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Rothamsted Experimental Station Report for 1965

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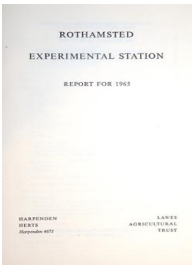

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THE FARMS

J. R. MOFFATT

ROTHAMSTED

The early winter of 1964/65 was dry and mild, and land work was well forward at the end of 1964. There was a little snow in December, January and February but no hard weather until early March. February was the eighth consecutive month with less rain than average, and in this period the deficit was 10·3 in. Seedbed preparations started in mid-February, but what promised to be an early season was made late by snow and rain in March. All sowings were finished in good weather in April and early May.

The four months June–September were dull, cool and wet, with total sunshine hours 181 below average; most of the hay was spoilt and cereals were slow to ripen and lodged badly. Harvest was delayed and protracted, and became almost a salvage operation.

Potatoes and beans grew well. Potatoes were burnt off early to lessen the risk of tuber blight in King Edward and to prevent oversized Majestic. Winter beans lodged badly and yields were much lessened by Chocolate Spot disease.

Potato experiments were harvested in the dry October and early November, but lifting was stopped by unusually severe frosts in early November, followed by rain, and several acres are still in the ground. Wheat drilling was delayed by the late corn and potato harvest, and then by frosts and rain in November, so at the end of the year some remains to be drilled and there is much ploughing still to be done.

Scout Farm, Redbourn, which adjoins Rothamsted Farm, was bought late in the year and some of its 224 acres ploughed and treated with herbicides.

The Effect of Weather on Crops

In the fine autumn of 1964 winter wheat and bean seedbeds had to be forced by disc harrows, and most of the drilling was done by the end of October. At the end of 1964 field work was well forward.

The weather in January and February was mainly dry and there were few spells of hard frost. Cold winds about the middle of the month dried the land, and within 2 days of seedbed preparations starting on 15 February most of the spring beans were sown. Rain and snow then stopped land work.

Early March was the coldest part of the winter; snow fell on 3 and 4 March and lay for a week. There were night frosts on each of the first 13 days, the coldest (5° F) on 3 March. The ground dried out slowly and sowing of spring crops, which started on 15 March, was soon stopped by rain. Although heavy rain delayed arable work until 29 March, most of the grassland was chain harrowed and fertilised.

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The last 4 days of March were summery and very hot; the ground dried out rapidly, and spring corn drilling finished on 3 April. The sowing of sugar beet, grasses and clovers followed; potato planting started on 2 April, but a break in the weather delayed the finish until 11 May. In May cold, damp and windy spells delayed cereal spraying. In a warm spell in the third week the early planted potatoes emerged early and were sprayed with herbicide. Grass cutting for silage started on 20 May in ideal weather.

June was mainly dull, cool and wet; rain fell on 16 days and sunshine hours were 40 below average. This weather played havoc with haymaking and delayed other field work. Most of the hay cut was lying for two weeks before it could be baled. Winter beans grew tall and were attacked by Chocolate Spot (*Botrytis cinerea*), and small areas of wheat and barley were lodged. Potatoes and sugar beet grew rapidly.

July was cold, dull and wet. Rain fell on 19 days and totalled 4·16 in. (1·63 in. above average); the mean air temperature was 4·2° F below average, and there was less than half the average hours of sunshine. Field work was much interrupted. The grass for hay was badly battered by the heavy storms and strong wind, and cutting was difficult. Even when cut it did not dry, and some became so badly leached that it was burnt. Most of the barley and winter beans were lodged, and some winter wheat. Potato blight appeared despite several precautionary sprayings.

August was dull, cool and showery, and although there was a warm spell in the middle of the month, this was followed by unsettled weather. Cereals were slow to ripen; most of the lodged barley made second growth, and most of the winter wheats were flat or leaning badly. Harvest started on 26 August.

September was dull, cool and wet, with only a brief spell of good harvest weather. There were 4·02 in. of rain spread over 19 days, and hours of sunshine were 24 fewer than average. Harvesting conditions became so desperate that little notice was taken of moisture content of grain, crops were cut whenever the laid straw was dry enough to go through the combine. Though some grain was moved from the drying bins when only partly dry, the drying plant was over-burdened and 40 tons were dried by a neighbour. Damage by birds was more serious than usual, probably because the grain remained so long in the field. The straw was dull and brittle, and broke in the combine and baler.

