ROTHAMSTED RESEARCH

Report for 1975 - Part 1

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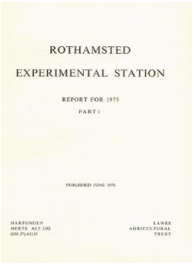

The Farms

R. Moffitt

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THE FARMS

R. MOFFITT

Staff

Head of Farms R. Moffitt, B.SC.

Assistant Farm Manager
J. P. Dickinson, B.SC.

Bailiff (*Woburn*)
A. W. Neill

Personal Secretary
Brenda M. Simpson

Recorders (*Rothamsted*)
J. M. Bidgood
M. N. Rogers
K. L. Sykes, B.SC.
H. L. Jones

Recorders (*Woburn*)
G. T. Pearce
Q. D. Pope

Foreman (*Rothamsted*)
W. A. H. Burton

Farm Workers
T. E. Ablewhite
T. J. H. Battams
V. Bowes
R. H. Burlinge
C. Bygrave
J. Bygrave
W. G. Clucas
R. Fearn
R. W. Gibson
A. V. Pawson
C. J. Stitchman
C. H. Waghorn

ROTHAMSTED

This year was an unusual and difficult one, notable for a marked contrast in weather pattern, with one of the wettest springs on record giving way to one of the hottest summers. Most crops were sown late and suffered severely from drought, potatoes being worst affected. However, a warm and dry autumn enabled potatoes to be lifted and winter cereals sown in ideal conditions.

General

At the beginning of the year much field work remained to be done following the exceptionally wet autumn of 1974. There was much ploughing, some straw still lay in the fields and the discards of grass experiments were uncut.

The weather in January was mild and wet with above average rainfall. The discards of grass experiments were cut and fed to cattle and manures were applied to Hoosfield and Barnfield. In a spell of drier weather it was possible to bale some straw but the remainder was chopped so that ploughing of stubbles could continue. Most ploughing was finished in early February except for a few small areas which were very wet.

The weather continued mild with little frost, and drilling of barley started on 25 February on the lighter land. Because of late ploughing and lack of frost, seedbeds were cloddy but it was thought best to accept this rather than attempt too many operations which would cause compaction and wheel damage. The weather broke in early March and then began a long wet spell which continued until late April. Sowing was possible on only a few days in March when a few beans, some barley and the small area of spring oats were sown. When arable work was impossible fertiliser was spread on grassland. March rainfall was 90 mm compared with an average of 48 mm and only seven rainless days were recorded.

It was 20 April before land work was resumed and the sowing of cereals was finished by the end of the month, one of the latest seasons on record. Because of ground conditions it was not possible to drill beans on Barnfield until 1 May.

Potato planting started on 28 April but soil conditions were not good. Although wind

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dried the surface, the soil underneath was wet and unweathered. Because of this an inter-row cultivator was used immediately after planting to loosen the soil in the tractor wheelmarks.

The weather in May was cool and windy making the spraying of cereals difficult and slowing the growth of crops. The first cut was taken from grass experiments in late May and silage was made but yields were light. Rainfall in May was 68 mm, a little more than the monthly average of 54 mm.

Then, in early June, the weather changed, and an exceptional spell of dry, hot weather started and continued with only a few showers until mid-September.

Excellent hay was quickly made in early June but yields were less than usual. There was little recovery after cutting and keep for cattle became short.

All crops, particularly potatoes, suffered in the dry spell and potatoes and grass were irrigated whenever possible. Rainfall in June was less than half normal, 23·5 mm compared with the monthly average of 57 mm, and in July only 21 mm fell compared with the average of 64 mm.

Grain ripened quickly in the hot, dry weather and harvest was started earlier than usual. A few days were lost because of rain and combining finished on 1 September. Little drying was needed and grain moistures were generally very low. Rainfall in August was 20 mm compared with the average of 65 mm. The dry weather continued, so practically all combined straw was baled and stacked, and very little (6·5 ha) was burnt.

It was impossible to work stubbles as the ground was so hard but on 13 and 14 September a total of 57·4 mm of rain fell and this work then started.

Unirrigated potatoes started to die back early and lifting started earlier than usual. Soil conditions were good, little time was lost from bad weather and lifting finished on 31 October.

Winter cereals were drilled in good conditions. In many cases stubbles were not ploughed but were cultivated with a heavy spring-tine cultivator and then sprayed with paraquat just before drilling to kill volunteers. Self-sown cereals were more numerous than usual, probably due to very light grains being carried over with the straw when combining.

A final and very light cut was taken from the grass experiments and a PK fertiliser was applied.

At the end of the year field work was well up to date and only a little ploughing remained to be done.

Field experiments

There were 3705 large plots managed by the farm and yields were taken from 3297.

