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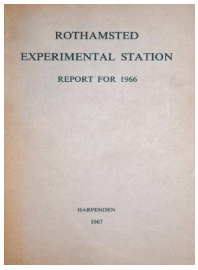

The Farms : Rothamsted

J. R. Moffatt

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THE FARMS

J. R. MOFFATT

ROTHAMSTED

The wet autumn of 1965 delayed ploughing and wheat drilling, and at the end of the year both these jobs were unfinished and some potatoes were still in the ground.

In winter long spells of frost alternated with mild, wet spells, but some more winter wheat was drilled.

Cereals and beans were drilled during a fine spell in early spring; potato planting started early, but rain made late what promised to be an early season.

The summer was dull, cool and wet; each of the months April to August had more rain than usual, and except May, less sun. The irrigation equipment was used only during one short spell. Some excellent hay was made early, but much grass cut later was spoilt.

Corn ripened slowly and harvest was interrupted by rain; grain yields and quality were much better than in 1965.

Potatoes and beans grew well. Most of the potatoes were lifted in the dry September, but rain delayed the finish.

Wheat drilling was completed early in November, and most ploughing was done at the end of the year.

The effect of weather on crops

On occasions during January and February when frost was slight, winter wheat was drilled, though it was not possible to drill the planned acreage. The January frosts enabled the ploughing to be completed; very little land work was done in the wet February.

March and early April were dry, which allowed spring cultivations to start early, and most of the cereals and beans were drilled by the end of March. The last of the 1965 potatoes were lifted, and although most of them were damaged by frost, some were saleable.

Potato planting started on 4 April, but was stopped by rain after 4 days. The 3·26 in. of rain in 25 wet days in April delayed arable work until the end of the month, by when it was far behind schedule. Potato planting finished on 17 May.

The changeable weather in May delayed the top dressing of wheat, and the rolling and spraying of cereals. A fine spell from 28 May until 10 June allowed some excellent hay to be made early, fortunately because the changeable weather afterwards partially spoiled later cuts.

The winter and spring wheat grew well during the summer, and the barley, which was very uneven early on, became more uniform. Several areas of barley were lodged by heavy rain towards the end of June, and more lodged in July. The cold, damp weather in July delayed ripening, but all cereals ripened quickly in a warm, sunny spell in the third week of

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August. Although interrupted by rain, harvest was finished on 10 September.

In the wet summer the potatoes grew vigorously. Most were lifted in excellent weather that lasted until the end of the month; there were only 9 wet days in September. The 3·55 in. of rain in October fell on 22 days and the ground became very wet. Lifting continued intermittently, but did not finish until mid-November.

In a 10-day fine spell at the end of October and early November, all the winter wheat was drilled, and though ground conditions were not ideal, germination was satisfactory. November and December were mild and wet, with rain falling on 22 and 24 days respectively, but work is well forward, and some areas ploughed early were reploughed.

Field experiments

There were 3,170 full-scale plots and more than 1,300 microplots. Some wheat plots were drilled at the end of October 1965, but bad weather delayed the drilling of several experiments. The fertilisers were sown on Broadbalk in November, but the ground was too wet for drilling. A slight frost early in January 1966 gave the first opportunity to cultivate the field, which was drilled on 7 January. Other wheat experiments were drilled in February, but four had to be abandoned.

Spring cereal and bean experiments were drilled under favourable conditions, but heavy rain delayed potato planting.

Despite the late sowing, wheat yields on Broadbalk exceeded the 10-year averages. The crop was less badly lodged than usual, and harvesting and baling was completed in a day. Lodging was worst on the unsprayed Section Va, where weeds were many. Perennial grass weeds are becoming more prevalent on Sections Ia and Ib, and in the autumn of both 1965 and 1966 Section Ia was sprayed with aminotriazole. There were many coltsfoot (*Tussilago farfara*) and creeping thistles (*Cirsium arvense*). Wild oats were few, and pulling on two occasions took 16 hours; in 1965 it took 80 hours. The wheat for the 1967 harvest was drilled early in November 1966. For the first time the field was rotary-cultivated to get a seed-bed.

On Hoosfield Wheat and Fallow the Cappelle and Rothwell Perdix on the two plots after a 1-year fallow was damaged by wheat-bulb fly (*Leptohylemyia coarctata*); the crop on the plot after 3 years' fallow was much less affected. The damaged sections were redrilled with Kloka spring wheat on 2 May, but the crop grew poorly and yielded about 10 cwt/acre; on the other plot Cappelle gave 11 cwt, Rothwell Perdix 14 cwt. This site was sprayed for the first time with a hormone herbicide, mainly to control black medick (*Medicago lupulina*).

