Calibrating Application Equipment

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Best Practices for Urban Pyrethroid and Fipronil Applications
March 9, 10, 2022

Image: K. Ballentine

UC DAVIS PLANT SCIENCES

University of California
Agriculture and Natural Resources

Calibrating Application Equipment

Topics presented

- Why it needs to be done
- Method 1- Measure Flow Rate
- Method 2- Sprayer Weight
- Converting to Product Use
- Porous surfaces

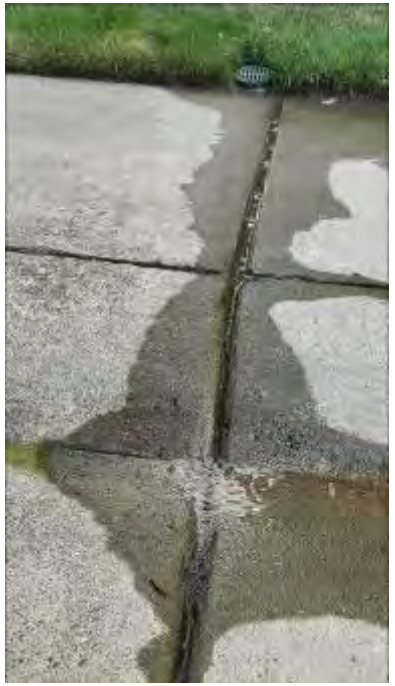

Photo: L. Oki

Calibrating Application Equipment

Why it needs to be done

- Protect urban creeks and streams

Photos: L. Oki

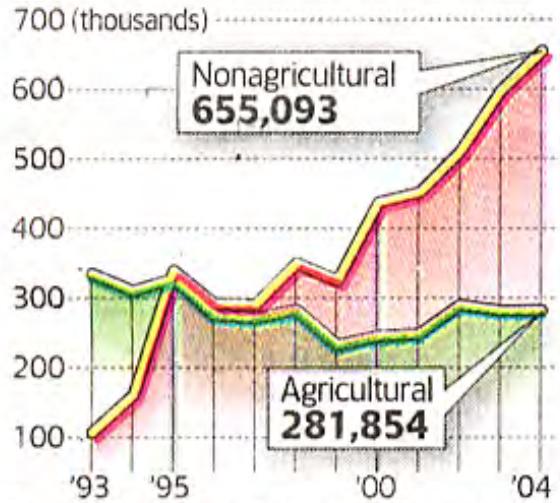


Sacramento Bee
July 14, 2006

Pyrethroid use in California

Commercial use of pyrethroid pesticides in California has been increasing dramatically, mainly because of urban use. The data below do not include usage of retail products by homeowners, which does not have to be reported to regulators and is suspected to be much greater.

POUNDS OF PYRETHROID-ACTIVE INGREDIENT USED ANNUALLY IN CALIFORNIA



Sources: Prof. Donald Weston, UC Berkeley
Sacramento Bee/Nam Nguyen

State toughens rules on a household pesticide

Low levels of pyrethroid products kill aquatic life

By Matt Weiser
BEE STAFF WRITER

California next month will begin to regulate a broad class of pesticide that has become the dominant home and garden bug-killer.

The state Department of Pesticide Regulation in August will notify manufacturers of pyrethroid insecticides that they must share data on their products or those products will be banned from sale in California. The data will drive a regulatory review that could result in use restrictions or a ban on specific products.

In doing so, California steps out ahead of the federal government and other states in regulating pyrethroids, found to be deadly to aquatic life at very low concentrations.

Mary-Ann Warmerdam, director of the Department of Pesticide Regulation, said it will be the biggest pesticide regulation effort in state history, involving 600 consumer products sold in hardware stores, garden centers and pet stores.

