



SNS COLLEGE OF TECHNOLOGY

AN AUTONOMOUS INSTITUTION

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DEPARTMENT OF AGRICULTURAL ENGINEERING

COURSE CODE & NAME: 19AGO301 & FARM MECHANISATION

III YEAR / VI SEMESTER

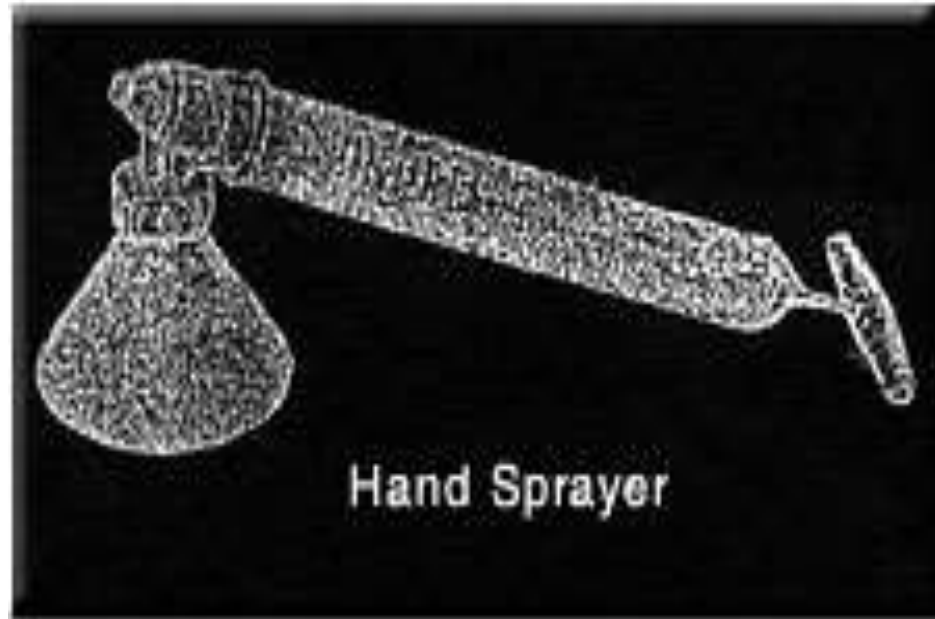
UNIT : IV Harvesting and Plant Protection Machinery

TOPIC 4 – Types of Sprayers





Hand sprayer



- ✓The hand sprayer is a small, light and compact unit.
- ✓The capacity of the container varies from 500 to 1000 ml.
- ✓This is generally used for spraying small areas like kitchen garden and experimental laboratory plots.
- ✓It is a hydraulic energy sprayer.
- ✓It has a hydraulic pump inside the container, with cylinder, plunger and a plunger rod.
- ✓By operating the plunger up, the spray fluid in the container is sucked into the cylinder through a ball valve assembly and then pressurised during the downward stroke.

