

SPRAY EQUIPMENT (NOZZLES, PUMPS, SYSTEMS)

I. COMPONENTS OF THE SPRAY SYSTEM

A. ESSENTIAL PARTS OF A SPRAY SYSTEM

1. Tank

- a) Corrosion-resistant, easy to fill and clean, shaped for mounting and agitation (openings for hydraulic or mechanical agitation)**
- b) Capacity markings on side, make sure these are accurate by adding water in 5-gallon increments and adding marks yourself.**
- c) Sealing lid, either threaded lid or locking mechanism**
- d) Drain at the bottom for through cleaning, you may need to make openings yourself and install bulkhead fittings and valves.**
- e) Types: Fiberglass (durable, can crack, some solvent problems), stainless steel (expensive, heavy, high use rate), galvanized (corrosion and rust flakes), aluminum tanks (good for most products, check labels for Al corrosion warnings) and polyethylene (suited to many types, proper mounting to avoid cracks)**
- f) Strainer in the tank lid, helps filter out any larger hard substances that can damage the pump housing.**

2. Agitation devices

- a) a maintain a proper mix in the spray tank**
- b) types: mechanical (paddles in tank) and hydraulic agitation (pipe or jet agitators)**

(1) With hydraulic agitation fluid circulated by the pump.

3. Pumps – (see HYPRO Sprayer Pump Handbook)

a) Roller pumps (rolling vanes, flexible impellers, and sliding vanes) vanes come in a variety of coatings for various uses.

(1) Sensitive to sharp object, coarse abrasives such as sand and barrel scale, use strainers to keep these out

b) Centrifugal pumps, handles WP and abrasives well, rapid performance drop off above 30-40 PSI, no pressure relief valve necessary, may require a speed-up pulley from tractor PTO (power take off) to get proper RPM.

c) Piston pump, positive displacement pump (output is proportional to speed and independent of pressure, high-pressure constant output) can deliver very high pressure for cleaning operations. Requires a surge tank to avoid spray pulsing, also damper in pressure gauge (glycerin-filled) to allow for an accurate pressure reading

d) Diaphragm pump, positive displacement, similar to piston with regards to performance, different pump working mechanisms, available with corrosion protection coatings.

e) Pump cost comparison:

Type	Estimated Cost
Roller	\$ 200 – 900
Centrifugal	\$ 400 - 700
Diaphragm	\$ 1000 - 1500
Piston	\$ 400 - 600

4. Regulating devices

a) Pressure relief valves are used to return flow to the tank when spray boom is turned off. Without a pressure relief valve, pump can be damaged and hoses ruptured.

b) Pressure gauges mounted between boom control valve and nozzle tips. Keep as close to outlets as possible to monitor changes in spray pressure. Will increase if nozzles clog and decrease if leaks develop.

c) Unloader valve, similar to pressure relief except that when boom is shut off, flow from the outlet is directed to the pump inlet to reduce pump working pressure., used with positive displacement pumps running above 200 psi.

5. Nozzles (go to Spraying Systems Co. Ag. Spray Products #51)

a) Types (see pages 2,3 & 4 , CAT 51, “Selection Guide”))

(1) flat fan, tapered edge, primarily for broad cast application over plant/ground surface

(a) TurboTeeJet: tapered edge, wide angle flat spray pattern for uniform coverage in broadcast spraying. Large opening to minimize clogging. Good for lower pressure spraying (15-90 PSI) to provide good spray coverage with larger drops and less drift.

(b) Extended range (XR) flat spray tips: provides excellent spray distribution over a wide range of pressure. Use with sprayer that have electronic controllers that adjust spray pressure to maintain constant delivery as tractor speed changes due to changes in terrain.

(c) TeeJet tip: this is the original spray tip that comes either as a solid metal piece or as a metal insert covered with a plastic body produces a tapered edge flat spray pattern for broadcast spray application. Produced in a wide range of spray angles (15, 25, 40, 50, 60 degrees) for adaption to machines and other situations where a spray is needed.

(d) Drift guard: these tips make use of a pre-orifice insert that produces larger droplets and reduces the small drift-prone droplets produced with the standard TeeJet tip. Produces a tapered edge flat spray pattern for broadcast spraying

(e) Twinjet, double outlet on a single spray tip to get better coverage of canopy and into crop residues. Best suited for broadcast spraying where superior leaf coverage and canopy penetration is important.

(f) Air Induction, has a venturi or hole to suck air and cause droplets with air pocket, you get larger drops for drift control but exploding air-filled drops provide small particles for improved performance. The air induction feature can be found on the following tips: TurboTeeJet, XR tips, standard TeeJet tips, TwinJet, and TwinTurbo tips.

(2) flat fan even edge, banded application, behind planter or under hooded sprayers. Even spray patterns are provided with the standard TeeJet tip, air induction TeeJet and Twin Jet models.

(3) Flood jets, coarse droplets, uneven pattern, non-crop w/herbicides, can use with fertilizer in liquids.

(4) Hollow and solid cones, mostly insecticide application, some post application.

(a) full cone for higher gallonage, big drops less drift

(b) ideal for banding over rows with multiple nozzles

(5) Disc-Core tips for spraying pesticides at high pressure, sometimes used with air blast orchard sprayers.

(6) off center, used to direct spray away from the boom end