

LECTURE -8: Spray Equipment NOZZLES, PUMPS AND SYSTEMS

Major topics to be discussed:

- Parts of spray system
- Nozzle types and uses
- Boom sprayers and proper adjustments
- Non-spray herbicide application equipment



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
- c) Sealing lid
- d) Drain at the bottom for through cleaning
- 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.





Multi-purpose farm sprayer
Boom spray for large fields
Spot spray for smaller areas





Turf sprayer



Macadamia nut sprayer

Cone shaped tank allows for complete volume use
Useful on hilly sites like orchards

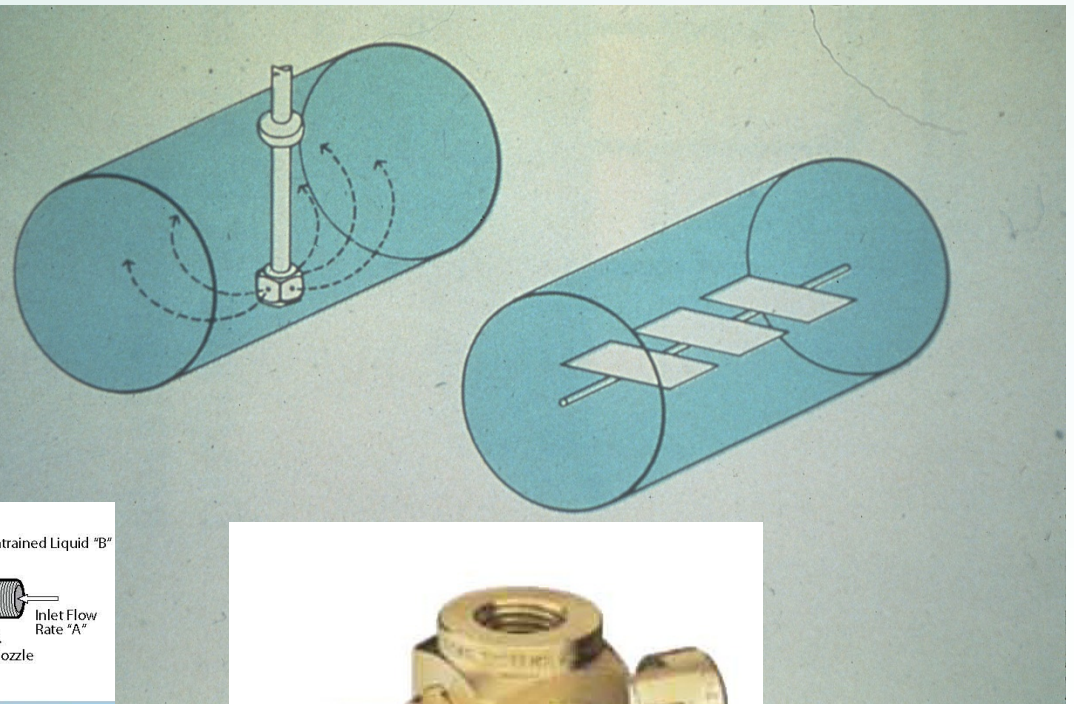
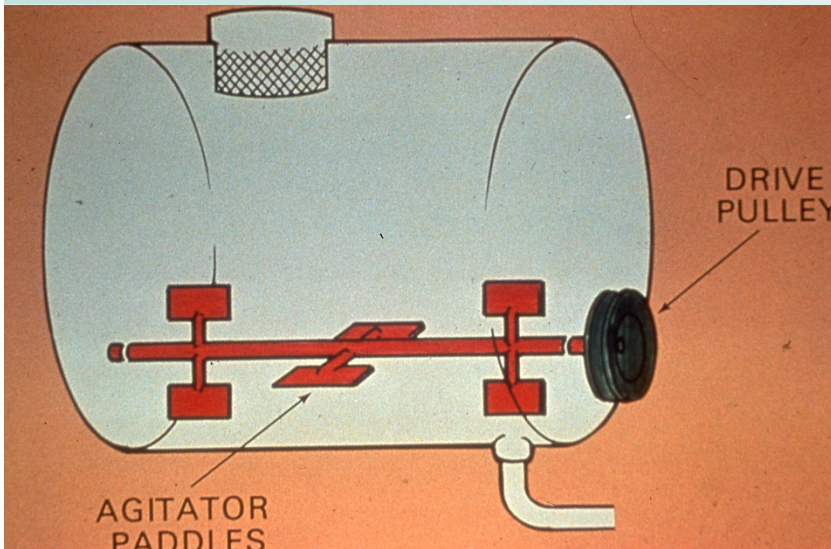


