QUICK AND EASY SPRAYER CALIBRATION

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Sprayer calibration is a procedure that should be practiced routinely by all people working with turf. Money and time will be saved when a sprayer has been properly calibrated.

Before a calibration check is made several factors such as nozzle selection, overlap, and wear should be considered. Most spray applications in turf are made using either a rectangular flat fan or a flooding fan nozzle. The flooding nozzle does not provide as uniform a spray pattern as does the regular flat fan. The flooding fan nozzles have a higher nozzle output and are used mostly for liquid fertilizer applications. The flat fan nozzle has a more uniform spray pattern and is generally used for herbicide applications. Since nozzle output is a function of pressure, forward travel speed and nozzle size, a good rule of thumb is to use pressure and forward travel speed to make small adjustments in sprayer output and to change nozzles when larger adjustments in nozzle output are desired.

Two recent developments in nozzle design should prove valuable in reducing drift potential. One nozzle is the spraying system's LP teejet nozzle which is a regular flat fan nozzle having the same pattern, spray angle and nozzle output at 15 P.S.I. as does a regular flat fan nozzle at 40 P.S.I. Another drift reducing nozzle is the Raindrop RA nozzle from Delevan. Th RA nozzle is a flooding fan nozzle that uses a large orifice to get larger spray droplets. Less drift results from larger nozzle orifices. There are decreased problems with clogging nozzles and increased nozzle lifetime because of reduced operating pressures and hence less wear.

Nozzle wear is the main reason why sprayers need to be consistantly calibrated. Nozzle wear results from the action of water and suspended particles being forced through the small nozzle orifice under pressure. Wettable powders are notorious for enlarging nozzle orifices due to the suspension of clay particles which make up the wettable powder solution. Brass is the most commonly used nozzle material, but the soft metal has one of the highest wear rates. The use of stainless steel may be worth the additional investment if you use your sprayer regularly. Nylon tips offer a low wear rate but may swell in certain solvents that are used to formulate some pesticides.

Overlap is a measure of the spray swath of a nozzle compared to the nozzle spacing on the boom. As an example, to achieve a 50 percent overlap with a nozzle spacing of 20 inches, the boom height would have to be adjusted until each nozzle provides a 30 inch spray swath. Likewise, to achieve 100 percent overlap with a spacing of 20 inches would require the boom height to be adjusted so that the spray swath of each nozzle covers 40 inches. When using a regular flat fan nozzle the overlap should be 50 percent and when using a flooding fan nozzle best coverage is achieved with 100 percent overlap.

Once you have determined that the nozzles are correct for your application and are spaced properly on the boom you are ready to calibrate your sprayer.

The first thing to do is to check the output from each nozzle. A jar or suitable container can be held under a nozzle for a timed period, usually 15 or 30 seconds, and the output collected. Each nozzle should be measured and a bad nozzle is determined in the following manner. Determine the average

output per nozzle. Every nozzle on the boom should have an ouput within $\pm$ 5% of the average value for all the nozzles. If a nozzle tip is outside the 5% range, the screen and nozzle tip should be cleaned and the output rechecked. If the nozzle is still outside the 5% range, it should be discarded. Remember when cleaning a nozzle tip use a toothpick or other soft material to clean the nozzle orifice. Don't use a nail or other metallic piece that may enlarge the nozzle orifice.

An instrument recently introduced in the United States simplifies greatly the above procedure. The Jetchek is an instrument that electronically measures nozzle output in either gallons per minute or liters per minute. Use of the instrument eliminates the need to use containers and measuring devices to determine each nozzle output. There are also electronic devices available which will monitor the output of your spray rig while you're spraying. These microprocessor controlled units range in price between $200-1000. Check your local dealer to determine what units are available.

Once you have determined nozzle ouput it is simple to determine the gallons per acre your applying. Below is a simple calculation for an 18 nozzle boom with a measured travel speed of 3 MPH. Determine average nozzle output by either the collection method mentioned above or by use of the Jetcheck measuring device. For the example below let us assume an average nozzle output of 0.22 gals/min.

Total boom output = # nozzles X ave. nozzle output
= 18 x 0.22 gals/min.
= 3.96 gals/min

Each 1 MPH of travel speed is equivalent to covering 88 ft/min (1 mile/hr = 5280 ft/60 min = 88 ft/min).

Travel speed = 3 MPH
1 MPH = 88 ft/min
3 MPH = 264 ft/min Spray swath = 15 ft

Area sprayed in one minute = 264 ft/min X 15 ft
= 3960 ft^2/min

$$\frac{\text{Gals}}{1000\ ft^2} = \frac{\text{boom output/min}}{\text{area sprayed/min}} = \frac{3.96\ \text{gals/min}}{3960\ ft^2/\text{min}} = \frac{1.0\ \text{gal}}{1000\ ft^2}$$

There are many ways to calibrate a sprayer, but I have chosen one that I feel is the easiest to use. The important point, however, is to calibrate your sprayer and to that end you should use whatever method with which you feel the most comfortable.