Selecting the Correct Nozzle to Minimize Drift

Relation of Drift to Droplet Size

Droplet size is usually expressed in microns:
- 1 micron (\(\mu m\)) = 1/1000 of a millimeter
- 1 mm = 1/1000 of an inch

Droplets that are 200 \(\mu m\) and smaller are more susceptible to wind drift. The larger the droplet diameter, the further it will travel before falling to the ground. Therefore, over 95% of the spray volume is contained in droplets smaller than 200 \(\mu m\).

Theoretical number of droplets/ ft \(^2\) from a 20 gpa application

<table>
<thead>
<tr>
<th>Droplet diameter</th>
<th>Droplets per square foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 (\mu m)</td>
<td>197,000</td>
</tr>
<tr>
<td>100</td>
<td>24,000</td>
</tr>
<tr>
<td>50</td>
<td>3,000</td>
</tr>
<tr>
<td>25</td>
<td>380</td>
</tr>
<tr>
<td>20</td>
<td>45</td>
</tr>
<tr>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

Droplet Size & Target Coverage

While large droplets are desirable to reduce drift, they are not always optimal for maximum effectiveness of the pesticide. Insecticides, fungicides, and contact herbicides with little or no systemic activity usually require smaller droplets for thorough coverage of the target area. However, systemic materials that move within the plant, such as growth regulator herbicides, can utilize much larger droplets without sacrificing control. Always consult the product label for information on nozzle selection and equipment setup to produce the appropriate coverage.

Effect of Nozzle Type & Pressure

- **Low-pressure Flat Fan Nozzles**
  - Broadcast flat-fan nozzle that operate in a 15 - 60 psi pressure range
  - Offer more flexibility than conventional flat-fan nozzles operated at 30 - 60 psi
  - Wide pressure range is compatible with variable controllers

- **Air-Induction Nozzles**
  - Produce large, air-filled drops
  - Droplet size is roughly twice that of standard flat fan nozzles
  - Operate at pressure range of 40 - 100 psi
  - Utilize a pre-orifice to reduce pressure, which draws air through inlet by venturi action
  - Air and spray solution are mixed and then discharged
  - Upon exit, air in droplets expands, increasing droplet velocity
  - Droplet size is dependent on composition of spray solution (additives, surfactants, etc.)

Strategies to Reduce Drift

- Select nozzle to increase drop size
- Increase flow rates - higher application volumes
- Use lower pressures
- Use lower spray boom heights
- Avoid adverse weather conditions
- Consider using buffer zones
- Consider using new technologies – drift reduction nozzles – drift reduction additives

Droplet Size Comparisons
(Data provided by Spraying Systems Co.)

<table>
<thead>
<tr>
<th>Nozzle type</th>
<th>Pressure</th>
<th>Dv0.5</th>
<th>Dv0.5</th>
<th>% Volume</th>
<th>Dv0.5</th>
<th>% Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbo Drop®</td>
<td>40 - 100</td>
<td>200</td>
<td>250</td>
<td>&lt;100</td>
<td>200</td>
<td>&lt;100</td>
</tr>
<tr>
<td>LFR Flat Spray Tip</td>
<td>40 - 100</td>
<td>200</td>
<td>250</td>
<td>&lt;100</td>
<td>200</td>
<td>&lt;100</td>
</tr>
<tr>
<td>Delavan Spray Technologies</td>
<td>40 - 100</td>
<td>200</td>
<td>250</td>
<td>&lt;100</td>
<td>200</td>
<td>&lt;100</td>
</tr>
</tbody>
</table>

Droplet Size Classification

- **Very Fine**
- **Fine**
- **Medium**
- **Coarse**
- **Turbo Drop**

Low-pressure Flat Fan Nozzles

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- Offer more flexibility than conventional flat-fan nozzles operated at 30 - 60 psi
- Wide pressure range is compatible with variable controllers

Pre-orifice Nozzles

- Utilize a pre-orifice insert to reduce pressure within nozzle
- Commonly called drift-reduction flat-fan nozzles
- Used to obtain larger droplets at a given operating pressure

Turbulence Chamber Nozzles

- Turbulence chamber added to further absorb energy within tip
- Increase in droplet size
- Maintains pattern over wide pressure range
- Used in both flat-fan and flooding tip designs

Product data sheet (back page).