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ROTHAMSTED RESEARCH

Rothamsted Report for 1967

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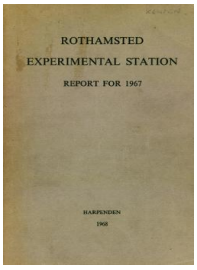

The Farms : Rothamsted

J. R. Moffatt

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THE FARMS

J. R. MOFFATT

ROTHAMSTED

In January land work was well forward. The winter was very mild and drier than average. Spring was mainly dry but cold, and all cereals and potatoes were sown early.

Cold, very wet weather in May delayed field work, but good progress was made in the dry, hot weather in June and July. The silage and most of the hay was of excellent quality.

Corn, beans and rape grew well. Harvest started early, and most of the cereals ripened about the same time; yields mostly exceeded those in 1966, and quality was good, but beans yielded less.

Potatoes grew well until early September; most were lifted in dry weather in September and early October, and yields were big.

Rain in late October and November delayed wheat drilling, which was not finished at the end of the year, but most of the ploughing was.

The effect of weather on crops

In a 10-day spell of frosty weather early in January dung and chalk was spread on arable land which was ploughed later in the month. Late January and early February was mild and dry; some ground was prepared for cereals, but rain delayed drilling until a dry spell in March. However, all cereals and beans were sown by 24 March, and oil-seed rape before the end of the month. The early-ploughed ground worked down easily, but that ploughed late became harsh on top while remaining wet underneath.

The dry weather continued into April; potato planting started on 30 March and finished 4 weeks later. Kale and sugar beet were drilled before the end of April.

The last week of April and the whole of May was dull, wet and cool. There were 5·03 in. of rain in 22 wet days in May, nearly 3 in. more than average, and sunshine was 40 hours fewer than average. Little land work was possible, and the spraying of herbicides to cereals and potatoes, and silage making, was delayed.

The first 3 weeks of June were dry with hot spells, and the silage was quickly made. About 150 tons of excellent hay were made, and as the warm spell after the rain in May made the grass grow ahead of the stock, several fields not planned for hay were cut. Some of this hay was less good, as the weather broke before it was all made.

Cereals grew well, but storms at the end of June caused some lodging. During July they ripened fast, but another storm at the end of the month caused further lodging, and rain later in July and early in August delayed the start of harvest until 17 August. All cereals ripened about the same time, and to avoid loss from shattering, the spring wheat was cut before the

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winter wheat. The beans ripened much earlier than usual and were cut when the cereals were damp. Corn harvest was finished on 9 September.

Wheat drilling started earlier than usual, and most of the experiments were drilled before the end of October. The latter half of October was very wet; the total rainfall in 22 rainy days was 6·02 in., double the average. The ground became very wet, and remained wet, as rain fell on 20 days in both November and December, although the monthly totals were less than average. Some wheat experiments, including Broadbalk, were not drilled until frost in early December made the ground hard enough to carry the tractor.

Ploughing was done whenever conditions were suitable, and most was finished by the end of the year.

Field experiments

There were 3394 full-scale plots from which yields were taken and more than 2000 others, some large plots from which yields were not taken and some microplots. Winter-wheat plots were drilled by early November, and spring cereal and bean experiments were drilled by the end of March. Potato experiments were planted under excellent conditions.

Broadbalk field was rotary cultivated in autumn 1966 for the first time to get a seed-bed. Squarehead's Master wheat was sown for the last time and was replaced in autumn 1967 by Cappelle. Section 1a was sprayed in autumn 1967 with aminotriazole against twitch. Wild oats were rather more numerous than in 1966, and it took twice as long to pull them. There was little lodging, but the many vetches on patches of the unsprayed Section 5a pulled the crop down. Yields from all plots were less than usual. Soil and weather made difficult the preparation of the seed-bed for the 1968 wheat crop. The first discing was done early in October, and on five occasions the land was spring-tine cultivated with a view to drilling, which could not be done until early December.

On Hoosfield Half-acre Cappelle wheat was drilled for the first time on the whole area.

Hoosfield barley plots were fallowed to clean the land in preparation for the revised experiment starting in 1968. The area was sprayed with aminotriazole against twitch (*Agropyron repens* and *Agrostis* spp.), and rotary and tine cultivated many times. Because of twitch, mainly *Agrostis*, the Exhaustion Land was also fallowed.

The wet autumn of 1966 delayed and interrupted the ploughing of Barnfield; work started in mid-January, but was not finished until mid-February. Without any severe frost, a suitable seed-bed was obtained only by discing and rotary cultivating. Tick beans (Maris Bead), were grown for the first time; they were sprayed with simazine, which seemed to damage plants on all plots other than those on the dunged strips. This damage was probably caused by the large amount of rain in May carrying the simazine through the soil containing little organic matter within reach of the bean roots; it resulted in small yields.

