HAND HELD ULV SPRAYERS

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INTRODUCTION

In normal spraying, using a pressure pump, most of the droplets produced are too large to efficiently cover the leaf surface of a crop. Some of the drops join together and run off the leaves to the ground where they are wasted. Most of the drops land on the top leaves which shield the lower leaves. Those insecticides which have to touch an insect to kill it, will not reach the insects on the bottom leaves and they will survive.

With a smaller droplet size, more droplets land on the target area and so coverage is more even. When the size of the drops is controlled, it is possible to produce a fine mist which will drift onto all the exposed areas of the plant not just the top leaves. A fine, even deposit is then formed rather than a series of large blobs. The right size of droplet can be chosen to make sure that the pesticide in the spray mixture has the maximum effect on the target (plant or insect). Consequently, the amount of spray mixture can be greatly reduced, even to the extent that it needs to be applied only at very low or ultra low volumes (ULV).

A recent example of use of the ULV technique was the aerial spraying of locusts using 95% ULV Malathion in the Markham and Ramu Valleys. The insecticide was sprayed at the rate of 560 mls/hectare and cost only about K1.42/hectare.

Aircraft, tractors and hand applicators are increasingly being used for controlled droplet ULV spraying.

HAND HELD BATTERY POWERED ULV SPRAYERS

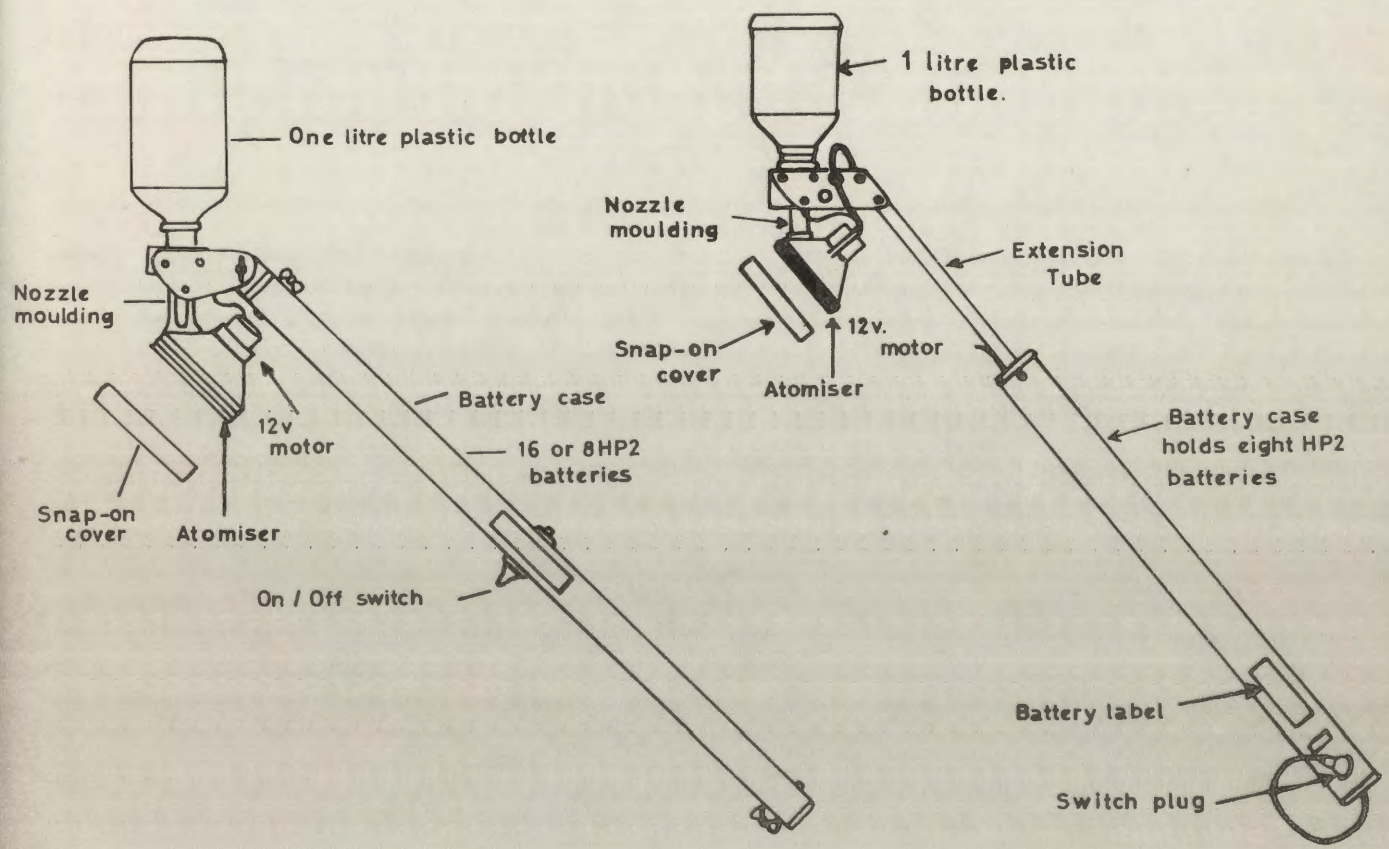
These sprayers consist of a spray head with a small DC motor, a spinning disc and a liquid reservoir (screw-on bottle) with an air bleed. The spray head is mounted on a handle which contains a battery power supply. The liquid spray is fed onto the spinning disc and is broken up into a mist of fine droplets. The faster the disc rotates, the smaller the droplets which are produced. The distribution of the droplets depends on natural forces such as gravity and air movement.

