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CRAM OF CROPS AND CONTROL MEASURES AGAINST LOCUST SWARM ATTACK

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ABSTRACT:
Locusts are the oldest migratory pests in the world. Swarms of locusts have invaded vast swathes of land in India since 11th April 2020. They entered several districts of Rajasthan via Pakistan's Sindh province. This locust attack has affected about 90,000 hectares across 20 districts in Rajasthan. Favourable rain-bearing winds aided their transport towards India. This hurriedly growing swarm is now threatening to amplify into an agrarian disaster. Pesticides like Malathion, Dimethoate and Carbaryl of various concentrations were employed over the crops depending on their stages of growth and the attack of Locusts by employing Drones. Spraying these agents over a wide of crops protects them from harmful locusts attack and also environmentally friendly.

KEYWORDS: - *Crops, Drones, Locust, Malathion , Pesticide*

INTRODUCTION

Locusts are insects that belong to the family of grasshoppers. Locusts are essentially harmless; however, when they meet suitable environmental conditions, they become start breeding. Locusts form enormous swarms that spread across regions, devouring crops and leaving serious agricultural damage in their wake. When the locusts start attacking crops and thereby destroy the entire agricultural economy, it is referred to as locust plague/locust invasion. Plagues of locusts have devastated societies since the Pharaohs led ancient Egypt, and they still wreak havoc today. Over 60 countries are susceptible to swarms. Regional crop types are highly variable and locust attacks damage the crops to a great extent [1].

During dry spells, solitary locusts are forced together in the patchy areas of land with remaining vegetation. This sudden crowding makes locusts. Moist soil favors locust reproduction rapidly. In these circumstances, they shift completely from their solitary lifestyle to a group lifestyle in what's called the gregarious phase. Locusts can even change colour and body shape when they move into this phase. Their endurance increases and even their brains get larger.

Locust swarms are typically in motion and can cover vast distances—some species may travel 81 miles or more a day. Locust swarms devastate crops and cause major agricultural damage, which can lead to famine and starvation. A swarm of desert locust containing around 40 million locusts can consume (or destroy) food that would suffice the hunger need of 35,000 people, assuming that one person consumes around 2.3 kg of food every day. Weather patterns and historical locust records help experts predict where swarms might form. Once identified, an area is sprayed with chemicals to kill locusts before they can gather. Drones are employed in order to achieve faster spray over the crops. Locusts normally arrive during July-October, but have already caused chaos in Rajasthan. At a time

India is battling coronavirus pandemic, locusts present a new worry with their potential for exponential growth and crop destruction. Standing crops and vegetables in Rajasthan, Punjab, Haryana and Madhya Pradesh face a major threat as swarms of locust have been reported a month in advance. There is an alert for Uttar Pradesh, Maharashtra and Delhi as well. The present study aims at protecting the crops using spray drones from locusts attck.

USE OF PESTICIDES AND ITS CONTROL MECHANISM

Biopesticides have previously been used in several countries to stamp out locust outbreaks. According to Long Zhang of China Agricultural University, over the past 3 years, China has applied biopesticides on more than 48,000 hectares annually. The main challenge is to the bands of young locusts and hit them with enough biopesticide. If the dose is too low, it will take a long time to kill locusts. Researchers in China have been selecting strains for greater virulence, but they still require that locusts to be exposed for several days longer than with chemical pesticides.

Liquid Pesticides are defined by the proportion of active ingredient in a given amount of the product. The active ingredient is given as a weight, usually in grams, so the proportion is given by weight of active ingredient in a weight of formulation expressed as a percentage.

TYPES OF PESTICIDES

There are four main classes of insecticides, that is, organochlorines, organophosphates, carbamates and synthetic pyrethroids. The organochlorines are highly persistent and include dieldrin and HCH. These insecticides were the most favoured for locust control because of their efficacy, cost and persistence. Now they are considered to be such a risk to man and the environment that safer alternatives are recommended. Organophosphates and carbamates have a moderate range of persistence and speed of action. Synthetic pyrethroids have a rapid effect on the behaviour of the insect but if the dosage is too low, or if the application technique is poor, the insects may recover.

APPROVED PESTICIDES AS PER GUIDELINES

Prior to 1980, persistent organochlorine compounds like dieldrin were used widely to contest locust swarms. For the reason that organochlorine compounds have been barred, locust control is presently mainly based on organophosphorus pesticides [2]. As per the approved uses of registered pesticides include Carbaryl, Carbofuran, Dimethoate, Malathion,Monochrotopos, Phenthoate. These pesticides play an important role in preventing the multiplication of locusts. In spraying the pesticide the calibration factors considered are Droplet size, Emission Height and Recommended dose of insecticide. LOCUST swarms can be sprayed with insecticides when the insects are settled or in flight [3].

