthora infestans*)

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with maneb to avoid copper scorch, but copper oxychloride was used in later sprays. Row-crop wheels were used on the tractor to check damage to the haulm, which remained green until towards the end of September, when it was burned off with concentrated BOV or "Reglone". "Reglone" killed more slowly than acid. The tubers, lifted during the fine spell in October, were clean and dry. The Majestic, and the King Edward which received dung, yielded 14 tons/acre, and the Ulster Supreme 13 tons/acre. As most of the potatoes were grown near the farmstead, the stillages were brought in on a tractor and were tipped straight into store. This system proved very satisfactory, and very economical of labour.

Grassland. Strong winds dried what little grass there was at the end of March, and spring growth did not start until late in April. Some cattle were turned out in early May, but others had to be kept in yards until 19 May. Growth during the next few weeks more than kept pace with the stock, but the cool, dry weather in June retarded growth; grass became scarce by the end of the month, and remained so until rain in mid-July enabled the plants to use the nitrogen applied after hay and silage cuts. Thereafter there was ample "keep" for all stock.

Silage and hay cuts were rather less than usual, the hay averaging 43 cwt/acre. The silage crops were cut by mower, and allowed to wilt for a few hours before being blown into trailers by a forage harvester. This method made it easier to control the silo temperature, and the resulting silage is being eaten readily. The hay was not bruised with the forage harvester, which was being used for silage, but as it was made quickly and had little rain on it, the quality is excellent; the batch bale drier was used only twice.

Autumn silage was made from the second cut of the Park Grass plots and the third cut of lucerne–cocksfoot mixture. This mixture, which was sown in spring 1959, was less productive than usual, probably because of virus disease in the grass, and verticillium wilt and mosaic virus in the lucerne. It was ploughed up in the autumn.

Livestock

Cattle. The unfinished cattle were brought into covered yards towards the end of November 1961 for fattening; they were joined in mid-December by 63 dehorned Herefords bought in autumn 1961, and were fed on silage, brock potatoes and kale, with a little hay and straw, and a small allowance of home-produced concentrates. The stores under this treatment gained weight at about 1¼ lb/day, and a few of the best were sold direct from the yards. Fourteen younger cattle were bought in early May. During the summer the cattle on short "keep" put on 1½ lb/day, and all, except those bought in May, were sold by early December. Fourteen beasts were brought from Woburn during the summer for finishing, and altogether 100 cattle were sold fat during the year.

Fifty-four cattle bought in autumn 1962 were brought into covered yards in December, and are being fed as last year.

The organophosphorus insecticidal wash used on all the store cattle in

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autumn 1961 proved very effective against warble maggots, and this treatment has now become routine.

The cattle are weighed regularly in the new handling pens to ensure that the rations and management are satisfactory.

Sheep. In October 1961, 138 ewes were put to Suffolk tups after being flushed on a new seeds ley. Hay was fed after Christmas 1961 and concentrates from 6 weeks before lambing started in late March. The ewes were in good condition for lambing, and the weather, though cold, was reasonably good. The lambing percentage of 159 was much below the 1961 figure. Six ewes were barren and 10 died either during lambing or shortly afterwards. Some of the deaths were from hypo-magnesemia, and feeding with calcined magnesite prevented further losses. The sale of fat lambs started towards the end of June, and all, except those kept on for grazing experiments in 1963, were sold before the end of the year.

Culling brought the flock down to 117, and 40 Scotch Half-bred gimmers were bought. The flock was flushed on clean grass in October 1962 before being put to Suffolk tups. Because of the frost and snow, feeding with hay started in late November. Silage was also fed from mid-December, and the rate was increased to 2 lb/head per day at the end of the year.

The ewes are injected each autumn, and again before lambing, with a combined vaccine to give them immunity, and the lambs a 16-week immunity, against a wide range of diseases; lambs are given an injection at weaning. Ewes and lambs are also drenched with a nematicide.

