

# Effective Pesticide Applications: Measuring Accurately

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## Integrated Pest Management

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# Six Steps to Effective Pesticide Applications

1. Identify pests correctly
2. Select appropriate product
3. Calibrate equipment properly
4. **Measure pesticide accurately**
5. Review treatment site before and during application
6. Monitor results



# Overlooked Step to Effective Pesticide Applications

- Accurately measuring pesticide products!



# Measure By The Gallon







# Measure By The Pound



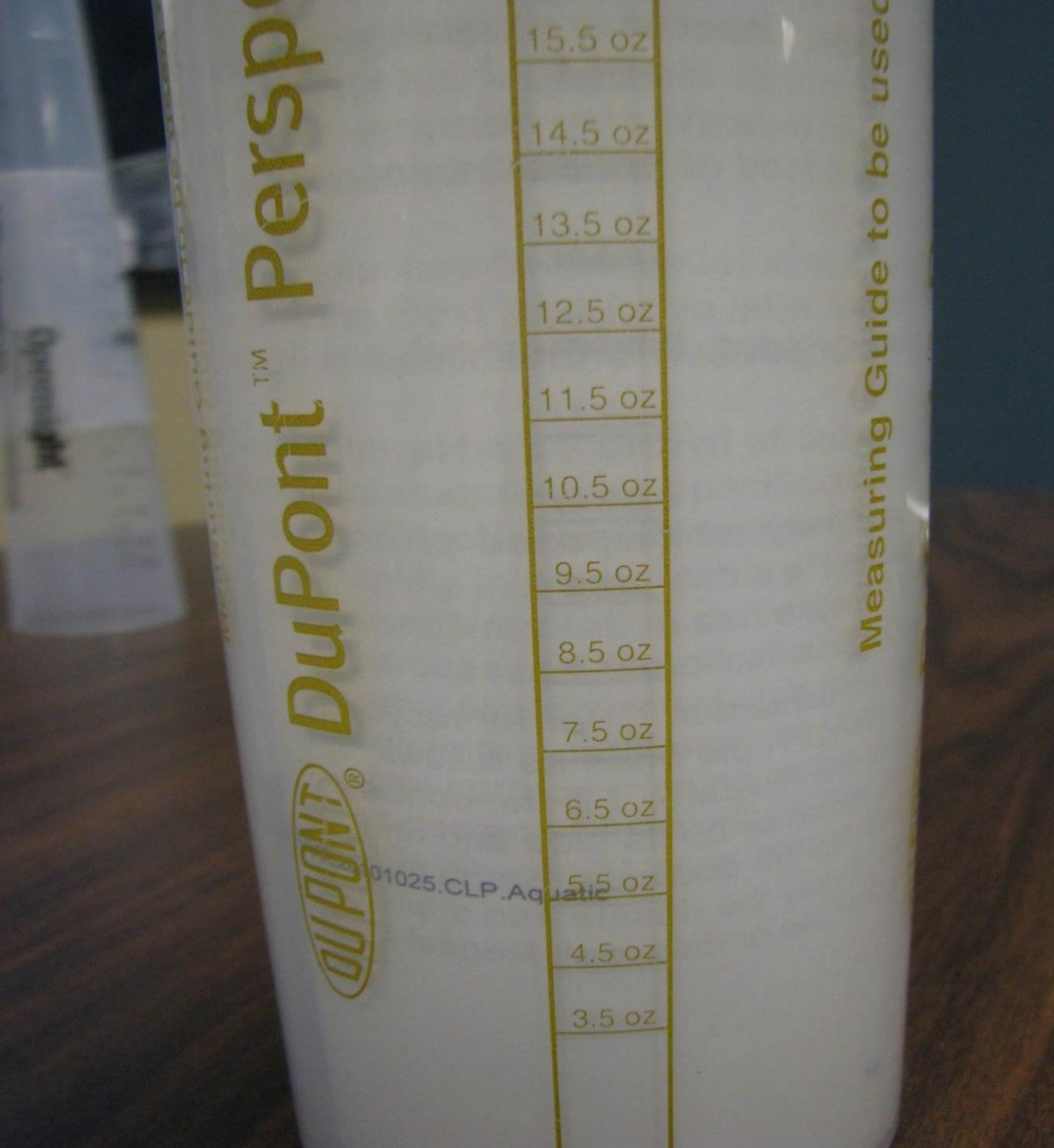


# Measure By The Ounce



# First Take Home Lesson

More precision  
required when  
measuring  
products by the  
ounce





# Liquid Ounces





## Insects in turfgrass

**Not for Sale or Use in Nassau and Suffolk Counties, New York**

### Active Ingredients:

halofenozide: Benzoic acid, 4-chloro-,  
2-benzoyl-2-(1,1-dimethylethyl)  
hydrazide.....

22.3%

Inert Ingredients.....

77.7%

Total Ingredients.....

100.0%

Contains 2 pounds of active ingredient per gallon.

**Keep Out of Reach  
of Children**

**CAUTION  
PRECAUCION**

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

**Refer to inside of label booklet for additional precautionary information including Personal Protective Equipment (PPE) and Directions for Use including Storage and Disposal.**

## Agricultural Use Requirements

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. Refer to the label booklet under "Agricultural Use Requirements" in the Directions for Use section for information about this standard.

**Notice:** Read the entire label. Use only according to label directions. **Before using this product, read Warranty Disclaimer, Inherent Risks of Use, and Limitation of Remedies at end of label booklet. If terms are unacceptable, return at once unopened.**

In case of emergency endangering health or the environment involving this product, call 1-800-992-5994. If you wish to obtain additional product information, visit our web site at [www.dowagro.com](http://www.dowagro.com).

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

## Shake Well Before Using

EPA Reg. No. 62719-471

EPA Est. 5905-GA-01  
900-009358 / 00197222

\*Trademark of Dow AgroSciences LLC  
**Dow AgroSciences LLC •**  
Indianapolis, IN 46268 U.S.A.

**Specialty Insecticide**

**Net Contents 2.5 gal**





## FRUITING VEGETABLES CROP GROUP 8-10 (0 DAY PHI) INCLUDING:

African eggplant; bush tomato; bell pepper; cocona; currant tomato; eggplant; garden huckleberry; goji berry; groundcherry; martyrnia; naranjilla; okra; pea eggplant; pepino; nonbell pepper; roselle; scarlet eggplant; sunberry; tomatillo; tomato; tree tomato; cultivars, varieties, and/or hybrids of these.

