Illinois-Indiana Seed Conditioning Workshop
What is behind the calculations?
Ron Reichert
February 5, 2019
What is behind the calculations?

Seed Treatment Rate Calculations

- Application Rate – the amount of a formulated product needed to achieve the desired dose or amount of active ingredient applied to the seed. Always consult product label for application rates. In some cases the label will have an application rate range based on the level of pest control needed. Do not exceed the maximum label rate.

  ▶ Application rate may be expressed several different ways and can be specific to a dose per volume of seed, a dose per given weight of seed, or a dose per seed or specific number of seeds.
What is behind the calculations?

• Application Goal
  - Safe and Accurate Application of the Correct Dose and Even Distribution of the Active Ingredient(s) to the Seed.

• Rates typically expressed as:
  - fl oz/cwt (ml/100kg)
  - oz/cwt (gm/100kg)
  - oz ai/cwt (gm ai/100kg)
  - mg ai/Seed
  - Fl oz/unit (typically calculated from mg ai/seed where a “unit” has been defined, i.e. 140,000 seed for soybean or 80,000 seed for corn)
    – It is very important to identify the number of seed per unit as not every seed company may use the exact same unit expression.
What is behind the calculations?

Seed Treatment Application Calculations – mg ai per seed

- This rate is used for seed treatment products that are applied as a specific amount of active ingredient per seed basis.

Example Product –

ILeVO®

A systemic seed treatment for use on Soybean for the protection against damage caused by early season plant pathogenic nematodes. As a soybean seed treatment provides protection from seedling infections by Fusarium virguliforme, the causal agent of Sudden Death Syndrome.

ACTIVE INGREDIENT: FLUOPYRAM: N-[2-[3-chloro-5-(trifluoromethyl)-2-pyridinyl]ethyl]
2-(trifluoromethyl)benzamide* .................................................................48.4%
OTHER INGREDIENTS: .............................................................................51.6%
TOTAL: 100.0%

Contains 5 lbs FLUOPYRAM per gallon (600 g FLUOPYRAM per liter) *(CAS Number 658066-35-4)
EPA Reg. No. 264-1167
SUSPENSION CONCENTRATE
What is behind the calculations?

- Seed Treatment Application Calculations – mg ai per seed
  - Example Product Rate for Soybean (from product label)

<table>
<thead>
<tr>
<th>SOYBEAN</th>
<th>Application Rates</th>
<th>Product Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sudden Death Syndrome</td>
<td>0.15 - 0.25 mg</td>
<td>Apply using...</td>
</tr>
<tr>
<td>(Fusarium viguliforme)</td>
<td>ai/seed or 1.18</td>
<td>uniform application</td>
</tr>
<tr>
<td></td>
<td>to 1.97 fl oz</td>
<td>of seed is necessary</td>
</tr>
<tr>
<td></td>
<td>(35 to 58 ml) /</td>
<td>to ensure seed</td>
</tr>
<tr>
<td></td>
<td>140,000 soybean</td>
<td>safety and best...</td>
</tr>
<tr>
<td></td>
<td>seeds</td>
<td>disease protection.</td>
</tr>
<tr>
<td>Early-season Septoria Brown</td>
<td></td>
<td>Dilute product with</td>
</tr>
<tr>
<td>Spot (Septoria glycines)</td>
<td></td>
<td>sufficient water to...</td>
</tr>
<tr>
<td>Soilborne Nematodes</td>
<td>0.075 - 0.25 mg</td>
<td>Apply to high quality,</td>
</tr>
<tr>
<td>(Heterodera glycines,</td>
<td>ai/seed or 0.6</td>
<td>properly cleaned...</td>
</tr>
<tr>
<td>Meloidogyne incognita,</td>
<td>to 1.97 fl oz</td>
<td></td>
</tr>
<tr>
<td>Rotylenchulus reniformis,</td>
<td>(18 to 58 ml) /</td>
<td></td>
</tr>
<tr>
<td>Pratylenchus spp.,</td>
<td>140,000 soybean</td>
<td></td>
</tr>
<tr>
<td>Hopiologymus spp.)</td>
<td>seeds</td>
<td></td>
</tr>
</tbody>
</table>
What is behind the calculations?

- Many Seed Treatment Manufactures Offer Excel Based Calculators for mg ai/seed products.