On Broadbalk establishment of wheat was patchy as drilling conditions in 1974 were poor. There was more blackgrass (*Alopecurus myosuroides*) than usual as there was much rain immediately after sowing and it was not possible to apply terbutryne which is normally used to control annual grasses.

Wild oat plants numbered about the same as in 1974.

Couch grass (*Agropyron repens*) was more vigorous on the continuous wheat sections and Sections 0, 1 and 9 were sprayed with glyphosate in late September.

A scheme of routine chalking has been adopted and a start was made by chalking Sections 1, 2 and 3 before ploughing.

Barnfield, one of the heaviest on the farm, suffered in the wet winter. It was not possible to apply dung until early 1975 and although the dunged strips were ploughed with great difficulty, more wet weather made further work impossible, and it was not possible to finish ploughing until the better weather in March. Sections 1 and 2 continued in beans and fallow but the beans were not sown until 1 May, and even at that late date the soil

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was very wet in places. The rest of the field, except for strip 3, was sown to S22 Italian ryegrass. Sown late, because of season and priority given to other work, it suffered severely from the drought and gave little production. It was sprayed with MCPA in June and then again with mecoprop in the autumn to control chickweed (*Stellaria media*).

On Park Grass the cutting of the discards from the last cut of 1974 was not done until January 1975. Spring nitrogen was applied late because of weather, and yields were about one fifth less than in 1974. The second cut was taken in September, earlier than usual as the grass was very dried up and growth had stopped.

Barley on Hoosfield was sown on the 25 February. Initial growth was very slow and yields were about 17% less than in 1974.

There were few wild oats.

The Exhaustion Land was fallowed to control perennial grass weeds.

Crops

There were 264 ha farmed. Cereal crops occupied 143 ha and the other main crops were potatoes (11 ha) and beans (17 ha). There were 11 ha of fallow and 72 ha of permanent and temporary grass.

Wheat. There were 43·9 ha of wheat, mostly winter sown. The main varieties were Cappelle (30·4 ha) and Bouquet (8 ha) but a little Maris Templar was grown. The Maris Templar was sprayed against rust in July. Most wheat is grown after a 'break' such as potatoes, beans, fallow or oats.

Because of the wet autumn of 1974 much wheat was sown late in poor conditions. However, it was favoured by the mild, if wet, winter and withstood summer drought well.

Because of the abnormal spring it was not possible to top dress with 'Nitro-Chalk' until late April and very little harrowing or rolling was done because of pressure of other work.

The best field yield was obtained from 8 ha of Bouquet which gave over 6·3 t ha $^{-1}$.

In the variety experiment the best yield was from Maris Templar which, when sprayed with fungicide against rust, gave 7·38 t ha^{-1}, when grown after a two-year break. When grown after another cereal in a similar experiment the yield was 6·26 t ha^{-1}.

Barley. There were 84·6 ha of barley, nearly all spring sown. Most of the barley was Julia and, as in previous years, home-saved seed was used and treated with ethirimol to control mildew (*Erysiphe graminis*). A little Maris Mink (14·6 ha) was also grown.

Some barley was drilled in late February but seedbeds were poor. A long spell of wet, cold weather then set in. On only a very few occasions was drilling possible on the lighter land, and it was not until late April that the weather improved sufficiently to enable sowing to be finished. The early-sown barleys were slow to emerge, patchy in appearance and badly discoloured. All barleys, particularly the late-sown ones, suffered badly from the severe drought and yields were below average. Field yields varied from 3·3 to 4·3 t ha^{-1}.

There was only 4 ha of winter barley, mostly Maris Otter.

Oats. There were 14 ha, mostly winter sown. They act as a 'break' crop in the rotation and are useful in spreading harvest as they are usually ready for cutting before the spring barleys. Stem eelworm resistant varieties only are grown, such as Peniarth and Maris Quest. They were harvested in ideal conditions and averaged 5·0 t ha^{-1}.

A few spring oats are grown. The old variety Manod is still grown as it is resistant to stem eelworm.

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Beans. There were 16·6 ha, mostly spring sown. The varieties were Maris Bead and Minden. Sowing was protracted and was done at various dates from late March to 1 May because of weather. The weather broke immediately after sowing the earlier drillings, and it was not possible to spray with simazine. These were tractor hoed but despite this became weedy, mostly with stinking mayweed (*Anthemis cotula*) and knotgrass (*Polygonum aviculare*). It was possible to spray the later sowings and these stayed much cleaner. Drought affected growth very severely, they ripened much earlier than usual in the hot summer, and harvesting finished in August. Yields were extremely low averaging about 1 t ha^{-1}.

