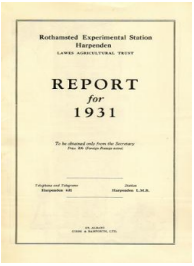
ROTHAMSTED RESEARCH

Report for 1931

Full Table of Content



Survey of Insect Pests at Rothamsted and Woburn

Rothamsted Research

Rothamsted Research (1932) *Survey of Insect Pests at Rothamsted and Woburn ;* Report For 1931, pp 52 - 57 **- DOI: https://doi.org/10.23637/ERADOC-1-65**

SWEDE

FINGER-AND-TOE (*Plasmodiophora Brassicae* Woron.). Was found on Barnfield, but was not common.

MILDEW (*Erysiphe Polygoni*, DC.). Fairly common.

MANGOLD

RUST (*Uromyces Betae* (Pers.) Tul.). Was found fairly frequently on Barnfield in October.

BLACK LEG (*Phoma Betae* (Oud.) Frank). Was found on Barnfield on young plants in June, in moderate quantity. Affected roots were found but were not common at harvest.

LEAF SCORCH (*possibly non-parasitic*). Was common on plots in Barnfield in October. It was on the whole more plentiful in plots which received nitrogen as manure than in those which did not.

SUGAR BEET

CROWN GALL (*Bacterium tumefaciens* E.F. Sm. and Towns). Was found on a few roots at Rothamsted. It was uncommon, but occasionally well developed.

RUST (*Uromyces Betae* (Pers.) Tul.). Was found occasionally in the sugar beet at Rothamsted. The attack was slight.

LEAF SCORCH (*possibly non-parasitic*). Was common both at Rothamsted and Woburn. At Rothamsted, on Rotation II on Long Hoos, it was fairly evenly distributed, and was moderate to plentiful on every plot. The difference in manurial treatment did not appear to affect the incidence of the disease.

At Woburn, on the Manurial and Cultivation Experiments on Butt Furlong Field, it varied considerably from plot to plot. Counts were therefore made of the number of plants showing " scorch " on the micro-plots and on the plots in four blocks of the main experiment.

There was some indication on the main experiment that late application of manure and the addition of sulphate increased the disease and rotary tillage reduced it. On the micro-plots, however, the addition of sulphate did not appear to increase the disease, which was on an average greatest on the unmanured plot.

REPORT ON INSECT PESTS OF THE ROTHAMSTED FARM, 1930-1931

By H. C. F. NEWTON

GENERAL. One of the most notable features on the Rothamsted farm this year was the almost complete absence of damage to the cruciferous crops by Flea-beetles (*Phyllotreta* spp.), although last year two, and in some parts of the fields three, sowings had to be made to get a plant.

Insect fluctuations and their causes are receiving an increasing amount of attention by entomologists. Very little is known about flea-beetle attacks, beyond the broad generalisation that a dry hot spell favours attack. Wet weather may be disastrous, in spite of general opinion to the contrary, provided the temperature be not too low. The attack, however, is not determined only by the weather prevailing at the time, but also by the character of the winter, for the damage is done by beetles that developed during the previous summer and survived the winter as adults.

https://doi.org/10.23637/ERADOC-1-65

Very little is known about the parasitism of the *Phyllotreta* spp. One of them, *P. nemorum*, passes through its developmental stages above ground and can be heavily parasitised ; the other species are all underground during development, and as far as is known suffer but little parasitisation ; and as these usually far outnumber *P. nemorum*, it appears unlikely that parasitisation can be an important factor in causing the enormous fluctuations in numbers recently witnessed on the farm.

Frit Fly (*Oscinella* (*Oscinis*) *frit Linn.*). This year an unusual and widespread attack on the winter cereals by " frit " took place during the months November-January. The maximum emergence of the last flight occurs about the months of August-September, but the cereals attacked were not sown till the middle of October, and of course grew up much later. There is thus a period of some weeks between the time when the flies are ovipositing and when the cereals could become infected. It is probable that the volunteer corn, which came up plentifully after the wet harvesting conditions, maintained the frit larvae in the interval, the young corn being infected from this source. The actual dates are as follows for Broadbalk, 1930 :

Cutting wheat . . .	August 18th
Cultivation	August 30th
Ploughing operations . .	October 3rd—14th
Wheat drilled . . .	October 16th*

There was therefore a period of nearly six weeks during which ample opportunity for infestation of volunteer corn occurred ; between final ploughing and seeding only a very short interval.

