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Insect pest - recent investigations into grasshopper control in Western Australia

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INSECT Pests AND THEIR CONTROL

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RECENT INVESTIGATIONS INTO GRASSHOPPER CONTROL IN WESTERN AUSTRALIA

THE principal grasshopper pest in Western Australia is the Little Plague Grasshopper (Austroicetes cruciata, Sauss) (Jenkins, 1938). This native species multiplied extensively in the outer wheatbelt area during the depression years of "1930's" when much cleared land was abandoned, and the present utilisation of large portions of this land for grazing rather than crop-growing means that extensive grasshopper breeding grounds still exist.

The development of various new insecticides and the construction of special types of equipment for their application have opened up new avenues for pest control and over the past few years various tests have been carried out to try and improve on earlier methods of grasshopper destruction.

CONTROL METHODS

Ground Baiting.

Baiting with poisoned bran bait has been the standard method of grasshopper and locust control for many years and is still one of the most effective ways of killing such pests. Recent tests, however, have shown that benzene-hexachloride (BHC or "Gammexane") gives a quicker kill than arsenicals and is less toxic to stock. The addition of molasses to the mixture showed no obvious advantages and the present recommendation for the bait formula, sufficient to treat one acre, is as follows:—

Bran	25 lb.
10% BHC Powder	1 lb.
Water (approximately)	2½ galls.

The dry BHC powder should be thoroughly mixed into the bran and sufficient water should be gradually added to produce a moist crumbling mash.

Oil and Dry Baits.

Tests overseas have shown that bran bait without the addition of moisture has given good results against various grasshopper species. The addition of small quantities of dieseline or kerosene to otherwise dry bait has also been successfully used under certain conditions. Preliminary tests against the local grasshopper with both these mixtures have shown them to be at least

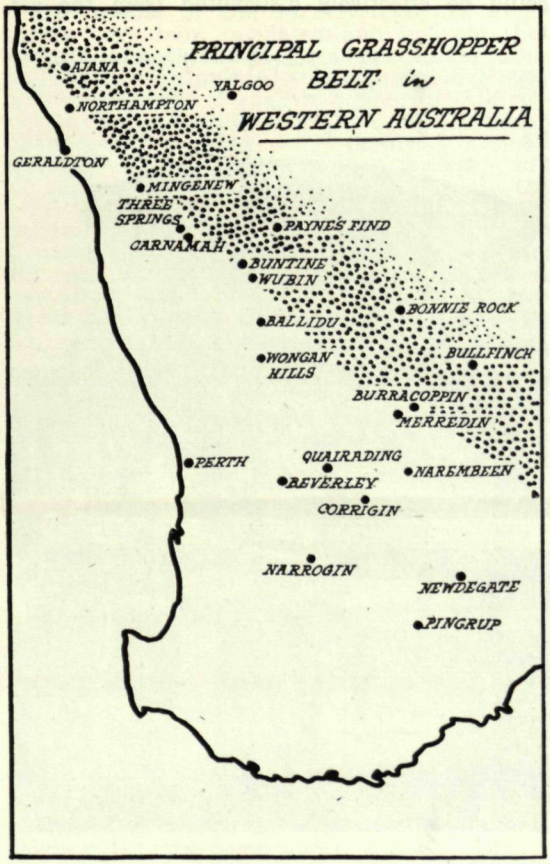

Fig. 1.—Map showing the main grasshopper belt in Western Australia.

partially acceptable to the insects. Further and more detailed trials are necessary, however, before the more orthodox bait mixture can be supplanted.

The advantages of these mixtures are obvious, as oil mixed baits will last without deterioration in the bags for long periods, and dry baits need no additional treatment by the farmer once the pre-mixed material has been issued from a depot.

Bran Substitutes.

In order to reduce the quantity of bran for grasshopper baiting during periods of shortage, several types of sawdust were mixed with equal parts of bran and the poison was added in the usual way. Pine sawdust proved the most satisfactory and good kills were obtained, but results were inferior to those associated with pure bran preparations.

Aerial Baiting.

