Calibrating Fertilizer Spreaders

Kai Umeda
David Kopec
University of Arizona
Cooperative Extension
Fertilizer spreader types

- Drop spreader
- Broadcast spreader
  - Rotary or centrifugal
Drop spreader calibration

- Calculate the area covered by the drop spreader that travels a specified distance
- Measure width of hopper between wheels
  - Generally 1.5, 2, 2.5, or 3 feet wide
- Measure and mark a distance to travel
  - 66 ft-8 in distance X 1.5 ft width = 100 ft$^2$
  - 50 ft X 2 ft = 100 ft$^2$
  - 40 ft X 2.5 ft = 100 ft$^2$
  - 33 ft-4 in X 3 ft = 100 ft$^2$
Drop spreader calibration

2 methods to measure the amount of product being applied

– “catch pan” method
  - attach a plastic or cardboard “pan” under the hopper to catch the product being applied

– “sweep” method
  - “apply” the product on a paved surface then sweep and collect the product into a dustpan
Drop spreader calibration

- Set the hopper opening to a low to medium range setting
- Fill the hopper half full with a product
- Push the spreader at a comfortable walking speed that will be the same pace used to actually apply product; open the hopper;
- travel the marked off distance;
- close the hopper
Drop spreader calibration

- Remove the “catch pan” with the product or
- “Sweep” and collect the product on the pavement
- Weigh the product
- Record the weight of the product that was collected
- Repeat the procedure 2 or 3 more times or until consistent results are obtained (10%)
Calculate the spreader output

Output rate = amount collected / area covered
- amount collected in pounds (16 oz = 1.0 lb)
- area covered 100 ft² or other calculated from hopper width X distance travelled
- Output rate = x pounds / 100 ft²
Example calibration

- Target is to apply 0.5 lb / 1000 ft$^2$ nitrogen using ammonium sulfate (21-0-0)
  - ammonium sulfate has 21% N
  - $0.5 \text{ lb N} / 21\% = 2.38 \text{ lb ammonium sulfate}$

- Spreader must be calibrated to drop
  $2.38 \text{ lb ammonium sulfate} / 1000 \text{ ft}^2$

- Target output rate of spreader should be
  $0.238 \text{ lb ammonium sulfate} / 100 \text{ ft}^2$ or
  $3.8 \text{ oz} / 100 \text{ ft}^2$
Example calibration

- Target is to apply 0.5 lb / 1000 ft$^2$ nitrogen using ammonium sulfate (21-0-0)
- Target output rate of spreader should be 0.238 lb ammonium sulfate / 100 ft$^2$ or 3.8 oz / 100 ft$^2$
- 10% error rate range 3.4 to 4.2 oz / 100 ft$^2$
Drop spreader calibration

- Repeat the procedure for each setting on the spreader
- Repeat the procedure for each different product that is applied using the spreader
- Record the weights of the products collected
- Record the settings on the spreader associated with each procedure
Broadcast spreader calibration

2 steps required for calibration

1. Determine effective swath width of spreader
   - Granular product throw distance to either side of spreader with “collection trays”
   - Distribution is not uniform
   - Even distribution achieved by overlapping

2. Measure amount of product being applied
   - “collection trays”
   - “catch pan” method
   - “sweep method”
Broadcast spreader calibration

Determine effective swath width of spreader

- Granular product throw distance to either side of spreader with “collection trays”
- Distribution is not uniform

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<thead>
<tr>
<th>10%</th>
<th>30%</th>
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<th>90%</th>
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“throw distance” in feet
Effective swath width is where the rate is about 50% of the amount at the center.

Example is 6 ft left and 6 ft right of center.

Effective swath width is 12 ft.

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“throw distance” in feet
Broadcast spreader calibration

- Calculate the area covered by the broadcast spreader that travels a specified distance
- Determine the “effective swath width”
  - Example “effective swath width” = 12 ft
- Measure and mark a distance to travel
  - 83 ft - 4 in X 12 ft = 1,000 ft²
Broadcast spreader calibration

Measure amount of product being applied

- “collection tray”
  - Use the center collection tray from the previous effective swath width determination

- “catch pan” method
  - Attach a collection bag or container around the impeller to catch the product being applied

- “sweep method”
  - “apply” the product on a paved surface then sweep and collect the product into a dustpan
Broadcast spreader calibration

- Set the hopper opening to a low to medium range setting
- Fill the hopper half full with a product
- Push the spreader at a comfortable walking speed that will be the same pace used to actually apply product; open the hopper; travel the marked off distance; close the hopper
Broadcast spreader calibration

- Remove the “catch pan” with the product or
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- Repeat the procedure 2 or 3 more times or
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- Target is to apply 0.5 lb / 1000 ft$^2$ nitrogen using ammonium sulfate (21-0-0)
  - ammonium sulfate has 21% N
  - $0.5 \text{ lb N} / 21\% = 2.38 \text{ lb ammonium sulfate}$
- Spreader must be calibrated to throw $2.38 \text{ lb ammonium sulfate} / 1000 \text{ ft}^2$
Example calibration

- Target is to apply 0.5 lb / 1000 ft$^2$ nitrogen using ammonium sulfate (21-0-0)
  - ammonium sulfate has 21% N
  - 0.5 lb N / 21% = 2.38 lb ammonium sulfate

- Spreader must be calibrated to throw
  2.38 lb ammonium sulfate / 1000 ft$^2$

- 0.00238 lb / 1 ft$^2$ = 1.08 gm / 1 ft$^2$

1 ft$^2$ = 12 in X 12 in center “collection tray”
## Calibration worksheet

<table>
<thead>
<tr>
<th>Spreader setting</th>
<th>Amount of product / covered area*</th>
<th>Calculated amount of product / 1000 ft²</th>
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*covered area = width of hopper X distance travelled
References

- Cooperative Extension “TURF TIPS”
  - a collection of turf maintenance publications designed to provide solutions for turf maintenance

- Cooperative Extension turf maintenance tips written for “Cactus Clippings”
  - a monthly publication of the Cactus & Pine Golf Course Superintendents Association of Arizona

- http://cals.arizona.edu/turf