Hoosfield barley was drilled earlier than usual, as wild oats are now so few that a preliminary germination of these is not necessary. Those that grew were pulled in 7 hours, about half the time needed in 1965. The field was spot-sprayed against perennial grass weeds in autumn 1965. Both Plumage Archer and Maris Badger were grown, and on the dung plot the Plumage Archer yielded nearly 40 cwt/acre, more than the Maris Badger. Six plots of Maris Badger yielded more than 40 cwt/acre.

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The Exhaustion Land was sprayed in autumn 1965 with dalapon and was sown with Maris Badger, with uniform N combine-drilled. The crop grew well and there was little lodging. The few wild oats were pulled in 3 hours. At harvest the plots fell as usual into two groups: those with residues of superphosphate or of FYM applied 1856–1901 yielded 27–33 cwt grain, those without residues 10–12 cwt, a larger difference than in recent years. There was much couch grass (*Agrostis gigantea* and *Agropyron repens*) in the stubble on all plots (in spite of sprays used for several years). This was greener and more vigorous on the plots without residues from last century, and the residual nutrients allowed the crop to suppress most of the growth of couch.

The first cut on the Park Grass plots was made about 3 weeks earlier than usual and the second at the usual time in October. Moles were destroyed during the winter.

Barnfield was fallowed for a second successive year, but dung and mineral fertilisers were applied.

In the Ley–Arable experiments slight changes in technique were introduced. Grass seeds were sown by drill instead of being broadcast by hand, and traditional cultivations to the potatoes were replaced by a linuron/paraquat spray, and a final ridging with a rotoridger. The Scotch Stock Seed Majestic potatoes used gave a very uneven stand.

In the Cultivation–Weedkiller experiment spring wheat and spring beans were grown. All the beans were sown at 21 in. between rows, but poor penetration at drilling, especially behind the tractor wheels, resulted in a very uneven plant. Kloka wheat replaced Jufy I, and Pentland Dell potatoes replaced Majestic. A rotoridger was used instead of the mouldboard ridger. In 1965/66 another plot in each block was used to compare existing treatments with a system of minimum cultivations, with sprays for all four crops. However, the ground was so compacted during the harvesting of the 1965 crops that the wheat and bean plots were deep-tine cultivated and disc-harrowed. The many grass weeds in the stubble of the plots ploughed and rotary-cultivated for the 1965 bean crop were reflected in the smaller wheat yields in 1966 than in 1965.

Two winter wheat varieties (Cappelle and Rothwell Perdix) and two spring varieties (Kloka and Jufy I) were compared on a site relatively free from soil-borne diseases. All varieties were sown on the same day in mid-February. Cappelle and Jufy I each yielded 43 cwt/acre, and Rothwell Perdix and Kloka 40 cwt. In 1965 Kloka equalled the yield of both winter varieties.

Methods of sowing winter wheat and barley at different seed rates were compared at Rothamsted and Woburn for the third and final year. The results of these experiments are summarised in the report of the Field Experiments Section.

Wheat yielded the same whether the seed was drilled or sown by a spinner-broadcaster; barley broadcast on ploughed ground yielded less than when broadcast on prepared ground.

In most potato experiments Rothamsted-grown seed of King Edward and Pentland Dell was used, but King Edward was bought for one; all Majestic was bought because those grown at Rothamsted were chilled

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before lifting. The Scotch Stock Seed Majestic had much mechanical damage, and was badly affected by skin-spot (*Oospora pustulans*) and gangrene (*Phoma* spp.); it gave a very gappy stand.

Cropping

Of the 663 acres farmed, 412 were under arable crops or fallow, 99 under short-term leys or lucerne–grass mixtures and 152 under permanent grass. The main crops were wheat (55 acres), barley (213 acres), beans (25 acres), potatoes (29 acres) and kale, sugar beet and oats (6 acres). Eighty-four acres, including headlands of experiments, were fallowed. The barley acreage more than doubled because much of the new land on Scout Farm was sown with the variety Impala. On the more gravelly soil with better topography, the crop ripened early, stood well and gave good yields.

