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Spreader Calibration

for Turfgrass

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SPREADER CALIBRATION

Proper application of pesticides and fertilizers is possible only with accurately calibrated equipment. Proper operation, maintenance and calibration of spreaders ensure the optimum effectiveness of fertilizers, pesticides, and other materials applied to turf.

Applicators who do not take the time to calibrate equipment misapply pesticides by more than 10 percent. Misapplication can lead to repeat applications, damaged plants, excess cost and contamination of the environment.

Calibration involves determining the distribution pattern and application rate of material being applied from a particular spreader. Techniques for measuring the distribution pattern and application rate depend on the spreader type. Two commonly used spreaders are the drop spreader and rotary spreader.

The drop spreader has a uniform and consistent pattern, low drift potential, and precise control of the pattern's edge (useful for edging around driveways and flower beds). When drop spreaders are working properly, their distribution patterns are seldom a problem.

Rotary spreaders are preferred for larger areas because their wide swath allows for faster application. Rotary spreaders have patterns that are more forgiving of operator error, are easier to push, have better ground clearance, and have less delicate rate mechanisms that allow them to hold their calibration over a longer period of time. The distribution pattern of rotary spreaders can be affected by spreader design, the product being applied, environmental factors, and the operator.

Spreader Design - The impeller (paddle, spinner, etc.) characteristics such as impeller diameter, speed (gear ratio), height above the ground, fin shape and angle and surface characteristics are all designed by the manufacturer.

A number of factors affect product distribution.

Product Being Applied - The characteristics of the product (fertilizer or pesticide) such as the particle shape, size, uniformity, density, critical relative humidity (the humidity at which the fertilizer becomes sticky), and surface friction all affect distribution.

Environmental Factors - Wind speed and direction, temperature and humidity affect distribution. These conditions also affect decisions on whether applications are made under current conditions or postponed until conditions become more acceptable.

Operator - The walking speed, handle height and pattern of travel are controlled by the operator. On spreaders equipped with an adjustable port or a pattern adjustment, the drop point of the material onto the impeller can be adjusted.

Because so many factors affect the distribution pattern, spreader calibration can change with different operators, products or environmental conditions. To give a valid indication of spreader performance, calibration should be performed under conditions similar to actual operating conditions. Ground speed, rate and pattern settings, operator, wind speed and direction, terrain, temperature, humidity and product should all closely reflect the predicted conditions at the time of application.

CALIBRATION methods

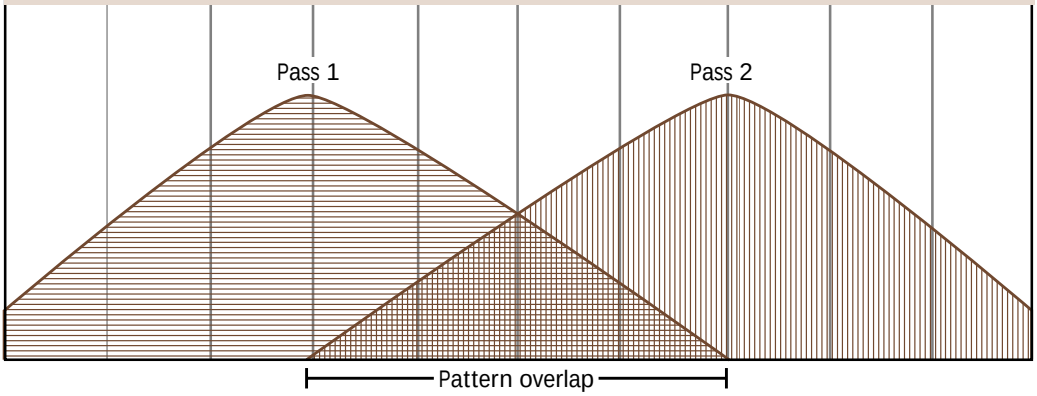
For the calibration of all types of spreaders, select a reasonable walking speed of about 3 miles per hour. Pacing devices that help achieve a consistent walking pace are available. For the purposes of calibration, select the suggested spreader setting (if available from the manufacturer) for the particular spreader in use. If there is no manufacturer's recommended setting, simply choose a "ball park" setting. Then proceed through the following steps.

Rotary spreader calibration

To calibrate a rotary spreader, place a line of collection pans perpendicular to the direction of travel. Use at least 10 pans to cover the entire throwing width (20 to 30 pans may be required for large spreaders). Spacing of the pans depends on the overall expected width. *Note: All collection pans must be identical in size, height and shape.* A rectangular shape, 1 square foot minimum, and 1 to 2 inches deep for small spreaders or 2 to 4 inches deep for larger spreaders is recommended. Material bouncing into or out of the pans can affect results.