PESTS	Rate of Application		COMMENTS <sup>1, 2</sup>
	Ounces of Beleaf 50SG/Acre	Lbs. Active Ingredient/Acre	
Aphids and Plant Bugs	2.8 to 4.28	0.089 to 0.133	Begin applications before populations begin to build, but and before damage is evident, according to local pest management guidelines. Use LOWER RATE for building populations and use HIGHER RATE for greater populations and/or dense foliage. Scout fields often and retreat as necessary to maintain populations below damaging levels. Rapidly growing plants may need retreatment.
Greenhouse Whitefly	2.8 to 4.28	0.089 to 0.133	Apply when adult whiteflies first appear. Do not allow population to increase unchecked before making first application. Application provides SUPPRESSION only. For control, apply in combination with other

## LEAFY VEGETABLES (EXCEPT BRASSICA) (0 DAY PHI) INCLUDING:

Amaranth (leafy amaranth, Chinese spinach, tampala), Arugula (rouquette), Cardoon, Celery, Chinese Celery, Celtuce, Chervil, Chrysanthemum (edible leaved and garland), Corn salad, Cress (garden and upland), Dandelion, Dock (sorrel), Endive (escarole), Florence fennel, Lettuce (head and leaf), Orach, Parsley, Purslane (garden and winter), Radicchio (red chicory), Rhubarb, Spinach, Spinach (New Zealand), Swiss chard, Vine spinach (Malabar and Indian)

PESTS	Rate of Application		COMMENTS <sup>1, 2</sup>
	Ounces Beleaf 50SG/Acre	Lbs. Active Ingredient/Acre	
Aphids and Plant Bugs	2.0 to 2.8	0.062 to 0.089	Begin applications before populations begin to build and before damage is evident, according to local pest management guidelines. Use LOWER RATE for building populations and use HIGHER RATE for greater populations and/or dense foliage. Rapidly growing plants may need retreatment. Scout fields often and retreat as necessary to maintain populations below damaging levels.
Greenhouse Whitefly	2.8	0.089	Apply when adult whiteflies first appear. Do not allow population to increase unchecked before making





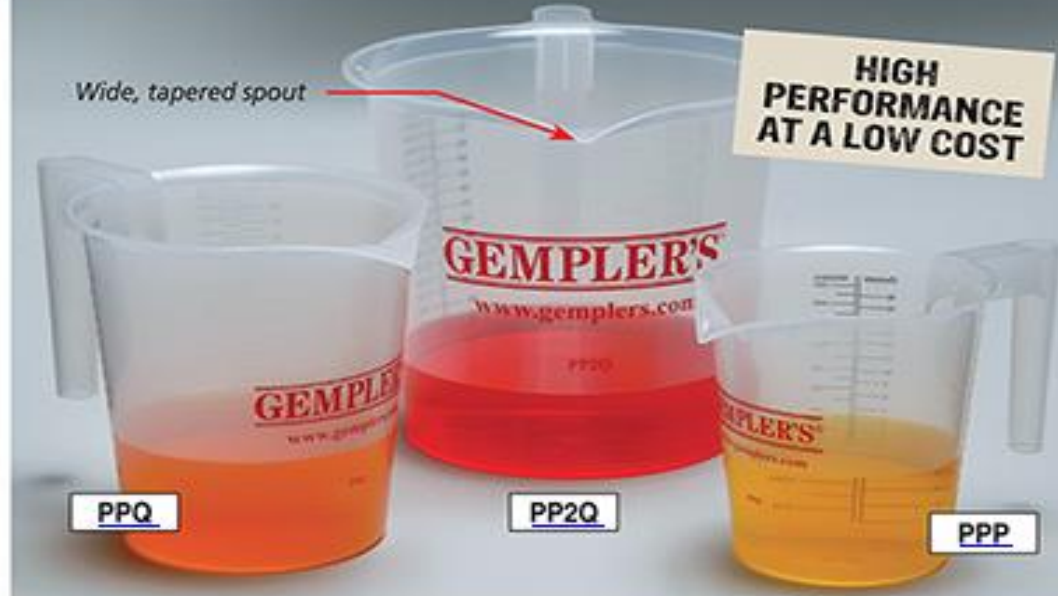


**ENCORE**  
PAINT SUNDRY LEADERS



MEASUREMENTS ARE APPROXIMATE





## **GEMPLER'S. Polypropylene measuring and calibration pitchers with english measurements**

### **Quality, USA-made pitchers**

Molded in high-density 100% virgin polypropylene for excellent chemical resistance and durability. Pint, quart and 2-qt. sizes are graduated with raised ounce and milliliter markings. Wide, tapered spout improves pouring accuracy. Open-ended handles are easy to grasp while wearing protective gloves. USA made.

Capacity	Item No.	1-5	6+
1 Pint	<u>PPP</u>	\$8.10/ea.	\$7.50/ea.
1 Quart	<u>PPQ</u>	\$8.80/ea.	\$8.15/ea.
2 Quart	<u>PP2Q</u>	\$9.85/ea.	\$9.15/ea.

