



**ROHINI COLLEGE OF ENGINEERING AND TECHNOLOGY**

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# **Unit 4**

## **Weeding and plant protection equipment**

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## **Classification on sprayer**

A device which causes disintegration or atomization of liquid formulation is known as sprayer and is used to apply pesticides in residential areas garden, nursery or green houses, farms, orchards, parks, forest etc.

### **Sprayers can be classified as under**

According to type of energy used for droplet formulation

According to the power used for application

According to energy for droplet formulation the sprayer can be categorized as under:

#### **1. Hydraulic energy sprayer**

The liquid is delivered in the form of fine droplets based on the hydraulic principle of liquid movement. In this type of sprayer the liquid to be sprayed is disintegrated by means of compressed air which is produced by a positive displacement pump or air pump. Following are the type of sprayer under this category:

- i) Stirrup pump      ii) Hand compression pump
- iii) Foot sprayer      iv) Rocking sprayer
- v) Manually operated knapsack sprayer
- vi) Power sprayer

#### **2. Gaseous energy**

The atomisation of liquid to be delivered is done by gaseous energy where air is commonly used. Streams of air passing through the liquid with high velocity breaks it down into fine droplets.

Following are the type of sprayer under this category:

- i) **Air atomizer**
- ii) **Air flow sprayer**
- iii) **Spray blower**
- iv) **Mist blower**
- v) **Motor operated knapsack sprayer**
- vi) **Air blower**

#### **3. Centrifugal energy spayer**

These sprayers use centrifugal force liquid through screen, perforated plates, sintered metal tubes etc. the streams emitted break into threads like atomization as compared to sheet formation in hydraulic sprayers. The flow volume is small of 1-10lt/ha and droplet size would be 75-200 $\mu$ m. The sprayer using this energy is electric powered hand held spinning disc



#### **4. Kinetic energy sprayer**

A filament of liquid is formed when liquid is fed by gravity through a small hole. The liquid filament when shaken breaks into large droplets. For example the watering can used for watering garden plants or a simple dribble bar. This type of sprayer is keeping the gasket at its seat tight. Disengage the plunger and charge in sufficient air, the pressure gauge should register 50-60 psi. Hang the sprayer comfortably on the back and starting.

The sprayer has an air pump, which compresses the air into the empty space in the tank. The air pressure is used for to force the liquid along the delivery hose to the lance and nozzle. Initially the pressure is high, but as the liquid is sprayed, the pressure falls affecting the performance of the nozzle. If a wettable powder is used, it is necessary to shake the sprayer occasionally to prevent suspension as no other agitation is provided.

Use: They are used in for spaying pesticides on potato, cotton, paddy, jute, groundnut, sugarcane etc. They are also used for mosquito control in livestock and poultry house.

#### **METHODS OF ATOMIZATION**

Generally atomizing devices utilize following principles to atomize liquid:

- Pressure or hydraulic atomization depends upon liquid pressure to supply the atomizing energy. The liquid stream from an orifice is broken up by its inherent instability and its impact upon atmosphere etc.
- Gas atomization, in which liquid is broken up by a high-velocity gas stream. The break-up may occur either outside the nozzle or within a chamber ahead of exit
- Centrifugal atomization, in which liquid is fed under low pressure to a centre of high-speed rotating devices, like disk, cup, cylindrical screen and is broken up by centrifugal force as it leaves the periphery.
- Low-velocity jet break-up, in which non-viscous, low-velocity stream after emerging from a small orifice or tube breaks up into droplets as a result of external/internal disturbances and effect of surface tension

Pneumatic atomizing (two-fluid) nozzles, in which compressed air is employed for atomization and is used to some special low volume sprayers because fine atomization can be obtained at low liquid pressure. Drift hazards from extremely fine particles limit the use of this equipment. High Speed rotating cages covered with fine-mesh screen gauge (40-80 mesh) are used on air-craft and air blast sprays having rotary screen atomizers are developed. Rotary atomizers operating in still air at relatively low liquid flow rate produce uniform droplets of controlled sizes for lab studies but when they are employed on aircraft or air blast sprayers rapidly moving air stream affects the atomization process and produces droplets with considerable range of sizes.