

Orchard Spraying

Objectives:

1. Apply pesticides to control insects, mites, fungal and bacterial diseases & weeds
2. Apply mineral nutrients to foliage & fruit (calcium, boron, zinc, nitrogen)
3. Apply plant bio-regulators for:
 - Flower & fruit thinning
 - Control suckers
 - Promote lateral branching
 - Improve fruit shape
 - Alter ripening
 - Control pre-harvest fruit drop

History:

Before 1950s, applied with handgun nozzles



During 1950s, “airblast” sprayer invented → shears water going through the nozzles with high speed air → small droplets carried into air



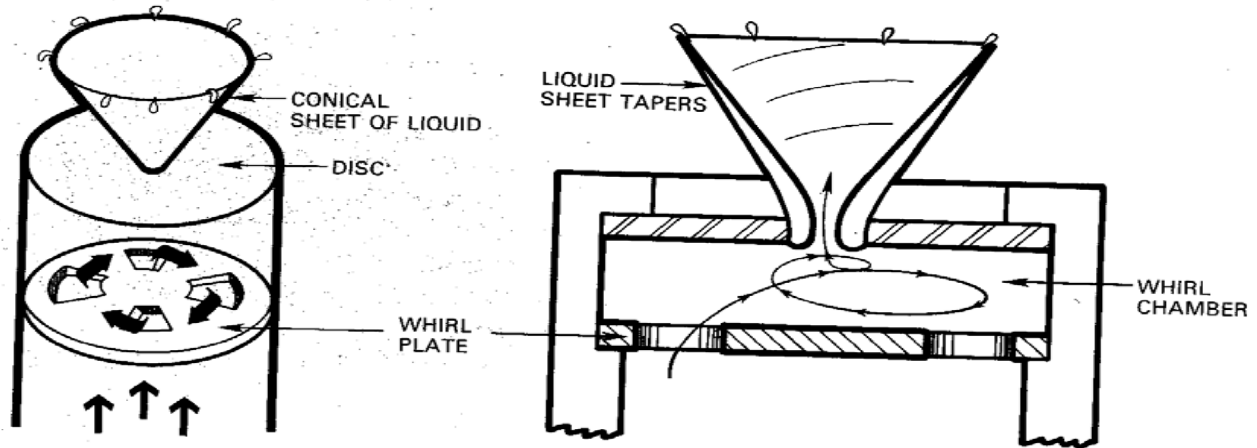
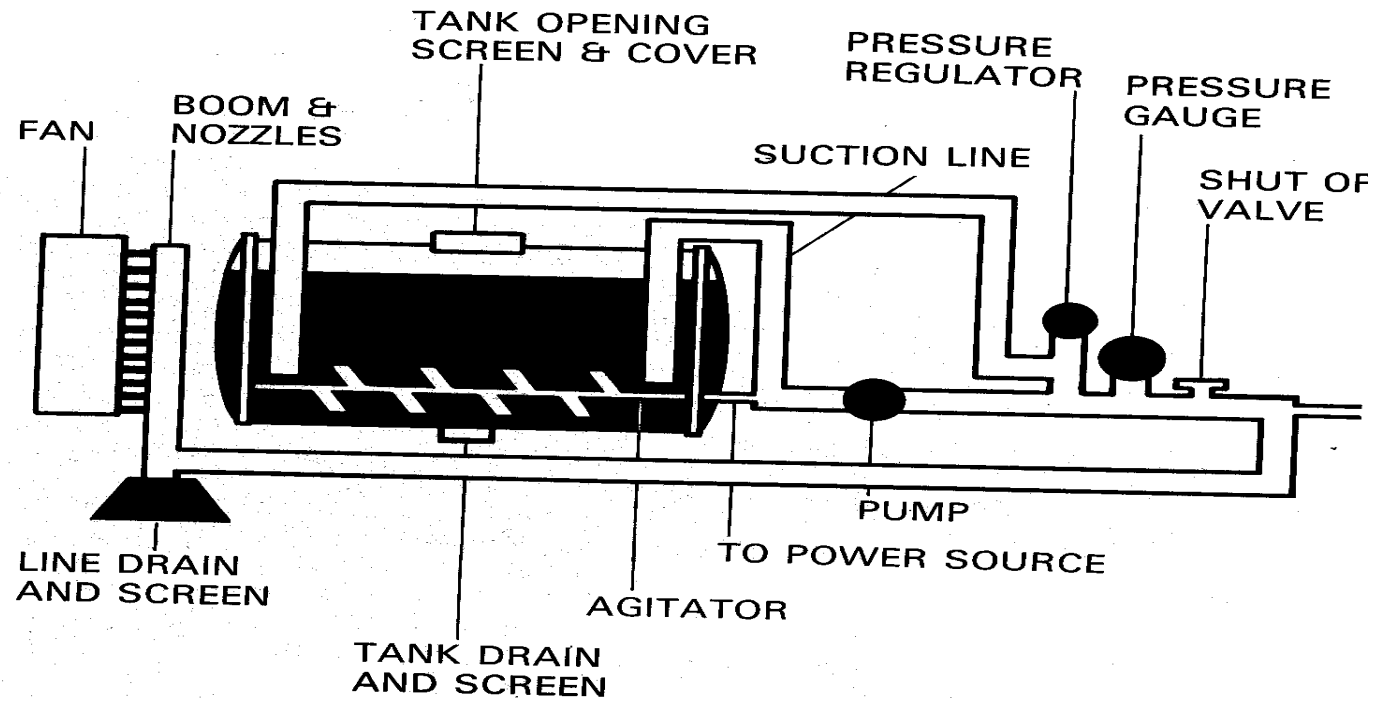
Orchard sprayer requirements:

