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ROTHAMSTED  
RESEARCH

## Report for 1934

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## Survey of Fungus Diseases at Rothamsted and Woburn

### Rothamsted Research

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Oat crops on Pastures field were in 1929, recorded as "winter killed," and again in 1931, when four acres near the road yielded 14 cwt. per acre.

#### LONG HOOS

*Wheat.* Wireworm attack was generally observed on the winter sown cereals. The stem sawfly (*Cephus pygmaeus* L.) was observed ovipositing in early June. *Barley* on the Three-Course Rotation was attacked by wireworm, that on the Six-Course Rotation less than elsewhere on the farm. The Barley flea-beetle (*Phyllotreta vittula* Redt.) was generally present, but did not cause appreciable damage. Frit fly and gout fly attacks were not serious.

*Sugar Beet* suffered little from insect attack. Some damage by *Plectroscelis concinna* Marsh, and by Springtails occurred on LONG HOOS I. The *beans* on the same section were severely attacked by the pea and bean weevil (*Sitona lineata* L.). On the *flax* the Flea-beetle (*Apthona euphorbiae* Schr.) was found but numbers were too small to cause damage.

#### FOSTERS

One sowing of *kale* was destroyed by Flea-beetles in early May, the second sowing (May 10th) escaped. Later, in early June the third sowing and the resown first plot were subject to a fresh attack.

#### GREAT HARPENDEN

Rooks destroyed the first sowing of beans in the north-east of the field.

#### WOBURN

##### STACKYARD

*Barley* was attacked by gout fly. Slight damage to *Sugar beet* was caused by wireworm, Pigmy Mangold beetle and Mangold fly (*Pegomyia hyoscyami* Panz.). Odd plants were eaten off by rodents. Mangold fly was also present in Butt Close.

##### LANSOME

*Maize* suffered from frit fly attacking the tillers, as many as twenty larvae occurring on one plant. Some flea-beetle damage occurred on the cruciferous crops and the *swedes* were attacked by cutworms.

#### FUNGUS DISEASES AT ROTHAMSTED AND WOBURN, 1933-34

MARY D. GLYNNE

##### WHEAT

Take-all (*Ophiobolus graminis* Sacc.) was rare. It is generally found on the Continuous wheat and barley experiments on Stackyard field, Woburn, but this season these were fallow.

Foot Rot (mainly *Fusarium culmorum* (W.G.Sm.) Sacc.) was found scattered as occasional "whiteheads" through several crops at Rothamsted, there being more on Broadbalk than on other fields. At Woburn it was plentiful on the "Precision" and on the "Nitrogenous Manure" experiments on Butt Furlong field, dead heads and stunted plants being common. Similar symptoms had been apparent in barley grown in the same field in 1929 when patches of stunted barley were associated with the presence of *Fusarium* sp. on the underground parts.

Yellow Rust (*Puccinia glumarum* (Schm.) Erikss. and Henn) was very rare in the hot dry summer of 1934. In normal years it appears in June and by July is found on most of the wheat crops, its incidence varying from slight to plentiful. In 1934, however, none was found before July; it was never more than slight on any crop at Rothamsted or Woburn; in some plots only one affected leaf and in many no trace of the disease was found.

Brown Rust (*Puccinia triticina* Erikss.) which in most years is slight in July, was not found at all.

Mildew (*Erysiphe graminis* DC.) was much more abundant than usual. It appeared in June, and by July, though still slight in some plots, was generally plentiful. An eye estimation of its incidence on Broadbalk showed a tendency for the disease to increase with the supply of nitrogenous manure. Differences in the amount of disease noticed in the strips fallowed in different years may have been due to their position in the field, or to the effect of fallowing. Mildew appeared rather more plentiful at Woburn.

Loose Smut (*Ustilago Tritici* (Pers.) Rostr.) was found, but was uncommon at Rothamsted and at Woburn.

#### OATS

Were grown only on Pastures field at Rothamsted.

Leaf Spot (*Helminthosporium Avenae* Eid.) was moderate in incidence.

Mildew (*Erysiphe graminis* DC.) varied from slight to plentiful in different parts of the crop.

#### BARLEY

Leaf Stripe (*Helminthosporium gramineum* Rabenh.) was scarce and only secondary infections were found.

Net Blotch (*Pyrenophora teres* Drechsl.) was very uncommon. The scarcity of these two diseases was noteworthy as they have been considerably more plentiful in other years.