There were few black aphid (*Aphis fabae*) but unusually much green aphid, and they were sprayed with either 'Metasystox' (demeton-S-methyl) or 'Aphox' (pirimicarb).

The small area of winter beans (Throws MS), although sown late, benefited from the mild winter and one experiment averaged 4·01 t ha^{-1}. There were some shedding losses and the following winter barley crop was sprayed in early November with mecoprop at a low rate to control volunteer plants.

Potatoes. There were fewer potato experiments than usual and less potatoes were grown, 10·9 ha compared with 13 ha in 1974. Mostly King Edward was grown.

Planting started late on the 28 April with the Scottish seed (King Edward and Pentland Crown), grown in isolation for seed production for the 1976 crop. There were many aphids in the early summer and although phorate granules were applied at planting and two 'Metasystox' sprays were given, Virus Y spread in the King Edward. This variety could not be saved for seed and Foundation Stock was bought in for potato experiments in 1976, as well as for growing on for seed production. The Pentland Crown suffered less and is suitable for seed.

Planting of potato experiments and ware potatoes followed after the seed crop, and all potatoes were sprayed with a paraquat/linuron herbicide before emergence.

There was little rain throughout the growing season and only one precautionary blight spray was given. An insecticide was included to control aphid. Wherever possible potatoes were irrigated but where irrigation was not possible yields were poor and tubers very small.

One experiment comparing liquid and solid fertilisers which was irrigated gave a mean yield of 25 t ha^{-1} of saleable tubers (King Edward).

Increasing amounts of nitrogen over 126 kg ha^{-1} increased yield only slightly, and increasing spacing in the row from 30 to 45 cm decreased yield by only 0·2 t ha^{-1}.

In another experiment where irrigation was included as a treatment the total yield on unirrigated plots was 18·8 t ha^{-1} compared with 34·6 t ha^{-1} on irrigated plots.

Unirrigated potatoes died back early and some were sold immediately after lifting. Later liftings were put into store once the skins had set.

Grass. Growth of grass was slow in the wet, cold spring and silage yields were less than normal. Hay was quickly made in early June at the start of the dry, hot weather. There was no weather damage and it was of excellent quality but because of early cutting and poor growing season, yields were about one-third less than normal.

Recovery was poor and keep for cattle became very short. Grass was irrigated where possible but the amount was restricted by the limitations of water supply and equipment, and the priority given to potatoes and other experiments.

There was no second cut of hay or silage as all grass was grazed, except for grass experiments and here the second and third cuts were very light.

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Cattle

Keep for cattle became very short in midsummer and supplementary feeding was required until rain in mid-September encouraged more growth of grass.

One hundred and eighteen cattle were sold fat during the year and 91 stores, mostly Hereford/Friesian cross, were bought. All young cattle were injected against lung worms, stomach worms and liver fluke.

Equipment

Improvements were made to the grain plant to increase throughput.

Staff

Mrs. S. Quan-Taylor resigned in March and H. L. Jones was appointed in September. A. Wilson left.

WOBURN

The spring of 1975 was one of the wettest on record and crops were late sown. The weather then became very dry and hot, and all crops suffered from drought. Yields of potatoes and beans were very poor and cereals and grass also suffered.

A dry autumn enabled potatoes to be lifted in good conditions and winter cereals sown in good time. At the end of the year field work was well forward.

General

January was mild and rainfall was 62 mm compared with the average of 54 mm. The last of the winter wheat was drilled and FYM was spread on stubble. Ploughing was finished in February which was also mild and a little drier than usual with 33 mm of rain, 6 mm less than average.

In a dry spell at the end of the month a start was made on drilling barley.

Very heavy rain in March stopped all arable work but fertilisers were applied to grassland. March rainfall was 106 mm, over twice the monthly average of 43 mm, and only nine rainless days were recorded. Some fields were virtually under water and there was erosion in places.

Most of April continued wet and the rainfall was 71 mm, 26 mm more than average. It was not until 22 April that sowing was restarted. Cereals and beans were all sown by the end of the month and sugar beet was also drilled.

Potato planting was late and was not finished until 22 May, initially soil conditions were poor but improved later.

June was hot and excellent hay was made. The dry weather continued in July and all crops suffered severely from drought. There were a few local thunderstorms which helped a little but rainfall was well below average. July rainfall totalled 30 mm, about half the average.

An easy cereal harvest, free from interruptions from weather, was quickly finished by 22 August but yields were light. Beans followed almost immediately but were a sorry crop.

Rainfall in August was only 10 mm compared with a monthly average of 62 mm, and potatoes, grass and sugar beet suffered severely. There was sufficient rain in September, 94 mm, over twice the average of 42 mm, to soften the ground without making it too wet, and cultivating of stubbles and potato lifting started. Dry, mild weather favoured autumn work which was well up to date at the year's end.