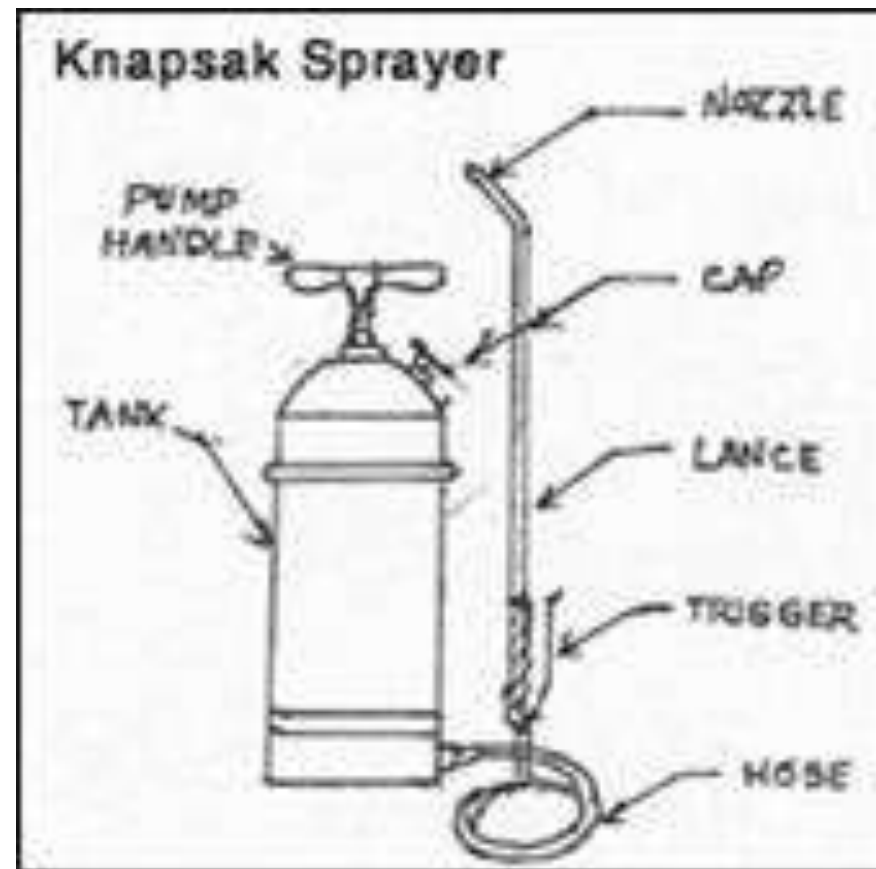


- ✓ The pressurised fluid is then let out through a nozzle, and sprayed into fine droplets.
- ✓ If the pressure to be built inside the container an air pump with cylinder, plunger and plunger rod is required.
- ✓ When the plunger is pulled up, the air is sucked into the cylinder and when pushed down the air bubble is released into the container with 80% of its volume filled with the fluid.
- ✓ The air reaches the space above the free fluid surface and presses the fluid.
- ✓ The pressurised fluid is drawn up through a trigger cut of valve to the nozzle, where it is atomized and sprayed.
- ✓ In some other type, air pump and the container are separate pieces and the pump is attached to the container in such a way to release the pressurised air through an orifice at the top of the container.
- ✓ The fluid is lifted through an orifice at the top of the container.
- ✓ The fluid is lifted through a capillary tube due to surface tension developed by the high velocity air at the outlet and sheared away by the air and sprayed as droplets.



Knapsack sprayer

- ✓ Any sprayer which is carried on the back of the operator is called a knapsack sprayer.
- ✓ The commonly used manually operated knapsack sprayer will have one hydraulic pump working inside the container.
- ✓ The plunger works inside the replacement well attached at the bottom of the container, for easier maintenance.
- ✓ The pump can be operated through the appropriate linkages by oscillating the handle, with the sprayer carried on the back.