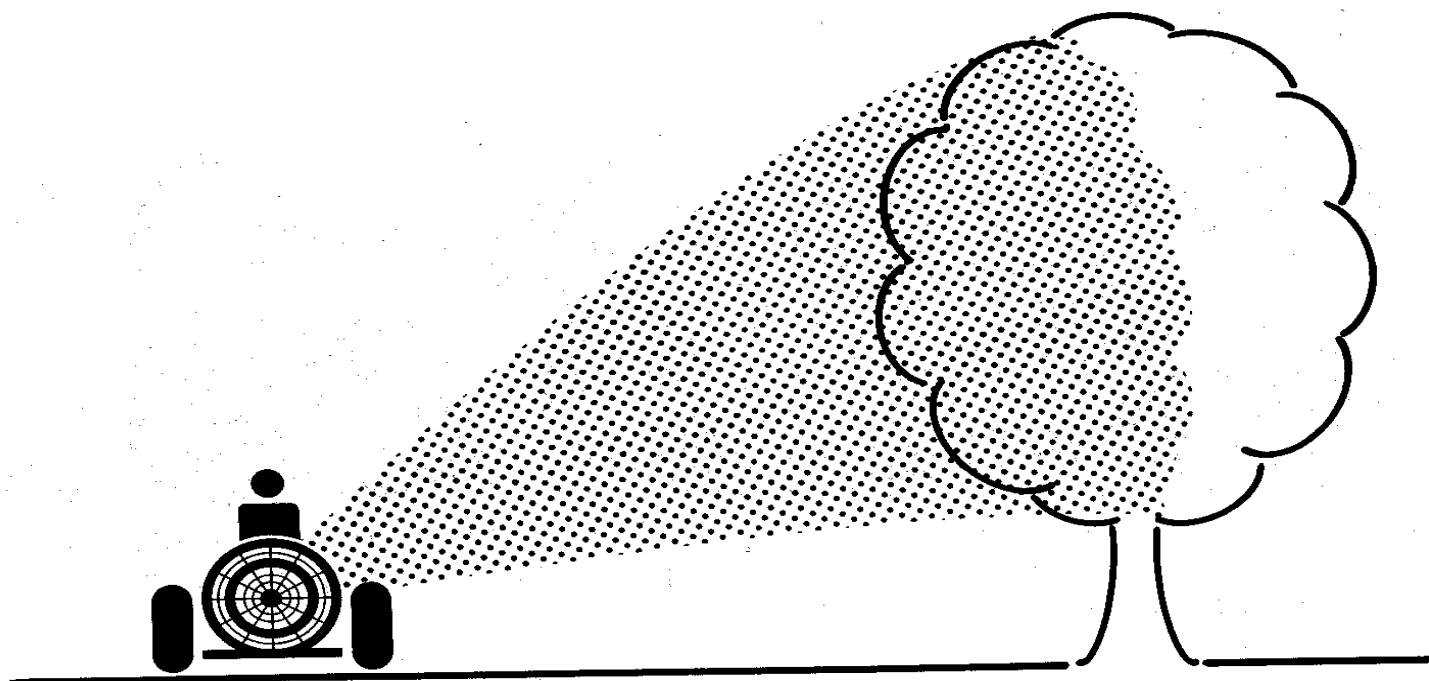
- 1. Tank to hold spray material**
- 2. Agitation system to keep spray mixture in suspension**
- 3. Power system to propel the spray**
- 4. Hoses & nozzles to carry spray mixture from tank & deliver to target area (trees)**