2. Agitation devices

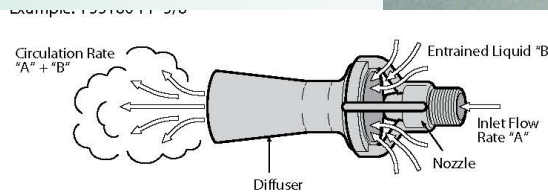
a) a maintain a proper mix in the spray tank

b) types: mechanical (paddles in tank) and hydraulic agitation (pipe or jet agitators)

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



- Allows small pumps to circulate large volumes of liquid.
- Manufactured of glass-filled polypropylene for excellent corrosion and chemical resistance.
- Large flow opening minimizes plugging.
- Available in 3/8" or 3/4" (M) pipe thread inlet connection.



APPROXIMATE FLOW RATE PERFORMANCE	MODEL NUMBER	INLET LIQUID PRESSURE					
		10 PSI	15 PSI	20 PSI	25 PSI	30 PSI	35 PSI
Inlet Flow Rate "A" (GPM)	Y33180-PP	9	11	12.7	14	16	18
	Y9270-PP	13.5	17	19	21	23	25
Entrained Liquid "B" (GPM)	Y33180-PP	36	44	50.8	56	64	72
	Y9270-PP	54	68	76	84	92	100
Circulation Rate	Y33180-PP	45	55	63.5	70	80	90