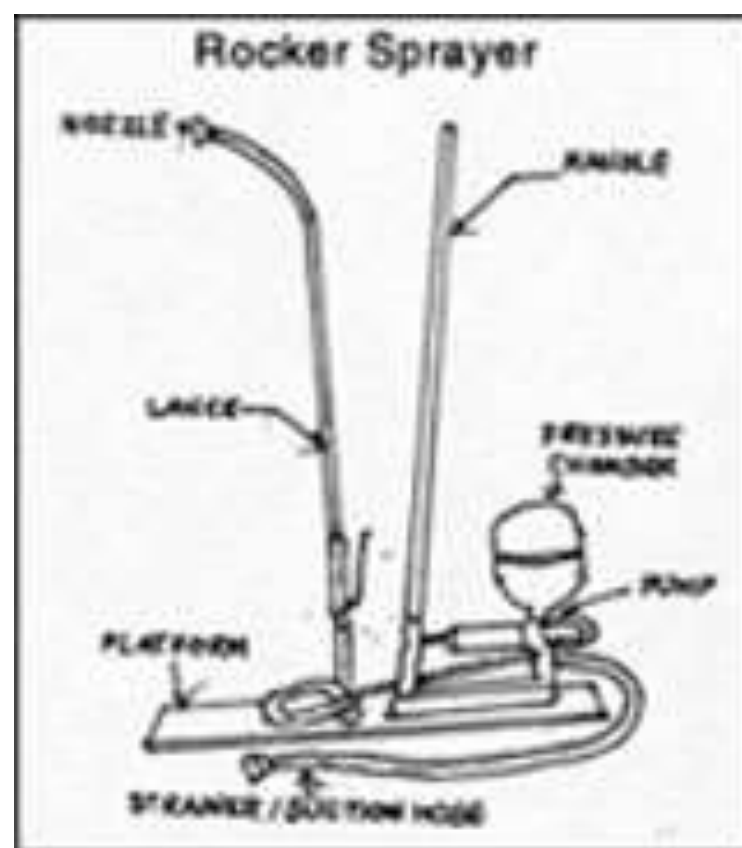
Knapsack sprayer



- ✓ An agitator is also provided with the pressure chamber to agitate the fluid so that the particles in suspension will not be allowed to settle down.
- ✓ A delivery tube is attached on the other end of the pump which carries the pressurised fluid to the spray lance.
- ✓ The flow to the nozzle is controlled by a trigger cut-off valve.
- ✓ In the case of compression knapsack sprayer, an air pump is used to build air pressure above the free surface of the spray fluid in the container and normally the pumping of the air will be done by keeping the unit on ground and then sprayed till the air pressure comes down.
- ✓ The unit is again brought back to the ground for pumping air and then the spraying is continued as before.
- ✓ The spray fluid, which does not require any agitation only can be sprayed by using this type of sprayers.



Rocker sprayer



- ✓ The rocking sprayer has a pump assembly, fixed on a wooden platform with an operating lever, a valve assembly with two ball valves, a pressure chamber, suction hose with strainer, and delivery hose with spray lance.
- ✓ When the plunger is pulled behind by pulling the lever way from the pump, the spray fluid from the container is sucked through the strainer and pushes the bottom ball valve above and enters the pump.
- ✓ The movement of the lower ball valve is arrested by the upper valve seat.
- ✓ When the lever is pushed towards the pump, the sucked fluid is forced to enter the pressure chamber by opening the upper ball valve.

