PROCEDURE FOR

Calibrating Granular Pesticide Applicators

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Granular applicators should be calibrated properly to ensure uniform and accurate application; this helps producers to apply the accurate amount of an active ingredient required for a given degree of control, thus benefiting both the environment and the producer.

Several factors can influence the amount of granular material applied to a given area. Granular material is usually metered with an adjustable orifice or outlet. The amount of material that flows through the outlet per revolution depends on the outlet's opening size and on rotor speed. A wide variation in product characteristics such as size, shape and density require re-calibration for every chemical applied. Change in climatic conditions such as temperature and humidity also can result in different flow rates, so a proper calibration is important and highly recommended.

Granular application usually is performed in combination with another operation, such as planting or cultivating. The applicator may be ground–driven or driven by a small electric motor. The following procedure will provide the total material (in pounds) applied per acre. This procedure requires a scale that can weigh in ounce increments. Scales should be accurate within ¼ oz to obtain a high degree of accuracy.

CAUTION:

Calibration is performed using the actual chemical to be applied. Protective equipment such as rubber gloves must always be worn during calibration to avoid direct contact with the chemical.

Step 1. Determine the type of application to be made and select the appropriate procedure from Table 1.

Table 1. Corresponding Procedures for Different Types of Application.

Type of Application	Procedure	Coverage Basis
Broadcast	A	Broadcast (lb/acre)
Band	B	Broadcast (lb/acre of band)
Row*	C	Row (lb/acre of row)

**Determine and use average row spacing for modified row patterns. Use the width of the area covered per row as the row spacing in skip–row patterns for broadcast rates.*

Step 2. Using the selected procedure from Step 1, determine the appropriate calibration distance from Table 2, or calculate the distance using Equation 1.

A. **Broadcast application:** Measure outlet spacing in inches. All outlets on the application equipment must be evenly spaced. Find this spacing in the left column of Table 2 and read across for the corresponding calibration distance. Example: For a 19–in. spacing, the calibration distance is 214.9 ft.
B. **Band application:** Measure band width in inches. Find this band width in the left column of Table 2 and read across for the corresponding calibration distance. Example: For a 12–in. band, the calibration distance is 340.3 ft.
C. **Row application:** Measure row spacing in inches for evenly spaced rows. Find this row spacing in the left column of Table 2 and read across for the corresponding calibration distance. Example: For a 38–in. row spacing, the calibration distance is 107.5 ft.

Table 2. Calibration distances with corresponding widths.

Row spacing, outlet spacing, or band width (inches)	Calibration distance (feet)
48	85.1
42	97.2
40	102.1
38	107.5
36	113.4
30	136.1
24	170.2
20	204.2
19	214.9
18	226.9
12	340.3
10	408.4
8	510.5

Equation 1. Calculate a custom calibration distance

Use the following formula to determine calibration distance for any given spacing or band width not listed in Table 2.

$$\frac{4083.6}{the\ spacing\ or\ band\ width\ in\ inches} = calibration\ distance\ in\ feet$$

For example, for a 13-in. band, the calibration distance would be 4083.6 divided by 13, which equals 314.1.

CAUTION:

Agricultural chemicals can be dangerous. Improper selection or use can seriously injure humans, animals, plants, soil, or other property. Select the right chemical for the job and handle chemicals with care. Follow instructions on the container label and instructions from the equipment manufacturer.

To increase calibration accuracy for wide outlet spacings, multiply the calibration distance by a factor (e.g., 2) and then divide the material collected (see Step 8) by the same factor (in this case, 2) for pounds per acre. For narrow bands, or row spacings with long calibration distances, divide the calibration distance by a factor (e.g., 4) and multiply the material collected (see Step 8) by the same factor (in this case, 4) for pounds per acre.

Step 3. Measure and mark the calibration distance in a typical portion of the field where chemicals will be applied.

Step 4. With all attachments (such as harrows or planters) in operation and traveling at the desired operating speed, determine the time in seconds that the application equipment takes to travel the calibration distance. Be sure the equipment is traveling at the desired operating speed for the full length of the calibration distance. Mark or make note of the engine RPM and tractor gear used to attain the desired operating speed. The tractor must be operated at the same speed during both calibration and actual application.

Step 5. Multiply the number of seconds required to travel the calibration distance by 8. This is the total time in seconds used to collect the material in Step 7.

Step 6. With the applicator sitting still and operating at the same engine RPM speed as used in Step 4, adjust the gate opening in the applicator to the desired setting. Collect material from each outlet for an equal, known time period to check uniformity of outlets across the swath or rows. Each outlet must be within 5% of the average outlet output.

Step 7. For procedure A (determined in Step 2), collect material from one outlet for the total time in seconds calculated in Step 5.**

For procedure B (determined in Step 2), collect material from all outlets used on one band width for the total time in seconds calculated in Step 5.

For procedure C (determined in Step 2), collect material from all outlets used for one row for the total time in seconds calculated in Step 5.

**For ground-driven equipment, multiply the calibration distance by 8 and collect from each outlet while traveling the calibration distance.

Step 8. Weigh the amount of material collected in ounces. The number of ounces collected is the applied rate (in pounds per acre) on the coverage basis indicated in Table 1. For example, if you collect 18 oz of material, the applicator will apply 18 lb per acre broadcast. If the applied material rate (lb/ac) is different from the target rate, adjust the applicator speed and gate opening to obtain the desired rate.

Step 9. Check applicators for proper calibration every 4 to 8 hr of use by repeating steps 7 and 8. If there is a difference of more than 5% in the applied rate from the original calibration, check the system and re-calibrate the applicator.

Calculating the amount of product needed for band application

To determine the amount of material in pounds required to make a band application in a field, determine the number of acres in the actual treated band. When all treated bands are the same width and all untreated bands are the same width, which is usually the case, calculate the acres in the treated band by dividing the width of the treated band by the sum of the widths of the treated and untreated bands, then multiply this fraction by the number of acres in the field.

Example: How many acres will be treated in a 30-acre field if a 12-in. band of chemical is applied over the drill of rows spaced 36 in. apart?

Calculations: The treated band width is 12 in. and the untreated band width is 24 in. (36 in. – 12 in.). Treated acres will equal 12 divided by 36 (12 in. + 24 in.), multiplied by 30 acres (12/36 x 30), which equals 10 acres. The total amount of material (in pounds per acre) required for a 30-acre field will be 10 times the amount of material calculated in Step 8.

Other Application and Storage Considerations

Humidity affects both the application rate and caking in the metering rolls. It's extremely important to recheck the acreage that a bag of granular material covers. Check hoses and outlets at each fill–up and look for any obstructions that might restrict the particles flowing through them. Other calibration methods such as using manufacturer's calibration cups also are accurate. The procedure usually is written on the cup itself. Make sure to use a cup specifically designed or recommended by the manufacturer for the specific material being applied.

Most granular materials are caustic to metals. Therefore, it's important to take proper care of applicator units to increase their working life. Before storing the unit, clean it thoroughly. To slow rust development on all metal parts, spray or brush on a mixed solution of equal parts diesel fuel and used oil. Remove any plastic, fiberglass, or rubber parts exposed to sunlight and store them inside. Direct exposure to sunlight will break down these compounds and cause them to become hard and brittle.

Always handle pesticides with extreme care and according to label recommendations. When misused or misapplied, they can be deadly.

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