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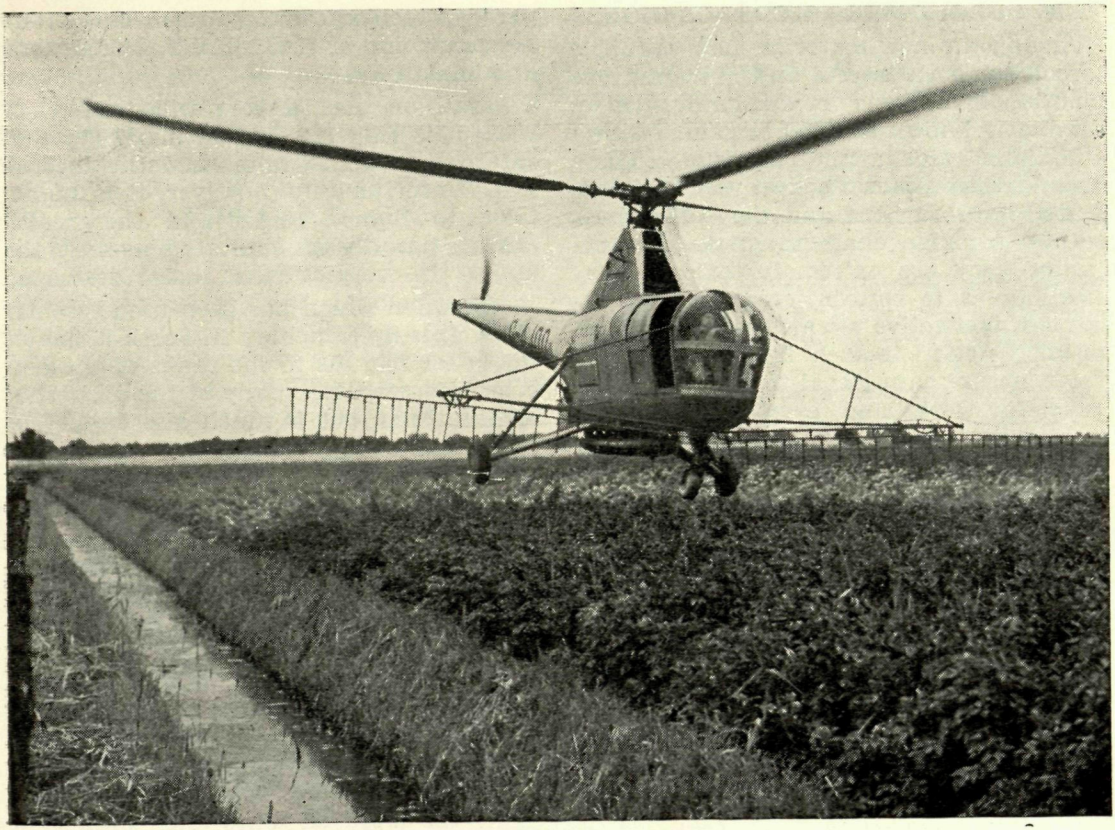


Helicopters appear to offer an ideal method of applying sprays and dusts over large acreages. They are already widely used for pest control work overseas

RECENT ADVANCES IN THE DEVELOPMENT AND USE OF INSECTICIDES

By C. F. H. JENKINS, M.A., Government Entomologist

IN recent years the use of insecticides has become such an everyday feature of modern agriculture that it is difficult to imagine the husbanding of crops and stock without the aid of chemical dusts and sprays. It is not long ago, however, that something more akin to black magic than science was depended upon to protect agricultural products, with results that left much to be desired.

The Chinese are credited with making the first use of arsenic as an agricultural spray as early 910 A.D., but it was not until the end of the last century that a truly scientific approach was developed towards the use of insecticides.

During World War II what might be called an insecticide famine occurred in almost all countries, and this resulted in an unprecedented stimulus to research on insecticides and allied products. The amazing success which crowned much of this work is common knowledge and has aroused public interest as never before in insect control.

The most outstanding of the new synthetic organic insecticides was DDT, but it was soon challenged by many later developments, the full potentialities of which are still being explored.

