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Survey of Fungus Diseases at Rothamsted and Woburn

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Clover. The clover in the pot cultures of soil taken from Stackyard series D was examined in June. Four varieties, Dutch White, Alsike, Broad Red and Crimson, were sown in Spring 1931; in June, 1932, all but the Crimson showed signs of considerable ill health and a microscopic examination showed an eelworm to be present. The identity of the eelworm was confirmed by Dr. Goodey to be *Anguillulina (Tylenchus) dipsaci* Kühn.

LANSOME FIELD. No insect damage was noted on the precision wheat experiment; the Brussel Sprouts were badly eaten by hares; Diamond Back Moth was common on the mustard during June; no flea beetles were seen.

BUTT CLOSE. The sugar-beet, apart from occasional leaf miner (*P. hyoscyami*) was unattacked. Later, in July, quite large plants were broken off through the tap root at ground level and left. The agent was not certainly identified but pheasants were suspected. Kale was attacked slightly in the cotyledon stage during the end of June. No loss of plant occurred; at that period of the year the attack is ceasing naturally.

WARREN FIELD. The beans suffered severely, as at Rothamsted, during the winter months, a strip along the road being very noticeably affected. Rodents (mice or rats) were probably responsible. *Sitona lineata* was also present but did no damage; the larvae were plentiful on the roots at the end of June.

FUNGUS DISEASES AT ROTHAMSTED AND WOBURN, 1931-32

MARY D. GLYNNE

WHEAT

Mildew (*Erysiphe graminis* DC.) was plentiful on the Top Dressing Experiment, Fosters field; elsewhere only slight. At Woburn it was also slight and on the Six Course Rotation Experiment on Stackyard much less than last year.

Whiteheads (Take-All) (*Ophiobolus graminis* Sacc.) was, as before, infrequent except on wheat grown continuously or in alternate years on the same land. It was slight on Broadbalk, Rothamsted, and on the Alternate Wheat and Green Manure Experiment on Lansome field Woburn, but was very abundant on certain plots of the Continuous Wheat on Stackyard field Woburn, the variations from plot to plot, as recorded by the detailed survey, being much the same as last year. High soil acidity, (pH below 5) almost eliminated it.

Loose Smut (*Ustilago Tritici* (Pers.) Jens.) Brown Rust, (*Puccinia triticina* Erikss.), and Foot Rot, (*Fusarium sp.*) were occasionally found in slight amount, and Leaf Spot (*Septoria tritici* Desm.) was found on most of the wheat crops, but its incidence was slight.

Yellow Rust (*Puccinia glumarum* (Schm.) Erikss. and Henn.) was in general slight though plentiful on some plots on Broadbalk, on the Top Dressing Experiment on Fosters field, on Long Hoos Wheat after Temporary ley, and the Precision experiment, where, as last year it was more abundant on Square Heads Master than on Yeoman II. It was much less plentiful at Woburn than at Rothamsted.

OATS

Mildew (*Erysiphe graminis* DC.) was on the whole slight except in patches under trees in particular on Butt Furlong at Woburn.

Loose Smut (*Ustilago Avenae* (Pers.) Jens.) was only occasional on the variety Unique. Rather more was found on the variety Marvellous.

Crown Rust (*Puccinia Lolii* Niels.) was uncommon, but was found on the Forage oats on Great Knott at Rothamsted.

Leaf Spot (*Helminthosporium Avenae* (Bri. and Caw.) Eid.) was moderate on Little Hoos, Commercial oats in January and February. This crop was then ploughed in and re-sown with Spring Oats, which later showed only slight attack. It was slight to moderate on other oats, becoming rather plentiful on Broadbalk Spring self-sown oats in July.

BARLEY

Mildew (*Erysiphe graminis* DC.) was in general slight except on certain plots in the Top Dressing Experiment on Fosters field where it was plentiful.

Whiteheads (Take-All) (*Ophiobolus graminis* Sacc.) is less common on barley than on wheat, being found only on the Continuous barley on Stackyard field Woburn. The detailed survey showed that the percentage of barley plants affected was considerably less than of wheat, but the critical pH below which little or no disease appeared was, as for wheat, about 5.

Net Blotch (*Pyrenophora teres* (Died.) Drechsl.) was present in all the barley crops, varying from slight to plentiful. On Hoos field Continuous barley, the attack was consistently less severe on Spratt-Archer than on Plumage-Archer and when as often happened every plant was infected the affected areas were fewer and smaller on Spratt-Archer than on Plumage-Archer.

Brown Rust (*Puccinia anomala* Rostr.) was fairly common, varying from slight to plentiful on different plots.

Leaf Stripe (*Helminthosporium gramineum* Rabenh.) was absent on some, slight on other crops including the Continuous barley at Woburn, but was common on the Continuous barley on Hoos field, Rothamsted, where in most plots Plumage-Archer was more badly affected than Spratt-Archer.

Leaf Blotch (*Rhynchosporium Secalis* (Oud.) Davis) was more than slight only in the Six Course Rotation on Stackyard field Woburn, where it was moderate. It was very infrequent or absent on some of the crops, including Fosters, on the Commercial barley in Long Hoos and Great Knott at Rothamsted and on Butt Close at Woburn.

RYE

Stripe Smut (*Urocystis occulta* (Wallr.) Rabenh.) was occasional on Long Hoos Six Course Rotation.

Brown Rust (*Puccinia secalina* Grove) was slight to moderate on Long Hoos Six Course Rotation.