The spring attack of Frit fly was below normal.

Wireworm (*Agriotes spp.*). Damage due to this pest was unusually bad on the classical barley plots, and is dealt with more fully in a later paragraph.

BROADBALK

Wheat

The Frit fly (*Oscinella* (*Oscinis*) *frit* Linn. An examination of brown discoloured shoots observed at the end of November revealed the presence of Frit fly larvae. The attack was spread generally over the field and was in places severe. A number of observations were made to discover (*a*) the percentage of attack ; (*b*) the number of attacked plants that recovered ; and (*c*) the spread of the infestation during the period under observation.

A number of random square yards were pegged out, and the number of dead, attacked but living, and unattacked plants were counted at intervals.

The counts on November 22nd and mid-December were, when expressed as numbers of attacked plants per acre :

---

* For the present season the dates are as follows : 1931. Cutting, August 18th ; ploughing operations begun August 29th and continued till September 15th ; cultivations, September 21st, September 26th and October 10th—12th ; seeding, October 13th. A search for frit-infested plants during the last month (November-December, 1931) has been almost entirely fruitless. In the absence of relevant data concerning the numbers of the last flight of frit in the two years it is not claimed that the difference in the cultural methods is wholly responsible for the difference in attack, but it is certainly suggestive. The matter could be simply settled by keeping an area of the field free from volunteer corn.

https://doi.org/10.23637/ERADOC-1-65

	November 22nd.	Mid December
Plot 2	22,448	96,800
,, 3	10,164	48,400
,, 5	4,840	34,848
,, 6	10,300	61,952
,, 7	14,036	—
,, 8	8,712	—
,, 13	—	40,072

The total number of plants per acre was about a million.

The worst attack encountered was in Plot 2 (farmyard manure), and affects just under 10 per cent. of the total plant population.

There is no correlation of attacks with manurial treatment, but the highest infestation was on an area in the Farmyard Manure Plot, 38 plants to the square yard, or nearly 15 per cent. Seventy per cent. of the plants marked as " dead " had not recovered up to the beginning of January. Whether the plant dies or not depends on how far the grub eats out the central shoot. In wet weather the plant frequently rots and is invaded by secondary parasites, e.g. mites and nematodes which complete the disintegrating process. Plants attacked just after germination and during the next month or so rarely recover ; after January the plants can resist the attack.

Wheat Bulb Fly (*Hylemyia coarctata* Fall.) This fly was present, but did no appreciable damage. Another dipterous larvae causing similar damage was also present, and is being investigated. This fly would appear to occur rather later than the bulb fly, as larvae not fully developed were found as late as the middle of May.

Leaf Miner (*Agromyza sp.*). This fly was much less plentiful than last year and damage was small. Most of the mines were inhabited by one larvae, but many with 2, 3 and sometimes 4, were found. Occasionally also, pupation takes place within the leaf instead of in the ground. Material has been collected to find out if more than one species is present, and to see what parasites—if any —emerge.

Midges (*Contarinia tritici* Kirby, *Sitodiplosis mosellana* Géhin.). The midge attack was the worst observed during the last five years. Parasitism was very heavy, in some cases the ears being at times almost black with ovipositing parasites.

The Wheat-stem Borer (*Cephus pigmæus* Linn.). This was again present, but damage was estimated *nil*.

Pheasants. A good deal of injury was caused by pheasants in the early winter.

Timothy Grass

The ears of the Timothy grass in the borders around Broadbalk were much attacked by the Timothy fly (*Amaurosoma* sp.).

