SUNSHINE AGRICULTURE
e-Newsletter

**ISSN (E): 2583 – 0821**

*Sun. Agri.:e-Newsletter*, (2022) *2*(8), 1-4

Article ID: 146

# Application Methods of Pesticides

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Open Access

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***Available online at***
www.sunshineagriculture.vitalbiotech.org

**Article History**
Received: 3.08.2022
Revised: 16.08.2022
Accepted: 21.08.2022



## INTRODUCTION

The method of application depends on nature of pesticide, formulation, pests to be managed, site of application, availability of water etc.

**1. Dusting**

Dusting in carried out in the morning hours and during very light air stream. It can be done manually or by using dusters. Sometimes dust can be applied in soil for the control of soil insects.

**2. Spraying**

Spraying is normally carried out by mixing EC (or) WP formulations in water. Various type of sprayer/atomizers are arranged below and classified according to the major source of energy employed.

| Type of spray | Energy utilized | Sprayer/ Atomizer |
|---|---|---|
| High Volume | Hydraulic | Knapsack Sprayer, bucket pump, stirrup pumps etc. |
| Conventional low Volume (CLV) | Hydraulic | Foot Sprayer, rocking sprayer etc |
| Ultra-low Volume (ULV) | Gaseous or Centrifugal or Electrical | Mist blowers, controlled droplet applicators, electrically operated blower-cum-sprayer |
| FOG | Thermal | Swing fog machine |
| Smoke | Thermal | Smoke generators |
| Vapour | Thermal | Vapour generators |

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The spray is also characterized on the basis of droplet size referred as Volume median diameter (Vmd) and represent in µm or µ.

| | | |
|---|---|---|
| >400 | - | Course Spray |
| 210-400 | - | Medium Spray |
| 101-200 | - | Fine Spray |
| 51-100 | - | Mist Spray |
| 1-50 | - | Aerosol/ Fog/ |
| 0.01-1 | - | Smoke |
| 0.01-0.1 | - | Vapour |

**Size of spray droplet and their targets in crop protection**

| **Target** | **Optimum size of spray droplet** |
|---|---|
| Flaying insect | 10-50 micron spray droplets |
| Insect on surface | 30-150 micron spray droplets |
| Plant diseases | 30-150 micron spray droplets |
| Weeds | 100-300 micron spray droplets |

**3. Granular application**

Highly toxic pesticides are handled safely in the form of granules. Granules can be applied directly on the soil or in the plant parts. The methods of application are given below

**(i) Broadcasting:** Granules are mixed with equal quantity of sand and broadcasted directly on the soil or in thin film of standing water.

**(ii) In furrow application**: Granules are applied at the time of sowing in furrows applied @ 3 g per meter row for the control of sorghum shoot fly.

**(iii) Side dressing:** After the establishment of the plants, the granules are applied a little away from the plant (10-15 cm) in a furrow.

**(iv) Spot application:** Granules are applied @ 5 cm away and 5 cm deep on the sides of plant. This reduces the quantity of insecticide required.

**(v) Ring application:** Granules are applied in a ring from around the trees.

**(vi) Root zone application:** Granules are encapsulated and placed in the root zone of the plant by mixing it with equal quantity of sand in the central whorl of crops like sorghum, maize, sugarcane to control internal borer.

**(vii) Pralinage:** The surface of banana sucker intended for planting is trimmed. The sucker is dipped in wet clay slurry and Fipronil 0.3 % GR is sprinkled (20-40 g/sucker) to control burrowing nematode.

**4. Seed dressing**

The insecticide mixed with seed before sowing (eg.) sorghum seeds are treated with imdacloprid 48% FS or Thiamethoxam 30%FS is directly used as dry seed dressing insecticide against cotton sucking pests.

**5. Seedling root dip**

It is followed to control early stage pests (eg) in rice to control sucking pests and stem borer in early transplanted crop, a shallow pit lined with polythene sheet is prepared in the field. To this 0.5 kg urea in 2.5 liter of water and 100 ml chlorpyriphos in 2.5 litre of water prepared separately are poured. The solution is made up to 50 1 with water and the roots of seedlings in boundless are dipped for 20 min before transplanting.

**6. Sett treatment**

Treat the sugarcane setts in 0.05% malathion for 15 minutes to protect them from scales. Setts treatment with Imidacloprid 70 WS @ 175 g/ha or 7 g/l dipped for 15 minutes to protect them from termites.