CONTROL METHODS

Techniques have been urbanized for the assessment of the quantity of spray collected by individual locusts [4]. Locust control methods include:

- Mechanical methods – digging trenches, beating and burning
- Baiting – scattering locust food impregnated with insecticide
- Dusting – applying a fine dust impregnated with insecticide
- Spraying liquid insecticides (chemical or biological)

DRONE SPRAYER

There is most select combination of spray droplet size circulation and spraying height according to the deepness and concentration of swarm, but superior performance can be obtained with a single fixed droplet size distribution [5]. In general the drone spray type we have to consider factors like

6.1 DROPLET SIZE

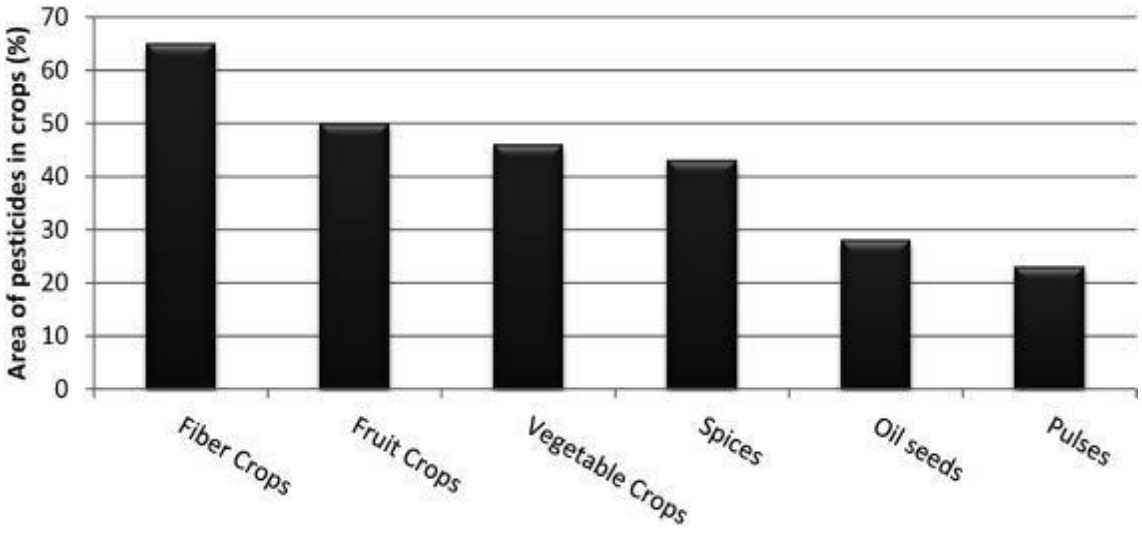
For locust control, ULV and conventional spray methods are used. The later applies the spray through hydraulic nozzles which atomizes the liquid by means of pressure [6]. It is necessary to check that the sprayer is adjusted to produce a droplet size that will spread and deposit well over the target area and deposit reasonably well on locusts and/or vegetation (current recommendation is a VMD of 50-100 µm). Since measuring droplet size requires special equipment and training, in practice, the atomizer is usually set to produce a rotational speed that will produce an assumed droplet size according to the manufacturer's handbook. The droplet size may have to be adjusted for different spraying situations.

6.2 EMISSION HEIGHT

The height at which the cloud of spray droplets is emitted will influence where the wind carries the drops, so if height is adjustable, it must be set so that insecticide is well distributed over the target area. In general, the higher the emission, the wider the swath, but if the emission is too high, there is a risk that the droplets will not come down in the target area. If the wind is very strong the height should be reduced when possible. Depending on the wind speed, emission height for handheld sprayers should be 0.5-2.0 m, for vehicle-mounted sprayers 2.0-3.5 m (although most are not adjustable) and for aircraft 5-10 m. height (up to around 8 m).

6.3 RECOMMENDED DOSE OF INSECTICIDE

The dose is the quantity of active ingredient (the poisonous component of the liquid) applied to an area of land, usually expressed in units of grams of active ingredient per hectare (g a.i./ha). The recommended dose is the amount known to be sufficient to kill the locusts reliably without wasting too much pesticide. VMD should be 50-100 m.



CONCLUSION

From the above result it has been concluded that the Drone spray of Insecticide on Locusts swarm controls over a wide spread and also prevent their spread in crops and results are represented below for effect of Pesticide for different varieties of crops such as Fodder crops, Fruits crops, Vegetable crops, Spices, oil seeds and pulses. Of these varieties the Locusts attack mainly on Fiber crops and hence more pesticide spray quantity is needed when compared to other crops whereas Fruit crops and Vegetable crops have higher percentage of area covered with higher inhibiting activity of Locusts. Crops that yield oil and pulses show less Pesticide with lesser percentage of effect on Locust. The present study concludes that the spread of Locust has been controlled by spraying the Insecticide through Drones after Drone spray techniques across Rajasthan, Punjab and Chandigarh.

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