THE CHLORINATED HYDROCARBONS

Among the new materials now available to combat both insects and mites may be mentioned benzene hexachloride, (more familiarly known as BHC or gammexane,) chlordane, aldrin and dieldrin. These chemicals are known collectively as chlorinated hydrocarbons and they all possess certain common characteristics. For instance they are extremely toxic in very small doses to certain creatures but relatively ineffective against others. Their residual action is such that treated surfaces may remain lethal to susceptible insects for weeks and even months after treatment.

Unfortunately, however, some insects have shown a tendency to develop a resistance to this group of chemicals and serious complications have resulted. Furthermore, various mites are largely unaffected by DDT and its allies, whereas many natural parasites and ladybirds succumb readily to such materials.

This means that none of the DDT-dieldrin group should be used indiscriminately to control insect outbreaks. Each material has its particular virtue and should be used only where it will give best results. DDT, for instance, is effective against most plant-infesting caterpillars and in consequence is widely used in market gardens and orchards. It will also control the red-legged earth mite at rates of as low as 2 ozs. of DDT per acre so that the status of this pasture pest has completely changed since the advent of DDT. Dieldrin has shown itself pre-eminent in the control of Argentine ants and grasshoppers and has been extensively used in Western Australia during the past few months against both these pests.

THE ORGANIC PHOSPHATES

It is not possible in an article of this nature to itemise the various uses to which each of the new materials may be put. My purpose is rather to illustrate the necessity for discriminating between the various chemicals and to combat any tendency to regard a particular ingredient as the solution to all insect problems.

Comparable in importance to the chlorinated hydrocarbons of the DDT-dieldrin group of insecticides are the organic phosphates. Well known names in this group are parathion or E.605, H.E.T.P. or hexone and malathion.

Parathion has a very wide range of uses; it is effective against many types of caterpillars, aphis, mites and the lucerne flea. Unfortunately, however, it is highly toxic to human beings and the health hazard has always militated against the use of this very efficient insect destroyer.

Malathion which has been used recently in an anti fly campaign in Perth is one of the latest recruits to the ranks of the new insecticides. It has many of the properties of parathion, but is much less dangerous to human beings. Mixed with sugar and water, it makes a very effective fly bait and as a contact spray has already proved itself in several directions.

SYSTEMIC INSECTICIDES

A group of chemicals which are still very much on the experimental list are known as systemic insecticides. These materials are actually absorbed into the sap-stream of the plant, rendering the foliage and more particularly the growing shoots toxic to sucking insects. The materials may either be sprayed onto the plants or watered around the roots. Unfortunately, most of the systemics are very toxic to the higher animals. This means that until much more is known about the movement and persistence of these chemicals within the plant tissues, they can have only a restricted use. They may be dangerous if used on fruiting trees or on vegetables and so at the present time are recommended mainly for the treatment of ornamentals.

The new insecticides can only get a very brief mention. They include the benzene sulphonates such as elimite, ovatran and their relatives. These materials are very selective in their section and, although harmless to most insects including parasitic wasps and ladybirds, they show a marked toxicity to the eggs and immature stages of certain fruit tree mites.

In these parts of the world where repeated DDT sprays have been regularly used for the control of codling moth, on apples and pears the increase in mite numbers has been a serious problem. What can occur has been exemplified locally where heavy DDT schedules have been

applied in the eradication campaigns against the Codling Moth at Mullalyup and Nannup and the Oriental Fruit Moth in the Bickley Valley. But generally speaking this problem has not developed to serious proportions in this State.

FUMIGANTS

In the realms of fumigation also important progress has been made Methyl bromide is being used increasingly for protecting stored wheat and other grain from weevil attack and has also proved to be an important soil fumigant. Ethylene dibromide is another material which has been used successfully to fumigate ripe fruit to prevent the development of fruit fly.

Preliminary tests carried out in Western Australia in the last couple of years indicate that ethylene dibromide fumigation may remove the necessity for some of the restrictions on fruit transport not only within the State but to overseas markets as well.