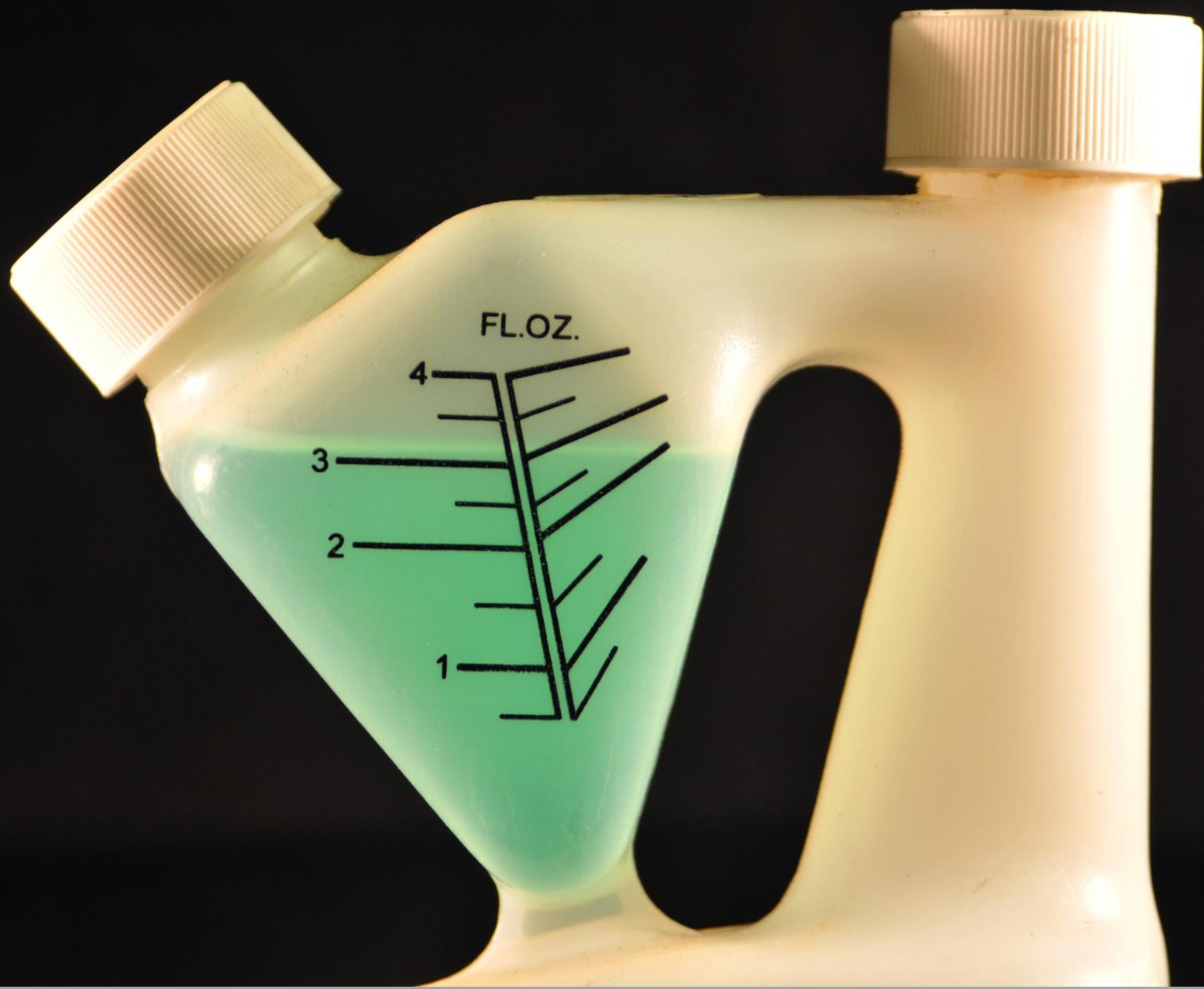


*All pitchers have both raised and printed markings next to the handle.*

**NOTE:** As expensive as some pesticide concentrates are, always calibrate any measuring cup for accuracy. There is a  $\pm 5\%$  chance of error because they are mass-produced.