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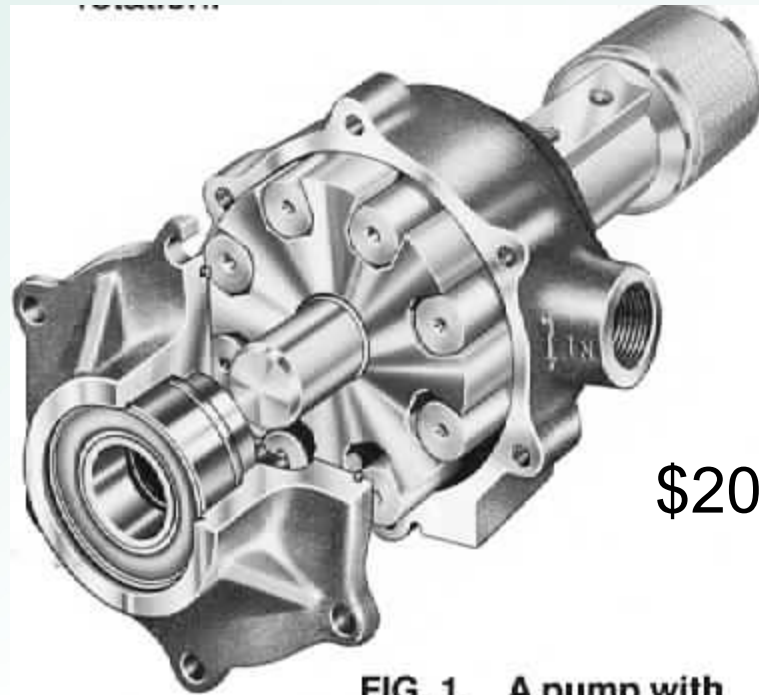
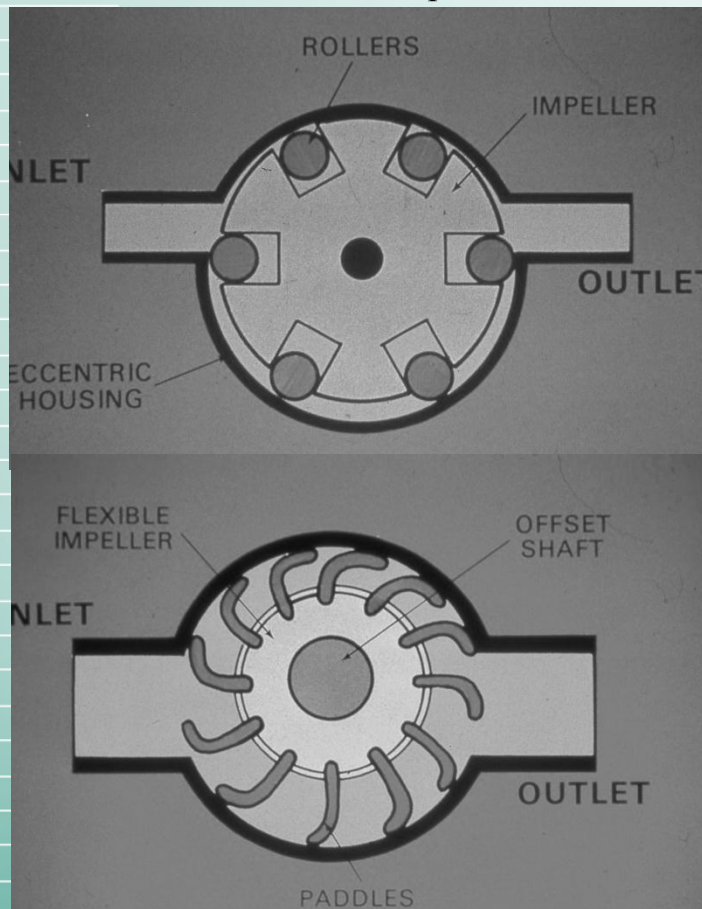
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Pumps used for hydraulic spraying

1. 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



\$200-\$900

FIG. 1. A pump with rolling vanes.

Pumps used for hydraulic spraying

1. Pumps – (see HYPRO Sprayer Pump Handbook)

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 to get proper RPM.

\$400 - \$700

Speed-up pulleys drive pump from PTO shaft.



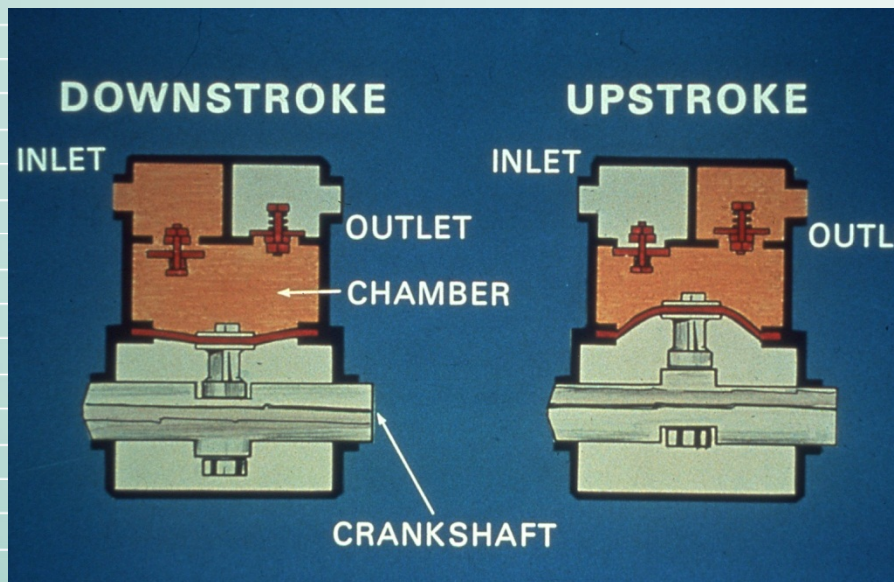
Compact planetary gears drive this PTO pump.



