

of the instruments described under the heading of "Design Section." The fine-instrument workshop and the electrical workshop have carried out repairs to a number of mechanical and electrical instruments for industry and Government Departments. In addition to the above, all workshops have carried out their major task of providing workshop facilities for the laboratories, thereby materially assisting the progress of the various research projects described above.

ENTOMOLOGY DIVISION

Director : Dr. D. MILLER

GRASS-GRUB

Insecticides.—The use of insecticides against larvæ and beetles has been studied. No satisfactory results have so far been secured against larvæ with D.D.T., benzene hexachloride, chlordane, pentachlorophenol, or sodium pentachlorophenate. On the other hand, 6 lb. lead arsenate in 14 gallons water per 1,000 square feet of turf gave control and allowed recovery of the grass without injury to it. Control of grubs was secured in strawberry-beds without injury to the plants by the application of lead arsenate at the rate of 10 lb. to 1,000 square feet.

Against adult beetles, low- and medium-volume spraying of pastures and gorse hedges was carried out, using D.D.T. and benzene hexachloride at various concentrations.

In general, the low-volume spraying gave poor results on pasture that had been heavily grazed during November and December. On the other hand, medium-volume spraying gave good control, increasing with the strength of insecticide. Work is progressing on areas of dense pasture.

Results on sprayed hedges were good in early stages, but rapid growth caused the late flights of beetles to be not affected.

Consolidation of Pasture.—The influence of rolling was studied, and it was found that (under the conditions of the experiment) this was less effective in consolidating the soil than the influence of trampling by sheep.

Irrigation.—The influence of grubs has been studied on pastures that have been under irrigation for three years : under these conditions no damage to the pasture was apparent although the grub population was found in places to be as high as 40 per square foot. In co-operation with the Agriculture Department, an experiment has been laid down to ascertain the influence of irrigation on the infestation of pasture by grass-grub (and caterpillar).

Biology.—Important data have been secured from investigations into the flight periods of beetles in relation to physical conditions, the duration and extent of flights, mating habits, and the effectiveness of light traps and fires. In the last, for example, it was shown that 2,000 males could be trapped without a single female, the highest percentage of females in any light trap being only 24 per cent., and the percentage was usually much lower. This indicates that fires are of little value in controlling the egg-laying females.

Parasites.—Cultures of the nematode parasite are maintained on grubs in the soil, but nothing further can be done until the necessary equipment is available.

The bacterial "milky disease" brought from America has been liberated in an experimental area, and is being studied.

Four native insect predators have been reared from grass-grubs, and what influence they might have on the grass-grub position is being studied.

In the search for parasites in Australia considerable progress has been made, and during the year sixteen consignments, comprising 8 different species and totalling 2,500 individuals, have reached New Zealand in excellent condition, fully 90 per cent. of the insects surviving the journey. These parasites all attack the Australian grass-grubs, but recent studies in Australia have revealed a locality where a parasite of adult beetles occurs in considerable numbers.