Make several passes in the same direction over the pans. Make sure the spreader is open before reaching the pans and remember to walk at the speed later used to distribute the material. Collect and weigh the material in each pan on an accurate scale (grams preferred). The data collected will be used to determine the distribution pattern and application rate.

A desirable distribution pattern for rotary spreaders is reflected in a bell-shaped curve. For uniform distribution, overlap all passes by one-half the width of the distribution pattern.



The first step in analyzing the collection of material is to empty each collection container into separate identical cylindrical tubes and examine the distribution pattern. A desirable pattern is one that peaks in the center of the pattern and descends evenly on each side (a bell-shaped curve). Similar quantities of material should be applied to the left and right side of the spreader (not skewed in either direction). Uneven distribution can be corrected by repositioning the pattern adjustment control (if the spreader has one) or restricting the discharge ports. Some overlap of the pattern is required to achieve a uniform distribution of material. This is because of the bell-shaped nature of the distribution pattern.

Next, the effective pattern width (or optimum swath width) is determined. The effective pattern width is the distance between continuous passes of a spreader during operation, where the calibration collection tray contents on the left and right are equal to one half the amount in the center tray.

Finally, to determine the application rate (lbs. material per 1,000 ft.^{2}), use the weight of material collected from the pan in the center of the pattern in the following equation.

Continue this process until the desired rate is achieved, either by increasing or decreasing the spreader setting (size of the discharge ports).

$$1{,}000 \times \frac{\text{lbs. material collected in the center tray}}{\text{sq. ft. pan} \times \text{\# of passes}} = \text{lbs. material per } 1{,}000 \text{ ft.}^2$$

Drop spreader calibration

Calibration of drop spreaders involves collecting and weighing the material being spread.

Pan method: The spreader is pushed over a pan(s) and the material is collected and weighed. By knowing the area of the pan and weight of the material, the application rate can be determined as follows.

$$1{,}000 \times \frac{\text{lbs. material collected in the center tray}}{\text{sq. ft. pan} \times \text{\# of passes}} = \text{lbs. material per } 1{,}000 \text{ ft.}^2$$

A drop spreader has a uniform, consistent application pattern.

Sweep and weigh method: Push the spreader over a clean, smooth surface of a known distance and sweep and weigh the material. The application rate can be determined by the following.

$$1{,}000 \times \frac{\text{lbs. material collected}}{\text{spreader width} \times \text{distance traveled}} = \text{lbs. material per } 1{,}000 \text{ ft.}^2$$

Catch pan method: Attach a catch pan to the bottom of the drop spreader. Establish and mark two points of a known distance. Then push the spreader over the known distance, opening the hopper at the starting point and closing it at the finish point. Collect and weigh the material caught in the pan. The application rate can then be determined using the following formula.

$$1{,}000 \times \frac{\text{lbs. material collected}}{\text{spreader width X distance traveled}} = \text{lbs. material per } 1{,}000 \text{ ft.}^2$$

With any method, make enough passes or travel enough distance so that the quantity of material collected is great enough to be weighed accurately. If the calculated rate is too high, reduce the setting adjustment. If it is too low, increase the setting adjustment. Continue this process until the desired rate is achieved.

SPREADER operation tips

- Close the lever before filling the hopper.
- Do not overfill the hopper.
- Make sure the screen is in place; this will prevent clogging.
- Always push the spreader; do not pull.
- Push the spreader as close to the calibrated speed as possible.
- Always start walking before opening the lever, and close the lever before stopping forward motion.
- Hold the handle at the height used in calibration. The impeller should be level.
- Walk in straight lines (use a reference point such as the spreader wheel marks or footprints).
- Do not spread material while turning. Often, only one wheel drives the impeller causing it to either speed up or slow down thus affecting the distribution pattern.
- Do not make applications in sensitive areas if wind speed is greater than 5 miles per hour.
- Keep material dry to prevent caking and clogging of the ports.
- Use spreader with deflector when applying near plant beds, streets, parking areas or other areas where application is not desired.

For more information, see the Web site at http://aggieturf.tamu.edu.

SPREADER maintenance tips

- Wash the spreader after each day's use to avoid buildup around ports and on the impeller.
- Cold water is adequate for cleaning water-soluble products. When using plastic or waxy products, however, a solvent and/or scraping may be required. (Be sure to consult the manufacturer for appropriate solvents.)
- Lubricate the spreader parts using an appropriate lubricant as noted in the operator's manual.
- Repair promptly, using proper replacement parts. Keep frequently used parts on hand.
- Store the spreader in a cool, dry place without a load in the hopper.
- Proper maintenance will increase the life of the spreader.

A rotary spreader uses a wide swath for rapid application.

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