Pumps used for hydraulic spraying

1. Pumps – (see HYPRO Sprayer Pump Handbook)

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

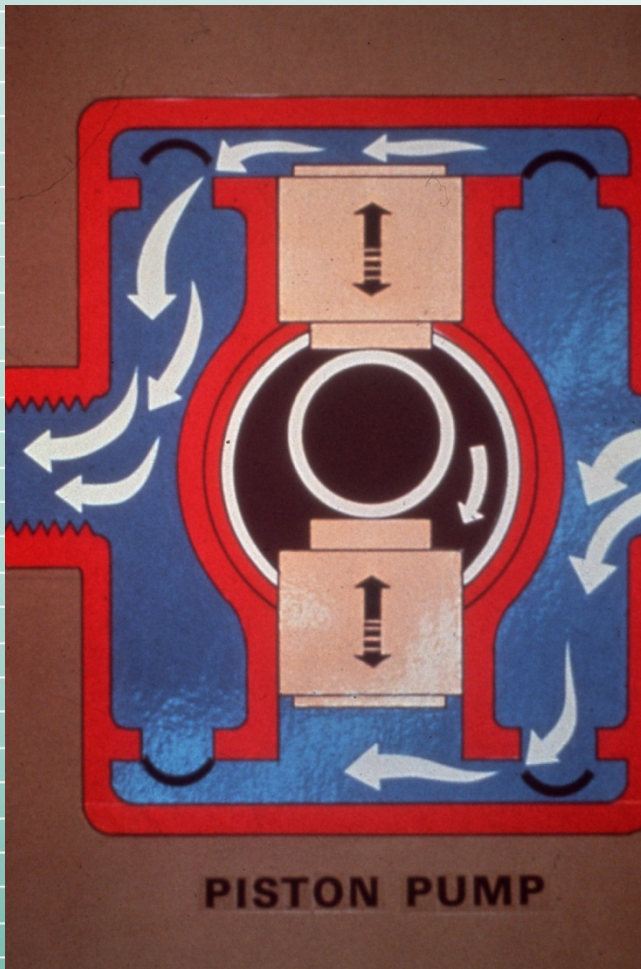


\$1000 - \$1500



1. Pumps – (see HYPRO Sprayer Pump Handbook)

