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The Farms : Rothamsted

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THE FARMS

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Rothamsted

The weather of 1957, as of 1956, was very unusual; this had a marked effect on crop yields. Land work was somewhat behind schedule at the beginning of the year, but the main factors which gave the season such a bad start, from the agricultural point of view, were the mild, wet winter and the very few frosts. It was very difficult to obtain suitable tilths for any crop; tilths could only be obtained by constant working, mainly with disc harrows. The adverse effects of the poor seedbeds on the germination and early growth of crops was greatly accentuated by the long spring drought and the drying winds. With the exception of winter wheat and beans, which looked well throughout the year, all crops suffered, and it was not until a wet spell began towards the end of June that they looked up. Growth was then very rapid, but it was too late to undo all the damage, and many crop yields were well below average. The corn harvest was late and long, but the lifting of all root crops was carried out under good conditions. These conditions also favoured autumn land work and autumn sowing, so that by the end of the year work was well forward.

THE EFFECT OF WEATHER ON CROPS

Good progress was made with land work in the late autumn of 1956, but it was still somewhat behind schedule by the beginning of 1957. The very mild autumn of 1956 encouraged the germination of weed seeds; a second ploughing was therefore given to several areas early in 1957, when the weather was mild and fairly dry. This work was brought to an abrupt stop by heavy rain towards the end of January, and wet, mild conditions persisted until almost the end of February. By this time the land was extremely wet and the surface was badly "panned", and field work could not start until the middle of March, when good progress was made with the drilling of spring beans and cereals. However, the land was still very wet underneath, and only surface cultivations were possible. Suitable seedbeds were very difficult to obtain owing to the absence of frost tilth and to the surface pan.

Progress, throughout the latter half of March and throughout April, was slow because of the difficulty in getting suitable seedbeds. In many cases the ground had to be worked under rather unsuitable conditions in order to facilitate drying out, but from about mid-April onwards strong winds dried out the clods too rapidly, and they became very difficult to break down.

However, spring-corn drilling was completed early in April. The dry weather, with strong, cold winds, continued until about mid-May; these factors, together with the rather unkind seedbeds,

caused uneven germination and slow early growth. The sowing of kale and small grass and clover seeds was delayed by unsuitable conditions.

Rain fell about mid-May, and the spring sowings were soon completed. During the 3 months March to May the rainfall only totalled 2.97 inches, less than half the normal.

The warm, dry weather continued throughout the first 3 weeks of June, and though this suited haymaking well, most of the spring-sown crops made only slow growth. The spring-sown beans looked very backward at this stage, while the germination of root crops was uneven, and growth slow. On Barnfield, the Classical root field, germination was extremely slow, and only on the two dunged strips were the rows visible when normally the crop would be fit for singling.

The long spell of dry, warm weather was broken towards the end of June by heavy thunderstorms, and in the 4 weeks from 23 June to 20 July 3.26 inches of rain fell. Conditions soon became very sticky, and little could be done to check the rapid growth of weeds. The root crops made a spurt of growth at a time when singling was almost impossible, and a small area of mangolds had to be abandoned. In the potato crop, also, rain caused rapid growth.

The wet spell lasted, except for one or two short breaks, until about the middle of August, and only then could harvest operations really begin. Most of the crops were harvested in good condition, though towards the end of the operation spring wheat was cut with a rather high moisture content, as the weather seemed to remain permanently dull and damp. Towards the end of August there were severe gales which caused extensive shedding of the dead-ripe corn.

After a wet spell in the latter half of September, during which time the potato haulm was burnt off with BOV, the weather improved, and conditions for potato picking in October were almost ideal. Autumn ploughing got away to a good start in September, and by mid-October the winter beans and some wheat had been drilled.

November was rather mild and damp, although drier than usual. Harvesting of the mangolds and sugar beet was finished before the end of the month. The last of the winter wheat was drilled during this period. In early December there was a spell of thick fog and sharp frosts. Full advantage was taken of the dry soil conditions to cart and spread farmyard manure (F.Y.M.), and almost all the dunging was done before the ground became too wet. The ploughing of the arable ground was completed, and several fields were ploughed a second time before the end of December. By this time land work in general was farther ahead than for many years past.