Equipment

Standardisation to one make of tractor was completed, and a centrifugal-type fertiliser drill was bought to spread chalk and fertilisers to grassland.

A high-clearance tractor fitted with narrow row-crop wheels was bought, which will be fitted with a specially designed sprayer, with interchangeable booms and nozzles, for use in experiments.

The four 10-ton radial-flow drying silos were inadequate for the wet harvest, for almost all the grain was combined with a moisture content of about 20%. More drying capacity will be needed for 1963, when a larger combine will be used, and the present fan is to be replaced by one giving about twice the present volume of air.

Buildings and Roads

About 500 yards of muddy tracks were made into gravel roads, and there is now good access to all the fields on the farm.

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WOBURN

At Woburn the autumn of 1961 was favourable to farm work. The early part of November was stormy, but the root crops were lifted before the end of the month, though the last of the beet were not despatched until January.

Two of the heavier fields, in good condition after potatoes, were grubbed with a rigid-tined cultivator and drilled with winter wheat. About 31 acres of light land were sub-soiled before ploughing to break a pan about 15 in. below the surface, and experiments in 1962 showed that spring wheat and barley benefited but sugar beet did not. Ploughing would have been finished by the end of the year but for the hard frost towards the end of December. During this time dung was carted out, but spreading and ploughing in was delayed by frost, a heavy fall of snow on 31 December 1961 and heavy rain in January.

February had only 0·34 in. of rain, and after strong, drying winds, seedbed preparations started about the middle of the month. The land broke down easily, and corn drilling was well forward when it was stopped by snow and frost at the end of the month. Neither frost nor snow were as severe as at Rothamsted, and corn drilling was finished by 5 March. Wintry weather returned in March with frost and some snow, and keen North-East winds, but there was little rain. Field operations were restricted, but early potatoes were planted in the middle of March and sugar beet was drilled by the end of the month. Cold weather in April delayed germination and retarded growth of all crops and grass during May.

Even with this slow start, and the dry weather in June (0·29 in. of rain), all crops looked well towards the end of the month, and a small quantity of excellent hay was made. The weather remained dry until about mid-July, when the effects of the long drought were apparent. Several areas of barley and oats were uneven, because many plants stopped growing just before ear emergence was completed; the lower bean leaves turned yellow and dropped, but the rain in late July kept the upper leaves green. The heavy storms laid several areas of spring wheat. The dull, wet weather delayed the start of harvest until 22 August, and it was finished on 22 September. Most of the corn had to be dried.

Potato lifting was completed, in dry weather, by 19 October, and a small part of the area was sown with winter wheat. Sugar-beet harvesting followed, and though interrupted by the wet weather in November and the onset of wintry weather early in December, it was finished on 17 December. At the end of the year there was still about 50 tons of beet awaiting despatch to the factory.

Ploughing was well forward before the early December frosts, during which dung was carted to arable land. This, and the ground after the last-lifted sugar beet, are the only areas still to be ploughed. Very frosty weather started on 23 December and continued until the end of the year, and 6 in. of snow fell on 30 December.

Cropping

Of the 127 acres farmed, 24 carried wheat, 29 barley, 7 oats, 21 potatoes and 8 sugar beet. There were small areas of rye, beans, lucerne, and

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carrots and other market-garden crops. Temporary grass occupied 16 acres and permanent grass 4 acres.

As potato-root eelworm (*Heterodera rostochiensis*) is now widespread, the interval between potato crops must be extended to 3 years. The acreage under sugar beet cannot be increased unless the harvesting is fully mechanised, and, without irrigation, beans cannot be used on the light land as a break from cereals. The provision of suitable sites for experiments now presents a difficult problem, but it will be eased now that we are renting 44 acres of land forming part of the Dairy Farm, Husborne Crawley. Except for 4 acres under kale, this land was under long-term leys or permanent grass, 4 acres of which was ploughed and sown with winter wheat in autumn 1962.