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)**



Piston pump
\$400 - \$600



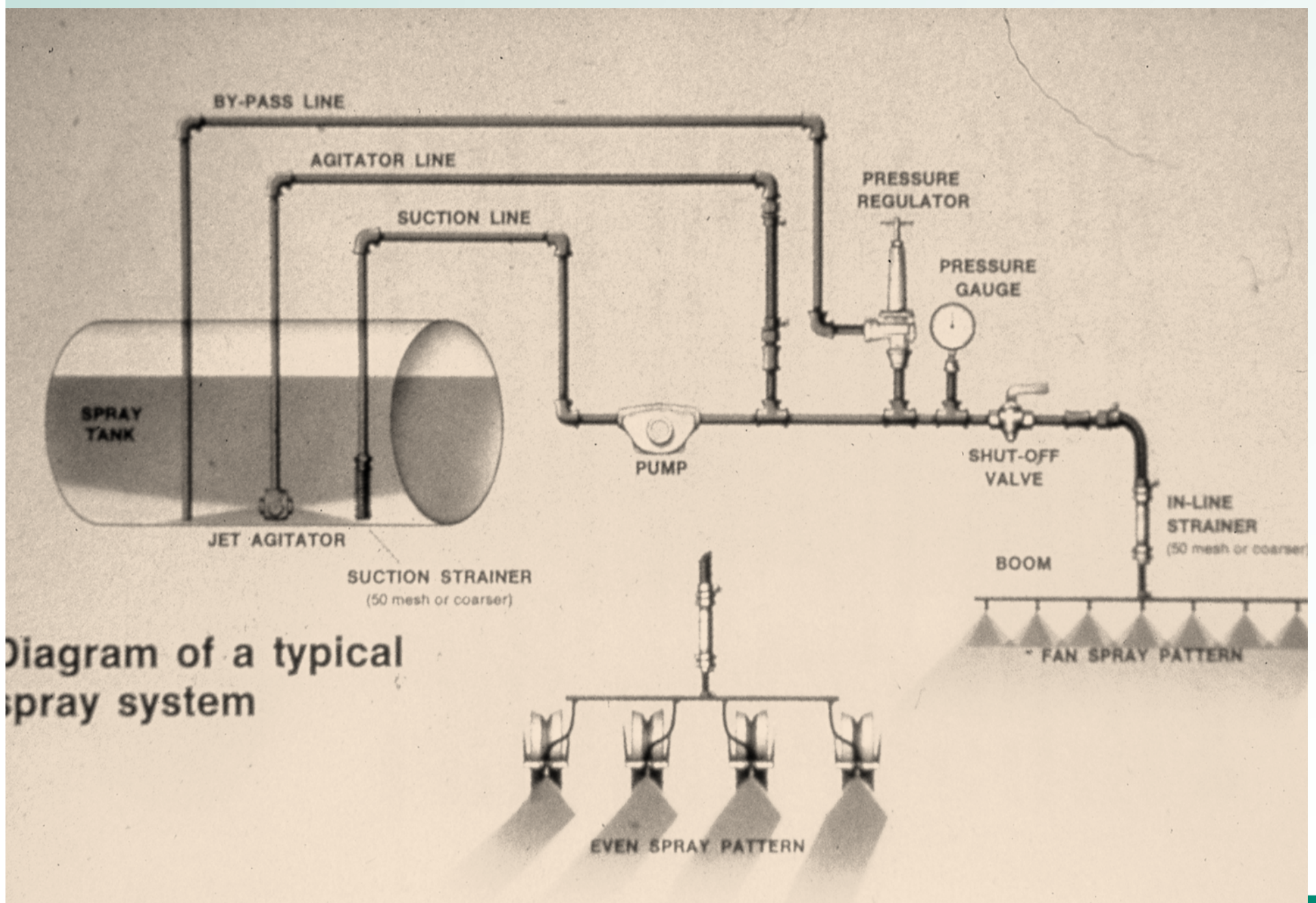
1. Regulating devices

- 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.