FIELD EXPERIMENTS

There was again a very full programme of field experiments, but the reasonably dry conditions, both in the autumn of 1956 and the spring of 1957, enabled the work at these two peak periods to be satisfactorily concluded, though the spring seedbeds left much to be desired.

Despite the stormy weather in July, not a great deal of lodging occurred, and the combine-harvesters were able to make a clean job on all field experiments. Nearly all the cereal plots were cut by combine-harvester, which, despite the late start, made it possible to finish harvesting in good time. This year for the first time the Classical wheat plots on Broadbalk field were cut by combine. Unfortunately some shedding took place during the severe gales just before cutting commenced, but otherwise the operation went without a hitch. Owing to rather unfavourable weather, it was spread over 5 days, and the actual time spent in the field was about the same as that taken by the binder method. Yields were taken separately from the centre cut and the two outside edges, but in future only one cut will be taken from each plot, and the position of this cut will vary from year to year. The straw was baled by a pick-up baler and weighed, but much of the chaff and fine cavings, normally removed with the sheaves, was left behind. It remains to be seen whether the use of the combine has any effect on the weed population in the field. The permanent barley plots on Hoosfield will continue to be cut by binder.

The wild oats in Broadbalk field were hand-pulled on two occasions. This has now become a routine procedure, and appears to be very necessary if a build-up of the weed is to be prevented. On Hoosfield, where this weed has been very prevalent for the past few years, drilling was again purposely delayed until 5 April in order to kill off an initial germination. All the plots were hand-pulled twice this year, and it is hoped that by continuing these two methods of control a marked improvement will soon be noticeable. Other weeds, especially coltsfoot (*Tussilago farfara*), annual sow thistle (*Sonchus arvensis*), creeping thistle (*Cirsium arvense*) and horsetails (*Equisetum arvense*), were very numerous, and the whole area was sprayed with MCPA for the first time, with excellent results.

The experimental spring bean crops had a very unhappy season because of poor seedbeds and growing weather and an extremely severe attack by bean aphids. On the other hand, the winter-sown beans did very well in this mild year. The late-sown spring beans were extremely slow to ripen. All bean plots were harvested by combine-harvester.

The mangolds and sugar beet on Barnfield had another bad year. Drilling had to be postponed, as strong winds prevented the application of fertilizers; the seedbed on that extremely heavy field was rather unkind, and the long drought which followed the drilling delayed germination. Very little growth was made until late June when heavy rain fell and the sudden spurt of growth of mangolds and weeds made it impossible to single the whole field in time. It was therefore decided that only four rows each of sugar beet and mangolds should be singled and harvested. The yield of mangolds eventually obtained was one of the highest for many years, and the roots were of excellent quality.

During the year, half of the "meadow" section of Broadbalk Wilderness was cut over seven times with a motor scythe to see what improvement this made. The cut half remained very much more green throughout the season, and botanical analysis will show what changes, if any, take place in the flora.

CROPPING AND ROTATIONS

Of the total of 447 acres farmed, 66 were under permanent grass, 148 under short-term leys and clovers or lucerne, and 253 under arable crops. The latter included 83 acres of wheat, 37 acres of barley, 11 acres of oats and 30 acres of beans. Of the root area, potatoes occupied 28 acres, sugar beet 4 acres, kale and mangolds 10.

The requirements of certain cereal experiments for sites on which these crops were not grown the previous year have resulted in a further reduction in the total acreage under cereals. The bean and potato acreages have reached the limit of what can be conveniently handled, as has the area of other root crops in the absence of any seasonal labour. Any further reduction in the cereal acreage will therefore result in an increase in the acreage under temporary leys, as this is the only alternative to fallow. The lucerne-cocksfoot mixture which was sown down in 1956 has proved very successful and productive, and further mixtures of this type may be sown in the future. In view of a possible increase of this nature, a surface silo will be erected.

CROPS

Wheat

The season greatly favoured the growth of winter-sown crops, but owing to pressure of other work following the very late harvest of 1956, only a small acreage was sown. The Heine's VII yielded 33 cwt./acre, but was outyielded by Leda, which yielded 36 cwt./acre. This was the first year Leda has been grown, but it topped the list in the varietal trial with a yield of 43 cwt./acre. Sixty acres of our standard spring variety, Koga II, were grown, but the season was disappointing for spring wheat, and although one small area yielded over 40 cwt./acre, most of the fields yielded under 30 cwt./acre. The Koga II was rather slow and late to ripen, and much of it had to be cut in the second week of September, despite a moisture content of about 22 per cent.