Droplet size is measured in microns (1 micron = 0.001 millimetre). Conventional spraying produces a mixture of droplet sizes. Of the droplets produced by a conventional sprayer,

those with a diameter of 30 microns and under will evaporate or continue to drift horizontally instead of landing on the target. Those larger than 350 microns are likely to join together and run off the plant. This causes a lot of wastage of chemical.

A controlled droplet sprayer will produce drops which are all approximately the same size. Very small and very large droplets will not be produced and spraying will be much more efficient. A Micron Sprayers ULVA machine producing droplets of 70 microns can be used to give a coverage of 58 droplets/cm^2 (357/in^2).

Diagram I. Hand held ULV sprayers



The Micron ULVA1 uses 8 or 16 batteries depending on the amount of spraying to be done.

The ULVA1 8 uses 8 batteries which are taken out and the extension tube pushed into the battery case for easier carrying.

Two basic types of machine are available depending on the droplet size required.

a) Those producing fairly large droplets (about 250 microns) for placement directly on the target. In this case the disc is held immediately above the target. These machines are designed mainly to apply herbicides.

b) Machines producing fairly small droplets (about 70 microns) to drift downwind to the target. The speed of the wind and size of droplet affects the distance downwind of the operator which can be treated.

This article is concerned with the second type of machine.

THE USE OF HAND HELD BATTERY POWERED ULV SPRAYERS

1. Wind Speed:

As the wind carries the droplets to the target (insect or plant), its force will be important for satisfactory spraying. A minimum speed of 5 kilometres/hour (gentle rustling of grass or leaves of trees) is necessary for operating a hand held ULV sprayer, while the maximum wind speed at which spraying can be carried out is 20 km/hr (the speed at which the wind will hold a flag straight out).

2. Wind direction:

The wind direction should be across the line of walking (see Diagram 2).