GREAT HOOS FIELD

Classical Barley Plots

Wireworm (*Agriotes* spp.). The most notable feature of the year was an attack by wireworm. It was first observed on May 6th and by May 13th the rows of barley on some of the plots looked as if a fire had swept across them. The attack was most noticeable on the unmanured or incompletely manured plots, and on the worst of

https://doi.org/10.23637/ERADOC-1-65

these, 6-1, 50 per cent. of the plants showed signs of attack and many were killed. On the completely manured plots the plants were better able to keep pace with the damage, but even here many gaps were made. By the end of June the surviving plants had outgrown the attack.

The relative damage on the different plots was as follows: (1) being the most damaged; (4) the least; in each category the plots are arranged in the order of the damage done:

1. 6-1 (most damage), 4, 3, 6-2, 3A, 1.
2. 7-1, 7-2, 4A, 1A, 1AA.
3. 2, 4AA, 3AA, 1AA.
4. 2AA, 2A, Rape Cake Plots (least damage).

The order in which the plots recovered was as follows, (1) being the quickest and (4) the slowest:

1. 7-2 (recovery quickest) Rape Cake Plots, 4A.
2. 2AA, 4AA, 2A, 3AA, 1AA.
3. 7-1, 4, 3, 2, 1.
4. 6-1 (recovery slowest).

This order corresponds fairly well with that of the average yields.

THE GOUT FLY (*Chlorops taeniopus* Meig.) was present as usual, but the attack was less than last year.

THRIPS. Frequently damaged the young ears, but not seriously.

FOUR COURSE ROTATION EXPERIMENT

WHEAT. *Cephus pigmæus* present.

Practically no leaf miner (*Agromyza* sp.).

SWEDES. This year there was no loss from flea-beetles (*Phyllotreta* spp.). A good deal of leaf damage to young plants was, however, caused by pigeons, June-July. An attack of mildew was encouraged by the late singling of the plants.

SEEDS AND BARLEY. No significant attacks.

ALTERNATE WHEAT EXPERIMENT

Early attack by Frit fly; wheat bulb fly (*Hylemyia coarctata* Fall), wheat midge and *Cephus pigmæus* all present. Leaf miner attack slight.

KALE

No flea-beetle attack.

SIX COURSE ROTATION

WHEAT. As expected, the wheat after fallow was attacked by wheat bulb fly during March and April. However, the wheat seeding had been so thick and so much early tillering had taken place before the attack began that no loss resulted. The number of tillers in a linear yard varied from 280 to 120, figures far in excess of those obtaining on Broadbalk. The average number of tillers attacked per linear yard was fifteen.

CHARLOCK PLOT. Larvae of *Chortophila brassicae* Bché occurred on the Charlock roots. This insect may be a serious pest of cultivated Cruciferae.

SUGAR BEET. *Atomaria linearis* Stephens, the Pigmy mangold beetle, was present but caused no loss of final "plant." The loss

https://doi.org/10.23637/ERADOC-1-65

that occurred was probably due to hares. Only two larvae of *Pegomyia hyocyami* were seen at the end of June. Numbers of the Spotted Snake Millipede, *Blaniulus guttulatus* Bosc. were found usually in association with *Atomaria* ; the wounds caused by the one apparently attract the other.

BARLEY. There was slight wireworm attack in April and some damage by wheat bulb flies which must have been very late specimens. Frit and Gout fly attacks were insignificant. A few leaf miners were found similar to the *Agromyza* on wheat.

CLOVER. POTATOES. No significant attack.

FORAGE MIXTURES. Slight attack by wireworm (March-April) after bastard fallow. Wheat bulb fly killed many tillers during the same period ; in the worst cases as many as four out of six tillers were attacked.

No damage was observed on the Rye plots, nor the Linseed and Kale that followed.

LITTLE HOOS

FORAGE CROP EXPERIMENTS. Attack by the pea and bean weevils (*Sitona* spp.) occurred, but was much less serious than last year, when the crop was spring-sown and so less able to withstand damage. An autumn attack by Frit fly occurred.

WHEAT EXPERIMENTS. The autumn early winter attack by Frit fly was general.