The wheat on the Ley–Arable experiment looked and yielded very well; the barley looked well until it was battered by storms at the end of July,

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but yields were good. A few potatoes in Highfield were infected with black leg, and part of some plots was discarded at harvest.

In the Cultivation–Weedkiller experiment soil conditions prevented autumn drilling, and both wheat and beans were spring sown. For the first time the whole of the wheat and barley areas were sprayed with a hormone herbicide. Two cultivations were needed on the minimum cultivation treatment for wheat and beans; all crops given this treatment yielded as much as those given more thorough cultivations. Because of the many weeds, the 1966 bean stubble was sprayed with aminotriazole. Paraquat was sprayed in autumn 1966 on the minimum cultivation plots for beans. In autumn 1967, all the plots except those after potatoes were split for a 0 *v* paraquat comparison; this modification to the experiment will be maintained.

As in past years, wheat sown at 170 lb/acre by a spinner-broadcaster on conventionally prepared land gave the same yield as seed drilled at 150 lb/acre. With barley there was little difference between the sowing methods.

Cropping

Of the 655 acres farmed, 421 were under arable crops or fallow, 103 under short-term leys or lucerne–grass mixtures and 131 under permanent grass. The main crops were wheat (125 acres), barley (165 acres), beans (49 acres), potatoes (25 acres), and kale, sugar beet, swedes and oats (8 acres). Forty-three acres were fallowed and oil-seed rape (6 acres) was grown for the first time. The acreage under wheat and beans increased at the expense of barley.

The fallowing in 1966 of a large acreage, mainly on Scout Farm, was successful in diminishing the amount of twitch (*Agropyron repens* and *Agrostis* spp.) and onion couch (*Arrhenatherum elatius*); one large field after fallow gave 44 cwt/acre of Cappelle wheat. Other fields on Scout Farm, with the same weed problem, were fallowed in 1967, but most of the arable area is under continuous barley, which gave an average yield of 35 cwt/acre. An old grass field there, ploughed late in spring, gave 40 cwt/acre of spring wheat. The fallows were worked many times during the summer, mainly by a rotary cultivator, with occasional deep-tine cultivations.

The 7-year rotation of two cereals, a "break" crop, two cereals and two "break" crops is now operational. 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.

Paraquat was used on several fields in autumn to kill annual weeds and volunteer corn, and prevent the perennial grass weeds from replenishing their "root" reserves. This proved successful, and this stubble hygiene will be used extensively in future. Some fields, where volunteer corn grew after ploughing, were sprayed with paraquat in late autumn instead of re-ploughing when the soil was wet.

On all fields where wild oats appeared they were hand-pulled.

Cereal diseases. Leaf diseases, particularly yellow rust and mildew, were more widespread than usual on both winter and spring wheat. On barley

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there was a widespread attack of yellow and brown rust, which fortunately came too late to do serious damage. There was also a general attack of mildew. Take-all and eyespot were widespread though not very damaging; eyespot was unusually prevalent on spring wheat.

Bean diseases. Virus infection of the bean yellow mosaic group was widespread on all fields, and may have been responsible for lessening yields.

Crops

Wheat. Cappelle was the only winter variety grown except on Broadbalk and a few other experimental areas. Drilling was finished early in November 1966, and though germination was slow, a good plant was established. Yellow patches appeared in early spring, but these disappeared after the N top dressings were given. There was some lodging, but yields were good; the Highfield Ley–Arable experiment gave a mean yield of 54 cwt/acre, and that on Fosters 62 cwt, with the largest plot yield of 71 cwt. Other experiments averaged between 45 and 50 cwt.

Kloka, the main spring wheat, was sown early, ripened about the same time as the Cappelle and was cut first. Yields averaged about 45 cwt/acre.

Barley. Maris Badger was the main variety in experiments, but Zephyr and Impala were also grown. Yields in most experiments exceeded 40 cwt/acre; the Fosters Ley–Arable experiment gave 51 cwt and the Highfield experiment 42 cwt. The non-experimental Zephyr averaged about 35 cwt/acre.

Oats. The small area of Manod, spring-sown on Fosters and Highfield Ley–Arable experiments, yielded about 42 cwt/acre.

Beans. Both Tarvin and Maris Bead spring ticks were grown. Planting was rather late, but in good conditions; all areas were sprayed with simazine soon after drilling. The crops were sprayed against bean aphids (*Aphis fabae*) in mid-June, and because of a widespread second infestation, again in July, most by aeroplane. Both varieties were ready for cutting before the end of August, but the pods were too dry and brittle. They were cut in a period of damp weather early in September. Yields averaged 30 cwt/acre.

Oil-seed rape. This crop was grown for the first time at Rothamsted. The spring variety Nilla was drilled at the end of March in rows 4 in. apart, with 175 units of N. It grew well, but the young plants were damaged by pigeons; it was sprayed with malathion against the pollen beetle. The crop ripened in the middle of harvest and, as it was too late to swathe, was combined direct, but a lot of seed was shed; despite this, yields were satisfactory and plot yields ranged from 17·4 to 23·6 cwt/acre, or from 710 to 920 lb oil/acre. In future the crop will be sown earlier or later than in 1967 to avoid harvest clashing with the corn harvest.