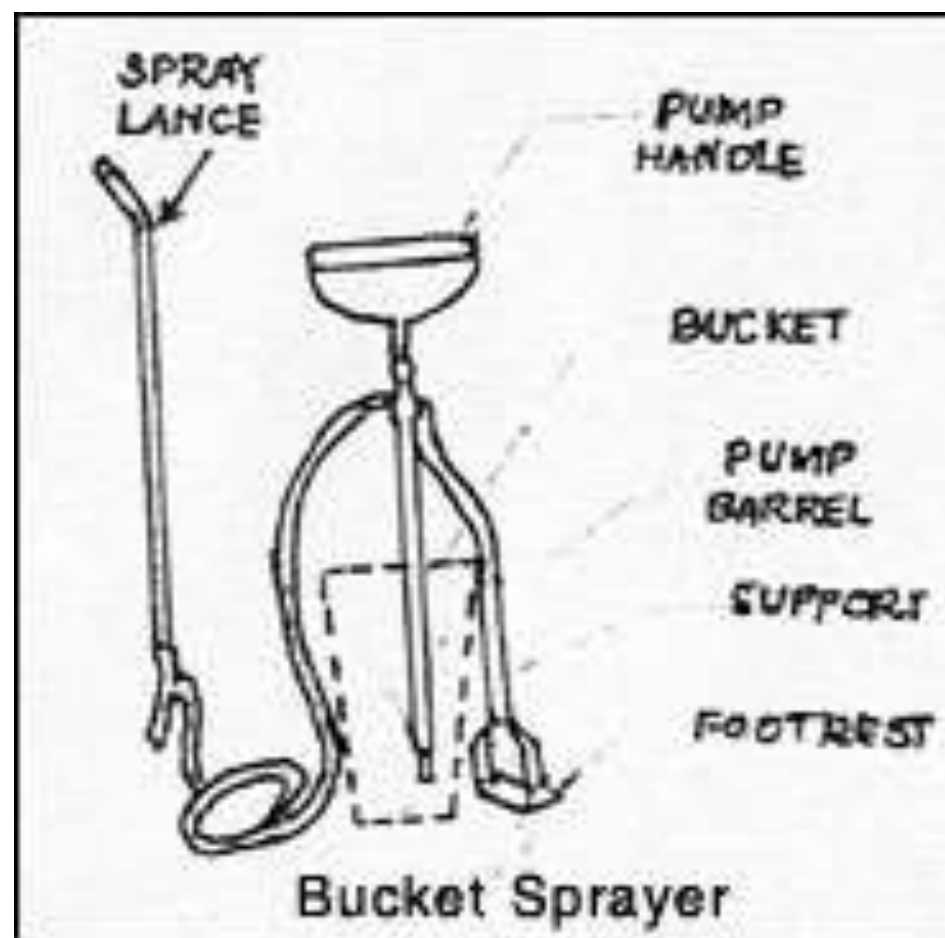


Rocker sprayer

- ✓The operation is continued till the entire suction pipe, ball valve assembly, delivery hose and a portion of pressure vessel is fitted with spray fluid and the pump operator finds it difficult to push the piston forward, due to the downward pressure developed by the entrapped compressed air in the pressure vessel.
- ✓Thereafter, the trigger cut off valve will be opened to allow the spray fluid to rush through the nozzle and get atomized.
- ✓Usually 14 to 18 kg/cm² pressure can be built in the pressure chamber and hence can be conveniently used for free spraying.



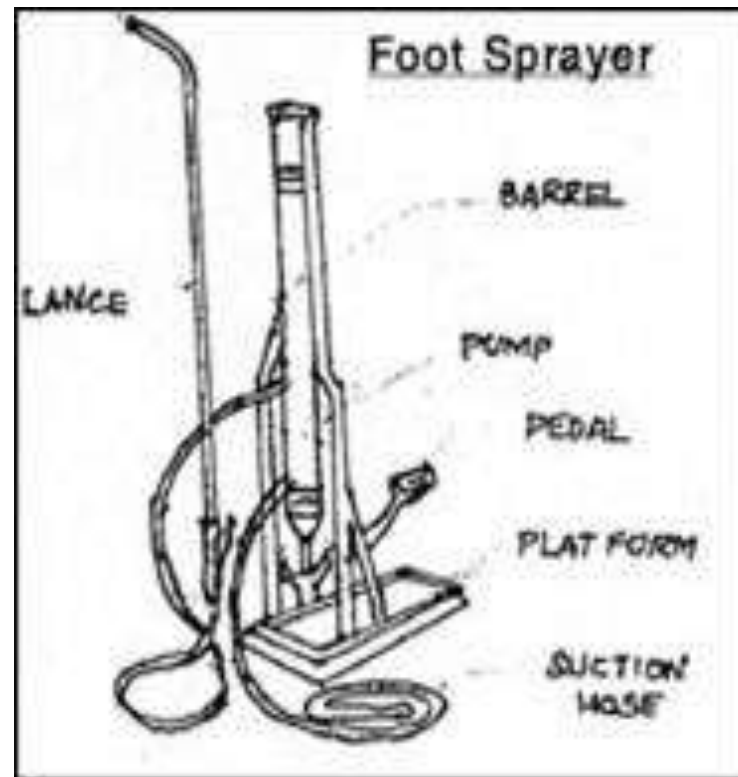
Bucket sprayer



- ✓ The bucket sprayer is designed to pump the spray fluid directly from, the open container, usually a bucket.
- ✓ The hydraulic pump will be put inside the bucket and held properly with the help of foot rest.
- ✓ As the plunger is pulled up, the fluid enters through the suction ball valve assembly and when the plunger is pressed down, the suction valve closes and the fluid enters the pressure chamber through a ball valve assembly.
- ✓ As the plunger is continuously worked, pressure is built in the pressure chamber and the delivery hose.
- ✓ As soon as the required pressure is built up, the spraying will be done.
- ✓ A pressure of 4 kg / cm² is developed in most of the models.



