Nozzles Tips - Critical to Effective Spraying and Coverage

Good quality accurate spray tips are critical to the success of the operation of the Boom Sprayer and yet they are rarely checked for wear or visible damage, which often results in ineffective application, coverage, crop damage and loss of yield. We tend to be frugal up front by saving as much as possible on the spray tips, when really we should be thinking of investing in the assurance that they will perform properly and give us better results in the long run. Installing nozzles that will resist wear and calibrating them on a regular basis will save money in chemicals, alone. A 500 acre farm using nozzles that have a wear of 10% will add over $4500.00 to its chemical costs. And then you add the cost of the inefficient applications, crop damage and low yields. Just imagine what you have been pouring down the drain, so to speak! Tips should be correctly maintained, with regular checks for visible damage and inaccurate flow. You should replace your tips when the original flow rate goes over 10%.

How Do You Calculate Wear? The nozzle industry works on a parameter that indicates that a brass nozzle at 200psi will achieve a 10% wear in 10 hours. Just think how long you've been running your nozzles out there without even thinking that they may be wearing. Other materials are more expensive than the standard brass tips, and the wear resistance increases with the material hardness and, of course the cost. However, a few years ago the Europeans made a breakthrough in producing nozzles in Polyacetal, an "engineering plastic" material which, with the help of the latest computer technology, can be precision molded to extremely fine tolerances. Also, where other plastics such as nylon readily absorb water and swell up in the process, Polyacetal is particularly stable. Perhaps the most striking quality of Polyacetal tips is their remarkable resistance to wear - superior even to stainless steel.

Relative Nozzle Tip Wear Life

Material	***Wear Factor***
Brass & Aluminum	**1**
Stainless Steel	**2 to 3**
Hardened Stainless Steel	**10 to 15**
Ceramic	**Lifetime**
Carbides (Tungsten, Chrome)	**Lifetime**

The above shows the wear factors of the common spay tip materials in the low to medium price range. Ceramic and Tungsten Carbide spray tips, which have a practically negligible wear factor, are three to five times the cost of spray tips made out of the materials shown on the chart. Polyacetal tips are available in most popular configurations such as fan, disc/core, hollow cone and deflected fan tips.

Choosing the Right Spray Tips

Droplet size and spray quality are affected by various factors, including the properties of the liquid, specific gravity, viscosity and surface tension. The applicator can significantly influence the quality of the spray pattern by the choice of:

- ***Nozzle Type*** - A hollow cone tip will generally produce a finer spray than a fan tip of the same output, pressure and spray angle.
- ***Nozzle Size*** - A small output spray tip will generally produce a finer spray than a large one - given the same nozzle type, spray angle and pressure.
- ***Operating Pressure*** - The spray from any tip will become finer as the pressure is increased.
- ***Fan Spray Angle*** - A 110 degree fan spray tip will give a finer spray than its 80 degree counterpart, where output and pressure are the same.

Choosing the Correct Application Rate

The spray volume or application rate is normally recommended on the chemical label and expressed in gallons per acre or liters per hectare, with upper and lower limits. Select the application rate on the basis of:

- Chemical label information or consultant data
- Special crop requirements - penetrating a dense canopy may require the higher end of the volume range
- The limits of the sprayer pump capacity at the PTO speeds to be used. Always allow plenty of spare capacity for agitation - especially with wettable powders
- If in doubt, use the high volume rate, ensuring that the spray quality is consistent with what has been recommended

Spraying in Wind

Windspeeds are critical when spraying. Spraying when it is too windy leads to poor application patterns as well as drift. Great care must be taken when assessing wind speeds before and during spraying.

Following are some guidelines for observing the effects of the wind. Generally, wind speeds of 2 to 5 mph are ideal for spraying.

- Less than 1 mph - calm - smoke rises vertically
- 1 to 2 mph - Light air - smoke drifts off
- 2 to 4 mph - Light Breeze - leaves rustle, wind felt on face
- 4 to 6 mph - Gentle Breezes - leaves and twigs in constant motion
- 6 to 9 mph - Moderate - small branches move, raises dust or loose paper

Setting the Boom Height

Each tip on a spray boom must not only deliver the correct flow rate, but must distribute the spray evenly across the boom width. When using flat fan spray tips, the spray from each tip should overlap the neighbor's by at least 50%. This is a function of tip height and spray angle.

When using hollow or full cone pattern tips, the boom height should be such that the edge of each pattern touches the edge of the neighbor's pattern at the target height.

To test the even pattern of your spray, regardless of the nozzle type, fill the sprayer with clean water and spray an area of dry concrete. If the surface dries leaving "wet streaks", the application is incorrect and the boom height should be adjusted so that the surface dries out evenly, assuming that the nozzle tips are in good order and are spraying correctly.