



SNS COLLEGE OF TECHNOLOGY

**An Autonomous Institution
Coimbatore – 35**

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Approved by AICTE , New Delhi and Affiliated to Anna University , Chennai.

DEPARTMENT OF AGRICULTURE ENGINEERING

19AGB302 – FARM IMPLEMENTS AND MACHINERY

2020-21 BATCH - III YEAR V SEMESTER

**UNIT V. SPRAYERS AND DUSTERS
TOPIC – L31- DUSTERS**



COMPONENTS OF DUSTERS



Duster is a machine used to apply chemicals in dust form. Dusters make use of air stream to carry pesticides in finely divided form on the plants.

A duster essentially consists of :

- 1.Hopper**
- 2. Agitator**
- 3. Feed control**
- 4. Fan or blower**
- 5. Delivery nozzle**



TYPES OF DUSTERS



Types of dusters :

- 1. Plunger type**
- 2. Knapsack type**
- 3. Rotary type**
- 4. Power operated duster**



PLUNGER TYPE AND KKNAPSACK TYPE DUSTERS



1.Plunger type –

It is a simple duster with a small piston. The piston drives a current of air over the dust in the hopper. The dust is carried away through a delivery spout. Small hand pump dusters of this type are available and are suitable only where the area to be dusted is small like vegetable gardens.

2.Knapsack type –

It is a duster with the powder container carried on the back of the operator. Knapsack dusters have a hopper through which a current of air is blown to pick up the dust. The air current is produced by a lever operated leather bellows. Shoulder straps are used to carry in the field. These dusters are suitable for small areas.



ROTARY DUSTER



- **Rotary duster –**
- **Hand rotary dusters are useful to apply chemicals which are in powder form. It consists of a hopper, a fan, gear box, handle, delivery hose and a deflector plate. When the handle is rotated, the fan rotates at high speed and draws air from outside.**
- **The chemical from hopper is fed in to the air stream in the suction side of the fan.**
- **The chemical mixes with the air, passes through the delivery line and is applied on the plants.**
- **The rate of delivery can be regulated It is used to apply powdery chemicals to vegetables, sorghum etc. crops.**



HAND ROTARY DUSTERS





POWER OPERATED DUSTER

- **Power operated duster-** Power operated duster mainly consists of a power driven fan, a hopper and a delivery spout.
- The fan creates strong air flow which causes the dust to blow off from the hopper to a considerable distance vertically or horizontally.
- Direction of dust is regulated by a movable spout suitably fitted with the unit. This type of dusters are used for large areas



POWER OPERATED MIST BLOWER CUM DUSTER



ARIAL DUSTER OR CROP DUSTER



- **Arial duster or crop duster** - an aircraft is used for dusting or spraying large acreages with pesticides. Aerial spraying and dusting permit prompt coverage of large areas at the moment when application of pesticide is most effective and avoid the need for wheeled vehicles that might damage crops.
- The technique was greatly improved in the 1960s with the development of ultra-low-volume applicators, in which concentrated pesticides are distributed in amounts as small as 1 ounce per acre (70 grams per hectare).
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ARIAL DUSTING



Arial dusting



TERMS PERTAINING TO PERFORMANCE EFFICIENCY OF SPRAYERS



- Important terms a) suction capacity of power sprayer- plunger type

- $Q = (\pi/4) \times D^2 \times L \times n \times 10^{-6}$

- Where

- Q- theoretical suction capacity , L/min

- D- diameter of plunger, mm

- n- rev/min

- L- stroke length, mm

- $$\text{B) Volumetric efficiency} = \frac{\text{Actual suction capacity}}{\text{Theoretical suction capacity}} \times 100$$

- $$\text{C) Pump efficiency} = \frac{\text{Water horse power}}{\text{Shaft horse power}} \times 100$$



POWER NEEDED TO OPERATE A PUMP



- Power required to operate a pump, $W = \rho gQH$
- ρ = mass density of water, kg/m^3
- Q = pump discharge, m^3/s
- H = head transmitted by the impeller, m
- $$P = \frac{\rho gQH}{75}$$
- $$P = \frac{\gamma QH}{75}$$
- γ is the specific weight of water, $100 \text{ kg}_f = 9810 \text{ N}$ ($\gamma = \rho g$)



WATER HORSE POWER



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- **Water horse power, hp = $\frac{Q \times H}{75}$**
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- **Where , Q = pump discharge, L /s**
- **H = height of spray, m**



CONVERSION OF A MIST BLOWER IN TO A DUSTER



1. Replace the liquid delivery hose by a bigger diameter pleated hose to carry the powdery chemical from the tank into the air stream
2. Provide a air distributor at the bottom of the tank for stirring and keeping the chemical in suspended form