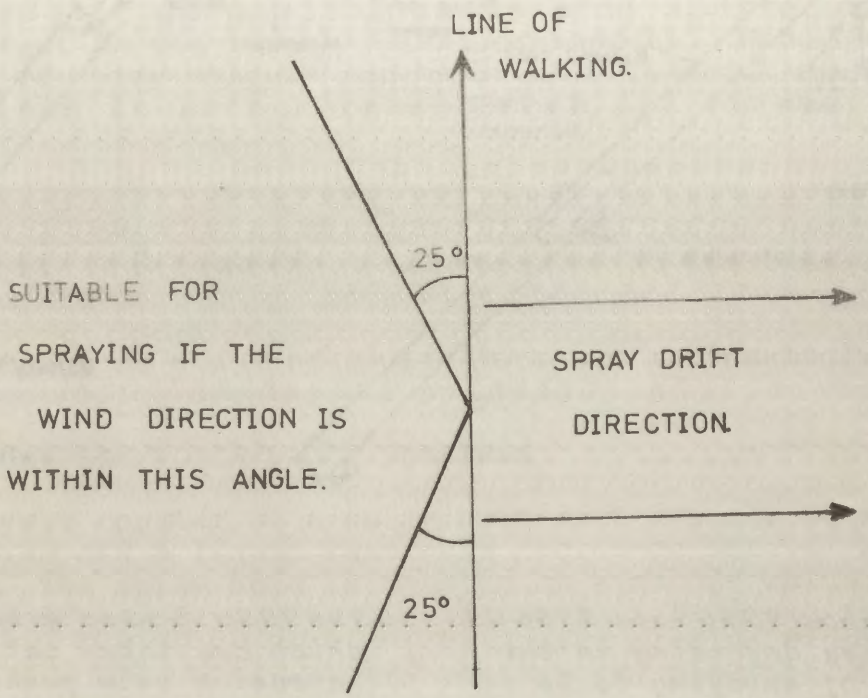


Diagram 2. Wind direction for spraying

3. Batteries:

A set of batteries should not be used for more than two hours a day. After two hours the batteries should be changed and stored for a day. 1.5 volt, HP2 batteries (as used in torches or transistor radios) should be used. Alkaline manganese batteries have a better output than zinc chloride batteries.

4. Insecticide:

An ideal ULV formulation should not evaporate quickly in the atmosphere, i.e. the droplets should not decrease in size between nozzle and target. ULV formulations of carbaryl, pirimiphos-methyl and malathion are already available in Papua New Guinea. These formulations do not contain water and are oil based. Various emulsifiable concentrates, either as supplied or diluted in water, may be worth trying. Micronised or soluble powder formulations such as Orthene 75 can be used with the addition of an anti-evaporant carrier oil such as "ULVAPRON" or "Sun Oil" at about 20% of total spray mixture. Regrettably neither of these products is available in Papua New Guinea at present.

As the surfaces of insects, plants and some fungi tend to repel water, oils which are able to penetrate waxy and greasy surfaces have a considerable advantage.