Leaf Blotch (*Rhynchosporium Secalis* (Oud.) Davis) was not found in 1933 or in 1934 though it has been fairly common in previous years.

Mildew (*Erysiphe graminis* DC.) was moderate in quantity on most of the barley crops.

*Deficiency Symptoms.* All plots which receive no phosphate in the Continuous Barley experiment on Hoos field showed striking symptoms of phosphate deficiency in the middle of May. Affected plots were readily distinguished at a distance from the others by their paler colour. The leaves were found to be withered at the tips with red colouration in the lower parts of the plants. After about six weeks new young leaves had grown and the signs of deficiency were no longer obvious.

#### RYE

Brown Rust. (*Puccinia secalina* Grove) was found at Woburn in mid-July, its incidence being slight.

Mildew (*Erysiphe graminis* DC.) was moderate to plentiful at Rothamsted and Woburn.

#### GRASSES

Black Stem Rust (*Puccinia graminis* Pers.) was found in the autumn on wild grasses present as weeds among the mangolds on Barnfield.

Choke (*Epichloe typhina* (Fr.) Tul.) varied in its distribution from plot to plot in much the same way as last year. It appeared, as it usually does, mostly on *Agrostis* and to a less extent on *Dactylis glomerata*. There was rather more on the latter host than in the previous year. The disease was most plentiful on plots which had received ammonium sulphate and were fairly acid, and was less on those treated with lime. *Agrostis* was also most plentiful on these plots. There appeared to be a slight increase compared with the previous season in the incidence of the disease on the unlimed parts of plots 8 and 15 and on the lightly limed parts of plots 19 and 20. Eggs and larvae of the dipteran *Anthomyia spreta*, Meig., were, as usual, found on the fungal stroma.

#### CLOVER

Rot, (*Sclerotinia Trifoliorum* Erikss.) Bare patches and dead plants were present both at Rothamsted and Woburn early in the season but the fungus was not obvious till the autumn when severe attacks were noted in Pastures field Rothamsted, and on Series D on Stackyard field, Woburn. Late in the autumn it was also common on the six-course rotation experiments at both stations.

Downy Mildew (*Peronospora Trifoliorum* de Bary) was generally moderate and was plentiful on Alsike clover in the six-course rotation and in Series D, Stackyard field, Woburn.

#### LUCERNE

Downy Mildew (*Peronospora Trifoliorum* de Bary) was found rarely on the excellent crop on Lansome field, Woburn.

#### BROAD BEANS

This crop was grown only at Rothamsted on Great Harpenden, Long Hoos and Little Hoos fields.

Chocolate Spot could not be found and Grey Mould (*Botrytis cinerea* Pers.) was uncommon contrasting with the previous year when both these diseases were plentiful.

#### POTATOES

Appeared on the whole healthy though a little virus was seen at Rothamsted and rather more at Woburn.

Blackleg (*Bacillus phytophthorus* Appel.) was found but rarely at Woburn.

Blight (*Phytophthora infestans* (Mont.) de Bary) occurred on the foliage in early October appearing to be slight at Woburn and moderate in incidence at Rothamsted.

Early Blight (*Alternaria Solani*, (E and M) Sorauer, emend. Jones and Grout) was abundant on the leaves which were still green in early October both at Rothamsted and Woburn. This has not been observed in previous years.

#### SUGAR BEET

Blackleg (*Phoma Betae* (Oud.) Frank or *Pythium* sp.) was fairly common on seedlings at Rothamsted and at Woburn in May.

Crown Gall (probably *Bacterium tumefaciens* E.F. Sm. and Towns.) was well developed on a few roots at Rothamsted.

Rust (*Uromyces Betae* (Pers.) Tul.) was slight to moderate on most crops and rather plentiful in parts of Long Hoos manurial experiment.

Leaf Spot (*Cercospora beticola* Sacc.) appeared on occasional plants.

Leaf Scorch associated with *Alternaria tenuis* Nees was moderately plentiful.

#### MANGOLDS

Blackleg (*Phoma Betae* (Oud.) Frank or *Pythium* sp.) was found occasionally on seedlings in Barnfield in May.

Rust (*Uromyces Betae* (Pers.) Tul.) varied from slight to fairly plentiful in different plots.

Downy Mildew (*Peronospora Schachtii* Fuck.) was found on one or two plants on Long Hoos.

Leaf Spot (*Cercospora beticola* Sacc.) appeared on occasional plants.

Leaf Scorch associated with *Alternaria tenuis* Nees varied from absent to moderate on different plots in Barnfield.