Leaf Blotch (*Rhynchosporium Secalis* (Oud.) Davis) was moderate on the Rye mixed with vetches and beans on the Six Course Rotation at Rothamsted and on Stackyard field, Woburn.

GRASSES

Ergot (*Claviceps purpurea* (Fr.) Tul.) was common on a number of grasses which were not cut, but allowed to ripen at the edge of the grass plots and between Fosters and Great Knott. It was found on *Dactylis glomerata*, on Ryegrass, and several other varieties.

GRASS PLOTS

Choke (*Epichloe typhina* (Fr.) Tul.) was found chiefly on *Agrostis*, but also to a less extent on *Dactylis glomerata*. Eye estimations showed as before that liming decreased and ammonium sulphate increased the disease. Plots 11—1 and 11—2 (treble ammonium salts), however, contain *Agrostis* only at the edge, and this was attacked by the disease. A comparison of plots 5—1 with 5—2, 7 with 8 and 9 with 10 showed rather more *Epichloe* apparent in plots 5—2 and 7 which receive potash than 5—1 and 8 which receive similar treatments without potash, on the other hand, in plot 9, which receives potash there appeared to be rather less disease than in 10 which does not. The evidence appears rather inconclusive as to whether potash deficiency is a predisposing cause for this disease. A more accurate method for assessing the amount of disease present is desirable. How far the manurial effect on the disease depends on the distribution of *Agrostis* is doubtful.

CLOVER

Downy Mildew (*Perenospora Trifoliorum* de Bary) was plentiful in May and June on the Alsike Clover on Stackyard field Woburn. It appeared to have decreased somewhat by July.

Rot (*Sclerotinia Trifoliorum* Erikss.) was observed in January on the Six Course Rotation Experiment on Long Hoos Field making bare patches and growing as a white mycelium over soil and over plants. The disease was checked by cold weather in February but bare patches remained. It was also found in Fosters Forage and Temporary ley experiments.

Leaf Spot (*Pseudopeziza Trifolii* (Biv.-Bern.) Fuck.) was commonly found though its incidence was slight in January and February on the old leaves, but the new leaves formed in the spring remained free from this disease until harvest.

BROAD BEANS

Chocolate Spot (*Bacillus Lathyri* Manns and Taubenh.) was slight in March but plentiful in July. It was more common on Warren field Woburn than on Pastures field Rothamsted, throughout the season. In July the attack in Warren Field was very severe, practically every leaf of every plant being affected, while on Pastures field, it was patchy varying from moderate to plentiful, though most plants were affected.

Grey Mould (*Botrytis sp.*) was slight to moderate on Warren field Woburn, as early as January. In mid-July it was very plentiful, most plants being infected and about 50 per cent. badly affected. It was consistently less in Pastures field Rothamsted, though by July it was plentiful.

POTATOES

Leaf Roll (*Virus*) was found occasionally.

Blackleg (*Bacillus phytophthorus* Appel) was slight in Hoos, Long

Hoos and Great Harpenden and moderate in Great Knott. It was not found on Stackyard field, Woburn.

Blight (*Phytophthora infestans* (Mont.) de Bary) appeared in late July, mostly on Great Knott where it was moderate in quantity.

Stem Canker (*Corticium Solani* Bourd. and Galz.) was slight at Rothamsted and moderate on Stackyard field, Woburn.

TURNIPS

Finger and Toe (*Plasmodiophora Brassicae* Woron.). There was a very bad attack in Agdell field on the variety Bruce (regarded as resistant).

FARM DIRECTOR'S REPORT, 1932.

Weather

Like the previous season, the year October, 1931, to September, 1932, was distinctly favourable for farm crops and grass. The rainfall was well distributed, while the summer was marked by hot sunny spells. Severe frost during the winter was practically absent, although there were several periods with light frost. The only appreciable amount of snow fell in the last week of December, but quickly disappeared.

October with only 0.66 inches of rain was 2.43 inches below the 79 year average ; mangold carting from Barn Field was completed under unusually favourable conditions ; there was no mud and thus the field escaped the usual cutting up with ruts. Despite this dry spell, it was more difficult to obtain good autumn seed-beds on account of the previous moist summer and wet harvest.

Root-lifting was finished before the weather broke in November. The rainfall of the next three months was all below the 79-year average, February being practically dry, with only 0.21 inches. This facilitated spring work after which numerous showers encouraged a good germination. May was unusually wet with 4.27 inches, compared with the average of 2.15 inches, which encouraged the grass, but also led to the leaching of some of our nitrogenous top-dressings. June had only 0.85 inches and there was a heat-wave at the end of the month and early in July, but well distributed showers kept the grass from becoming burnt up. For both hay-making and harvest the weather was highly favourable and conditions remained reasonably dry up to the end of the farm year. The rainfall for the 12 months was only 23.55 inches, 5.22 inches below the 79 years' average, yet there was never any fear of drought.

The sunshine for the year, 1,406 hours, was 173 hours below the average. This deficit occurred chiefly in April, May, July and September. The only month with an excess of over 12 hours was March with 144 hours (an excess of 28).

The mean temperature for the season practically coincided with the 54 years' average of 48°F. The winter months and August were warmer than usual, while all months from February to May were consistently below their averages. March was cold, with easterly winds, and this withered up the pastures and everything at all green.

For other weather features, see the graph of deviations from average values (p. 66).

Cropping, 1931-32 (For dates, yields and other information, see pp. 108-114).

This year it was the turn of Great Harpenden to receive dung