"We know we have enough caution flags, and that requires a

▶ PESTICIDE, Page A4

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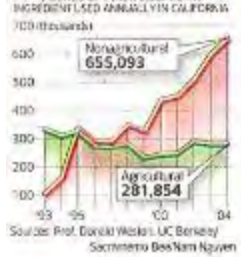

Sources: Prof. Donald Weston, UC Berkeley
Sacramento Bee/Nam Nguyen

Sacramento Bee/Jay Mather

Researchers address people from government agencies Thursday at Roseville's Pleasant Grove Creek. The pyrethroid class of pesticide has been found in stream sediment at levels toxic to tiny crustaceans.

Sacramento Bee
July 14, 2009

The Mayhew Drain in the Rancho Cordova area carries stormwater to the American River. A new study found enough **pyrethroid** pesticides in the American River to kill tiny shrimp – among the first in the aquatic food chain. Much of it is coming from Sacramento's runoff, the study found.

OUR REGION

REGION IN BRIEF B2
REMEMBRANCES B6
BUSINESS B8
WEATHER B10

State labeled default risk
A London financial firm's global rankings rate California ninth most likely to default on its financial obligations. **Page B8**

Tuesday, July 14, 2009 | The Sacramento Bee | sacbee.com/ourregion

B1

THE ENVIRONMENT

Capital called Delta's top pesticide source

LEZLIE STERLING lsterling@sacbee.co

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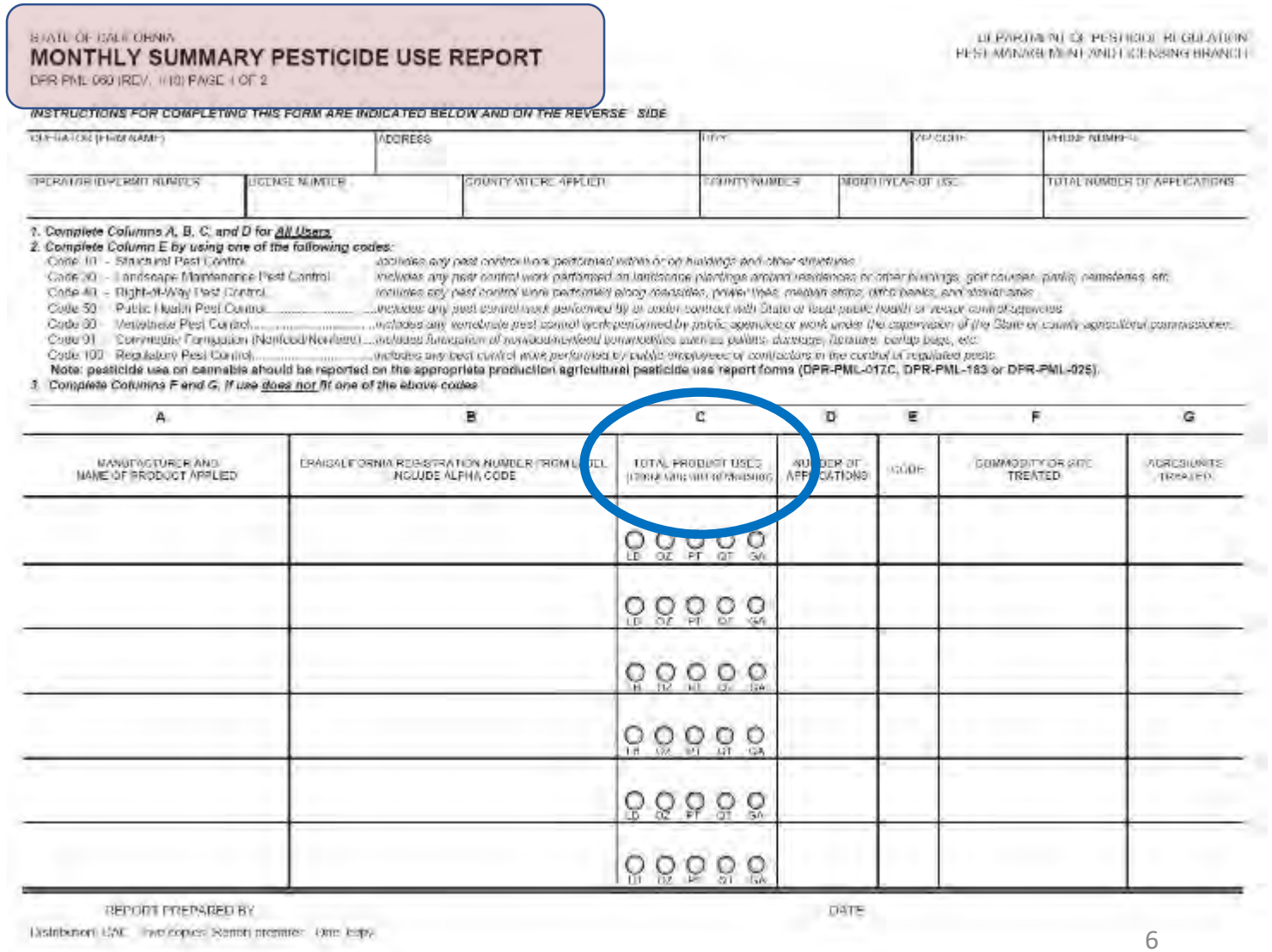
Calibrating Spray Equipment