Grass weeds in the corn crops were encouraged by the wet summer and grew through the lodged crops. About 56 acres of stubble at Rothamsted were sprayed with aminotriazole to control couch grass (*Agropyron repens*), or dalapon to control *Agrostis* spp. About 3 acres after potatoes was sprayed with TCA. The stubbles in Scout Farm were particularly foul and 62 acres were sprayed.

October brought welcome relief from the bad weather. There was little rain and more than average sunshine. Cereal harvest finished on 5 October and of beans by 12 October, though straw carting lasted until 23 October. Potato lifting started early in the month, and the experiments took 2 weeks, which delayed corn drilling until the end of the month. The fine spell broke in early November and potato lifting was interrupted and then brought to a stop by rain followed by severe frosts (13° F) about the middle

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of the month; about 8 acres remain in the ground. Wheat drilling was also stopped. In December there were 4·73 in. of rain in 23 days, 2·13 in. above average, and ground frosts were 22. This prevented any drilling, and at the end of the year several fields, including Broadbalk, remain to be drilled. Some ploughing was done, but conditions were bad, and a lot remains to be done.

Field Experiments

There were 3,222 full-scale field plots, rather fewer than in 1964, and several hundred microplots. All sowings were done in good time, but the late and protracted harvest delayed the lifting of the potato plots, which in turn delayed the sowing of the 1965/66 winter cereal experiments.

The winter wheat and bean experiments were sown in October. Most spring cereal experiments were drilled in mid-March in excellent conditions. All grew well in early summer, but lodging started in June, and got steadily worse, so that nearly all crops were lodged well before harvest; there was a lot of second growth in the barley. In many experiments the plots given most N lodged most and gave less yield. The spring wheat was not lodged. A few areas of cereals were severely damaged by birds.

Broadbalk was drilled on 26 October 1964 and the seed germinated rapidly. There were more wild oats than usual and pulling on four occasions took 80 hours. There were more broad-leaved weeds than in 1964; on Section Va, unsprayed, there were many and on several plots the laid corn was smothered by vetches. Horsetails were numerous on several plots, but were fewer where they were hand-pulled in 1964. Lodging was widespread and severe, and some grain sprouted in the ear. Harvesting was slow, but the combine picked up the crop well in a short spell of fine weather. Black grass (*Alopecurus myosuroides*) seemed more numerous than usual, possibly because it grew through the lodged crop. Couch grass (*Agropyron repens*) was plentiful on several plots of Section Ia and strip 20, so these areas were sprayed with aminotriazole in early October. This delayed ploughing, and frost and rain prevented drilling until January 1966.

On Hoosfield Wheat and Fallow, Cappelle and Squarehead's Master 13/4 were grown side by side, and though Cappelle looked thinner, it yielded slightly more than the Squarehead's Master 13/4. There was much Black Medick (*Medicago lupulina*), and a hormone herbicide will be used in future.

Hoosfield barley plots were again split to compare Plumage Archer with the mildew-resistant Maris Badger, which was given twice the N given to the Plumage Archer. Drilling was delayed until 1 April to get an early germination of wild oats, but there were rather more than usual, and it took 13 hours to pull them on three occasions. Lodging was patchy, and there was less with Maris Badger than Plumage Archer, despite its double dose of N. On the dung plot the Plumage Archer was completely lodged, but yielded 36·7 cwt/acre, and Maris Badger yielded 44·9 cwt/acre. Twelve plots of Maris Badger yielded over 30 cwt/acre, a yield reached on only three plots of Plumage Archer.

The Exhaustion Land was sown with Maris Badger with uniform N

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combine-drilled. The crop grew well, but was rather uneven in wide swathes. Wild oats were pulled in 8½ hours on two occasions. Most plots had couch grass (*Agrostis* spp.), and all were sprayed with dalapon in October 1965. Several plots had much mayweed (*Tripleurosperum maritinum*).

A new liming scheme was introduced (*Rothamsted Report* for 1964, pp. 226–228) on the Park Grass Plots, and the first dressings of carbonate were given in January 1965. Bad weather delayed the grass cutting until the end of June and early July. The field recovered well, but the second cut was delayed by bad weather until early December, and even then the ground was very soft. Yields were taken from all plots. The plentiful moles in winter were destroyed.

Barnfield was fallowed in 1965, but dung and mineral fertilisers were given. Some potatoes left from the 1964 crop grew vigorously and survived many cultivations.

In the Ley–Arable experiment one of the third-year lucerne plots on Fosters and one on High Field were ploughed as there were patches of stem eelworm (*Ditylenchus dipsaci*). The oats on both fields gave very big yields (High Field 51·0 cwt/acre, Fosters 54·3 cwt/acre). The wheat lodged only with the most N, which on some plots lessened the yield.