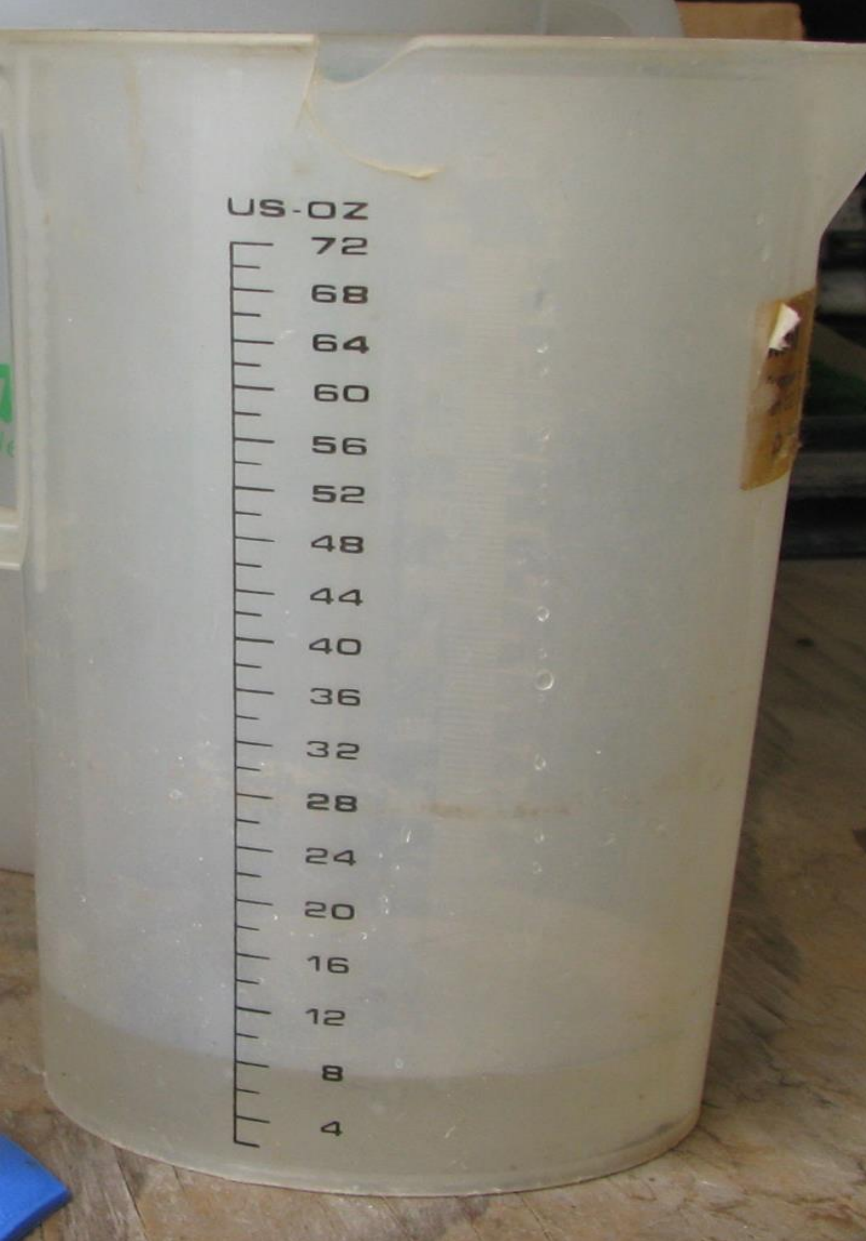






**237 milliliters = 8 ounces**

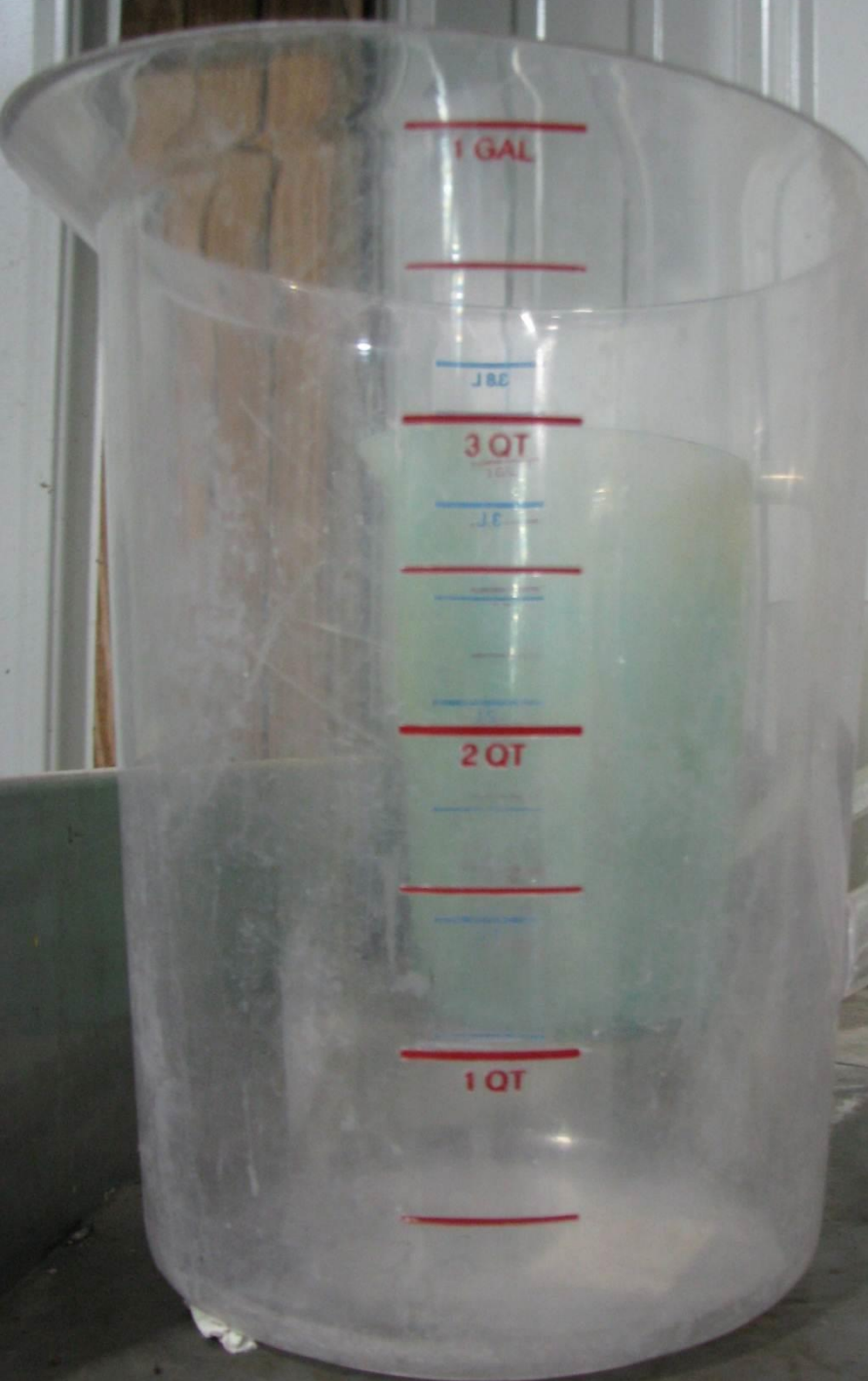




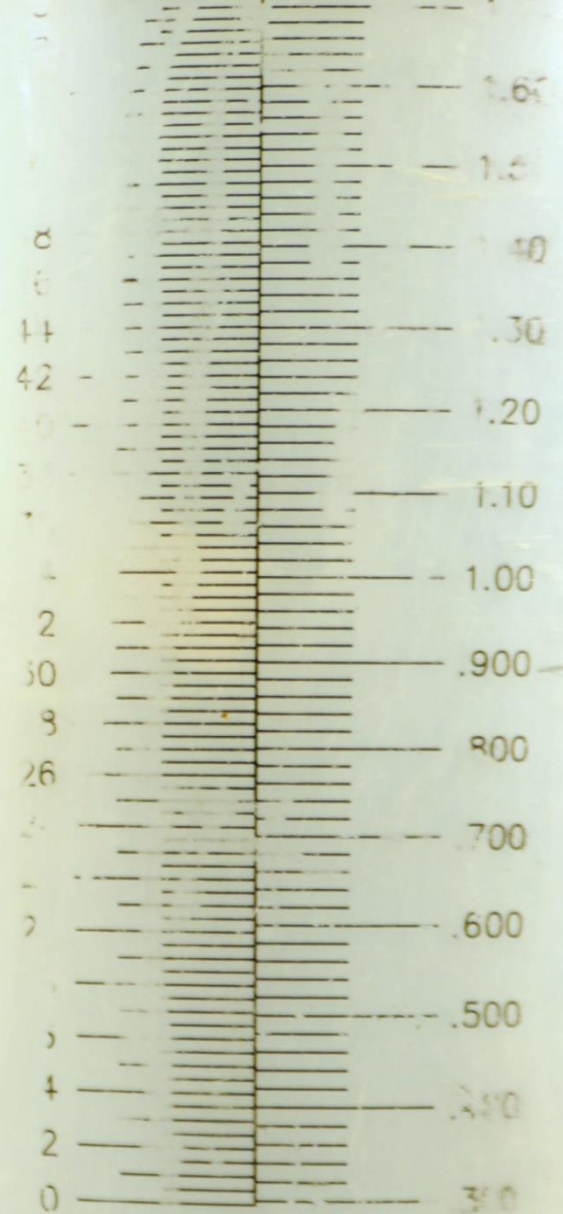
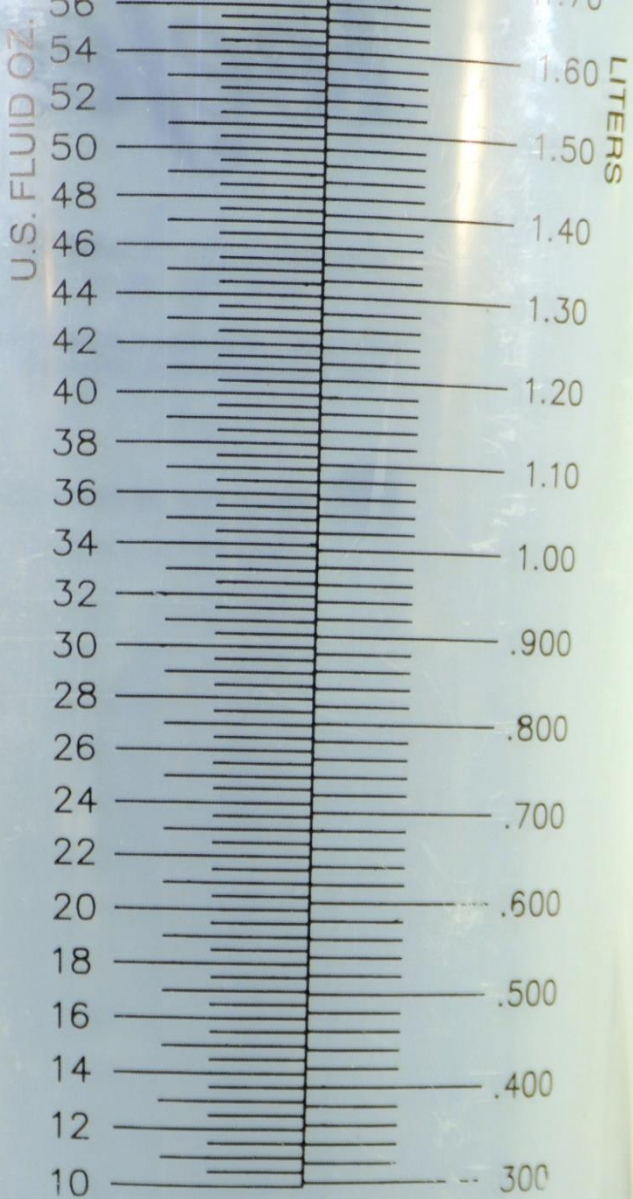
# Second Take Home Lesson

