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RECOVERY OF ENDOSULFAN FROM PIGEONPEA, CHICKPEA, AND GROUNDNUT AFTER SPRAYING WITH DIFFERENT APPLIANCES

C S PAWAR
International Crops Research Institute for the Semi Arid Tropics Patancheru 502 324
Andhra Pradesh

In pesticide application low volume sprays are known to offer better pest control than conventional high volume sprays (Mathews 1979 Pawar 1986) This is because much of the pesticide applied in the form of fine droplets by low volume techniques is retained on the plants unlike bigger droplets of high volume sprayings which roll down the plant surface to fall on the soil Since the ultra-low low medium and high volume techniques of pesticide application are now available there is a need to work out as to how much of the pesticide is deposited and retained on the target crop with the use of different sprayers At ICRISAT Centre experiments were carried out to estimate the pesticide retained on pigeonpea chickpea and groundnut after spraying with a hand-operated knapsack motorised knapsack and hand-held spinning disc Controlled Droplet Applicator (CDA)

A hand-operated knapsack using 500L/ha, a motorised knapsack using 250 L/ha and a hand-held spinning disc CDA using 10 L/ha of spray liquid were compared The commonly available appliances of ASPEE Ltd Bombay India were used Endosulfan (Thiodan 35 EC Hoechst India Ltd ,) was used

A simple titrimetric method of estimating endosulfan in formulations (Graham *et al* , 1964) was used to estimate endosulfan in organic solvent washates of plants treated with the insecticide In this method endosulfan was refluxed in methanolic sodium hydroxide to form sodium sulfite which was acidified and determined by titration with iodine (0 5 N) To get distinct titration values endosulfan was applied at a rate of 1 16 g a i /m^2 on the crop in the experimental fields

Three plots each of 600 m^2 (40x15 m^2) of pigeonpea chickpea and groundnut were marked when the crops had full vegetative growth Two litres of endosulfan 35 EC was applied in each of these plots using one of the three appliances Within half an hour of application 1 m^2 areas were marked at five places selected diagonally across the field and all the plants from each of these areas were uprooted and dipped for 5 minutes in 2-3 L of ethanol The washates thus collected as five replicates from each plot were filtered through activated charcoal to remove the extracted plant pigments and then evaporated to dryness in the laboratory Endosulfan in each dried sample was estimated by the titrimetric procedure of Graham *et al* (1964)

Average percentage recovery of endosulfan from pigeonpea chikpea,and groundnut treated using three different appliances are given in Table-1 The percentages have been calculated with the base figure of 1 16 g a i /m^2 of endosulfan applied on the crop The percentage recovery of endosulfan on all crops was higher with the use of the hand-held CDA (79-85%) than with the motorised knapsack (60-73%) and hand-operated knapsack (38-57%)

TABLE 1. Endosulfan recoverd (%) from the plant surfaces within 30 minutes of spraying with different appliances, ICRISAT Center, 1987.

Spray appliances (Volume of application)	Pigeonpea	Chickpea	Groundnut
Hand-operated knapsack (500 l/ha)	45	57	38
Motorised knapsack (250 l/ha)	67	73	60
Hand-held CDA (10 l/ha)	85	85	79
S.Em±	4.0	4.4	5.3

In other words, 43-62% of endosulfan was lost during application with the hand-operated knapsack, 27-40% with motorised knapsack and 15-21% with hand-held CDA. Much of this loss in the case of hand-operated knapsack and motorised knapsack which produce a wide range of droplets (100-400 μ), must have been through big droplets which have fallen from the plant surface to the soil. In the case of hand-held CDA, which produces a narrow range of fine particles, the loss would have been mainly due to drifting of finer droplets (75-150 μ), by wind, away from the target. These effects are well documented (Matthews 1979, Johnstone 1985, Pawar 1988).

The recovery of endosulfan differed with crops for a given sprayer. Since the experiment was laid out separately for each crop, explaining such differences is rather difficult. However, there is a scope to study the effect of the crop canopy structure of different crops on the retention of spray droplets applied through different sprayers.

The CDA's better pesticidal deposit and efficiency in pest control is well known as is the risk caused by drift, to the operator (Pawar, 1988). The use of adaptive developments such as 'Backpack CDA' and 'Tropicultor mounted CDA' of ICRISAT is more advantageous as these equipments overcome the disadvantages of the hand-held CDA (Pawar and Muller, in press).

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