Quick Guide: Calculating Herbicide Concentration

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PAMF management reports for herbicide require you to report percent concentration by volume for both herbicides and surfactants. If you are unsure how to calculate percent concentration by volume, this quick guide provides instructions as well as relevant examples to help you out.

To determine percent concentration by volume, you need to know the amount of product (herbicide or surfactant) used and the total amount of mixture you generated. With these values and a conversion factor that ensures terms are in the same units, you can calculate the percent concentration by volume using the equations below.

**Note:** PAMF does not restrict you to the following examples for treating Phragmites. We entrust you with deciding the most appropriate herbicide mixture for your management actions. As always, pesticide applicators are required to follow label instructions. If you need guidance on herbicide concentrations, refer to the GLPC Phragmites Treatment Herbicide Quick Guide.

### Using Volumes

If you know the volume of both your product and mixture, use the equation below to find the percent concentration by volume.

$$\% C_{prod} = \frac{V_{prod}}{V_{mix}} \times 100$$

Where:

- $\% C_{prod}$: Percent concentration by volume of product (herbicide or surfactant)
- $V_{prod}$: Volume of herbicide or surfactant poured in the mix
- $V_{mix}$: Total volume of mix

**Note:** The volumes in the above equation must have the same units (e.g. both in gallons, ounces, etc.). If they were measured in different units, use the volume conversion equations below:

- Converting ounces to gallons: $V (oz) \times \frac{1 \text{ gal}}{128 \text{ oz}} = V (gal)$
- Converting gallons to ounces: $V (gal) \times \frac{128 \text{ oz}}{1 \text{ gal}} = V (oz)$

For conversions to and from other units, see the Additional Conversions section at the end of this guide.

### Example: Using Volumes

You prepare a backpack sprayer’s worth of herbicide mix. In this 4-gal backpack sprayer, you add 7.7 oz of herbicide and then top off the tank with water. What is the percent concentration?

**Converting ounces to gallons:** $7.7 \text{ oz} \times \frac{1 \text{ gal}}{128 \text{ oz}} = 0.06 \text{ gal}$

**% concentration by volume:**

$$\% C_{prod} = \frac{0.06 \text{ gal}}{4 \text{ gal}} \times 100 = 1.5\%$$

In this example, you would report the herbicide percent concentration as 1.5%. Repeat for surfactant.
Using Application Rates

If you know the application rate of both your product and mixture, use the equation below to find the percent concentration by volume.

\[
\%C_{prod} = \frac{AR_{prod}}{AR_{mix}} \times 100
\]

Where:

- \( %C_{prod} \) Percent concentration by volume of herbicide or surfactant.
- \( AR_{prod} \) Application rate of herbicide or surfactant in volume per land area
- \( AR_{mix} \) Application rate of mix in volume per land area

Note: The application rates in the above equation must have the same units (e.g. both in oz/acre). If they were measured in different units, use the conversion equations below to convert between units:

Converting ounces/acre to gallons/acre: \( AR \ (oz/acre) \times \frac{1 \text{ gal}}{128 \text{ oz}} = AR \ (gal/acre) \)

Converting gallons/acre to ounces/acre: \( AR \ (gal/acre) \times \frac{128 \text{ oz}}{1 \text{ gal}} = AR \ (oz/acre) \)

Example: Using Application Rates

You prepare an herbicide mixture by following label instructions for an herbicide application rate of 48 oz/acre. You then spray the mixture on *Phragmites* at a rate of 100 gal/acre. What is the percent concentration?

\[
\text{Converting oz/acre to gal/acre: } \frac{48 \text{ oz/acre}}{128 \text{ oz}} = 0.38 \text{ gal/acre}
\]

\[
\text{Percent concentration by volume: } \left( \frac{0.38 \text{ gal/acre}}{100 \text{ gal/acre}} \right) \times 100 = 0.38\%
\]

In this example, you would report the herbicide percent concentration as 0.38%. Repeat for surfactant.

Additional Conversions:

<table>
<thead>
<tr>
<th>Volume</th>
<th>1 US gallon</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 pints</td>
<td>4 quarts</td>
</tr>
<tr>
<td>3.8 liters = 3800 mL</td>
<td>256 tablespoons</td>
</tr>
<tr>
<td>128 ounces</td>
<td>16 cups</td>
</tr>
<tr>
<td>1.2 imperial gallons</td>
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<table>
<thead>
<tr>
<th>Area</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 hectare</td>
<td>2.5 acres</td>
<td>4050 m²</td>
</tr>
<tr>
<td>1 acre</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Parts Per Notation</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1 part per million</td>
<td>0.0001% (V/V)</td>
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