An annual experiment with winter beans on Long Hoos V looked promising in June, but Chocolate Spot spread rapidly; it was also attacked by aphids when too tall to spray completely, but the outside strip was sprayed with menazon. This not only controlled the aphids, but the crop on this strip was less affected by Chocolate Spot and was less lodged. The experiment was abandoned as the plants grew over 6 ft tall and the unsprayed area was beaten flat by rain and wind.

All potato experiments, except those requiring special lots of seed, were planted with chitted Rothamsted-grown seed produced from selected Northern Irish stock.

Two winter wheat varieties (Cappelle and Rothwell Perdix) and two spring varieties (Kloka and Opal) were compared on a site relatively free from soil-borne diseases and the winter varieties were compared on an infested site where bird damage was severe; there was little difference in yield between the winter varieties, but Kloka outyielded Opal and equalled the yield of winter wheat. The yields of winter wheat differed greatly between the sites. On the uninfested site the Cappelle lodged at all levels of N some time before the Perdix, but the Perdix was more lodged by harvest. Neither of the spring varieties lodged.

Methods of sowing winter wheat and different seed rates were again compared. The broadcast seed at both Rothamsted and Woburn yielded more than the seed drilled at 4 in. or 7 in. spacing, and at both farms seeding with 130 lb yielded better than larger seed rates. A similar experiment with barley showed no difference in yield between the wide and narrow rows or advantage from combine-drilling. However, the yield from broadcast seed was less than from drilled seed.

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Cropping

Of the 451 acres farmed, 281 were under arable crops or fallow, 108 under short-term leys or lucerne–grass mixtures and 62 under permanent grass. The main crops were wheat (86 acres), barley (93 acres), beans (28 acres), potatoes (39 acres), and kale, swedes, sugar beet and oats (5 acres). Thirty acres, including headlands of experiments, were fallowed. The irrigation plant was not used on non-experimental crops.

The basic three-course rotation of wheat, barley and either roots or beans was varied to suit the requirements of experiments. Potatoes were the main root crop, as kale and sugar beet is grown only on experimental plots, and the acreage was more than could be handled. The balance of the root break was sown with beans or fallowed. Several fields are kept acid or deficient in phosphorus or potash to provide sites for fertiliser experiments, and these are usually kept under long-term leys or fallow.

The extra 224 acres provided by Scout Farm will permit a longer crop rotation than previously possible and, by giving a 2-year break from cereals, will provide land free from soil-borne diseases for cereal experiments. The 7-year rotation chosen consists of two cereals, a "break" crop, two cereals and two "break" crops, which provides land with different amounts of disease. Beans, potatoes and short-term leys will be used as "break" crops, with fallows where necessary to control twitch. The flexibility in the "break" crops enables a limit to be put on the area given to any one crop. The new rotation will start in 1966, and should be in full operation in 1967 or 1968.

Crops

Wheat. Because of the big yield given by Rothwell Perdix in 1964, this variety replaced Cappelle where little eyespot was expected. Seedbeds were difficult to prepare in the dry autumn of 1964, but sowing was done in late October. Germination was slow and uneven, and the crop looked yellow in March, but recovered and grew well in early summer. It was slow to ripen and early lodging lessened yields. The biggest winter wheat yield was over 50 cwt/acre, but yields varied according to the time and degree of lodging; the average was about 35 cwt/acre.

Opal was the main spring wheat and very little lodged; some Kloka was grown for seed in 1966, but though the germination was poor it will be used. Kloka will be the only spring variety in 1966.

Eyespot was worse than usual, and both Cappelle and spring wheats were attacked. Take-all varied from field to field, and was severe on some areas.

Barley. Maris Badger is the standard variety, but Procter is still grown on some of the long-term experiments. Cambrinus and Maris Badger were both grown on non-experimental fields, and some Impala, which lodged less than the Maris Badger or Cambrinus, was grown for seed in 1966. This and Zephyr are likely to be the main varieties grown in 1966.

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Most of the barley was sown in late March or early April, and germination and early growth were good. The much rain in June caused some lodging long before ear emergence, but most of these areas recovered. All the barley was lodged later, some quite flat, and there was much second growth and sprouting in the ear. Despite this, yields averaged about 35 cwt/acre; the grain was of poor quality.

Oats. The small area of Condor, spring grown, yielded exceptionally well.

Beans. The 8 acres of winter beans survived the winter well and grew rapidly in early summer, but were attacked early by Chocolate Spot and later by aphids. The stems grew very tall and many were lodged; yields varied greatly according to the intensity of disease and degree of lodging, but were mostly small.