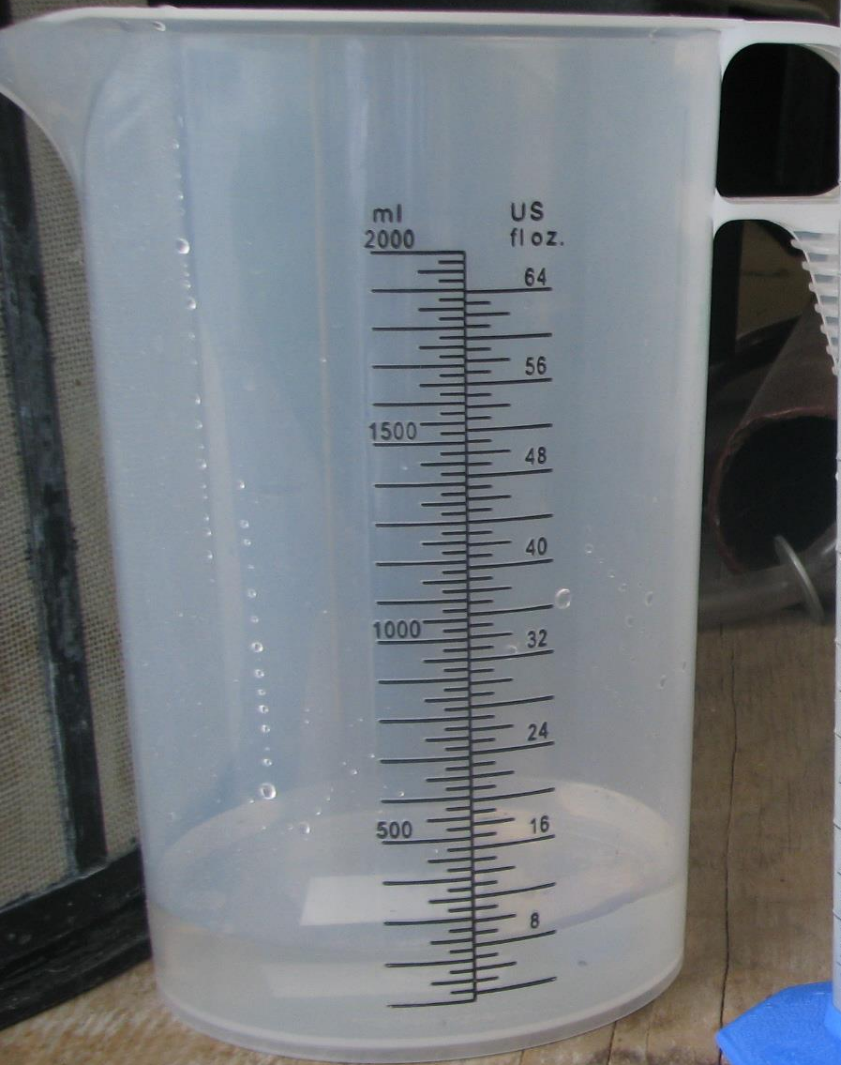
Make sure device is accurate



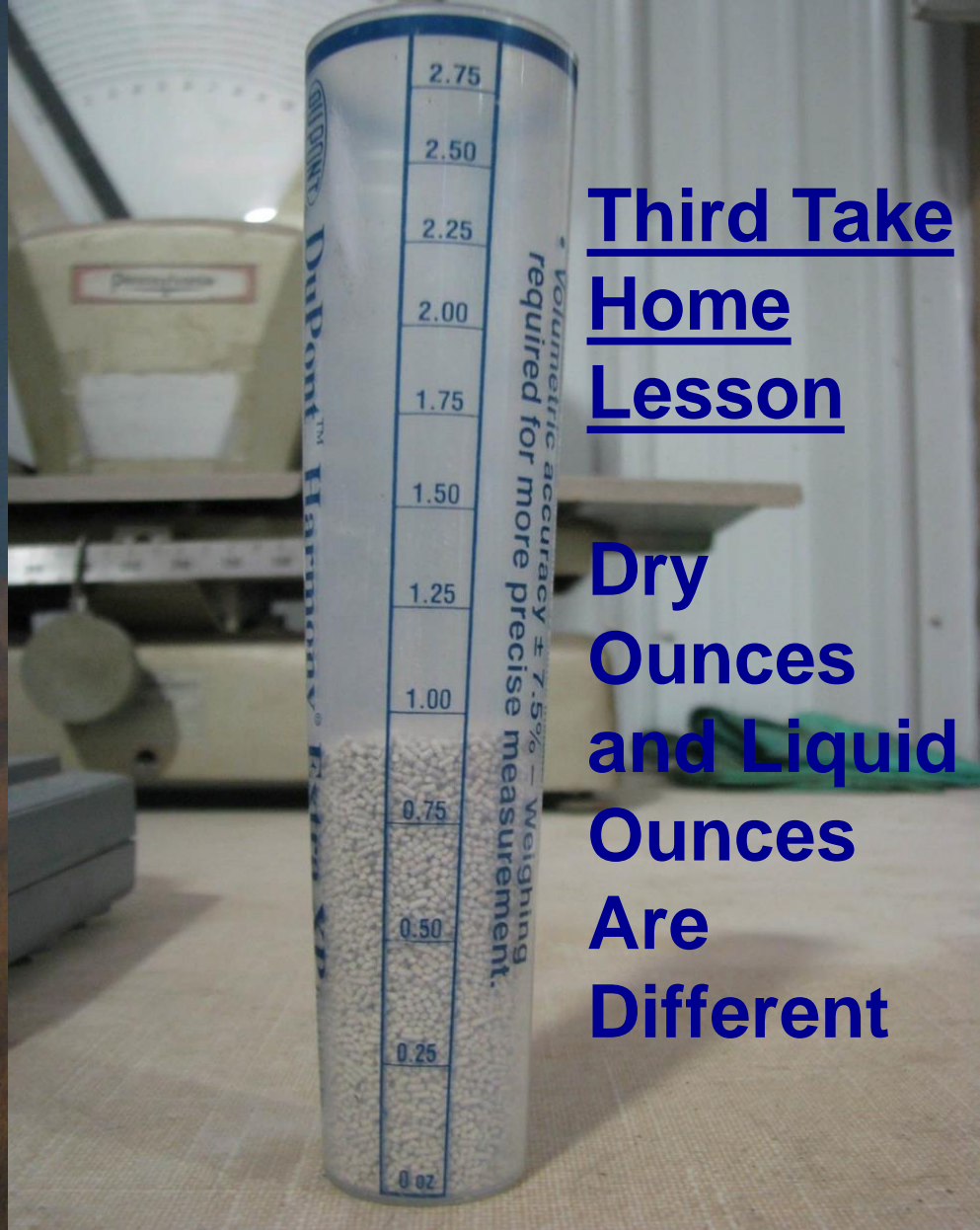












## Third Take Home Lesson

**Dry  
Ounces  
and Liquid  
Ounces  
Are  
Different**



# Fluid Ounce vs. Dry Ounce

- 3-oz table salt measured by volume
- 3-oz table salt measured by weight



128 liquid ounces = 1 gallon

16 ounces = 1 pound





# Fourth Take Home Lesson

Use the  
measuring  
device that  
comes with  
dry materials







1.5 oz

3.0 oz

4.5 oz

Water Soluble  
**Granule**

# What Weighs more?

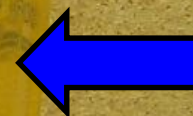
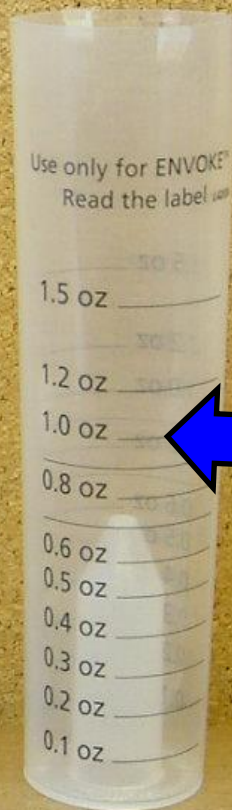
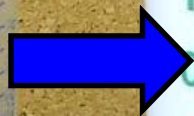
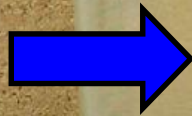
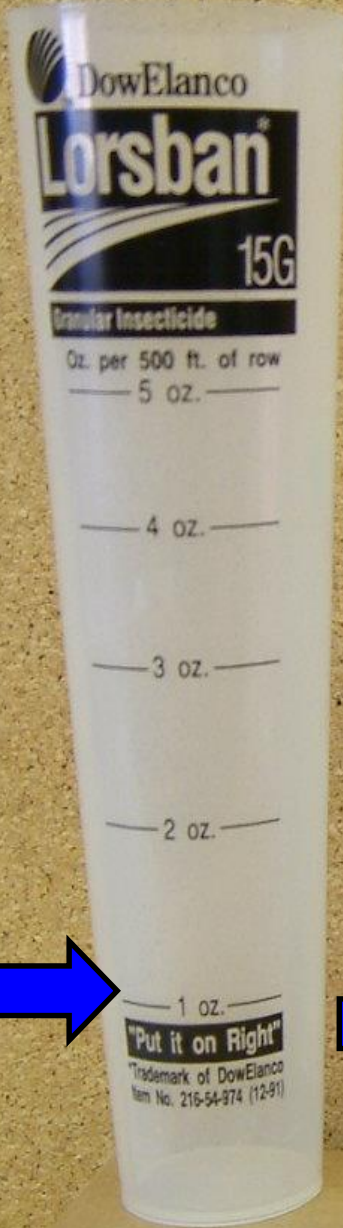
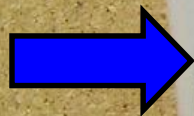
## A pound of feathers or a pound of lead?





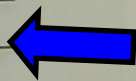








32 fl. oz. \_\_\_\_\_  
31 fl. oz. \_\_\_\_\_  
30 fl. oz. \_\_\_\_\_  
29 fl. oz. \_\_\_\_\_  
28 fl. oz. \_\_\_\_\_  
27 fl. oz. \_\_\_\_\_  
26 fl. oz. \_\_\_\_\_  
25 fl. oz. \_\_\_\_\_  