### ILeVO® and Poncho/VOTiVO® Rate Calculator For Soybean

<table>
<thead>
<tr>
<th>Product</th>
<th>Rate - mg a.i./seed</th>
<th>Fl. Oz. / CWT. To Apply*</th>
<th>Fl. Oz. per 140,000 Seed Unit To Apply</th>
<th>Rate - GM Product / KG Seed To Apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>ILeVO (Nematode Rate)</td>
<td>0.075</td>
<td>1.16</td>
<td>0.592</td>
<td>0.94</td>
</tr>
<tr>
<td>ILeVO (SDS Rate)</td>
<td>0.15</td>
<td>2.33</td>
<td>1.183</td>
<td>1.88</td>
</tr>
<tr>
<td>Poncho/VOTiVO</td>
<td>0.13</td>
<td>2.02</td>
<td>1.026</td>
<td>1.68</td>
</tr>
</tbody>
</table>

Enter Seed Per Pound in Blue and Click Green Cell to Calculate Fl Oz / CWT To Apply. Pounds Seed / 140,000 seed unit.

* fl oz/cwt rates for ILeVO and Poncho/VOTiVO are valid only for the seeds per pound of the seed lot to be treated entered in Red font above. The seeds per pound for each seed lot to be treated must be entered to calculate the correct fl oz/cwt rate for each specific seed lot to be treated.

For proper stewardship of seed applied insecticides such as Poncho/VOTiVO a polymer coating for dust control must be used. Peridiam Quality 1010 @ 1 fl oz/cwt is recommended. Coatings other than Peridiam Quality 1010 may be approved for dust control by BASF prior to application.

BASF Seed Solutions, 2 T.W. Alexander Drive, Research Triangle Park, NC 27709. Always read and follow label instructions.
What is behind the calculations?

Seed Treatment Application Calculations – mg ai per seed

- In some cases you will need to determine the grams ai/liter in order to calculate the amount of product to apply if the label only provides pounds a.i. per gallon.

Example Product –

**ILeVO®**

A systemic seed treatment for use on Soybean for the protection against damage caused by early season plant pathogenic nematodes. As a soybean seed treatment provides protection from seedling infections by Fusarium virguliforme, the causal agent of Sudden Death Syndrome.

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**OTHER INGREDIENTS:** ..........................................................51.6%

**TOTAL:** 100.0%

Contains 5 lbs FLUOPYRAM per gallon (600 g FLUOPYRAM per liter) *(CAS Number 658066-35-4)

EPA Reg. No. 264-1167

SUSPENSION CONCENTRATE

- 5 pounds ai per gallon
  - 1 pound = 453.6 grams, 1 gallon = 3.785 liters, 1 liter = 1,000 milliliters, 1 gram = 1,000 milligrams, 1 fluid ounce = 29.574 milliliters
  - 5 pounds \( \times \) 453.6 grams per pound = 2,268 grams ai per gallon
  - 1 gallon = 3.785 liters so 2,268 grams ai per gallon = 2,268 grams ai per 3.758 liters
  - 2,268 grams ai \( \div \) 3.758 liters = 603.5 grams ai per liter or 603.5 grams ai per 1,000 milliliters (this is typically rounded to 600 grams ai per liter)
What is behind the calculations?

Seed Treatment Application Calculations – mg ai per seed to fl oz/cwt

- Calculating Fluid Ounces per 100 lbs Seed needed from a milligrams ai per seed rate.

If you do not have the number of seed per pound it can be determined from the unit count and weight.

- 140,000 seed per bag unit with a unit (bag) weight of 48.7 pounds.
  - 140,000 seed per bag unit ÷ 48.7 lbs per bag = 2,875 seed per pound

Fluid Ounces per Hundredweight calculated from seed per pound and mg ai/seed

- 2,875 seed per pound × 100 pounds = 287,500 seed per 100 pounds
- 287,500 seed × 0.15 milligrams ai per seed = 43,125 milligrams ai per 100 pounds seed
- 43,125 milligrams ai per 100 pounds ÷ 1,000 milligrams per 1 gram = 43.125 grams ai per 100 pounds
- 43.125 grams ai per 100 pounds × 1,000 milliliters ÷ 600 grams ai = 71.875 milliliters per 100 pounds
- 71.875 milliliters per 100 pounds ÷ 29.574 milliliters per 1 fluid ounce = 2.43 fluid ounces per 100 pounds

Note – the 2.43 fluid ounces per 100 pounds is only valid for seed with 2,875 seed per pound.
What is behind the calculations?