The aerial distribution of bran bait was tested in the Mingenew district in 1949, particular attention being given to rough country where ground baiting would be impracticable (Jenkins, 1950). At a height of approximately 150 feet a spread of one chain was averaged when the run was made at right angles to a light breeze. The tests showed that bran bait could be effectively distributed from the air,

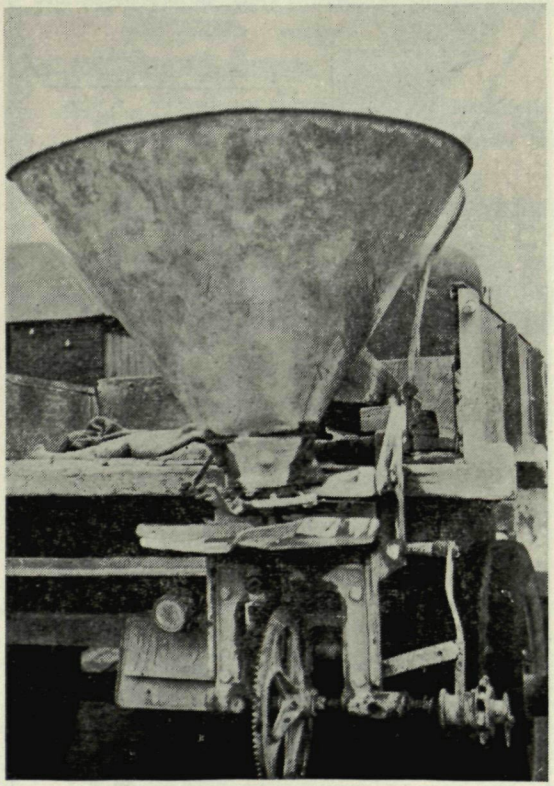

Fig. 2.—Bait spreader with revolving plate and vanes for throwing poisoned bran.

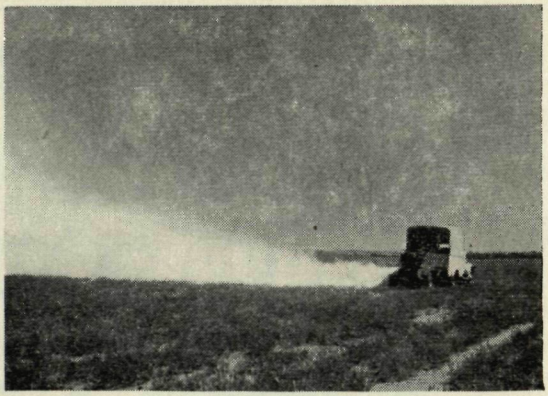

Fig. 3.—Fogging a paddock with an insectidal fog applicator.

but that various practical difficulties reduced the efficiency of aerial baiting as a control method.

The relatively small loads which could be carried made frequent landings necessary and the flying height necessary for satisfactory spread reduced the accuracy of baiting when fence lines and roadsides were concerned.

Fogging.

The TIFA (Todd Insecticide Fog Applicator) was tested with BHC and chlordane. A Sovacide-chlordane solution was tested at the rate of 1lb. of insecticide and 3 gallons of solvent to the acre. Water emulsions of BHC and solutions in PY Sovacide were applied at the rate of 1½lb. of crude BHC (3ozs. of gamma approximately) and 3 gallons of liquid to the acre. Lindane 22%, gamma isomer at 14.8% (4ozs. of gamma approximately) and 3 gallons of liquid per acre were also applied as a cold spray. The paddocks were treated in strips one chain apart and a very impressive fog was generated by the Sovacide mixtures. The kill with all treatments was disappointing, however, as although close to the machine high mortality occurred, results tapered off rapidly over the remainder of the treatment trip. The necessity for low wind velocities and the ocurrence of severe foliage burning after Sovacide applications, were further drawbacks to the TIFA for large scale grasshopper control work.

Ground Spraying.

Arsenical sprays have long been used against grasshoppers, particularly for treating roadsides and other limited areas. The slowness of early spraying methods and the large volume of water required, however, severely limited the practical application of such treatments.

Two types of low volume spray units were tested. One depending on an air blast to disperse and direct the spray, and the other being an orthodox low volume spray unit with a 30 feet boom. The latter proved the most satisfactory, and was used with good results against the pre-winged stages of the grasshopper. As shown in the accompanying table, dieldrin at 4ozs. to the acre and chlordane at 1lb. to the