24 fl. oz. \_\_\_\_\_  
23 fl. oz. \_\_\_\_\_  
22 fl. oz. \_\_\_\_\_  
21 fl. oz. \_\_\_\_\_  
20 fl. oz. \_\_\_\_\_  
19 fl. oz. \_\_\_\_\_  
18 fl. oz. \_\_\_\_\_  
17 fl. oz. \_\_\_\_\_  
16 fl. oz. \_\_\_\_\_  
15 fl. oz. \_\_\_\_\_  
14 fl. oz. \_\_\_\_\_  
13 fl. oz. \_\_\_\_\_  
12 fl. oz. \_\_\_\_\_  
11 fl. oz. \_\_\_\_\_  
10 fl. oz. \_\_\_\_\_  
9 fl. oz. \_\_\_\_\_  
8 fl. oz. \_\_\_\_\_  
7 fl. oz. \_\_\_\_\_  
6 fl. oz. \_\_\_\_\_



— 16 oz —  
— 15 oz —  
— 14 oz —  
— 13 oz —  
— 12 oz —  
— 11 oz —  
— 10 oz —  
— 9 oz —  
— 8 oz —  
— 7 oz —  
— 6 oz —  
— 5 oz —  
— 4 oz —



Measuring  
Herbicide

Volumetric

Weigh scale  
more precise

Not for use

Made in  
Form 1451

24 oz. \_\_\_\_\_  
23 oz. \_\_\_\_\_  
22 oz. \_\_\_\_\_  
21 oz. \_\_\_\_\_  
20 oz. \_\_\_\_\_  
19 oz. \_\_\_\_\_  
18 oz. \_\_\_\_\_  
17 oz. \_\_\_\_\_  
16 oz. \_\_\_\_\_  
15 oz. \_\_\_\_\_  
14 oz. \_\_\_\_\_  
13 oz. \_\_\_\_\_  
12 oz. \_\_\_\_\_  
11 oz. \_\_\_\_\_  
10 oz. \_\_\_\_\_  
9 oz. \_\_\_\_\_  
6 oz. \_\_\_\_\_  
5 oz. \_\_\_\_\_  
4 oz. \_\_\_\_\_