Mosaic was very scarce, only about fifteen affected plants being found in the whole field of 8 acres. This afforded a great contrast to the previous season when the percentage of diseased plants varied from 3 to 70 per cent. in different plots, having obviously spread from centres of infection. The difference in incidence of the disease in the two seasons probably depended on weather conditions which in the hot dry season of 1934 were unfavourable to the development of the insect vectors, the chief agents in spreading the disease.

#### Deficiency Symptoms

A type of scorch beginning with a black spotting of the leaves followed by a dark brown to black scorching of the edges was very plentiful on certain plots and absent from others in Barnfield at Rothamsted by October, an eye estimation indicating that in the badly affected plots more than half the plants were affected. Microscopic examination showed no signs of fungal or bacterial parasites. A survey showed that the symptoms were most marked where potash was deficient and nitrogen plentiful in the manurial applications, and that their distribution in different plots was consistent with the hypothesis that the scorch was due to potash deficiency. Notes on its incidence have been made in other years. There was some indication of an inverse relationship between the incidence of rust and of this type of scorch.

#### SWEDE

Club Root (*Plasmodiophora Brassicae* Woron.) with the usual symptoms occurred in patches varying from moderate to plentiful in the upper part of Stackyard field, Woburn. A brown dry rot, beginning near the base of the bulb and spreading upwards was found attacking swedes on Lansome field in moderate quantity. No galls were found and at first the disease was not thought to be Club root. Microscopic examination, however, showed the organism (*Plasmodiophora Brassicae* Woron.) present in healthy-looking flesh. This was therefore assumed to be the primary agent in rotting, with wound parasites such as *Rhizoctonia* sp., saprophytic eelworms and boring insects acting as secondary agents.

Soft Rot (possibly *Bacillus carotovorus* L. R. Jones) was found in moderate quantity on Lansome field, Woburn, in the early autumn and increased considerably in the late autumn.

Downy Mildew (*Peronospora parasitica* (Pers.) Tul.) was plentiful in October at Woburn. In Butt Furlong field where kale and swedes were mixed the leaves of the latter could be identified by the abundance of the disease on them while the kale was free as late as October, though two months later the kale was also attacked.

#### Deficiency Disease

Brown Heart. Symptoms resembling "Brown heart" were found occasionally on Lansome field, Woburn.

#### KALE

Was very healthy in the early part of the season and showed little or no sign of disease until the late autumn.

Downy Mildew (*Peronospora parasitica* (Pers.) Tul.) appeared in the winter at Rothamsted and Woburn in moderate quantity.

Grey Mould (*Botrytis cinerea* Pers.) was moderate at Rothamsted and slight at Woburn in the winter.

White Blister (*Cystopus candidus* (Pers.) de Bary) and *Alternaria Brassicae* (Berk.) Bolle were found occasionally.

#### BRUSSELS SPROUTS

Very healthy early in the season.

Grey Mould (*Botrytis cinerea* Pers.) was present on the outer leaves and a Soft Rot (bacterial) was occasional, in the autumn, at Rothamsted.

#### CABBAGE

Ring Spot (*Mycosphaerella brassicicola* (Fr.) Lindau) was moderate and *Alternaria Brassicae* (Berk.) Bolle occasional in the autumn at Rothamsted.

CARROTS were grown only on Lansome field, Woburn.

Violet Root Rot (*Helicobasidium purpureum* (Tul.) Pat.) was found on a few roots at harvest.

Sclerotinia Rot (*Sclerotinia sclerotiorum* (Lib.) de Bary) appeared in the clamp in moderate quantity.

Soft Rot (*Bacillus caratovorius* L.R. Jones) appeared in the clamp, about 10 per cent. of the roots being affected to some extent.

### FARM REPORT, 1934

#### Weather

The year, October, 1933, to September, 1934, was abnormally dry and hot, rather similar to the previous one. The rainfall totalled 19.16 inches, 3.32 inches below last year's figure and 9.40 inches below the 81-year average. The biggest deficit occurred in the last three months of 1933, when only 3.49 inches were recorded against the 80-year average of 8.38 inches. There was, however, one very wet spell at the end of February and early in March, which stopped all land work for almost three weeks. The four summer months, May to August, were dry, and gave a deficit of almost 4 inches compared with a corresponding deficit last year of almost 5 inches. In nine of the twelve months the rainfall was below the average, and the biggest increase over the average which occurred in March, was only  $\frac{1}{2}$  inch. Frequent showers occurred in August, which rather interfered with the harvest.