Spring beans grew well in early summer, but because of a bad aphid attack the whole area was sprayed once with menazon and the headlands twice. Chocolate spot was also widespread. The crop grew tall and ripened rather unevenly, but was harvested in good conditions in early October. Yields averaged about 26 cwt/acre.

Sugar beet, kale, swedes. These crops were grown only in experiments. Sugar beet and kale gave satisfactory crops, and the yield of swedes was considerably more than on a similar experiment in the dry year 1964. Weeds were controlled by few mechanical and hand operations.

Potatoes. The 39 acres grown were more than usual because of the many experiments and the need to crop fields uniformly. In addition to King Edward and Majestic grown for ware, some Pentland Dell and Maris Piper were grown to give seed for 1966. Planting tilths were reasonably good, but wet weather delayed the finish of planting until 11 May. The seed was chitted and the sprouts of all except the late-planted ones emerged during a warm spell towards the end of May, so spraying with a mixture of linuron and paraquat had to be done hurriedly. This controlled all weeds except Cleavers (*Galium aparine*), the seeds of which were deep, and so the roots escaped contact with the herbicide. About 14 acres were sprayed with linuron + paraquat, and about 7 acres with a diquat–paraquat mixture which had to be followed by cultivations and earthing up.

In the wet summer the haulm grew rapidly, and earthing up was finished before the end of June. As conditions favoured the spread of blight, the first spraying was done at the end of June, earlier than usual. Two later sprayings were delayed by rain, and there was some blight on the haulm by the end of July. The disease spread rapidly on King Edward in August, and haulm burning was started about the middle of the month, much earlier than usual. The Majestic haulm was burnt off to prevent the tubers growing too big and cracking.

Yields were big, Majestic about 20 tons/acre and King Edwards 18 tons/acre total yield, but many tubers of King Edward were blighted; there was very little scab on either variety.

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New certified stock of King Edward, Majestic and Pentland Dell were grown in isolation to produce seed for 1966, and were given an H certificate. A few Maris Piper, an eelworm-resistant variety, were grown to provide seed to plant infested areas at Woburn. A granular insecticide was applied at time of planting to all crops grown for seed. All varieties grew well; the haulm was burnt off on 10 August, and two of the varieties were lifted later in the month. Some of the King Edward and all the Majestic are still unlifted and will not be used for seed.

Grassland. A high-nitrogen compound fertiliser was given to most of the leys in mid-February, and to the older grass a month later. There was little growth until April, since when there has been ample grass for the stock, with no irrigation and with mid-season N to a few fields only.

Grass grew rapidly in May; silage cutting started on 20 May and finished on 4 June. Weather was favourable and the silage was of good quality.

Most of the grass for hay was badly laid, and without any fine spells good-quality hay could not be made. Most of it was badly leached.

Livestock

Cattle. The eight cattle not fattened on grass in 1964 were brought into covered yards in November 1964. Fifty-two younger cattle were bought in autumn and were yarded in December 1964, and seventeen bought in January 1965 were put straight into yards. They were fed on silage, brock potatoes, hay and the most forward were given home-grown concentrates. These were fed to gain about 2 lb/day. The smaller beasts gained between $1\frac{1}{4}$ and $1\frac{3}{4}$ lb/day. These were turned out at the end of April and the forward cattle two weeks later. Grass was plentiful and live-weight gains averaged over 2 lb/day in June. In August and September gains dropped to about $1\frac{1}{2}$ lb/day. More young cattle were bought in spring, and fat cattle were sold throughout the summer. Altogether 80 cattle were sold fat during the year.

Eighty-three young Hereford beasts about 15 months old were bought in autumn and most were yarded in early winter and fed to give a live-weight gain of 1 lb/day. Because of the wet winter, the remaining 23 bought in spring were yarded in November 1965 for fattening.

All cattle likely to be on the farm next spring were treated with an organophosphorus insecticide against warble fly in November.

Sheep. In October 1964, 172 ewes, mainly Scotch Half-breds were mated to Suffolk rams after flushing on grass brought on by irrigation. Hay was fed from early in December and concentrates from the end of January. The lambing percentage of 148 was satisfactory, considering there was no stockman at the time; 14 ewes died during the year. The lambs, creep fed, fattened readily, and the first were sold when 9 weeks old at 40 lb dead weight; all were sold by the end of November.

The flock was culled to 125, and in September 105 Scotch Half-bred gimmers were added to it. After flushing on fresh grass they were mated to Suffolk rams to lamb in early March 1966, a little earlier than usual.

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