Lecture (8)

Types of Pesticide Sprayers and Sprayer Calibration

A. Knapsack Sprayers

It is loaded on the back of worker during operations. Tanks may be of plastic or metal. Common Knapsack sprayers are

i. Hydraulic
ii. Manual pneumatic
iii. Motorized pneumatic

i) Hydraulic Knapsack Sprayers

Manually operated, tank capacity is 16 liters, mechanical or hydraulic agitation, worked with a hand lever to maintain constant pressure, particularly used for spot treatment by small holding farmer and hand treatment.

ii) Pneumatic or compressed system Knapsack Sprayer

It does not require pumping during operation / spraying. The tank is pressurized after filling the liquid to 2/3rd capacity with a built in hand pump. Undesirable for weedicide as spraying pressure declines after some time resulting into uneven spray. Tank cleaning is a challenging task. It is used in limited amount to spray on weeds in paddy and jute.

iii) Motorized Pneumatic sprayers

As a low volume sprayer, it is suitable for spraying concentrated spray liquid. A blast of air flows through spraying jet of delivery hose and nozzle tube and ejects spray liquid in this blast. Air blast atomizes spray liquid in to fine droplets. Air acts as carrier, faster the air is pressured, more the atomization.

The main advantages of Knapsack blower are:

1. Low volume spray. Saves time in refilling tanks.
2. Portable working.
3. Fast spraying. Suited to post emergence translocated type.

B. Foot Sprayer/Pedal Pump Sprayers

Popularly applied for CPP application and is operated with foot. It has provision of 1–2 long delivery hoses.

C. Traction Pneumatic Sprayer

It is a developed bullock drawn sprayer with size nozzle boom that is powered from the wheels of the frame. It is efficient, easy to operate and simple in its construction.

D. Tractor mounted sprayers

Fitted with multi nozzle boom are very useful in CPP application for large holding of farmers. Tractor mounted sprayer fitted with booms are used to spray road side vegetation.

Tractor mounted boom sprayer

Tractor operated blowing orchard sprayer

E. Aerial sprayers

CPP (Crop protection products) application from air is limited to treat aquatic weeds like water hyacinth, paddy fields and large sugarcane plantation. Presence of obstacles like trees and diversified farming are bottle necks in its use.

F- ULV pesticide sprayer

G- Backpack mosquito Fogger (ULV sprayer)

When do I use which sprayer?

The selection of a sprayer is governed by several factors

i. Frequency of CPP application,
ii. Availability of diluent (water, oil, kerosene, etc.),
iii. Availability of labor (human or animal power),
iv. Area requiring treatment,
v. Characteristics of area (machine equipment for large areas, hand-operated equipment for smaller areas),
vi. Durability of equipment,
vii. Cost of equipment,
viii. Availability of after sales service,
ix. Operating cost, and
x. Speed required treating an area (this will depend on type of crop, stage of crop growth, and volume of spray solution to be applied).

Sprayer Calibration

Sprayer calibration aims at obtaining a spray pattern and droplet size that will ensure optimum coverage of the target area with uniform sized droplets without causing runoff. Calibration should therefore be taken into account

1. ***Target Area*** – area to be sprayed (large area would require higher quantities)

2. ***Droplet size*** **–** fine droplets cover a large area with less volume and reduce run off, but can cause more drift and evaporation losses

3. ***Nozzle size and spacing*** **–** once the volume of the spray and droplet size is determined, the nozzle size and spacing on the boom should be decided keeping in view the height between the boom and the crop.

4. ***Nozzle capacity*** **-** Nozzle capacity is a manufacturer's rating that depicts what output a nozzle will have at a given pressure. At constant pressure and speed, nozzle capacity is directly proportional to sprayer output. Output becomes greater as nozzle capacity increases. When multiple nozzle booms are used on knapsack sprayers it may be necessary to keep the nozzle capacity ratings low to avoid exceeding the output capacity of the knapsack pump. Typical nozzle sizes are 700, 800 or 900 ml/minute. Smaller nozzle sizes are manufactured by some companies but may not be universally available. A 1000 ml/ minute nozzle will have twice the output as a 500 ml/minute nozzle at the same pressure.

5. ***Speed*** **–** keeping boom output constant Speed is inversely proportional to spray application. As you walk faster, less spray is applied to a given area.

6. ***Pressure*** **-** ***As*** pressure increases, sprayer output increases. However, this relationship is not direct. Pressure must increase four times in order to double nozzle output. Variable pressure will cause variable output. Pressure may also affect the spray angle of different nozzles.