GREAT HARPENDEN

SPRING OATS. A rather bad attack by wireworm occurred generally during April, and this, together with the rooks, depleted the plant. Spring Frit fly attack was small, but there was occasional damage by a lepidopterous larva, probably *Apamea secalis* Bjerk.

WINTER OATS. A slight attack of wireworm occurred during the spring following the early winter Frit fly attack.

WHEAT VARIETY TRIALS AND RYE PLOTS. In early winter there was an attack of Frit fly generally. Some plants when about 1 foot high had the central shoot killed by *Apamea secalis* Bjerk.

MICRO SUGAR BEET PLOTS. *Atomaria linearis* Stephens was the chief pest here, but the sugar beet had been " dibbled " in, some 5 or 6 seeds to a hole, so that though some plants were destroyed the final stand was not affected. Observations made on the life history of this beetle are being published (*Ann. Appl. Biol.*, Feb., 1932). Surrounding dock plants were much eaten by *Plectroscelis concinna* Marsh, but no damage to beet plants was noticed.

BARNFIELD

Atomaria attacked the mangolds in early May, but the numbers were insufficient to account for the failure of the first sowing, which appeared to be due in part to cultural conditions. Only one *Plectroscelis concinna* was seen, and there was no evidence of attack by this beetle.

The second sowing did not appear to suffer from attack except for a strip along the west side of Plots 1C, 1AC and 1A, where the mangolds were taken but not the swedes. Pigeons probably did much of the damage, but earwigs were also plentiful, obtaining

https://doi.org/10.23637/ERADOC-1-65

shelter from the grass banks at the side and perhaps from the chicken pens. Three earwigs captured from the plants at night were kept in the laboratory confined with 2 swede and 3 mangold plants. Within 5 days the plants were destroyed but no preference was shown.

WOBURN

An attack on the micro-plots of sugar beet was the only thing of interest this year. Only a few plants were lost, the stems being eaten off a short distance above ground level with a short length of the central strand left. Mammals or birds are suspected. A *Harpalus* was collected by spreading sacking at night, but no damage could be ascribed to this insect.

FIELD PLOT TECHNIQUE

The Statistical Department has been largely concerned with the methods of the interpretation of field and laboratory experiments, and with the principles of their design. The principles which govern the dependence of interpretation on design have been made clear in previous years. Many voluntary workers, however, are anxious to illustrate particular aspects of these principles and to explore further the practical bearing of the observations made in uniformity trials and in explicit experimentation.

During the year three workers (F. R. Immer, S. H. Justensen and R. J. Kalamkar) have taken up the question of the most efficient use of land in experiments in which an edge row must be discarded. In such cases the narrower the strip used as a plot, the larger the proportion of the crop rejected from the experimental data. On the other hand, it has been widely verified that, for the same area harvested, subdivision into numerous small plots generally leads to a considerable increase in precision. Using independent data relating in two cases to potatoes and in one to sugar beet, each enquiry showed that the best use of a given area can be made by using 4-row plots, where half the total area is discarded. Consequently where the precision of the experiments is chiefly restricted by the experimental area available, this width of plot may be expected to give the best results.

The efficiency of the sampling method, both in its application to yield trials and to the progress and growth of crops, largely depends on the choice of the sampling unit, or set of drill lengths fixed by a single act of randomisation. Experience in previous years had thrown doubt upon whether the form of sampling unit originally chosen for crop weather observations was the best possible: (1) because the 4 quarter metres of which it was composed were all taken from the same drill row, and as had been first shown by Clapham, lengths from the same drill row were somewhat highly correlated; (2) because it was doubtful if any additional precision was gained by spreading the sampling unit over a length of 10 feet, when probably there was a real competition between the growth of parallel adjacent rows. By harvesting a small area completely in ½-metre lengths, Kalamkar was able to test experimentally the efficiency of different forms of sampling unit, with the result that a unit of four parallel lengths on adjacent rows was found to be actually the most efficient. Since this form of unit is very convenient to take in the field, and in

https://doi.org/10.23637/ERADOC-1-65