**7. Trunk/stem injection**

This method is used for the control of coconut pests like black headed caterpillar,

mite etc. Drill a downward slanting hole of 1.25 cm diameter to a depth of 5 cm at a light of about 1.5m above ground level and inject 5 ml of imidacloprid 30.5 per cent SC into the stem and plug the hole with cement (or) clay mixed with a fungicide. Pseudo stem injection of banana, an injecting gun or hypodermic syringe is used for the control of banana aphid, vector of bunchy top disease.

**8. Padding**

Stem borers of mango, silk cotton and cashew can be controlled by this method. Bark of infested tree (5x5 cm) is removed on three sides leaving bottom as a flap. Small quantity of absorbent cotton is placed in the exposed area and 5-10 ml of imidacloprid 17.8 SL is added using an ink filler. Close the flap and cover with clay mixed with fungicide.

**9. Swabbing**

Coffee white borer is controlled by swabbing the trunk and branches with fipronil 2 per cent suspension.

**10. Root feeding**

Trunk injection in coconut results in wounding of trees and root feeding is an alternate and safe chemical method to control black headed caterpillar, eriophyid mite, red palm weevil. profenophos 10 ml and equal quantity of water are taken in a polythene bag and cut the end (slant cut at 45) of a growing root tip (dull white root) is placed inside the insecticide solution and the bag is tied with root. The insecticide absorbed by root, enter the plant system and control the insect.

**11. Soil drenching**

The chemical is diluted with water and the solution is used to drench the soil to control certain subterranean pests. Soil drenching of imidacloprid 17.8 SL @500 ml/ha used against termite in wheat and chlorpyriphos used against cutworms and soil mealy bug.

**12. Capsule placement**

The systemic poison could be applied in capsules to get toxic effect for a long period. In banana to control bunchy top vector (aphid) the insecticide is filled in gelatin capsules and placed in the crown region.

**13. Baiting**

The toxicant is mixed with a bait material so as to attract the insects towards the toxicant. E.g. Rats: Zinc phosphide is mixed of 1:49 ratio with food like popped rice or maize or cholam or coconut pieces (or) warfarin can be mixed at 1:19 ratio with food. Ready to use cake formulation (Bromodiolone) is also available. Coconut rhinoceros beetle: Castar rotten cake 5 kg is mixed with insecticide.

**14. Fumigation**

Fumigants are available in solid, liquid forms and gaseous form. They can be applied in the following way. Soil: To control the nematode in soil, the liquid fumigants are injected by using injecting gun. Storage: Liquid fumigants like Ethylene dibromide (EDB), Methyl bromide (MB), carbon tetrachloride etc. and solid fumigant like Aluminium phosphide are recommended in godowns to control stored product pest. Trunk: Aluminium phosphide ½ to 1 tablet is inserted into the affected portion of coconut tree and plugged with cement or mud for the control of red palm weevil.

**Pesticide Calculations**

Formula; $N_1 V_1 = N_2 V_2$

$N_1$: Concentration of commercial formulation in per cent or grams

$V_1$: Volume or amount of commercial formulation required in milliliter or grams

$N_2$: Desired concentration of spray fluid in per cent

$V_2$:Volume or amount of spray fluid required (In milliliter)

**Problems:**

1. How much quantity of chlorintanilprole 18.5 SC required to spray @ 0.02% for the control of yellow stem borer in rice and the spray fluid recommended for spraying is 150 liter/ha.

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Solution:

$N_1$=10
$V_1$=?
$N_2$=0.05
$V_2$=250 liter/ha (150,000 ml)

Formula is $N_1 V_1 = N_2 V_2$

$$V_1 = \frac{N_2 x V_2}{N_1}$$

$$V_1 = \frac{0.02x150000}{18.5}$$

=162 ml/ha

**2.** How much quantity of spinosad 45 SC for one acare required to spray @ 0.02% for control of gram pod borer in chick pea and the spray fluid recommended for spraying is 250 liter/ha.

Solution:

$N_1$=45
$V_1$=?
$N_2$=0.02
$V_2$=250 liter/ha (250,000 ml)
Formula is $N_1 V_1 = N_2 V_2$

$$V_1 = \frac{N_2 x V_2}{N_1}$$

$$V_1 = \frac{0.02x250000}{45}$$

110 ml/ha

**3.** Monocrotophos 36 SL is recommended to control aphids in cotton measured 250 ml and is added 125 liter of water spray fluid. Calculate the percentage concentration of the insecticide in the spray fluid.

Solution:

Given, $N_1$=36 %
$V_1$=250 ml
$N_2$=?
$V_2$=125 liter/ha (125,000 ml)
Formula is $N_1 V_1 = N_2 V_2$

$$N_2 = \frac{N_1 x V_1}{V_2}$$

$$N_2 = \frac{36x250}{45}$$

=0.072%