BE CAREFUL

THIS MACHINE HAS NO BRAIN
USE YOUR OWN
Topics

- Review video & conversions
- Appropriate uses and sites
- Other calibration methods
- Assumptions (in the fine print) & Evaluations
- Terms and tips
- Minimizing risk
- Keeping everyone healthy and happy
Video Review

- Uniform pressure (how?)
- Consistent walking speed- up, down
- Proper, well functioning nozzle tips (screens).
- Consistent nozzle distance from target
Handy items to have or know

<table>
<thead>
<tr>
<th>Area</th>
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<tbody>
<tr>
<td>1 acre</td>
<td>43560 sq. ft.</td>
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<tr>
<td>1 mile</td>
<td>5280 ft.</td>
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<table>
<thead>
<tr>
<th>Liquid (vol)</th>
<th>Oz.</th>
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<tbody>
<tr>
<td>teaspoon</td>
<td>0.17</td>
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<tr>
<td>tablespoon</td>
<td>0.5</td>
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<tr>
<td>cup</td>
<td>8</td>
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<tr>
<td>pint</td>
<td>16</td>
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<tr>
<td>liter</td>
<td>34</td>
</tr>
<tr>
<td>gallon</td>
<td>128</td>
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<tr>
<th>Dry (weight)</th>
<th>Oz.</th>
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<tbody>
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<td>gram</td>
<td>0.035</td>
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<tr>
<td>pound</td>
<td>16</td>
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<tr>
<td>kilogram</td>
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For small amounts (liquids) use ml- 1 fl. oz. = 29.6 ml

Calculator, measuring cups, lots of tips, disposable gloves, O rings etc....
Appropriate sites and uses

- **Note to user** - There is no seat, steering wheel or cockpit.
- Smaller sites, remote or rough locations
- Consider ~ 4 ac./person/day of broadcast applications as full day. Access to water/mixing and filling will influence your coverage
Appropriate use

• Adjust your GPA output so you are in the 2-20 GPA range.
• Above 20 GPA- consider an easier application option.
• How to adjust- run, or switch to a nozzle output that gives the GPA desired.
• If the label says.... Add x amount to 100 gallons of water... Look for other options.
Method 2- 1/128 ac.

1 sq. acre = 208 feet on a side

1 acre = 43560 sq ft.

1 Quart = 128 oz.

43560 sq. ft./128 = 340 sq. ft.

Time your area spraying and match with collection time into containers graduated in ounces.

Ounces = gal./ac.
Step 1 - Measure out 340 square feet

- Determine your spray width on a surface you can see the output (with water only).
- Your timed walk should be on a site similar to your application target.
- Example - 340 sq.ft./3 ft. (your width) = 113 ft. Length.
- Walk the length a few times while timing yourself.
Step 2- Time your spray into a collection container (graduations in ounces). Do this a number of times

- 1st try = 12 ounces (time for 240 ft²)
- 2nd try = 14 ounces
- 3rd try = 13 ounces

- Your gpa application rate is 13 gallons/acre (using that nozzle and that walking speed)

- After mixing, your 3 gallon sprayer will need 4.3 “fill-ups” to cover an acre.
Spraying trees rather than ground- added dimensions

- Know where and when coverage is needed.
- The “rate” may be an amount per ac. per application with a max per season. Or an amount for a range of outputs i.e. (2, 10, 20 gpa)
- Same system as ground but calibrate a representative field site- ½ side on each row.
- Coverage (TwinJet), timing, plant size make this complicated.
Always check yourself  (Area per Backpack)

- Determine area per BP.
- Your backpack holds 4 gallons
- 4 gallons/13 gallons/ac = 0.3 ac.
- 3.3 BP loads for each ac.
- (with that nozzle, that speed and that pressure)
Another method --% Dilution

Example- mix 2% Garlon 3A in water for blackberry control

Spray “till wet” or “till runoff” has many interpretations

.02 X 128= 2.6 oz./gallon
3 gallon sprayer= 7.7 oz/sprayer
Calculating amounts for mixing (use liquids if possible)

First, determine how the amount was derived—guidebook (a.i.), label (product), your neighbors guess (about 2 glugs)?

Accord (1qt/ac = 32 oz/ac)
- 32 oz. per ac / 13 gallons per ac.=2.5 oz/gal.
- 2.5 oz. per gallon X 3 gallon sprayer=7.4 oz. per tank

R-11 (1/4 of 1%)
- .0025 X128 oz.= .32 oz. per gallon (.9 oz. per 3 gal tank)
Mixing WDG, etc.

Westar (16 oz./ac.)

Wait!!!!

What kind of oz. are these??????

Grab your scale or weight / volume tube. Easier to pre-mix a liquid volume in a mixing bucket for an acre or two and keep in solution. Use that for your BP mix.
Mixing in a BP sprayer

Don’t get to exotic. You are the agitator!!!
Check label
Jar test if this is a new mix.
Again, use liquids if possible.
½ fill tank with carrier, compatibility agents, next harder to mix products
1st WP, DF, WDG, F, L + add water, EC
Last- surfactants
Always assume you will spill everything- so you are prepared......
Assumption #1 ... Watch for the fine print

- “Add 2.0 grams of Export XP to 3 gallons of water in a backpack sprayer, stir the mixture for 1 minute then add 1 teaspoon (3 ml or 60 drops) of ammonia.”

