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SPRAYER CALIBRATION

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Maximizing operating efficiency should always include minimizing unnecessary expense. Effective sprayer calibration techniques do just that. Although pesticide applications today can be very different from 20 years ago (or even 10 years ago), the same principles apply. Although technology has taken a lot of the headache out of accurate application, not all of our operations are of the scale to justify the latest technology. A fair percentage of pesticide applications still do not include automatic flow control valves and computer monitors. Bottom line, regardless of what type of sprayer you operate, maintaining efficiency includes an understanding of how to make accurate pesticide applications. The most effective way to maintain accurate calibration is to know the facts. Here are some helpful pieces of information when it comes to calibrating sprayers.

$$GPM = \frac{MPH \times GPA \times W}{5940}$$

"GPM" stands for gallons per minute, "MPH" stands for miles per hour, "GPA" is your desired gallons per acre, and "W" represents the nozzle spacing when broadcasting or the area sprayed by each nozzle when banding. Most broadcast sprayers are equipped with flat fan type nozzles set up on 20 inch spacings. Therefore if I want to broadcast 10 gallons per acre at 7 mph and my sprayer has nozzles spaced every 20 inches, the gallons per minute I should catch from <u>one</u> nozzle would be as follows:

$$\frac{7 \times 10 \times 20}{5940} = 0.235 \text{ (GPM)}$$

It is also handy to remember that there are 128 oz. of water in a gallon so 0.235 GPM is equivalent to 0.235 x 128 or 30 oz. of water per minute. So, if you turn on this sprayer and catch water from one nozzle for one minute you want to adjust your regulator until you reach the desired 30 oz per minute at the desired pressure. Another bit of handy information is that most nozzle sizes actually correspond with the GPM (gallons per minute) which they deliver at 40 PSI. Typically the first numbers on a nozzle describe the angle of the spray pattern and the last numbers describe the output in GPM. For example, an 8002 nozzle is one that delivers 0.2 GPM at 40PSI with an 80 degree pattern. Therefore, in this

scenario, before we begin to actually catch the water we already know that an 8002 nozzle at 40 PSI only delivers 0.2 GPM, so if we want to catch the 0.235 GPM from the previous example we know our pressure is likely to be above 40 PSI with an 8002 nozzle or below 40 PSI with an 8003 nozzle (since 0.235 falls between 0.2 and 0.3 GPM). This is where nozzle life becomes an issue. Worn out nozzles will deliver more water than their intended capacity. Therefore, always catching the water (instead of going by the book) ensures that you are as accurate as possible.

Unfortunately, broadcast spraying is not where most producers encounter problems with calibration. Without a doubt, BANDING pesticide applications can be very confusing. Making a direct comparison to the calibration we just figured, let's try a similar application, but this time, on a banded basis. In this scenario, I want to put out 10 gallons per acre in a two-nozzle band which covers 13 inches (on 40 inch rows) over the center of the row, again at 7 mph. Here's the formula:

$$GPM = \frac{7 \times 10 \times 6.5}{5940} \qquad GPM = 0.077 \quad \text{or} \quad 0.077 \times 128 = 9.9 \text{ oz/min}$$

Notice that we substituted the previous broadcast nozzle spacing of 20 inches with the 6.5 inches that each nozzle is to be responsible for when applying our 2 nozzle 13 inch band. Had the example asked for a single nozzle band we would have plugged the 13 in place of the 6.5 because the single nozzle would be spraying the full 13 inches. If we follow the formula we come up with 0.077 GPM or 9.9 oz/min. In other words to correctly calibrate for this situation you should be able to catch 9.9 oz/min from one of the two nozzles used for this band. This part of the banding issue is fairly straight forward. So, the sprayer is calibrated correctly and we're ready to mix. Typically the confusion begins now. If I want to apply a 1 qt/A of Glyphosate at 10 GPA in a 13 inch band how much water and chemical do I need to spray 80 acres? When making this calculation remember the difference between treated and land acres. This is where most problems arise. Normally, a broadcast application over 80 acres at 10 GPA would require 800 gallons of water. However, when we're only banding 1/3rd of our row spacing our water will spread over 3 times the amount of land acres. Therefore, we only need 267 gallons of total solution (800/3 = 267) to make our banded application to this 80 acre field because were actually only treating 13 inches over the row or 1/3rd of our row spacing which is in this case equivalent to 26.7 treated acres. Therefore if we need to treat only 26.7 acres at 10 GPA we only need 267 gallons of water (26.7 x 10) and 26.7 acres worth of chemical (26.7 quarts in this case). Often times, the fashion in which some choose to refer to banded applications leads to calibration or mixing errors.

For example, the correct way to describe a banded application would be as follows: I want to apply 1 quart/acre at 10 gallons per acre in a 13 inch band (on 40 inch rows). This statement accurately describes both the chemical rate and the amount of water applied in the treated area. Often someone makes the mistake of referring to the same application by saying "since were using a 13 inch band (on 40 inch rows) we only want to put down 1/3rd of a quart per acre or "we're applying 3.33 gallons per acre" instead of 10 GPA in a 13 inch band. These references are used because the producer is thinking in land acres and not treated acres. Speaking in land acres can get you in trouble when you calculate your water and chemical needed. The key to avoiding errors is to always calibrate, mix and spray treated acres. Applying the principles above to your situation will help reduce frustration and increase profitability, and that is the name of the game!

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