Why it needs to be done

- To determine the amount of product applied at the jobsite
- To report the correct amount of material applied



STATE OF CALIFORNIA
MONTHLY SUMMARY PESTICIDE USE REPORT
DPR PML 060 (REV. 1/10) PAGE 1 OF 2

DEPARTMENT OF PESTICIDE REGULATION
PEST MANAGEMENT AND LICENSING BRANCH

INSTRUCTIONS FOR COMPLETING THIS FORM ARE INDICATED BELOW AND ON THE REVERSE SIDE

OPERATOR (PERMIT NUMBER)	LICENSE NUMBER	COUNTY WHERE APPLIED	COUNTY NUMBER	MONTH/YEAR OF USE	TOTAL NUMBER OF APPLICATIONS

1. Complete Columns A, B, C, and D for All Users.
2. Complete Column E by using one of the following codes:
   - Code 10 - Structural Pest Control ... includes any pest control work performed within or on buildings and other structures
   - Code 20 - Landscape Maintenance Pest Control ... includes any pest control work performed on landscape plantings around residences or other buildings, golf courses, parks, cemeteries, etc.
   - Code 40 - Right-of-Way Pest Control ... includes any pest control work performed along roadsides, power lines, median strips, ditch banks, and similar areas
   - Code 50 - Public Health Pest Control ... includes any pest control work performed by or under contract with State or local public health or vector control agencies
   - Code 60 - Vertebrate Pest Control ... includes any vertebrate pest control work performed by public agencies or work under the supervision of the State or county agricultural commissioner
   - Code 91 - Commodity Fumigation (Nonfood/Nonfeed) ... includes fumigation of nonfood/nonfeed commodities such as pallets, dunnage, furniture, burlap bags, etc.
   - Code 100 - Regulatory Pest Control ... includes any pest control work performed by public employees or contractors in the control of regulated pests

   Note: pesticide use on cannabis should be reported on the appropriate production agricultural pesticide use report forms (DPR-PML-017C, DPR-PML-183 or DPR-PML-025).
3. Complete Columns F and G, if use does not fit one of the above codes

A	B	C	D	E	F	G
MANUFACTURER AND NAME OF PRODUCT APPLIED	CA/CA REGISTRATION NUMBER (FROM LABEL) INCLUDE ALPHA CODE	TOTAL PRODUCT USED (ENTER AMOUNT OF DILUTION)	NUMBER OF APPLICATIONS	CODE	COMMODITY OR SITE TREATED	AGRICULTURE TREATED
		LB OZ PT QT GA				
		LB OZ PT QT GA				
		LB OZ PT QT GA				
		LB OZ PT QT GA				
		LB OZ PT QT GA				
		LB OZ PT QT GA				