Several fields on Scout Farm were foul with twitch (*Agropyron repens* and *Agrostis* spp.) and some onion couch (*Arrhenantherum elatius*). A combination of spraying and fallowing was adopted to clean the land thoroughly in one year, and this increased the area under fallow. The fallows were worked many times during the summer, mainly by a rotary cultivator, with occasional deep-tine cultivations. Weeds, mainly charlock and fat hen (*Chenopodium album*), on one field were lacerated by a horizontal flail before a shallow rotavating in autumn. Weed seeds, which germinated rapidly, were destroyed by a shallow spring rotavation, and more weeds were destroyed by a hormone weedkiller after drilling barley.

The potato acreage was less than in 1965 because compact siting of the experiments meant less area to be filled in with non-experimental potatoes to maintain uniformity of cropping.

All the grass fields on Scout Farm were chalked at 3 tons/acre in early August and most of the arable land on the stubble in September.

The new 7-year crop rotation of two cereals, a "break" crop, two cereals and two "break" crops, began, but it will not be fully operational until 1967 or 1968. Several fields are outside the rotation, as they are kept acid or deficient in phosphorus or potash to provide sites for fertiliser experiments; most of these are under long-term leys or fallow, but some grow cereals.

Crops

Wheat. Cappelle was the only winter variety grown, except for Broadbalk and a few other experimental areas. Much was sown late, some in mid-February, but most did well and there was little lodging. The biggest winter wheat yield from plots was 63 cwt/acre on the Ley–Arable experiment; the average yield outside experiments was 42 cwt/acre.

Kloka was the only spring wheat except for Jufy I in a few experiments. It ripened about the same time as the winter wheat, but shed rather badly during harvest. The average yield was about 40 cwt/acre.

Barley. Maris Badger was the main variety in experiments, but Impala was grown on other areas. It ripened several days before the Maris Badger

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and averaged 36 cwt/acre. The largest plot yield from the Ley–Arable experiment in Fosters Field was 61 cwt/acre, and both Ley–Arable experiments averaged more than 51 cwt/acre. The average yield of Maris Badger outside experiments was 37 cwt/acre. Much of the Maris Badger was lodged, but Impala lodged little. A small area of Zephyr, sown late, was badly attacked by mildew, and the straw bent over about 1 ft from the ground; it yielded about 30 cwt/acre. The grain was of fairly good quality

Oats. The small area of Condor, spring-sown, yielded more than 50 cwt/acre on Fosters Ley–Arable experiment.

Beans. Only spring tics were grown, and they were drilled early, more shallowly than was planned, so few of the experimental areas were sprayed with simazine. The plants were damaged where simazine was used, but elsewhere grew rapidly in the wet summer. They were sprayed against black aphis, and there was no attack. The crop ripened slowly and unevenly, and cutting was late, which resulted in big cutter-bar losses. Yields were bigger than usual; in two experiments the best yield exceeded 47 cwt/acre and the mean yield was over 40 cwt/acre; non-experimental crops gave about 30 cwt/acre.

Sugar beet, kale. These crops were grown only in experiments. Early sowing gave an even plant which grew well during the summer.

Potatoes. King Edward and Majestic were the main varieties, but some Pentland Dell were grown. Tilths were excellent when planting started early in April, but heavy rain made the soil difficult to work and spread the planting over 6 weeks. All the seed was chitted, and some plants had emerged through the ground before planting was finished. On many areas weeds were controlled by a linuron/paraquat mixture; where mechanical cultivations were done a rotoridger replaced the mouldboard ridger. The paracrinkle-free King Edward grew vigorously and uniformly. The first spraying against blight was done on 30 June, but subsequent ones were delayed by bad weather. Most of the Majestic and Pentland Dell were burnt off in early September. Yields were big; in one experiment King Edward averaged 21 tons/acre, and the average of all King Edward was 16 tons/acre. In many experiments where both varieties were grown, King Edward outyielded Majestic. The best plot yield was almost 27 tons/acre of Majestic from Highfield Ley–Arable experiment, and the average exceeded 22 tons/acre. Where the Majestic haulm was not burnt off early, there was a large proportion of split and mis-shapen tubers.

Scotch Foundation Stock Seed of King Edward, Majestic and Pentland Dell was grown in isolation to produce seed for 1967, and all varieties were given an H certificate. A granular systemic insecticide was applied at time of planting. The haulm of the Majestic and Pentland Dell was destroyed on 6 August, and the King Edward at the end of August; there is some skin spot on all, and black scurf on the King Edward.