Barley

Proctor remained the principal variety, although some Herta was also grown. The spring barleys seemed to grow better throughout the season than did the spring wheats, and this is reflected in the yields, which rose to over 40 cwt./acre, with an average of about 33 cwt./acre. These yields are better than those obtained in 1956.

Oats

The acreage of this crop was reduced to 11, the variety favoured being Sun II. Of all the cereals, this crop suffered most from the unfavourable season.

Owing to pressure of work for the combines on experimental plots, the harvesting of this crop was delayed and serious shedding occurred in the gales of late August. Yields were therefore very low. Sun II was the variety mainly grown.

Beans

Only a small acreage of winter beans was sown owing to the late start of autumn operations in 1956. The crop got away to a good start, had only a very mild winter to survive and maintained growth throughout the spring drought. The aphids which were very prevalent did little damage, and spraying only increased the yield from 32 to 34 cwt./acre.

With spring beans the story was very different. They got away to a poor start and proved easy victims for the aphids. Spraying had a marked effect, and greatly increased the yield, but even the best yield was well below that of the winter variety. This is the second consecutive year that the winter have outyielded the spring beans.

Potatoes

Of the 28 acres devoted to this crop about 3 acres were under an early variety, Arran Pilot, 3 acres under Ulster Supreme and the balance of the area was planted with Majestic. Tilths, generally, were satisfactory considering the season, but planting took place rather later than usual. Early growth was very slow, but the crops shot ahead during July and developed a mass of haulm. As the weather conditions then favoured the spread of Late Blight (*Phytophthora infestans*) three preventive copper sprayings were given; these proved very effective. The haulm was burnt off in the latter half of September, but this was not as effective as usual, owing to the toughness of the haulm and the damp conditions.

The second earlies were lifted at the end of July and early in August, and yielded 7 tons/acre, all of saleable size. The lifting of the maincrops started early in October under good conditions, and yields were heavier than were anticipated. The Majestics gave a total yield of 14 tons/acre, but many of the tubers were very large and were badly cracked or split. Common Scab was rather prevalent, but there were very few blighted tubers. The Ulster Supreme variety was grown under different conditions, but yielded very well. The tubers were not numerous, but were large and had a very smooth skin. Unfortunately they lived up to their reputation as poor keepers. Although they seemed to leave the clamp in good condition, they bruised very easily during sorting and loading, and soft rots set in almost immediately.

Kale

Only about 3 acres of kale were grown, for use after the beet tops were finished. Drilling was delayed, as the ground was too dry and rough for the small seed. Following rain, a suitable seedbed was obtained and sowing was done in the second week of May. Growth in the early stages was very slow, but flea-beetle damage was prevented by a γ -BHC seed treatment. From July onwards the crop made very rapid growth, and the yield is estimated at 30 tons/acre.

Sugar beet and mangolds

Reference has already been made to the mangolds on Barnfield. The acreage of sugar beet is always kept to the minimum because of the heavy labour demands, and this year 4 acres were grown, all

experimental. There was big variation in speed of germination and early growth resulting from the dung treatments, and plots reached the singling stage at different times. Resulting from the heavy aphid infestation, there was a severe attack of sugar-beet yellow disease, and although the crop was sprayed with "Metasystox", it was done rather too late for maximum benefit.

The crop grew rapidly during the latter part of the season, but the difference between plots remained. When lifting started soil conditions were not too good, and though they improved later, the soil remained very adhesive, and each individual beet had to be scraped clean. The mean yield of $10\frac{1}{2}$ tons/acre was satisfactory for the season, as was the sugar content of over 17 per cent.