**What are the consequences of using the wrong measuring tube?**







# Product Specific Measuring Devices





## Fifth Take Home Lesson

**Devices not very accurate. Weighing out material will get you the most accurate measurement.**





USE ONLY TO MEASURE



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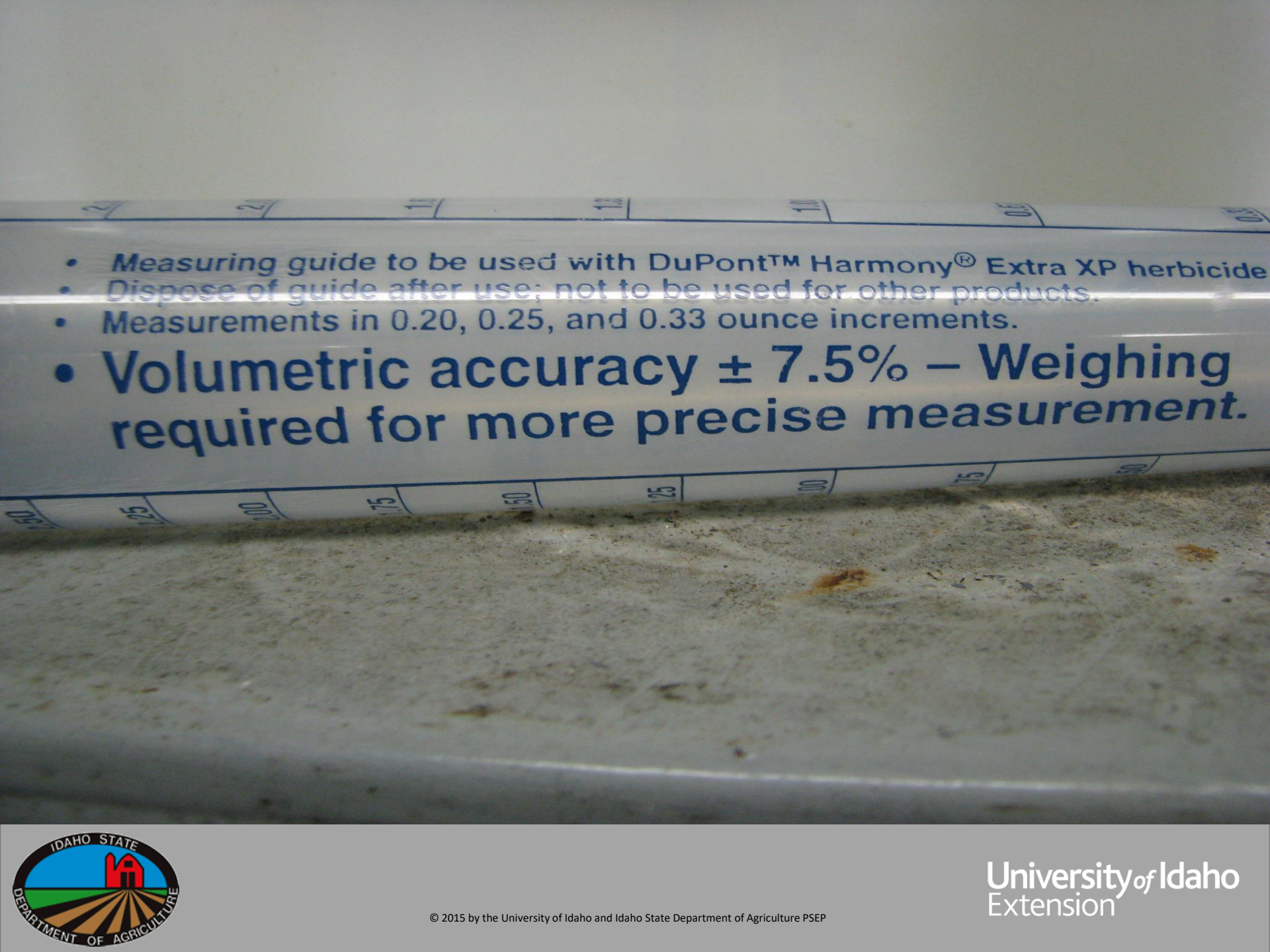
DuPont™  
Streamline™  
herbicide

This volumetric guide provides a reasonably accurate measurement of weight but where a high degree of accuracy is required, the material should be weighed.

Do not use the measuring guide for products other than DuPont™ Streamline™ herbicide.

E. I. du Pont de Nemours and Company, Wilmington, DE 19898  
A01402903

**Do You Want Convenience or Accuracy?**

- 
- Measuring guide to be used with DuPont™ Harmony® Extra XP herbicide
  - Dispose of guide after use; not to be used for other products.
  - Measurements in 0.20, 0.25, and 0.33 ounce increments.
  - **Volumetric accuracy  $\pm 7.5\%$  – Weighing required for more precise measurement.**





- Measuring guide to be used **only** with Fla
- Dispose of after use. Not for use with othe
- Volumetric accuracy  $\pm 10\%$ .

Made in USA

Printed in USA

**SP 681 1209**  
**302468**





# Clipper<sup>TM</sup>

## HERBICIDE

Measuring guide for  
Clipper<sup>TM</sup> Herbicide.

Volumetric accuracy  $\pm 15\%$ .

Weigh scales required for  
more precise measurement.

Dispose of after use.

Not for use with other products.





Use only for measuring SCEPTER® herbicide.  
Level off at desired weight, rinse thoroughly after use. This volumetric  
device provides a reasonably accurate measurement of weight (+/- 20%).  
Where a high degree of accuracy is needed a scale should be used.

herbicide







# Sixth Take Home Lesson

**Throw away  
the  
measuring  
device after  
your supply  
has run out**



# Seventh Take Home Lesson: REMEMBER FORMULATIONS!

## Liquid Products

Emulsifiable Concentrates  
Flowables  
Solutions



## Dry Products applied as a spray mixture

Water Dispersable Granules  
Wettable Powders  
Soluble Powders

## Dry Products applied dry

Dusts  
Granules  
Pellets  
Baits





# Demonstration

## Liquids

- Emulsifiable Concentrates (EC)
- Flowables (F)/Liquids (L)
- Solutions (S)

## Dry Products—mixed with carried and sprayer

- Water Dispersible Granules (WDG)
- Wettable Powders (WP)
- Soluble Powders (SP)