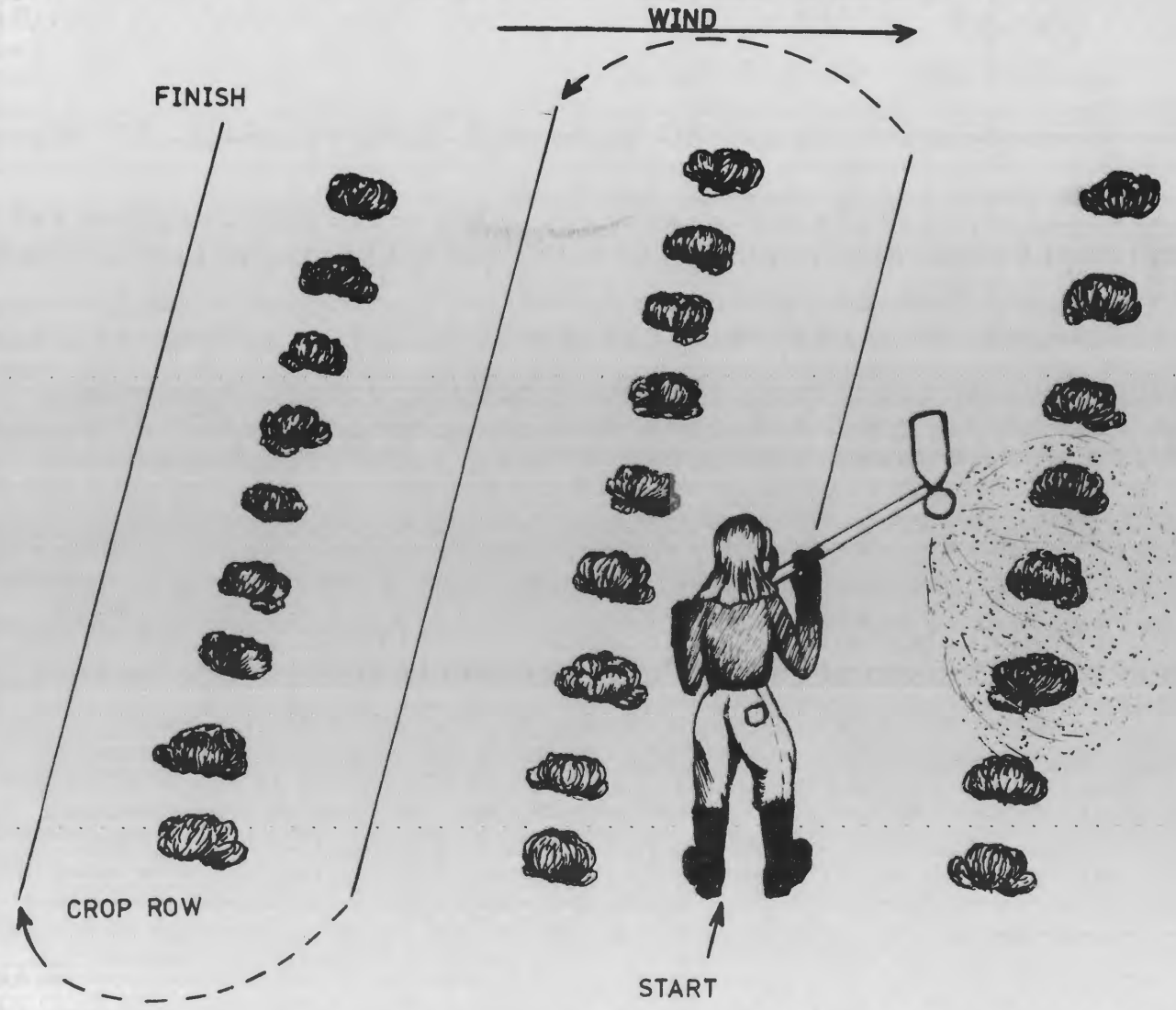


Diagram 3. The correct way to use a hand held ULV sprayer. The sprayer is always held so that the wind blows the spray away from the user.

5. Safety precautions:

The operator should avoid inhaling the spray or allowing it to get on his skin or in his eyes. Goggles, face masks, rubber boots and overalls should be worn, as the amount of active ingredient is much higher than in a conventional spray mixture.

Finally a word of caution. The operator will require time to gain the skills necessary to efficiently use this machine.

FURTHER READING

Mathews, G.A. - New spraying techniques for field crops. *World Crops*, May/June, 1976.

Mathews, G.A. - Taking the work out of spraying. *Appropriate Technology*, Vol. 3, No. 3.

Controlled-droplet application and ULV spraying. British Petroleum, U.K. July, 1976. Available from Agricultural Branch, B.P., Britannic House, Moor Lane, London EC2Y 9BU, U.K.

MANUFACTURERS OF ULV SPRAYERS

Micron Sprayers Ltd., 3 Mills, Bromyard, Herefordshire, HR7 4HU, U.K.
Ciba-Geigy Ltd., Basle, Switzerland.
Turbair Ltd., Britannica House, Waltham Cross, Herefordshire EN8 7DR, U.K.
Cooper Pegler & Co. Ltd., Burgess Hill, Sussex.

SUPPLIERS OF CARRIER OILS

"ULVAPRON" - B.P. Ltd. (not available through B.P. Australia).
"Sun Oil" - Sun Oil Co., Sun Building, 2-3, Groenplaats 2000, Antwerp, Belgium.

Editor's Note:

A new family of insecticides, distributed through a novel ultra-low volume sprayer is being used to control tsetse fly in Africa. The tsetse, because it is the vector of the disease trypanosomiasis affecting humans and animals, effectively prevents development of large areas of Africa.

The new insecticides, synthetic pyrethroids, are more efficient than conventional chemical controls. Hence, they can be applied in smaller amounts and represent an economic as well as a functional improvement. To match the effectivness of the pyrethroids, British inventor Edward Bals has come up with a sprayer that can distribute insecticide in droplets about half the thickness of a human hair in diameter. This extremely fine spray is applied by aircraft flying across the wind. Blown on the wind, only about a quarter of a teaspoon of pesticide is required to treat a hectare of forest and bush against tsetse. The sprayer may be used in control programmes for malarial mosquitoes, locusts and other pests.

(From: The IDRC Reports Vol. 7 No. 2 June 1978). "New spray spreads it very thin".