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Cropping

There were 1582 large plots from which yields were taken and 134 from which no yields were taken. In addition there were 262 large plots managed by scientific departments and 535 microplots.

There were 75·4 ha farmed and the main crops were wheat 9·1 ha, barley 16·7 ha, beans 5·4 ha and potatoes 6·8 ha. There was a little sugar beet (1·0 ha) and 30 ha of grass.

Wheat. Cappelle was the main variety with a little Maris Huntsman. Mostly grown after potatoes or beans it was sown late and suffered in the wet winter, and only improved in late April when the ground dried out sufficiently to apply 'Nitro-Chalk'.

In the variety experiment on a healthy site, although Maris Templar gave slightly the best mean yield of 4·29 t ha^{-1}, there was little difference between any varieties. The site lay wet during the winter and was under water at times, and this may have been responsible for the generally low yield. Another experiment in the same field gave a mean yield of 5·0 t ha^{-1} of Maris Templar when sprayed with benodanil against rust.

Barley. Julia was the standard variety and Rothamsted grown seed treated with ethirimol was used. Some barley was sown in late February but then suffered in the subsequent wet spell. It was slow to emerge and consequently was badly damaged by rooks and pheasants. Some experiments had to be resown in April because of loss of plants. On the sandy sloping ground on Gt. Hill there was severe erosion and many gulleys formed. The worst areas were redrilled later.

Sowing was not finished until the drier weather of late April and even then wet pockets of soil made drilling difficult.

Slow growth and poor plant populations in the early sown crops favoured the spread of weeds and there was much mayweed. Spraying with herbicide was delayed by weather and shortages of chemicals.

Yields were generally lower than average but one field on the better land which was sown in good time averaged 5·0 t ha^{-1}.

Beans. Spring beans only were grown and the variety was Minden. Sown late and suffering from drought, yields were poor. They were sprayed once with 'Metasystox' against aphid.

Potatoes. Pentland Crown (4·1 ha) and Maris Piper (2·3 ha) were the two main varieties grown. Potato cyst eelworm (*Globodera rostochiensis*) is a problem as it spreads easily in the light sandy soil. On fields in the six-course rotation these varieties are alternated so that the susceptible variety Pentland Crown is grown only once in six years.

Planting conditions were poor and tilths were knobbly. Planting was not finished until 22 May. A linuron/paraquat herbicide was used to control weeds. They were sprayed with 'Metasystox' to control aphid. One blight spray only was given in July.

The Maris Piper grown on light land suffered in the drought and gave very low yields of small tubers with much scab (*Streptomyces scabies*). Pentland Crown on some better land yielded surprising well despite the dry summer, and several experiments gave yields of over 30 t ha^{-1}, but the average was much less. In one experiment comparing varieties Pentland Crown gave the biggest yield.

Sugar beet. Drilling was done at the end of April and although a good plant stand was obtained it later suffered badly from drought and during the summer leaves were permanently wilted. One experiment on the sandy soil at the top of Gt. Hill was ploughed in. The remainder of the crop was sprayed with 'Metasystox' in June and 'Solubor' in early July.

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The roots were very small and yields poor. The best was 16 t ha^{-1} on one experiment but all others were less.

Grass. No silage is made at Woburn only hay, and excellent quality material was made in early June with virtually no weather damage. There was sufficient keep for cattle during the summer but because of drought there was no second cut of grass for conservation.

Undersown seeds on Gt. Hill were killed by drought and were resown after harvest and then established well.

On the permanent grass on the Dairy Farm chickweed (*Stellaria media*) grew rapidly in the mild autumn and so it was sprayed with mecoprop.

Cattle

Thirty two cattle were sold fat off the grass during the year and six were transferred to Rothamsted for finishing in yards. Thirty six stores were bought for wintering on straw, hay and a few waste potatoes.

Buildings

A timber hay barn was erected to replace the general purpose building lost in the November 1974 fire but on a different site. A lean-to for implements and fertiliser was added to the building housing the grain plant.

The interior of the potato store was lined with insulating material.

Equipment

Replacing the Clayson combine harvester lost in the fire was difficult as it had been extensively modified for use as a bagger-cum-tanker for plot work. A similar used machine was bought and the bagging equipment was salvaged and transferred to it. This machine performed satisfactorily in the 1975 harvest.

Low volume cold air ventilation equipment was installed in the grain plant to cool stored grain and allow storage at higher moistures. This was most useful in the very hot weather at harvest.

A flat eight bale loader and associated 40 bale rear carrier greatly eased bale carting. Previously trailers were used because of the road work involved.

Staff

P. Neill resigned in March to gain further experience in Canada. C. H. Waghorn was appointed in May.

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