Throttling
valve
Cent.-pumps
and agitation
flow control



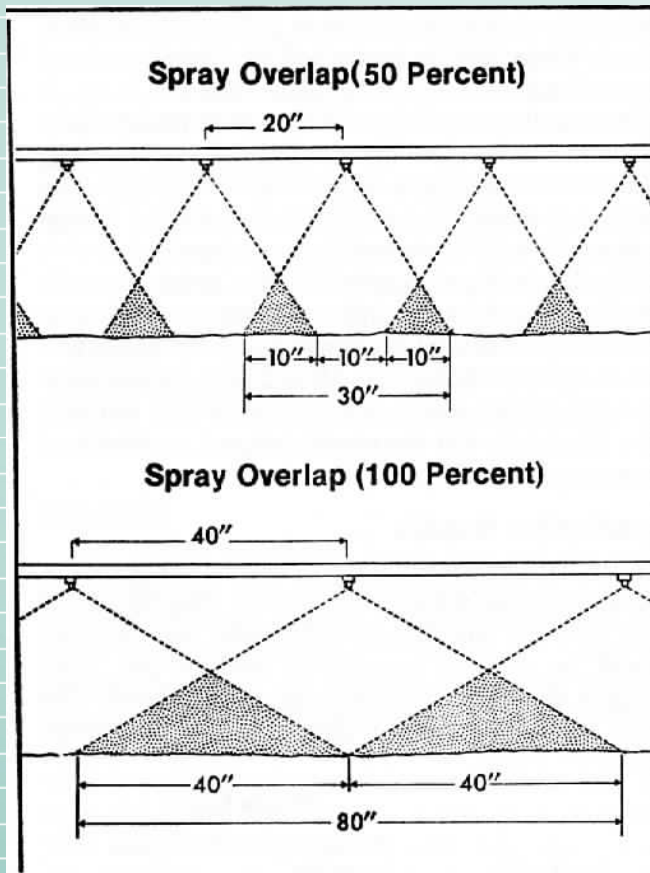


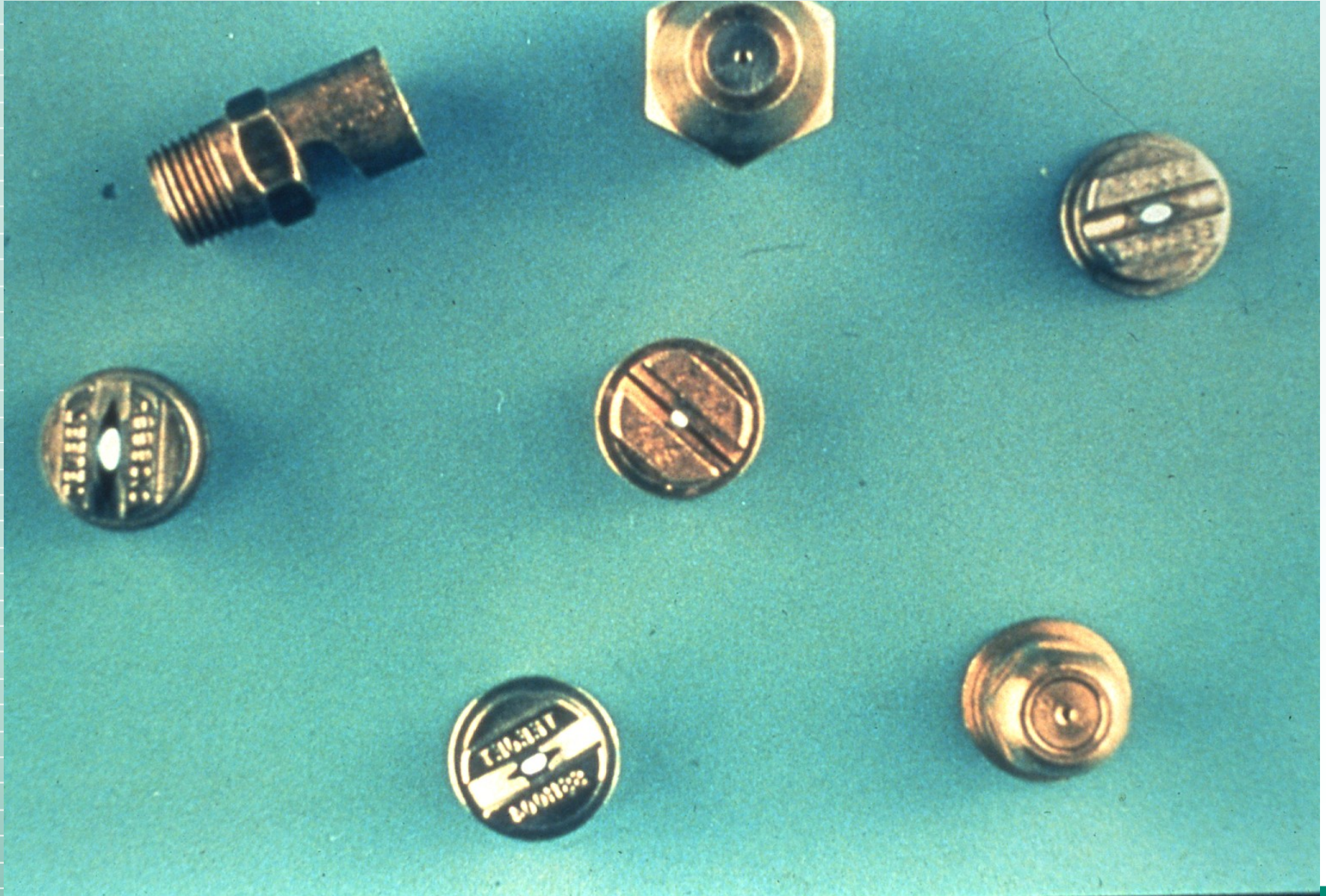


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Spray tips for broadcast applications with a boom

Tapered edge pattern
Uniform spray pattern at proper boom height



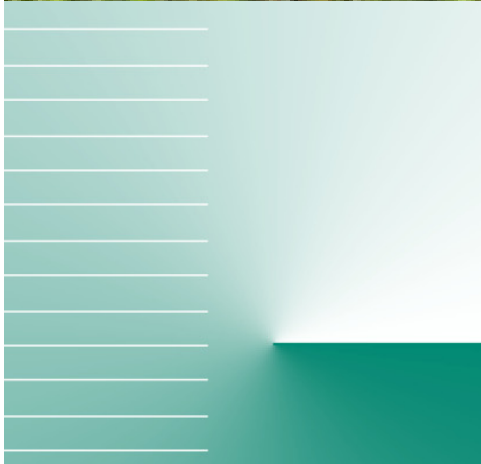


All tapered edged broadcast tips from TeeJet

- Turbo, tapered edge wide angles = low booms
- XR-extended range, used with flow controllers for changing PSI
- AI-air induction, large hollow droplets for drift control
- Drift guard, low pressure spraying w/large drops
- TwinJet, dual outlet tips for post spraying, best foliar coverage
- FloodJet, high gallonage, less clogging reduced drift



Twin jet for best foliage coverage



Even spray pattern for banding application



Spray pattern is the same
No tapered edges
Same tip features models as
tapered edges





Even spray pattern for banding application





Even spray tip application





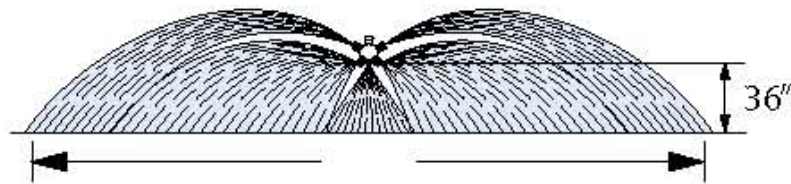
Full and hollow cone application-orchard spraying for insect control



Disc core tips for orchard air blast sprayers



Boomless tips-wide spray for trucks and train tracks
Also pasture sprays in very hilly areas booms not used



W = Maximum effective coverage with
nozzle mounted at 36" height.