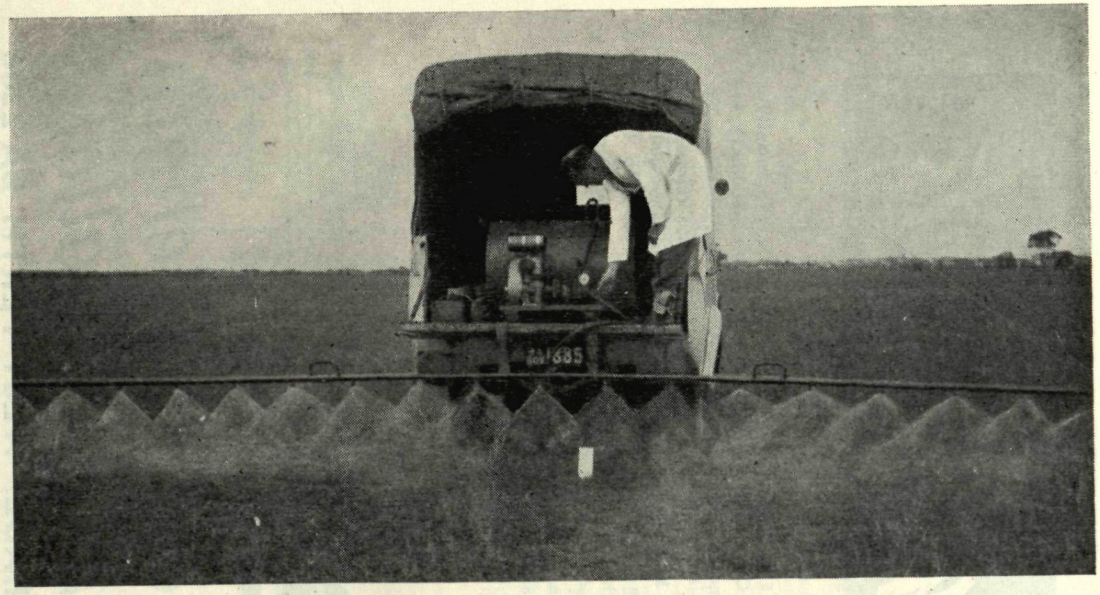

Fig. 4.—Low volume spray-boom used for applying insecticides.

acre gave the best results. All mixtures were applied in the form of emulsions and the liquid was applied at 10 gallons per acre.

Aerial Spraying.

A Tiger Moth aircraft was used to apply lindane, aldrin and chlordane in accordance with the details set out in the accompanying table. Dieselene formulations of chlordane and lindane were also used, and all aerial applications were at the rate of two gallons to the acre. The speed of flight was 80 m.p.h. and the average hight six feet from the ground. The spray was applied by a boom with open jets fitted under the lower wing of the plane and delivering one gallon per acre on one chain strips. Under these conditions it was necessary for the machine to make two runs over each strip to deliver the required two gallons per acre.

Cultural Methods.

The efficiency of cultivation in reducing grasshopper populations under wheatbelt conditions has long been recognised. Ample evidence of the effect of ploughing or scarifying upon the subsequent grasshopper population can be obtained by observing the progeny arising from cultivated and non-cultivated fields and by comparing the damage done to crops adjoining broken and non-broken country. Cloddy cultivation and poor weed control during the winter may allow many hoppers to survive and so weeds should be turned in as well as possible once hatching has commenced.

Summer cultivation has been very satisfactorily carried out in various districts with good results. The breaking of the soil at this time of the year has the advantage of effectively destroying grasshopper egg beds and still allowing feed growth during the following winter.

GENERAL DISCUSSION

The results of the various spraying treatments have been tabulated and indicate that dieldrin and chlordane gave outstanding control against immature grasshoppers and very satisfactory control against adults. Aldrin appeared to be slightly inferior to dieldrin and chlordane, but gave very promising results against all stages. BHC gave a moderate kill of hoppers and adults but was inferior to the other three insecticides. A feature of the treatments was the almost total kill obtained by chlordane and dieldrin against hoppers and the toxicity of these materials to insects migrating into the treated areas up to four weeks later.

In an attempt to assess the value of BHC and chlordane in preventing migration into ripening wheat, a crop face was sprayed to a depth of two chains and the adjoining grass paddock was also sprayed along a similar width to present a four chain barrier to advancing grasshoppers. Although a considerable grasshopper population was present in portions of the paddock adjoining the crop, no major movement towards the wheat took place, and so no definite conclusion could be drawn from this treatment.

From the evidence gained in the foregoing experiments, it would be difficult to discriminate between the efficiency of low volume boom spraying and aerial application. At Southern Cross there were some observational evidence to suggest that a better kill against adults was obtained from the aircraft than from the ground. The Mingenew results against hoppers, however (no comparative aerial treatments were applied), were so satisfactory with the boom spray that this method must be regarded with favour. Application costs and the type of country requiring treat-

