Tea Bull. 8(2), 25-29, 1988

A GUIDE FOR CALCULATIONS INVOLVED IN PESTICIDE USAGE ON PLANTATIONS

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Acaricides, Fungicides, Insecticides, Nematicides and Herbicides are the pesticides mainly used on plantations.

To achieve the desired results in Pest Control, one must correctly calculate the quantity of pesticide formulations needed. Incorrect calculations lead to either application of ineffective doses or wastage of money.

Formulations :

Pesticides are available as "emulsion concentrate", "wettable/soluble powder", "granule" and atomizable formulations provided with special applicators.

A commercial formulation of a pesticide is a mixture of the following:

1. Active ingredient (a.i.) - only this component kills the pest. A recommendation is generally given with reference to the a.i. name.

2. Inert ingredients :

   Solvents
   Carriers
   Surface active agents
   Special additives

Recommendations :

1. Pest Control recommendations are generally given in terms of the active ingredient (a.i.) per unit area of field (e.g. kg a.i./ha).

2. Recommendations can also be given as a percentage concentration of the a.i. in the spray solution e.g. for drenching sprays, spot spraying and nursery applications.

Data needed for calculations are :

1. The recommended dosage

2. The strength or concentration of the commercial formulation (given on the label)

3. Amount of spray volume needed per unit area of field

4. Area of field to be treated.

Conversion Table :

1 Hectare (ha)	=	10,000 square meters (m^2)
1 acre (0.4 ha)	=	4,000 square meters (m^2)
1 litre (l)	=	1,000 millilitres (ml)
1 kilogramme (kg)	=	1,000 grams (g)

Calculations :

A. SPRAYING WITH EMULSIFIABLE CONCENTRATES (E.C.)

I Label indicates a % concentration (e.g. Dipterex 50 EC)

(a) Recommendation as a % spray solution :

(Let the data be represented by symbols as given below)

Given :

1. Recommended dosage = a %
2. Spray volume desired = V litre/ha
3. Strength of the formulation = C % a.i.
4. Area to be treated = A ha
5. Capacity of the sprayer = v litres

Probelm : How many litres of the commercial formulation are required to treat the extent of A ha?

Solution : 1. Total quantity of EC formulation required to give a % application =

$$\frac{V \times A \times a}{C} \text{ litres}$$

2. Quantity of EC formulation per sprayer load = $\frac{v \times a \times 1000}{C}$ ml.

(b) Recommendation as a quantity of a.i. per unit area :

If recommendation is given as a kg a.i./ha then,

total quantity of EC formulation required to give a kg a.i./ha in A ha

$$= \frac{a \times 100 \times A}{C} \text{ litres}$$

II. Label indicates "specific gravity" and "weight per volume" Strength of a.i.

To find the % a.i. in the formulation:

- Multiply concentration in "lb/US gallon" by 12
- Multiply concentration in "lb/Imperial gallon" by 10
- Multiply concentration in "gram/litre" by 0.1

Given : 1. Recommendation = a kg a.i./ha
2. Concentration = b lb/US gallon
3. Specific gravity = s
4. Area to be treated = A ha

Solution :

Total quantity of emulsifiable concentrate needed =

$$\frac{a \times A \times 100}{(b \times 12) \times s} \text{ litres}$$

(NB. There are sprayers developed on the principle of atomizing and they dispense neat chemical, thus eliminating the need for any calculations. It is a closed system carrying a particular nozzle for a fixed volume of pesticide to cover a specified area at a particular operator walking speed, e.g. Electrodyn)

B. SPRAYING WITH WETTABLE POWDERS OR SOLUBLE POWDERS (WP/SP)

Given :

1. Recommended dosage = W kg a.i./ha
2. Spray volume desired = V litres/ha
3. Concentration of the formulation = C % a.i.
4. Capacity of sprayer = v litres

Problem : How many kg of the commercial formulation are required to treat the area?

Solution :

1. Total quantity of WP/SP needed

$$= \frac{W \times A \times 100}{C} \text{ kg}$$

2. Amount of WP/SP per sprayer load

$$= \frac{W \times A \times 100}{C} \div \frac{VA}{v} = \frac{100\ Wv}{CV} \text{ kg.}$$

C. APPLICATION OF GRANULAR PESTICIDES

Given :

1. The recommended dosage = a kg a.i./ha
2. Concentration of formulation = C %
3. Areas to be treated = A ha

Solution :

The amount of granular formulation required to treat the area

$$= \frac{a \times A \times 100}{C} \text{ kg}$$

A granular application can also be recommended on a per plant basis in which case the trade name of the formulation and the quantity of the formulation per plant are also indicated.

When granular formulations are to be applied by broadcasting, the usual problems encountered are in the uniformity of application and bulk for handling. These can be overcome by bulking the granules with an inert material like sand for broadcasting by hand; if sand is slightly damp, there would be no separation of the mixture.

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