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Survey of Insect Pests at Rothamsted and Woburn

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samples of *Lonchocarpus* were much poorer than certain wild samples.

The biological tests require large supplies of insects raised under standard conditions, and last year H. C. F. Newton after various trials worked out the technique for producing cultures of *Myzus persicae* Sulg. in the necessary quantity, both the insect and its host plant, the dock (*Rumex obtusifolius*) being easy to grow.

INSECT PESTS AT ROTHAMSTED AND WOBURN, 1931-32
H. C. F. NEWTON

GENERAL. In the winter unusually severe damage to cereals was caused by slugs, chiefly the Grey Field Slug *Agrolimax agrestis* L. The wheat experiment on Fosters suffered badly, doubtless due to the encouragement of the slugs by the surrounding ley. Partial failure of wheat after ley appears to have been general especially in Norfolk though damage appears to be more severe after ley mixtures containing rye grass. It is therefore possible that frit fly attack is responsible for some of the loss (cf. last year's report) yet on one field examined at midnight scarcely a plant was without its attendant slug.

BROADBALK. *Wheat*. It is interesting to note that these observations indicate no increase in insect damage on this field, as compared with rotation wheat fields, in spite of the continuous cropping with the same plant. In fact, during the last two years the greatest loss of wheat plant has been on the rotation series. Similarly the permanent mangold field, Barnfield, suffered no loss from *Atomaria linearis* the Pigmy mangold beetle this year, though the severity of attack by this insect is supposed to be greatly increased by a sequence of mangold crops. It would seem therefore that the other factors controlling insect increase completely swamp any effect due to continuous cropping.

Frit Fly (*Oscinella frit* L.). No winter attack by this insect occurred this year.

The Wheat Bulb Fly (*Hylemyia coarctata* Fall.) attack was slight, as was also that of the Wheat Leaf-Miner. The latter insect was bred from material collected last year and identified by Mr. J. E. Collin as *Agromyza (Domomyza) ambigua* Fall. In addition, the following parasites have been bred out: the two Braconids *Dacnusa leptogaster* Hal., *Opius maculipes* Wesm. and a Chalcid *Lamprotatus gibbus* Walk.

Wheat Midge (*Contarinia tritici* Kirby, *Sitodiplosis mosellana* Géhin), attack though still high was slightly less than last year; the parasitism was still high. The figures for the last six years are:

Year	1927	1928	1929	1930	1931	1932
Percentage of damage to grain	3.2	6.5	7.7	17.6	21.4	15.4

GREAT HOOS FIELD. *Barley*. The Grey Field Slug (*Agrolimax agrestis* L.) caused some damage during the winter months. Wireworm, *Agriotes* spp. was again present causing some gaps but less damage was done than last year. Gout fly *Chlorops taeniopus* Meig. was again less prevalent than in 1929-30.

LONG HOOS. SIX COURSE ROTATION. *Sugar Beet*. An attack of wireworm beginning when the plants were in the cotyledon stage

and continuing up to July reduced the whole plant and replanting was necessary. *Bourletiella hortensis* Fitch added to the damage and *Atomaria linearis* Steph. was present. Their attack was intensified by their concentration on the plants left by wireworm on the eastern side. A few cases of the leaf miner *Pegomyia hyoscyami* Panz. were noted, both the cotyledons and true leaf being attacked.

Clover. Clover Seed Midge (*Dasyneura leguminicola* Lint.) was present in the flower heads (see Paper No. LIX., p. 87).

Forage Mixtures. Most of the beans were taken off during the winter by an agent not identified, but voles or mice are suspected. The stalks were bitten or broken through just above ground level the broken tops lying untouched by the side.

General. Losses in the wheat plant during the winter were caused by slugs and soil insects, e.g., leather jackets and wireworms. Similar attacks occurred sporadically on other cereals but otherwise there was no notable insect attack in the series.

FOSTERS. Wheat. An attack by slugs (*Agrolimax agrestis* L.) during the winter caused considerable loss of plant in local areas. No relation of attack to manurial treatment was noted. Slugs were collected from the field and the damage reproduced in the laboratory. Fraying of the leaves, only the veins being left, is a typical symptom. The barley experiment in this field suffered loss from birds.

GREAT KNOTT. Sugar beet suffered no attacks by wireworm, *Bourletiella* or *Atomaria*, and a good plant was obtained. The forage crop and potatoes were also free from insect attack, but occasional loss in cereals on the rest of the field occurred during the first months of the year from soil insects, e.g. leather jacket.

LITTLE HOOS. Oats. Frit fly was generally distributed throughout the field but the damage was not great.

GREAT HARPENDEN. The early sowings of Kale came through in wet weather (middle—end of May) and though flea-beetle was present, little loss occurred. Later sowings were untouched. The earlier sowings were regularly attacked by a flock of pigeons. The plants were well established but in many cases the whole leaf tissue was stripped leaving only the veins.

BARNFIELD. The mangolds germinated well and the full plant did not suffer from insect attack. A strip adjoining the poultry experiment was again attacked, the cotyledons being eaten off. Birds are suspected.

WOBURN

STACKYARD FIELD. Sporadic damage by wireworm and other soil insects in January was spread over the autumn sown cereals. No areas of serious attack were observed. Most of the beans of the forage mixture were eaten off at ground level as at Rothamsted. Only occasional wheat leaf-miner on wheat after mustard. No damage by frit fly was seen. The rotation sugar-beet remained free from attack except for occasional examples of leaf miner (*P. hyoscyami* Panz.). *Plectroscelis concinna* Marsh, often reported as attacking beet, was present but remained on the *Polygonum convolvulus* which was much eaten.

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.