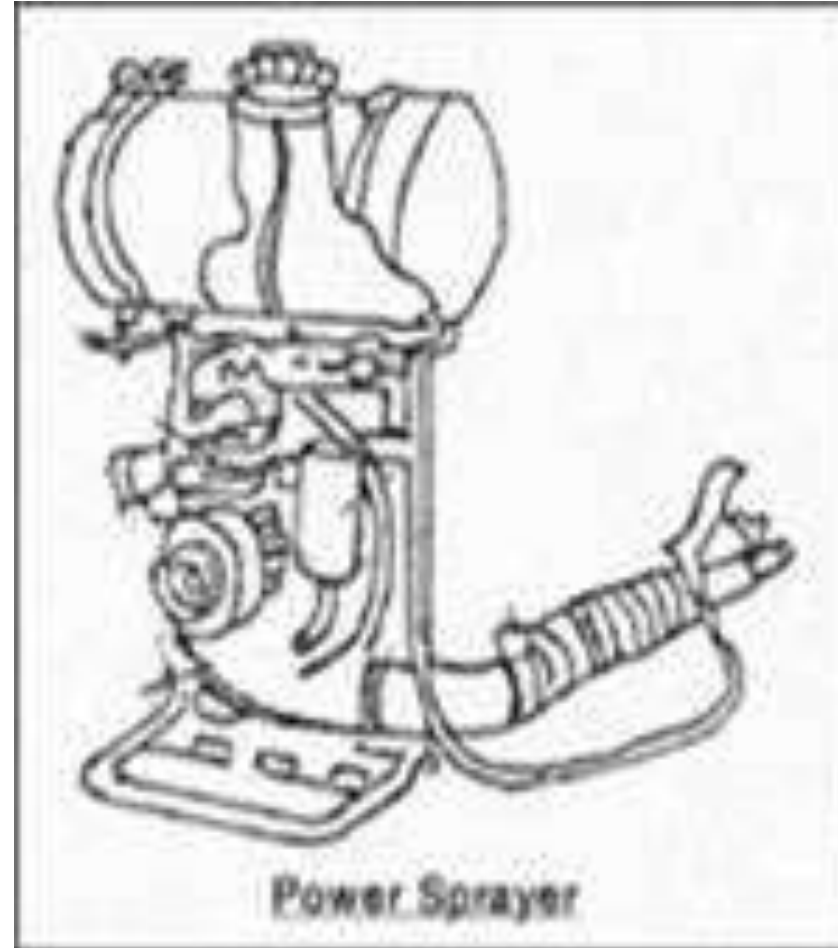
Foot sprayer



- ✓ This is a modified version of rocker sprayer.
- ✓ The pump is fixed in a vertical position with necessary braces.
- ✓ The plunger moves up and down when operated by the pedal.
- ✓ A ball valve is provided in the plunger assembly itself to allow the fluid to cross the plunger and getting pressurized in the pressure vessel.
- ✓ During the upward motion of the piston fluid is sucked in and pressurized into the pressure vessel and during downward movement, the sucked fluid crosses the plungers and enter the pump.
- ✓ The pressure developed is about 17-21 kg/cm².



Power sprayer



- ✓ All the sprayers which impart the mechanical energy developed by an I.C. Engine, on the spray fluid before spraying is called as a power sprayer.
- ✓ The most commonly used type of power sprayer in India is a gaseous energy type knapsack sprayer.
- ✓ In construction, it has a back pack stand on which a blower with a S.I.
- ✓ Engine of 1.2 to 3 hp capacity, the spray fluid tank and the petrol tank are fixed rigidly.
- ✓ A pleated hose is attached to the blower elbow to carry the high velocity air and at the end of that a shear nozzle is fixed to allow the spray fluid to trickle in from the spray fluid storage tank, with a valve control.



Power sprayer



- ✓ From the top of the blower casing, an air hose is taken into the spray fluid tank, which carries little quantum of air to press the spray fluid during operation.
- ✓ In operation, the engine is started by keeping the unit on the ground and then carried by the operator.
- ✓ The blower sucks the air behind the backrest and forces it into the pleated hose.
- ✓ The valve of the shear nozzle is opened or the shear nozzle with selective opening and discharged through the nozzle.
- ✓ The high velocity air shears off the droplets and atomizes by the impact of diffuse and delivers it on the plant the surface.
- ✓ An air current of 2.7 to 9.1 m² / minute is delivered at a velocity of 175 to 320 kmph.
- ✓ The spray fluid tank capacity varies from 7 to 12 litres.
- ✓ The fuel tank capacity varies from 0.75 to 2.25 litres.
- ✓ The spray fluid discharge can be varied from 0.5 to 5 lit / minute.



Thank You