Orchard air-blast sprayer:

Properties:

- 1. High speed, fan-driven air stream disperses spray**
- 2. Series of nozzles ejects very small droplets into air**
- 3. Delivers either high volume (100-1000 gallons/acre), dilute sprays or low volume (10-100 gal/A), concentrated sprays**





Two Approaches to Spray Delivery

High volume	Low volume
100-1000 GPA	10-100 GPA
Dilute spray with larger droplets	Concentrate spray with smaller droplets
Air volume from spray must replace all air in tree canopy	Smaller volume of concentrated spray droplets
Better wetting action for larger trees	Better for small trees & high-density plantings
More effective for applying plant bio-regulators & nutrients	Better for pesticides because it reduces chemical used
Better in wind	Less time refilling tank→more acres/day
	Lighter→less soil compaction



**Off-target
spray drift**

Reducing Pesticide Drift

- **Food Quality Protection Act of 1996**
Mandated EPA review and strengthen safety limits for pesticide residues in foods
- ***Pesticides in the Diets of Infants and Children***
(National Academy of Sciences' National Research Council, 1993)

PropTec Tower Sprayer



Tower Sprayers

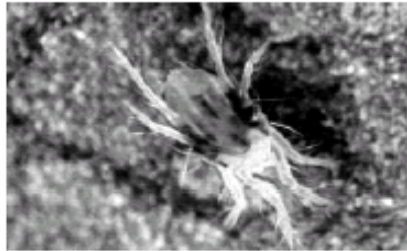
- **Objectives:**
 1. **Reduce drift**
 2. **Reduce quantity of pesticides used**
 3. **Increase efficiency of deposition & uniformity on the target**
- **Timing:**
 1. **Full implementation of IPM**
 2. **Sprayers that can deliver spray in narrow window of time, i.e. as needed, under acceptable weather conditions**
- **Target:**
 1. **Close all nozzles that direct spray above or below target**
 2. **Adjust application rate of each nozzle to match the target canopy**

- **Tower sprayers have a different air distribution system that:**
 - 1. Produces a continuous curtain of uniformly spray-laden air**
 - 2. Moves the spray-laden air horizontally, parallel to the ground**
 - 3. Produces smaller sized droplets, which result in improved deposition & uniformity**





2003 Crop Protection Guide for Tree Fruits in Washington



<http://cru.cahe.wsu.edu/CEPublications/eb0419/eb0419.pdf>