Grassland

The very mild autumn and winter of 1956-57 enabled the grassland to maintain its growth throughout the winter, and most of the cattle were outwintered on it. Spring growth started very early, and grass was plentiful by early April. As a result of this early "flush" of grass we had several tons of mangolds and about 3 acres of kale more than we needed. Sheep grazing on the grass plots of the experiments started early in April, 2 weeks earlier than usual. However, after prolific early growth the grass seemed to have spent its energy, for by mid-May the drought had so retarded growth that "keep" was becoming short, and a dressing of nitrogen was given to several areas as a stimulant. However, such growth as there was took place mainly in the formation of flowering heads, and "topping" had to be done. Rapid growth took place again during the wet spell which started towards the end of June, and was maintained throughout the autumn and early winter, giving an ample supply of grass, which lasted to the end of the year.

Most of the hay crops from the long-term leys were on the light side, but what was lacking in quantity was made up for in quality. The weather conditions were ideal, and in most cases only 2 clear days were needed between cutting and baling. The hay, being in such beautiful condition, was carted almost at once.

The lucerne-cocksfoot mixture which was grazed almost the whole of March, yielded 2 tons/acre from the first cut, taken early in June, and 33 cwt./acre from the second cut. This second cut was also made under excellent conditions early in August. No further grazing has taken place, but the sward will be grazed early in 1958.

CONTROL OF WEEDS AND PESTS

The peculiar weather conditions of 1957 brought out some special problems of weed and pest control.

Weeds

On some land infested with couch grass (*Agropyrum repens*) two sprayings of TCA, each at 20 lb./acre, were applied. Because of the wet soil conditions the second spraying could not be given until late February in one case, and early March in another. This spraying was followed by a long period of drought. In both areas the spring corn which followed germinated satisfactorily, but the seedlings died off just before emergence.

MCPA was used on several of the corn crops, but where cleavers (*Galium aparine*) or chickweed (*Stellaria media*) were present in any quantity, DNOC or CMPP was used with satisfactory results. MCPA was also used on the "permanent" wheat section of Broadbalk field to control a heavy infestation of creeping thistle (*Cirsium arvense*).

Weeds in the bean and root crops were easily controlled by inter-row cultivations in the early part of the season. However, they grew rapidly in the latter half of the season under the moist conditions, when the wet state of the ground and the height of the crops prevented any further cultivations.

Pests

The year was fairly free from severe infestation by pests, and in all cases damage was reduced by spraying. Eggs of the mangold fly (*Pegomyia betae*) were present in large numbers on sugar-beet and mangold leaves; here damage was prevented by spraying with miscible DDT. Aphids were present in very large numbers, and caused a severe attack of sugar-beet yellows, which should have been minimized by an earlier spraying.

The very heavy aphid (*Aphis fabae*) infestation caused little damage to winter beans or to spring beans where spraying was done sufficiently early. Where spraying was delayed some loss of yield occurred, and on plots where no spraying was given yields ranged from 0 to 5 cwt./acre.

LIVESTOCK

Cattle

In 1956 the decision was made to qualify for the Attested Herds Scheme during 1957. As the preliminary tuberculin test showed several reactors amongst the fattening cattle, it was decided to finish these off as early as possible and to delay the purchase of fresh stock until all the reactors were sold. Owing to the ample supply of winter grass and the mild weather, the covered yards were not used at all in 1956-57, but the reactors were segregated and fattened off in an open yard.

The purchase of fresh store cattle was therefore delayed until the early months of 1957, by which time prices had risen steeply. However, some 40 Hereford, 20 Galloway cross and 13 Aberdeen Angus cross cattle, all attested, were purchased and a further 22 Herefords were transferred from Woburn later in the year. Most of these were sold fat from the grass during the summer and autumn, but the remainder were brought into yards for finishing during the winter of 1957-58. Altogether 88 cattle were sold fat during the year. They were all sold within the 1½-2-year age range, and mostly at weights between 8 and 10 cwt.

The herd had three clear tuberculin tests during the year, and became attested in September.

Some fresh young stock was purchased in December, and more will be purchased early in 1958. These will be used to graze off the lucerne-cocksfoot sward and the rough grass on some of the outlying fields.

months of 1957, but much more remains to be done before appreciable replanting can be done. It is hoped to make some further progress with this work during the winter of 1957-58.

Owing to the pressure of other work, no progress was made in 1957 with the clearing of the derelict orchard in Whittlocks field which was purchased in 1955. However, it is planned to push ahead with this work early in January 1958, and it is hoped to clear the field before the rush of spring work commences.