Non-spray herbicide application equipment

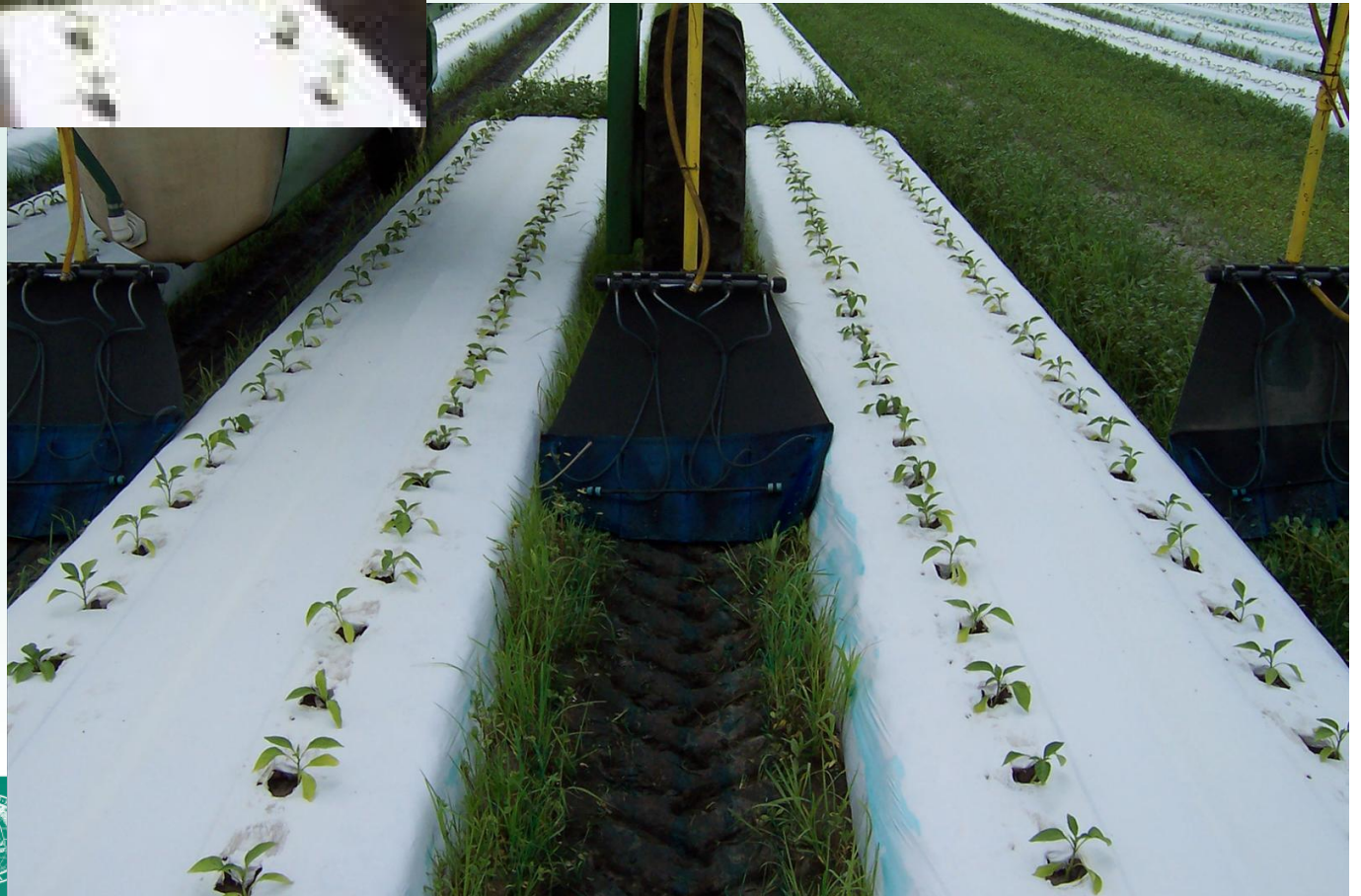


Wick application for
topical herbicide
applications





Between row wipers
to prevent herbicide
drift to sensitive
vegetable seedlings





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Broadcast herbicide wiper for non-selective kill. Used in noncrop settings where spraying is prohibited or winds are problematic



Trailer mounted wiper for application to weeds higher than the lower growing crops.



Systemic herbicides applied to brush bristles and then rolled across area for no-drift weed control



Duster & granular applicator

Air blast mechanism is isolated from material being applied.
A great tool but hard to find-purchased in Hilo at Coop.



End of slid show –
Lets check out the
equipment and
view plots

