

Calibrating Turf Hose Reel Sprayers

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Introduction

Properly calibrating spray equipment is the foundation of any pesticide application. Labeled rates and uniform coverage of turf products are only achieved when equipment output, applicator speed, and appropriate overlap are known and maintained throughout an application. To quote the Purdue Pesticide Program's Dr. Fred Whitford, "There is a science to calibration and an art to application." In other words, it is important to get the math of sprayer output and tank mixing down to a science. It is just as important to have applicators and technicians practice the art of applying pesticides with consistent walking speeds and uniform arm movements. It is this balance of art and science that creates consistently successful turf applications.

Step 1: Calibrating Equipment Output

The first step to hose reel sprayer calibration is to know the sprayer output. This is a simple two-part process of selecting the desired nozzle and then verifying its output with a catch test, which is described below. Nozzles are rated in gallons per minute (GPM) of flow and often color coded. For this example we will assume a nozzle that is rated at 2 GPM is selected.

Verify the 2 GPM flow from this nozzle on your sprayer. Start by marking one gallon increments on the inside of a five gallon bucket. Add exactly one gallon of water to an empty bucket and use a



Figure 1. Catch test performed using a pre-marked five gallon bucket. Be sure to maintain constant pressure, measure time precisely, and check multiple times to ensure accurate catch test results. Photo credit to Josh Landreth - Ace of Blades, LLC.

bold sharpie to mark its level. Repeat with two, three, and four gallons of water in the same bucket.

Next, using the sprayer to spray for one minute into the bucket (Figure 1). Be careful to capture all of the spray and time the catch accurately. It is recommended to repeat this step a couple more times to ensure an accurate reading. If the flow captured in the bucket is consistently much lower than the targeted GPM, then increase the spray pressure. If the captured flow is consistently much higher, then decrease the spray pressure.

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Step 2: Pace Yourself by Calibrating Walking Speed

Calibrating an applicator to cover a certain amount of lawn in a specified amount of time takes practice. Start by marking a 24 feet by 42 feet rectangle on a dry parking lot, which will create an approximately 1,000 ft² area to spray. Attempt to uniformly spray the 1000 ft² area in one minute at a comfortable pace using parallel swaths. Perform this step a few times so that the pace can be increased or decreased as needed to cover the area in one minute. This pace should be able to be maintained throughout actual applications that are much larger than 1000 ft². Be careful to only run the stopwatch while spraying. For accuracy, consider stopping the clock while the nozzle is off such as while turning around or adjusting the hose.

Remember that the sprayer has a flow rate in this example of 2 GPM. If the applicator can reliably cover the 1000 ft² in one minute, then the application volume would be calibrated at 2 gallons per 1000 ft².

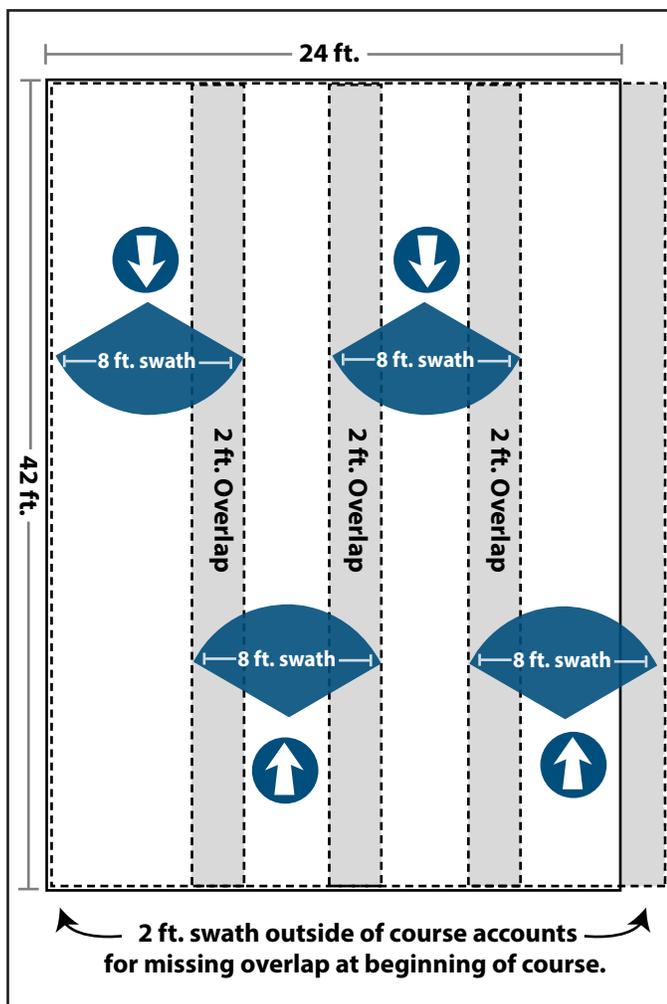


Figure 2. Illustration of 1000 ft² spray course used to practice walking pace and uniform overlap. When used on dry pavement, needed adjustments to an applicators technique become evident in how uniformly the surface dries.