Experiments

The number of experimental plots under grain and pulse crops increased by 148, and root crops by 116, to give a total of 1,064, 264 more than in 1961.

The excellent soil conditions in autumn and spring enabled all crops to be sown in good time. The corn harvesting by combine presented no great difficulties, and in the good weather of autumn 1962 potato and sugar-beet plots were harvested quickly and easily.

Crops

Cereals. As soil conditions in autumn 1961 were good, the acreage of Cappelle wheat was larger than usual. One small area was destroyed by birds, but the rest did well and averaged 34 cwt/acre. The Jufy I spring wheat looked well before it was badly lodged by storms in late July, and yielded 32 cwt/acre. The Condor oats and some of the Proctor barley were affected by drought and were uneven, with dwarf and normal plants side by side; the difference in height of oats was as much as 12 in. Many aphids infested the oat panicles, and the yield was small. The average barley yield of 33 cwt/acre was better than usual.

All crops were sprayed with a herbicide with great success. Polygonum spp. were the main weeds on most areas and were sprayed with MCPA/MBA or MCPA/2,4-DP. Where mayweed (*Matricaria inodora*) was present, TBA/MPCA was used.

Beans. Beans were grown only in experiments. The late-sown winter beans on the Irrigation Experiment were destroyed by birds and replaced by spring beans. Irrigation increased their yield from 21·0 to 33·5 cwt/acre. An experiment on the control of aphids gave a patchy crop and poor yield, but there were few aphids to control. On the long-term liming experiment on an acid soil the beans showed very little early response to lime, phosphate or potash, but later improved colour and increased height from liming was obvious; liming increased yield from 14·8 to 22·0 cwt/acre.

Potatoes. Most of the early varieties were grown in experiments. They were sown in mid-March, but were slow to come through the ground, and

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there were many gaps. They grew slowly, and although lifting was delayed until late July to increase bulk, yields averaged only 3·5 tons/acre. In the Market Garden experiment dung increased yield by 2·0 tons/acre and irrigation by 3 tons/acre. Potato-root eelworm (*Heterodera rostochiensis*), now present on the Green Manure Experiment in Stackyard field and in the Market Garden Experiment in Lansome field, probably contributed to the small yield.

King Edward VII occupied the biggest acreage of the main crop, though some Majestic were grown. Planting started in mid-March, but growth was slow until mid-July. About the end of August most of the King Edward turned yellow very rapidly, and the plants soon died. The cause was diagnosed as *Verticillium* wilt; this disease has not previously been recognised at Woburn, but similar yellowing and rapid death has occurred, though it spread unusually rapidly in 1962. The Majestic hardly seemed affected. What little King Edward haulm was left was removed mechanically, but in the mild, wet weather in September weeds, mainly chickweed (*Stellaria media*), grew rapidly. This interfered with lifting, which had to be postponed until the weeds had been killed by spraying with diquat, but the fibrous root system still proved a nuisance. The haulm of the Majestic was killed by diquat. Blight (*Phytophthora infestans*) came early; the first spraying was done on 16 July, and the King Edward were given two further sprayings. The Majestic were sprayed twice.

Lifting was done without interruption in an excellent spell of weather, and for the first time the crop was handled by the pallet system. The King Edward yielded 10 tons/acre and the Majestic 12 tons/acre. Common scab (*Actinomyces scabies*) was less prevalent than usual.

In the experiment on weed control in potatoes, trietazine plus paraquat was the only treatment to control weeds satisfactorily and gave a yield of 1·5 tons/acre more than the plot given conventional cultivations. In the Cultivation–Weedkiller Experiment early spraying with prometryne alone failed to control weeds, and in the Irrigation Experiment trietazine alone also failed to control groundsel (*Senecio vulgaris*), mayweed (*Matricaria inodora*) and chickweed (*Stellaria media*).