## Dry Products—applied dry

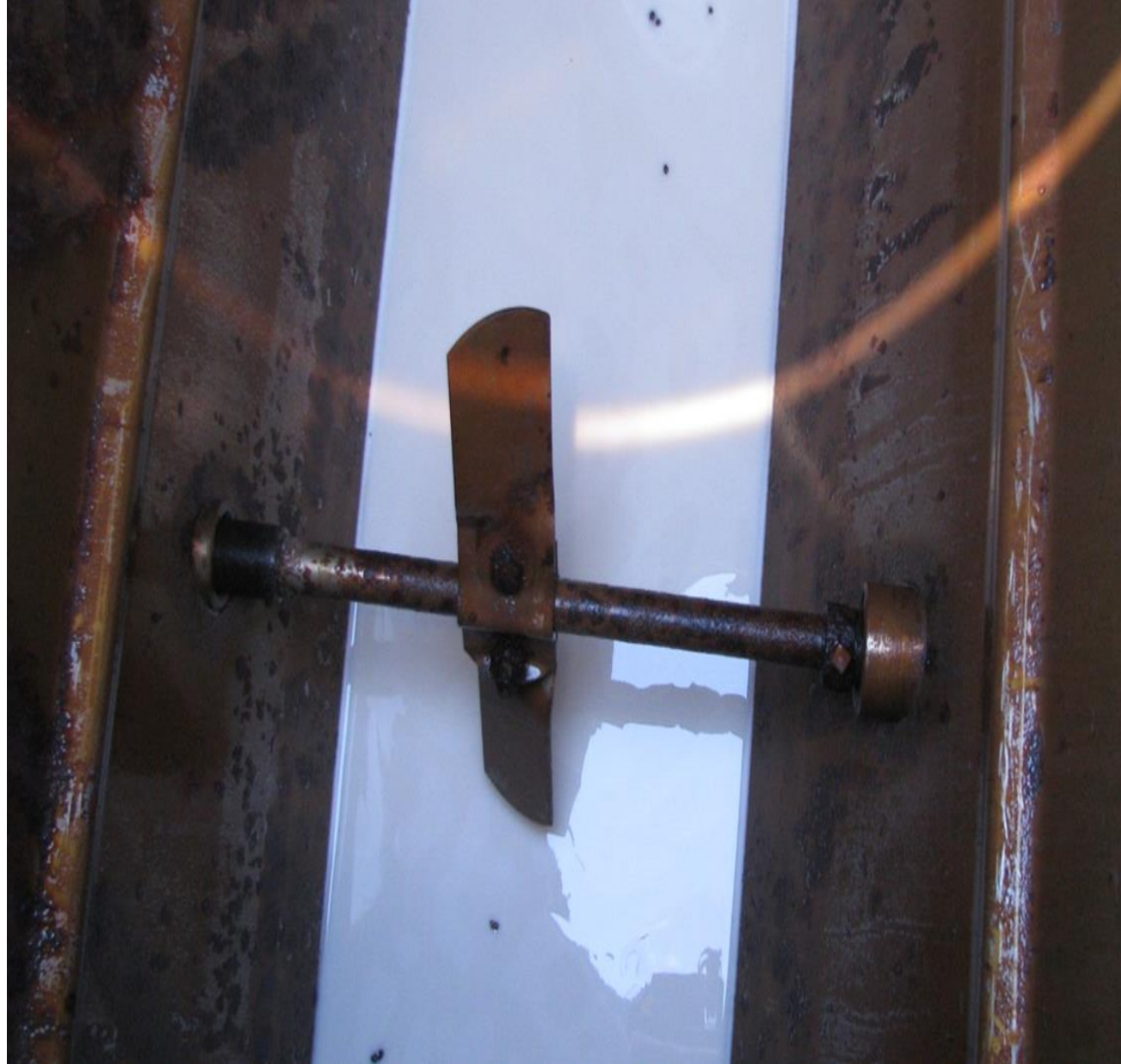
- Dusts
- Granules
- Pellets
- Baits



# Eighth Take Home Lesson

**Keep the dry  
product agitated  
in the spray tank**

**You might have to  
premix if water is  
really cold**





# Accurate Measurement Starts the Chain of Events to Success or Failure



More precision for  
ounce measurement

Dry and liquid ounces  
are different

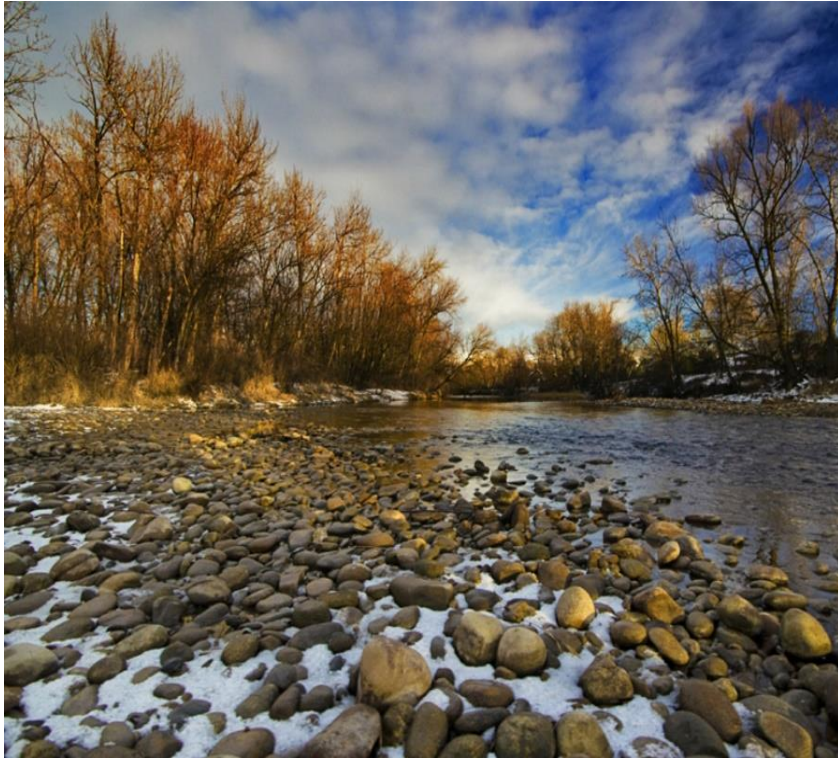
Use specific tubes made  
for dry products

Throw away dry  
measuring tubes

Weigh dry products for  
accuracy



# Accurate Measurement Starts the Chain of Events to Success or Failure



- **Improve application results**
- **Save money**
- **Enhance safety (crop and human)**





# Take Home Lessons

1. More precision required for ounce rates
2. Be sure to use an accurate measuring container
3. Dry ounces ARE different from liquid ounces
4. Use provided devices for dry measurement—weight matters
5. Some measuring containers not very accurate—use judgement
6. Toss product specific measuring containers
7. Know your formulations
8. Keep dry products agitated



# THANK YOU TO:

- **Jeff Watkins and Dale at Crop Production Services (Parma and Caldwell)**
- **Dr. Fred Whitford, Purdue Pesticide Program**
- **Ms. Pat Hipkins, Virginia Tech Pesticide Program**