Staff

G. F. Jarvis transferred from the post of Recorder to the Field Experiments Section in December 1957. The vacant post has not yet been filled.

Woburn

The work of the Woburn Farm is directed and managed by the staff of the Rothamsted Farm. The field experiments are planned by the Field Plots Committee, while the day-to-day planning is done by the bailiff at Woburn.

1957 was a rather disappointing year for cereals, nearly all of which were spring sown. These felt the full effect of the spring drought on the light Woburn soil. On the other hand, potatoes and sugar beet, after a slow start, developed into good crops.

THE EFFECT OF WEATHER ON CROPS

Despite the delayed start of field work in the autumn of 1956, following upon the very late harvest, this work was reasonably well forward by the beginning of 1957. Good progress was made in January, but heavy rain at the end of the month put a stop to further work. The wet conditions prevented much land work in February, and not until the end of the month could the ploughing be finished. The winter of 1956-57 was remarkable for its mildness. Except for a brief spell in December 1956, there were remarkably few frosts, none of any severity, and no snow at all.

After a false start early in March, the preparation of seedbeds for spring cereals commenced about the middle of the month, and drilling followed immediately. As the dry weather continued it became increasingly difficult to get suitable seedbeds for other crops, and sowings were delayed. However, on the lighter soil at Woburn the difficulties were not so pronounced as on the much heavier soil at Rothamsted. Only 0.2 inch of rain fell in April, compared with the average of 1.5 inch. The drought continued well into May, and the sowing of small seeds had to await rain, which fell about the middle of the month. During the drought the surface of the soil on the heavy-land field in which beans were growing set hard and huge cracks appeared, making inter-row cultivations impossible. The total rainfall for the 3 months April to June totalled 2.91 inches, compared with the average of 5.18 inches.

Except for a fairly heavy fall of rain early in June, the weather remained mainly hot and dry. The effect of this was apparent mainly on the grassland, where growth ceased, on the early potatoes

Sheep

The rather old Scotch Half-bred ewe flock was again mated to Suffolk rams. The lambing season was very successful in that lambs were plentiful, the ewes had plenty of milk, losses were low and weather conditions were good. There were 122 lambs from the 66 ewes put with the rams, a lambing percentage of 182, the highest for several years. Losses from Pulpy Kidney disease began to occur; the flock was inoculated immediately, and later vaccinated against the disease.

Twenty of the lambs have been sold fat, the remainder being retained for grazing on field plots here and at Woburn in 1958.

Thirty-four young home-bred ewes from the 1956 lamb crop have been retained for breeding and were put to the tup with the remainder of the old ewes in October. It is proposed to sell them with their lambs in the spring.

Fortunately no sheep-worrying has been observed this year.

IMPLEMENTS

The purchase of new implements was restricted, as much of the money available was spent on equipment needed for the grain-drying and storage plant. However, a few items were purchased, including a reversible plough and a fertilizer distributor for use on experimental plots. One of the old vaporizing-oil tractors was exchanged for the latest diesel-engined model.

GRAIN DRYING AND STORAGE PLANT

The plant, consisting of four radially ventilated drying bins and eight square galvanized storage bins, was completed during the year and was put into operation for the first time for the 1957 harvest. It performed very well, and was about adequate to deal with the output of the two 10-foot combine-harvesters, one of which spends most of its time cutting the produce of experimental plots. No pre-cleaning was done, as this required an extra elevator, which it was hoped would not be needed. However, in the light of our experience in 1957 it has been decided to install this elevator during the year so that pre-cleaning can be carried out when necessary.

The relative humidity was constantly recorded so that the minimum amount of heat was used. As the volume of grain to be dried diminished towards the end of harvest, drying was only done when the relative humidity was such that no heat was required.

The fifty-hole platform drier was moved and re-erected adjoining the new plant so that the one fan and heater can be used for either the drying silos or the platform drier. On re-erection the platform was arranged with holes in banks of twelve so that any multiple of this number of sacks, up to forty-eight, can be dried at once. This greatly facilitates the drying of small quantities of grain from experimental field plots.

ESTATE WORK

Following the inspection of the woodlands in 1956 by the Forestry Commission, a lot of tree thinning was carried out during the early