TABLE SHOWING DETAILS OF EXPERIMENTAL APPLICATIONS OF INSECTICIDES FOR GRASSHOPPER CONTROL, 1952

Insecticides (Emulsions except where otherwise stated).	Method of Application.	Locality.	Area Sprayed.	Stage of Grasshopper.	Date.	Rate of Liquid per Acre.	Rate of Active Ingredient.	Results.	Approx. Cost of Material per Acre.†	Remarks.
Aldrin	Low volume spray	Mingenew	½ acre	2nd-4th instars	20–8–52	10 gallons	1⅔ ozs.	About 60% kill	2s. 6d.	Heavy weed growth on paddock (cape-weed and barley grass).
Dieldrin	do. do.	do.	do.	do. do.	20–8–52	do.	do.	No live hoppers survived	3s. 9d.	
Chlordane	do. do.	do.	do.	do. do.	20–8–52	do.	1 lb.	Very few live hoppers survived	7s. 0d.	
Aldrin	Low volume spray	Southern Cross	½ acre	Mostly late instar, some recent adults	31–8–52	10 gallons	4 ozs.	50–60% control	5s. 9d.	Sparse barley grass, grass, etc., over paddock.
Dieldrin	do. do.	do.	do.	do. do.	31–8–52	do.	do.	80–90% control	8s. 3d.	
Chlordane	do. do.	do.	do.	do. do.	31–8–52	do.	1 lb.	Approx. 70% control	7s. 0d.	
BHC (22% lindane emulsion)	do. do.	do.	do.	do. do.	31–8–52	do.	4 ozs. gamma isomer approx.	Approx. 50% control	30s. 0d.	
Aldrin	Tiger moth	Southern Cross	15 acres	Mostly late instar, some recent adults	2–9–52	2 gallons	4 ozs.	Approx. 75% kill	5s. 9d.	Gusty cross wind.
Chlordane	do.	do.	do.	do. do.	2–9–52	do.	1 lb.	do. do.	7s. 0d.	
Do.	do.	do.	do.	do. do.	2–9–52	2 gallons (Dieselene)	do.	do. do.	11s. 3d.	
Aldrin	Tiger moth	Southern Cross	18 acres	Adult	29–9–52	2 gallons	2 ozs.	Approx. 70% kill	2s. 10d.	
Chlordane	do.	do.	do.	do.	29–9–52	2 gallons (Dieselene)	1 lb.	do. do.	11s. 3d.	
BHC (22% lindane emulsion)	do.	do.	do.	do.	29–9–52	do.	4 ozs. gamma isomer approx.	Approx. 50% kill	34s. 0d	
BHC (22% lindane emulsion)	Tiger moth	Southern Cross	18 acres crop and pasture	Adult	29–9–52	2 gallons	4 ozs. gamma isomer approx.	No major infestation of crop face	30s. 0d.	
Chlordane	do.	do.	do.	do.	29–9–52	do.	1 lb.	....	7s. 0d.	

† The costs quoted are those prevailing in 1952 when the work was carried out.

Fig. 5.—A Tiger Moth aircraft applying insecticides from a boom under the lower wing.

ment will in many cases determine the relative suitability of aerial as opposed to ground spraying.

Although the prices quoted for dieldrin and aldrin are only tentative the costs of most of the treatments can be regarded as well within economic limits. The standard methods of baiting and ploughing, however, still show to good advantage, the cost of 1lb. of 10% BHC dust and 25lb. of bran per acre being approximately 5s. 10d. and the rate for Government contract ploughing being 10s. per acre.

To all insecticide treatments must be added the cost of application. In the case of aircraft this was charged at the rate of 15s. per acre and 1s. per mile transport to and from Perth. Truck rates for bait spreading and boom spraying were not calculated as these would usually be done by the individual landholder.

Although grasshopper baiting and other means of chemical control should be encouraged as much as possible, such treatments should not supersede cultural methods. Cultivation is the most effective and economical method of combating grasshoppers. Cultivation at 10s. per acre may free areas from grasshoppers for several seasons. Baiting and spraying give no better kills than ploughing, are effective for one season only, and still leave the treated paddocks as potential breeding grounds for the following season.

The spraying experiments here described gave very promising results but unfortunately the most effective materials—dieldrin, chlordane and aldrin—are dollar products and are not available in unlimited quantities in this State. When ample stocks are imported, however, there seems to be considerable scope for spray treatments, both from aircraft and low volume booms.

(Thanks are due to the Shell Oil Company of Australia for the supplies of aldrin and dieldrin used in the tests.)

REFERENCES

Jenkins, C. F. H., 1938, Journ. Dept. Agric. West. Aust., Vol. 14 (2nd Ser.), No. 4, p. 367.

Jenkins, C. F. H., 1950, Ibid., Vol. XXVII (2nd Ser.), No. 2, p. 164.