- Assumption: (this mix is based on a 42 gpa application rate).
- Hard to “stir” in a BP tank
Assumption #2- Nozzles

- You received 2 cheap plastic nozzles when you got your sprayer 5 years ago.
- Use these for everything!!!!
  - **NO**
- Investigate nozzles that fit your sprayer with a wide range of outputs and functions
- Purchase a new wand if tips do not fit. BP’s have a mix of threads and openings
<table>
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<tr>
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<th>Fungicides</th>
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<tr>
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<td>Insecticides</td>
<td>Liquid Fertilizer</td>
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<td><strong>Good</strong> (At Medium Pressure)</td>
<td><strong>Excellent</strong> (At Lower Pressures)</td>
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Assumption 3- Nozzles last forever

NEW SPRAY TIPS
Produce a uniform distribution when properly overlapped.

WORN SPRAY TIPS
Have a higher output with more spray concentrated under each tip.

DAMAGED SPRAY TIPS
Have a very erratic output – overapplying and underapplying.
Clean up

- Clean out used containers as you go
- Only mix what you can use
- Have one sprayer for herbicides another for insecticides/fungicides
- When finished triple rinse the BP and lines. Remove nozzles.
- On the 2nd rinse, consider including -detergent, ammonia, approved cleaner (ck. label or PNW handbook)
Terms to understand

- Broadcast application
- Spot spraying
- Band Spraying
- Directed spray
- Over-the-top spraying
- Dormant application
- Waving wand techniques
- Bark application
- Thinline treatments
- Foliar applications (Leaf, bud, petal, needle stages)
- Pre/post-emergent sprays
Evaluate your work

Off-center nozzles set too low
Evaluate your work....
Evaluate your work...
Simple Solutions
Minimizing risks

• With backpack spraying you often are in close contact with concentrated products while mixing. And solution is on your back walking into the spray
• Keep a box of disposable gloves handy and use them, face protection, wind???
• Use a flat surface to mix-about waist height (avoid picking up from ground)
• Store products in buckets
• Spills
Being safe while field spraying

Keep distance/time or both between multiple applicators.

Have a clear way to mark where you stop...so you can start in the correct spot.

Clean screens after 3 tanks- esp. with harder to mix solutions

Don’t multitask,
Don’t bend over.
Don’t slow down

Fall on your back, if you fall.
Keeping everyone healthy and happy

Notify your neighbors, especially if you are using a full suit with respirator.

No drift – wind, temperature, many surfactants increase droplet size, pressure, nozzle tech.
The Hypro Ultra Lo-Drift is the ideal spray tip for use where drift reduction is paramount. The tip produces large air-filled droplets, which cut drift dramatically compared with a standard fan and conventional low-drift spray tips. Ideal for use with pre-emergence and broad spectrum products.

Hypro Fast Cap Ultra Lo-Drift Flat Fan Spray Tip

Fast Cap Ultra Lo-Drift Flat Fan Spray Tip - Creates air-filled droplets - Wide spray angle (120°) enables boom height to be lowered to further decrease drift
The future
Questions
Method 3- The 1 minute calibration

- Step 1-Calibrating your walking speed.
- Comfortable pace is 2 miles per hour.
- 176 ft./min
- Practice until you can do it consistently
Calibration continued

Have a collection device

• Graduated cylinder
• Measuring cup
  • Plastic better
  • Glass easier to read
Select the best tip for your needs

- Step 2: Select a tip that gives you the width needed (water on driveway)
- Measure band width
Determine the Output – Gallons/minute

• Step 3: With clean tip/screen measure the output.
• Use water only
• Pump up to operating pressure – 25-30 psi
• Spray for 1 minute – time yourself
• Record volume – do it again – 2-3 times for each tip
STEP 4- Area Calculations

- Tip output is 32 oz/min
- Band width is 2 ft.
- Travel speed 2 mph
- Area covered in 1 min is
  \[2 \text{ ft.} \times 176 \text{ ft.} = 352 \text{ ft}^2\]
- \[\frac{352 \text{ ft}^2}{43,560 \text{ ft}^2} \text{ per ac} = 0.008 \text{ acres}\]
Step 4- Output Calculations

- Tip output is 32 oz/min or 0.25 gal/min
- Coverage is 0.008 ac/min
- 0.25 gal/min divided by 0.008 ac/min
  
  = 31.25 gallons per acre
Calibration Examples-Video

2 gallons used
Area sprayed: 2 rows each with 5 ft width and 580 feet long.
Calculate gallons/acre applied
Calibration

Want-- gallons/acre.

2 gallons

Acre- 2 rows X 5 ft. row X 580 ft.

= 5800 square feet

5800/43,560 sq. ft./Ac.=.13 Ac.

2 gallons/.13 Ac.=15 gallons/Ac.
What to change?

Options to change delivery rate

- Pressure
- Speed
- Nozzle (hint - this is the correct answer)

2X speed - 1/2 delivery rate

4X pressure - 2X delivery rate.
Factors Impacting Drift

Spray Pressure
Nozzle Size
Application Rate
Spray Nozzle Height
Operating Speed
Wind Velocity
Air Temperature and Relative Humidity
Buffer Zones (safe distances from sensitive areas)
Instructions from the crop protection chemical manufacturer