Grass. A high-nitrogen compound fertiliser was given to most of the leys in February, and "Nitro-Chalk" at the end of March for hay crops

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on the reserved areas. The wet and cold weather delayed spring grazing until the end of April. Grass was plentiful during the wet summer. Mid-season nitrogen was given only after hay and silage crops, and to grass on Scout Farm; very little irrigating was done. The fields were topped by a rotary cutter.

Cutting for silage started in mid-May and finished at the end of the month. The first cut of lucerne/cocksfoot mixture on 17 May was made into reasonable hay, and 50 acres of grass cut on 31 May made excellent hay. An 8-acre field was cut at the beginning of a fine spell in September, and was baled and carted in excellent conditions.

Livestock

Cattle. Nineteen cattle not fattened on the grass in 1965 were brought into covered yards in November 1965. Eighty-three younger cattle were bought in autumn, and most were yarded in December 1965. They were fed on silage, hay and brock potatoes, and the most forward were given home-grown concentrates to gain about 2 lb/day. The yards were not emptied until the end of April, as the weather was wet and cold. Fifty-two cattle bought in spring did well on the plentiful grass and were sold fat throughout the summer. Altogether 161 cattle were sold fat during the year, twice the number sold in 1965. Of these 25 were from Woburn and finished at Rothamsted.

Sixty-eight young Hereford beasts were bought in autumn 1966 to be outwintered. All the other cattle are in yards, where the most forward ones are being fattened.

All the young cattle were treated in November with an organo-phosphorus insecticide against warble fly.

Sheep. In October 1965, 230 ewes, mainly Scotch Half-breds, were mated, after flushing on fresh grass, to Suffolk rams. Because of snow, hay was fed from mid-November. Concentrates were fed from 26 January. The ewes were wintered at Scout Farm to give the Rothamsted fields a rest from sheep. Lambing started about mid-March, but the ewes were rather short of milk, and several lambs died in cold wet weather during April.

The ewes were injected before lambing with a combined vaccine to protect them and their lambs against several diseases. Ewes and lambs were sprayed against sheep maggot fly, and were dosed regularly against worms.

The percentage of lambs alive on 1 May from the ewes put to the tup was 150. The single lambs were creep-fed until weaning, when all lambs were trough-fed. All except 32 lambs had been sold fat by the end of the year.

The ewes were flushed on fresh grass in September 1966, and the rams were put with them on 14 October. Only a very little hay was given to them before the end of the year.

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Equipment

A new 4 tons/hour oil-fired vertical-flow grain drier was installed to deal with the more grain from the extra land at Scout Farm. This worked satisfactorily, and on no occasion was cutting delayed by lack of drying facilities. Four new Crittall storage bins, each holding 30 tons, were built and equipped for pneumatic emptying.

Buildings

Four new cottages for farm workers were completed.

The sunken cattle yard at the steading was filled in, and the space is used to store, sample and weigh produce from grain and potato plots.

WOBURN

The wet and cold autumn of 1965 delayed wheat drilling, sugar-beet lifting and ploughing, and at the end of the year all three jobs were unfinished. Cereals and most of the potatoes were planted in a fine spell during early spring. The summer was dull, cool and wet; however, some good hay was made, but the corn lodged badly. Sugar beet and grass grew well, but potatoes, after a good start, were disappointing. Harvest was rather late, but grain yields and quality were good. In the dry September most of the potatoes were lifted, but much rain in the last 3 months delayed the lifting of sugar beet and ploughing. However, at the end of the year only a little ploughing remained to be done.

The effect of weather on crops

The harvesting of sugar beet was not finished until almost the end of January 1966. Most of the wheat was sown early in November, but some was not sown until early January when there was a slight frost.

Very little land work was possible in January, but some ploughing was done. February was mild and wet, and the 3 in. of rain made the ground very wet. Temperatures were above average, and there was no frost of any severity. Ploughing was finished, and by the end of the month field work was up to date.

March and early April were dry, and field work was uninterrupted. Spring cultivations started early, and all spring cereals and beans were sown before the end of the month.

Potato planting started at the end of March, and most were planted before a wet spell started early in April. April was wet and cold, and there were 3·13 in. of rain in 23 rainy days. The ground became very wet, and no field work was done between 5 and 26 April. Sugar beet was drilled early in the month in good conditions.

The weather in May was changeable, which delayed the spraying of cereals and other field work, but by the end of the month it was up to schedule. May ended with a blaze of sunshine and the early part of June was hot, but on 10 June there was a heavy thunderstorm, during which 1·5 in. of rain fell. The weather then changed and there were 4·3 in. of rain

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