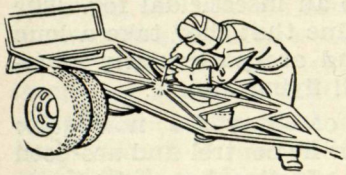
Developments in new machinery and application techniques have also shown great progress in the last few years. Low volume boom sprays now make it possible for liquids to be applied at rates of as low as 1 gallon to the acre. The use of spray booms up to 40ft. long means that large areas can be done quickly and relatively cheaply with motor vehicles and tractors, or that aeroplanes and helicopters can be satisfactorily used where the crop to be sprayed is sufficiently extensive.

One of the latest developments for use both indoors and in the field and orchard is the aerosol. Insecticides such as DDT are atomised under pressure and produce what amounts to an insecticidal fog. The particles are so fine that they take a long time to settle and are particularly effective against small flying insects.

Aerosol types of spray are now quite popular locally for fly control and are both convenient and effective but perhaps a little expensive.

In the fumigation field the development of durable and gas proof plastic sheeting has greatly facilitated the treatment of various commercial products in recent years. At one time a solid gas proof structure was almost essential excepting in the case of citrus tree fumigation where canvas tents were found to be adequate. Now plastic sheets and envelopes can be adapted to a variety of purposes and as many of you may recall nearly 4,000,000 super feet of imported timber was fumigated under plastic tents at Fremantle a few years ago to prevent the establishment of the sirex wasp.

From the foregoing it will be seen that the wide range of new insecticides and miticides which have been developed in the last ten years have aided considerably in subjugating many of our major pests. New and complex problems have come hand in hand with these modern materials, however, and many puzzles still await solution. The increased tendency for resistant strains to appear in many insect groups and the biological upsets which sometimes follow the use of DDT and its allies show that the insects have not given up the fight and that they are likely to remain dangerous and resourceful adversaries for a long time to come.



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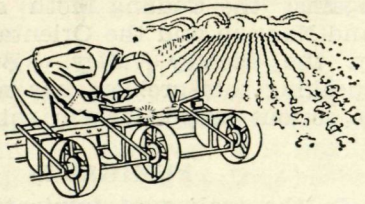

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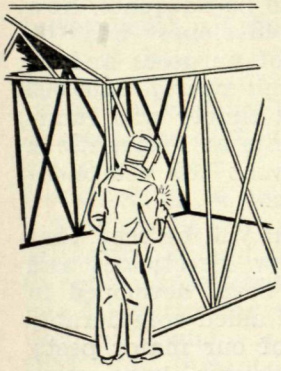

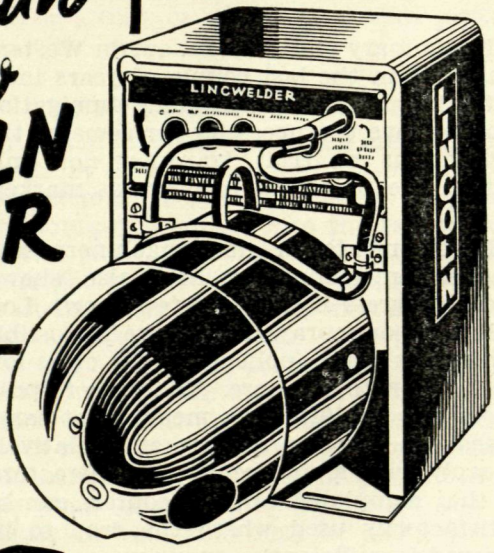

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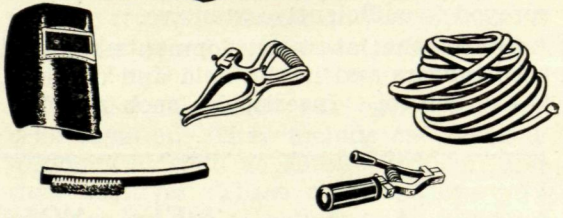

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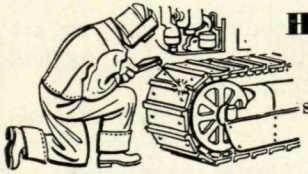

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