Seed Treatment Application Calculations – mg ai per seed to fl oz/140,000 seed unit

- 140,000 seed per bag unit with a unit (bag) weight of 48.7 pounds.
  - 140,000 seed × 0.15 milligrams ai per seed = 21,000 milligrams ai per 140,000 seed

- 21,000 milligrams ai per 140,000 seed ÷ 1,000 milligrams per 1 gram = 21 grams ai per 140,000 seed

- 21 grams ai per 140,000 seed × 1,000 milliliters ÷ 600 grams ai = 35 milliliters per 140,000 seed

- 35 milliliters per 140,000 seed ÷ 29.574 milliliters per 1 fluid ounce = 1.18 fluid ounces per 140,000 seed unit
What is behind the calculations?

- **Seed Treatment Application Calculations – Fluid Ounces per Unit to Fluid Ounces per Hundredweight**

  - Some product labels and many technical bulletins will provide application rates for milligram ai per seed rates in a fluid ounce per unit format. For example with ILeVO at 1.18 fluid ounces per 140,000 seed as listed on the label is equivalent to 0.15 mg ai/seed.

    - 140,000 seed per bag unit with a unit (bag) weight of 48.7 pounds.

    - 1.18 fluid ounces ÷ 48.7 pounds per unit × 100 pounds = 2.42 fluid ounces per 100 pounds seed.

  Note – the 2.42 fluid ounces per 100 pounds is only valid for seed with a 140,000 seed unit weight of 48.7 pounds.
What is behind the calculations?

Seed Treatment Application Calculations – Fluid Ounces per Unit from Fluid Ounces per Hundredweight

- Some product labels may only provide application rates as fluid ounces per hundredweight.
  
  - Fluid Ounces per Unit does not always equal Fluid Ounces per Hundredweight divided by 2 for a product only labeled as fl oz/cwt.
    
    - A seed treatment product labeled for soybean at 2 fl oz/cwt and applied at 1 fl oz/unit will exceed 2 fl oz/cwt once the unit weight gets below 50 pounds.

<table>
<thead>
<tr>
<th>Seed per Pound</th>
<th>Pounds per 140,000 seed unit</th>
<th>1/2 of 2 fl oz/cwt label rate</th>
<th>Fl Oz/CWT Actually Applied</th>
</tr>
</thead>
<tbody>
<tr>
<td>2300</td>
<td>60.87</td>
<td>1</td>
<td>1.64</td>
</tr>
<tr>
<td>2400</td>
<td>58.33</td>
<td>1</td>
<td>1.71</td>
</tr>
<tr>
<td>2500</td>
<td>56.00</td>
<td>1</td>
<td>1.79</td>
</tr>
<tr>
<td>2600</td>
<td>53.85</td>
<td>1</td>
<td>1.86</td>
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<tr>
<td>2700</td>
<td>51.85</td>
<td>1</td>
<td>1.93</td>
</tr>
<tr>
<td>2800</td>
<td>50.00</td>
<td>1</td>
<td>2.00</td>
</tr>
<tr>
<td>2900</td>
<td>48.28</td>
<td>1</td>
<td>2.07</td>
</tr>
<tr>
<td>3000</td>
<td>46.67</td>
<td>1</td>
<td>2.14</td>
</tr>
<tr>
<td>3100</td>
<td>45.16</td>
<td>1</td>
<td>2.21</td>
</tr>
<tr>
<td>3200</td>
<td>43.75</td>
<td>1</td>
<td>2.29</td>
</tr>
<tr>
<td>3400</td>
<td>41.18</td>
<td>1</td>
<td>2.43</td>
</tr>
</tbody>
</table>
What is behind the calculations?

- Seed Treatment Application Calculations Misc.
  - Common Abbreviations
    - cwt - used for hundredweight or for seed treatment 100 pounds of seed.
    - lbs. - pounds
    - fl oz - fluid ounces (volume measurement) typically used for flowable and other liquid products or slurries.
    - oz – ounces (weight measurement) typically used for wettable powder products. Many times used incorrectly to abbreviate fluid ounces.
    - g or gm – grams (weight measurement)
    - mg – milligrams (weight measurement)
    - ai – active ingredient, the actual pesticide compound or compounds in a seed treatment product.
We create chemistry