Sugar beet. This crop was drilled before the end of March into a fine seedbed. Germination was slow and uneven, but eventually a good plant developed. Singling was done early, and in the dry weather weeds were controlled easily. Spraying was not needed against leaf miner (*Pegomyia betae*) or aphids. The crop grew rapidly after mid-July, but the many bolters caused trouble at lifting. This started early in October, but frost delayed the finish until mid-December. Frost did some damage to the roots still in the ground in December, but when clamped the beet were protected against frost. Yield of washed beet was about 20 tons/acre, with a sugar content which varied between 14·4 and 18·8%. The largest plot yield was 78·3 cwt/acre total sugar.

Carrots. Carrots were grown in two experiments. In one, testing the effect of controlling aphids which spread motley dwarf virus, the crop grew well in a year remarkably free from aphids, and gave yields of over 25

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tons/acre of good-quality carrots. Three routine "Metasystox" sprayings were given to Series D carrots, which also gave a good yield.

Market-garden crops. The leeks grew well in autumn 1961, but the first lifting was delayed by bad weather until January 1962. The second lifting was in early March. Yields were about average. The crop planted out in 1962 had a favourable autumn, and the first lifting will be made as soon as the soil thaws.

The red beet were uneven, but as this seemed to reflect manurial treatments, they were left. As many bolters developed, the beet were harvested early, and the area was resown about mid-July. This sowing was damaged by cutworms and aphids, and when harvested at the end of November there were very few marketable beet.

Lucerne. In the Irrigation Experiment lucerne drilled about mid-April grew well and gave three useful cuts, the first on 17 July. The Ley–Arable Experiment was drilled a few days earlier and was the first crop of lucerne after soil sterilisation, but it was not ready for cutting until 14 August, and only two cuts were taken. The second- and third-year crops on this experiment grew slowly in the early part of the season, and they looked patchy and unhealthy. Only three cuts were taken.

Grassland. Grass grew very slowly, and there was no spring flush. After the sheep were returned to Rothamsted in May 10 acres were shut for hay, but 4 acres of this had to be grazed. The other 6 acres gave about 8 tons of hay, and as no rain fell on it, the quality was excellent. "Keep" remained scarce until the latter half of July, when rain and a top dressing of nearly 5 cwt/acre "Nitro-Chalk" produced rapid growth, which gave abundant grass in late summer and autumn.

In the Ley–Arable Experiment grazing started in mid-May, 3 weeks later than average, and the mid-season drought affected grazing, so that the second- and third-year leys were grazed only five times and the first-year leys only four times. The 1-year seeds hay produced such a dismal second cut that there was not enough to weigh.

Livestock

Cattle and sheep. Eighty-eight tegs for grazing experiments at Rothamsted and Woburn were over-wintered at Woburn in 1961/62. Sugar-beet tops were fed until Christmas, when, because of the severe frosts and snow, hay was fed. In 1962, 60 lambs after weaning were sent for over-wintering and were fed in the same way. During the cold weather at the end of December, the lambs were brought in to the covered yard at the farmstead recently rented.

Fourteen dehorned Hereford bullocks were wintered in covered yards, and were not turned out until early May. Five were transferred to Rothamsted in early May and the remainder fattened on the grass during the summer. Thirty-one bullocks were bought early in October 1962 to deal with the flush of autumn grass, and they were later given sugar-beet tops

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or carrots. Hay was fed when the frost became severe, and brock potatoes replaced the frozen sugar-beet tops. They were brought into covered yards towards the end of December.

Pigs. The Large White pig herd was maintained at about 25 by keeping home-bred gilts. The use of farrowing crates increased the average litter size at weaning from 7·3 in 1961 to 8·2 in 1962, and pig sales, mostly as pork, increased from 215 in 1961 to 332 in 1962.

Implements

A small market-garden track-laying tractor with individual seeder units was used to drill carrot and red-beet seed on experimental plots. This eliminated the variation in sowing depth associated with the tracks of a wheeled tractor. A front-mounted bale carrier and rear buckrake saved time and labour in carting hay and straw bales, as did a pallet-handling system for potato carting.

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