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Sugar beet, kale, swedes. These crops were only grown in experiments. They were drilled under good conditions; sugar beet and kale grew well and gave big yields, but the swedes grew slowly, giving small roots and a small yield.

Potatoes. King Edward and Majestic were the main varieties, but some Pentland Dell were grown; all except those grown for seed were chitted. Good seed-beds were made by the rotavator, and planting was done in an unbroken period of 4 weeks. On most areas weeds were controlled by a linuron/paraquat spray; three or four sprayings were done against blight. The crops grew well and looked healthy except for a severe attack of leaf drop streak in Pastures field which spread rapidly from about 10 focal points. A few plants in the crops being grown for seed also became infested, so this seed will not be used for experiments in 1968. The seed crop was lifted in August and yielded about 11 tons/acre of seed size. The ware crop began to die in early September, when the haulm was burnt off. The King Edward and Majestic both averaged about 22 ton/acre total produce, but the Pentland Dell only about 16.

Grass. A high-nitrogen compound fertiliser was given to most of the leys in February or early March, and 84 units of N as "Nitro-Chalk" in March for the silage and hay crops. The grass grew rather slowly at first, and grazing did not start until the end of April. Growth was rapid in May and in June, and the crops of silage and hay were big. Growth was maintained by the liberal use of N, aided by irrigation which continued until mid-August. Some of the grass that was surplus to grazing needs was made into hay that was sprayed with a mixture of organic acids as it entered the baler, and baled wetter than is usually accepted as safe for hay. All fields were topped by a rotary cutter, and some were sprayed against thistles and docks.

Livestock

Cattle. Forty-eight cattle were brought into covered yards early in December 1966, and 68 bought in the autumn were out-wintered at Scout Farm. All were fed on hay, silage and brock potatoes, and those yarded were given home-grown concentrates to gain about 2 lb/day. Most of these were sold from the yards, and the remainder were kept in until late in April. Sixty-five young Hereford beasts bought during the spring and summer did well on the plentiful grass, and some were sold fat during the summer and autumn. Altogether 121 cattle were sold fat during the year, 44 of which were from Woburn and finished at Rothamsted.

In autumn 1967, 46 young cattle were bought and were outwintered on Scout Farm with 36 of the smallest of the cattle on the farm; 62 of the most forward were yarded in November for fattening.

All the young cattle were treated in October with an organophosphorus insecticide against warble fly.

Sheep. In October 1966, 177 ewes, mainly Scotch Half-breds, were mated, after flushing on grass, to Suffolk rams. Very little hay was given until early

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January 1967, and concentrates were fed from 18 January. Lambing started about mid-March, and although the first lambs were rather small and weak, those born later did well in the dry weather. There were 285 lambs alive on 1 May, giving a lambing percentage of 161. The single lambs and triplets were creep-fed until weaning, when all were trough-fed. The first lambs were sold on 22 May, and all but 38 were sold fat by the end of the year.

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

Sixty-six half-bred shearlings were bought in autumn 1967. Nine home-bred shearlings and 20 lambs were kept to bring the flock to 238. They were flushed on new seeds and were mated in mid-October. As there was plenty of grass, very little hay was fed before the end of the year.

WOBURN

Despite the wet autumn, field work was well forward at the start of 1967. The winter was mainly mild and wet. During a long fine spell in spring, beans, cereals and potatoes were sown, but a wet May delayed land work. The summer was mainly dry and hot; some excellent hay was made, but other crops on the lighter land suffered. Cereals and potatoes on some areas yielded little. In the dry September and early October, potatoes and sugar beet were lifted and some land was sub-soiled; most of the winter corn was drilled before the ground became too wet, and much land ploughed. Late autumn was wet, but at the end of the year field work was up to schedule.

The effect of weather on crops

The many hard frosts early in January made possible several jobs left over from 1966. Dung was carted and spread, chalk was sown and ploughing finished.

In a dry, mild spell early in February some seed-beds were prepared and some wheat and beans sown. Rain then stopped work until early March, when the ground dried rapidly, and all spring cereals and beans were sown by 20 March. Rain in April interrupted potato planting, which nevertheless finished earlier than usual.

May, cold, dull, windy and wet, gave 4·27 in. of rain, almost twice the average, in 22 days. Little land work was done, and the spraying of herbicides on cereals and potatoes was delayed.

The weather improved in June; rain fell on only 5 days at the end of the month. Hay was cut early in June; no rain fell during its making or carting and yields were big. In July the weather was mainly fine and dry, with more sunshine than usual; occasional storms caused some corn to lodge.

August had an inch less rain than average, but it was spread over 16 days mainly early in the month. This delayed the start of harvest, which finished on 4 September.

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