Equipment adjustments need to be made if the applicator consistently completes the 1000 ft² course faster or slower than one minute. This adjustment is easy to make by noting the length of time required to complete the course and then using this time to repeat step one described above. As an example, if the desired pace only takes 50 seconds to complete the course, then adjust the pump output to deliver the target rate of 2 gallons in 50 seconds instead of one minute. This adjustment results in the same 2 gallons per 1000 ft² applied at a pace customized for the applicator.

Step 3. Uniformity Through Calibrated Arm Motions

Moving at the calibrated pace may cover the lawn but it does not ensure uniform coverage of products. An applicator's arm motion must apply the spray at a uniform width, pace, and overlap. Similar to walking pace, this takes practice.

Tips for uniform overlap:

- Focus on a point in the distance so that you walk straight.
- Practice holding the spray gun level, out, and spraying forward instead of down at your feet.
- Swing your arm (not wrist) at a brisk pace throwing approximately an 8-foot-wide swath.
- Individual weeds should receive about three swings of product as you walk forward.
- At the end of a pass, take two large steps over (approximately 6 feet) to make the next parallel pass. This should produce approximately 2 feet of overlap between swaths. Figure 2 illustrates a 1000 ft² course, traversed with proper overlap using 4 passes producing 2 feet of overlap between swaths.

It is easy to identify if adjustments need to be made by practicing these steps with water on a paved surface. After the practice application is completed, uniformity can be observed as the pavement dries. Areas that dry quickly received a lighter rate than areas that remain wet longer. Look for patterns and tweak techniques to produce a uniform application. Remember that this is a process and it takes practice.

Step 4. Tank Mixing

With a known sprayer output and an applicator that can consistently and uniformly cover the needed ground, we can now determine how much product to mix.

Remember that in this example we are applying 2 gallons of spray solution per 1000 ft². If our spray tank can hold 500 gallons of solution then we simply divide tank volume by sprayer output to get the area covered by one tank.

$$\frac{\text{Tank Volume}}{\text{Sprayer Output}} = \text{Area covered by one tank}$$

$$\frac{500 \text{ gal}}{(2 \text{ gal} / 1000 \text{ ft}^2)} = \text{Area covered by one tank}$$

Calculation is simplified and entered into a calculator as -

$$\frac{500 \text{ gal}}{2 \text{ gal}} \times 1000 \text{ ft}^2 = 250,000 \text{ ft}^2$$

Most labels specify how much product to apply per 1000 ft². So the next step would be to determine how many 1,000 ft² we can cover with one tank. This can be calculated by dividing the “area covered by one tank” by 1,000.

$$\frac{\text{Area covered by one tank}}{1000 \text{ ft}^2} = \# \text{ of } 1000 \text{ ft}^2$$

$$\frac{250,000 \text{ ft}^2 \text{ covered}}{1000 \text{ ft}^2} = 250$$

Finally, refer to the product label to determine the rate per 1,000 ft². As an example, we’ll assume that the rate is 3 oz. per 1000 ft². We know that we can cover 250 separate 1000 ft² areas and that each of them should receive 3 oz. of product. Therefore, 250 times our rate should give us the total amount of product we should put in the tank in ounces.

$$(\# \text{ of } 1000 \text{ ft}^2 \text{ areas covered}) \times (\text{rate per } 1000 \text{ ft}^2) = \text{product per tank}$$

$$250 \times 3 \text{ oz.} = 750 \text{ oz. of product needed per tank}$$

Ensure proper mixing by filling the tank half full, adding product slowly, agitating the solution and then filling the remainder of the tank. You are now ready to confidently apply the properly mixed spray solution with the science of a calibrated sprayer and the art of a calibrated applicator.

Conclusion

Sprayer calibration in turf is essential to making responsible and economical applications. Hose reel sprayer applications are a balance of art and science that take practice and periodic system checks to ensure accurate and uniform applications. These checks should be repeated throughout the spray season, any-time changes are made to equipment and with new applicators. Over and under applying pesticides can be costly, ineffective, bad for business and environmentally hazardous. Calibrate, practice, and apply with confidence.

References

Whitford, F., Hardebeck, G., Becovitz, J., Avenius, B., and Blessing, A. (2009). *Calibrating the Hose Reel Lawn Care Sprayer*. West Lafayette, IN: Purdue University Cooperative Extension Service.

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