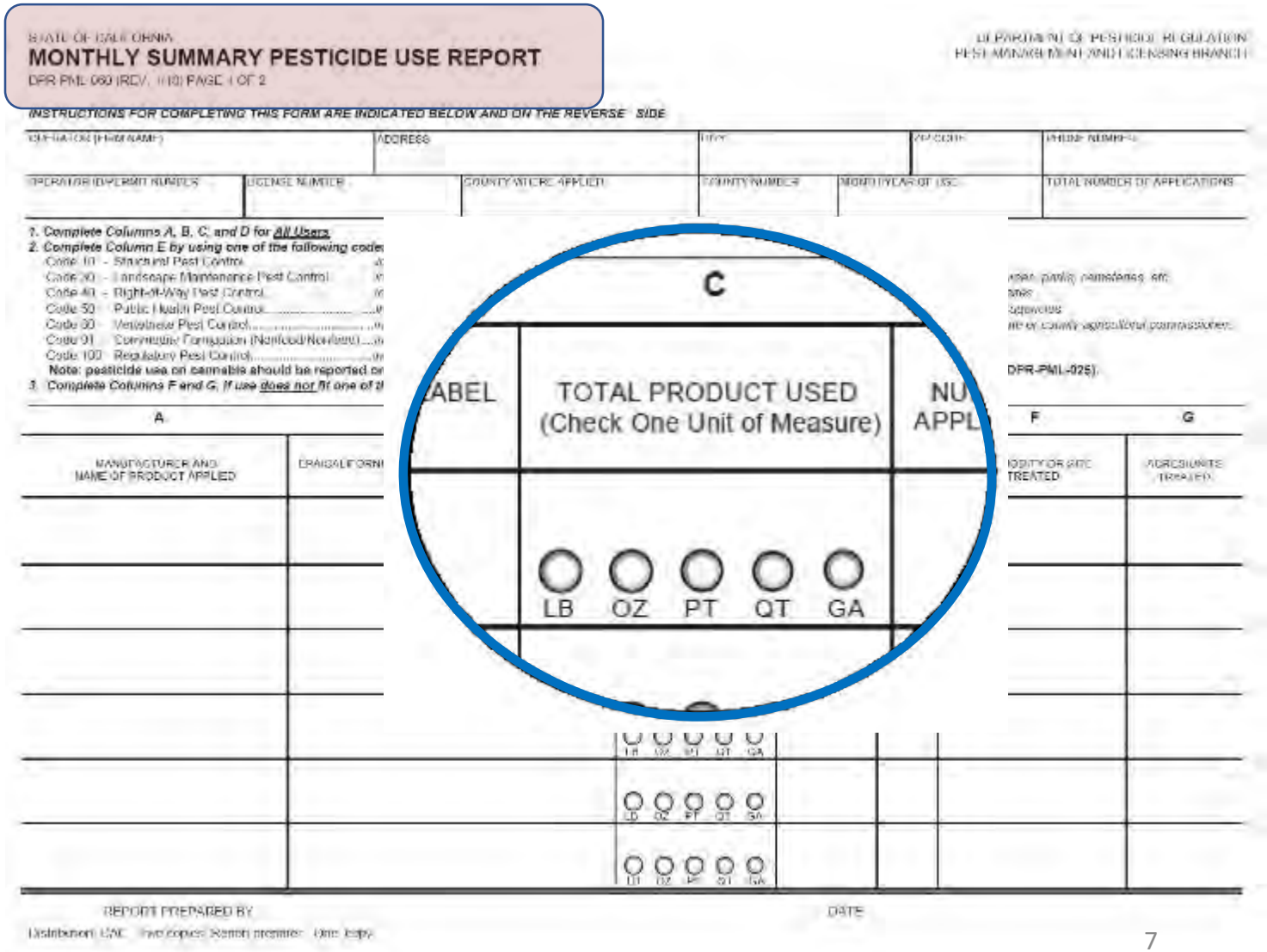
REPORT PREPARED BY DATE

Distribution: USE - Two copies; Retain premises - One copy

Calibrating Spray Equipment

Why it needs to be done

- To determine the amount of product applied at the jobsite
- To report the correct amount of material applied
- Remember to report total amount of the product **concentrate** used to make the applications

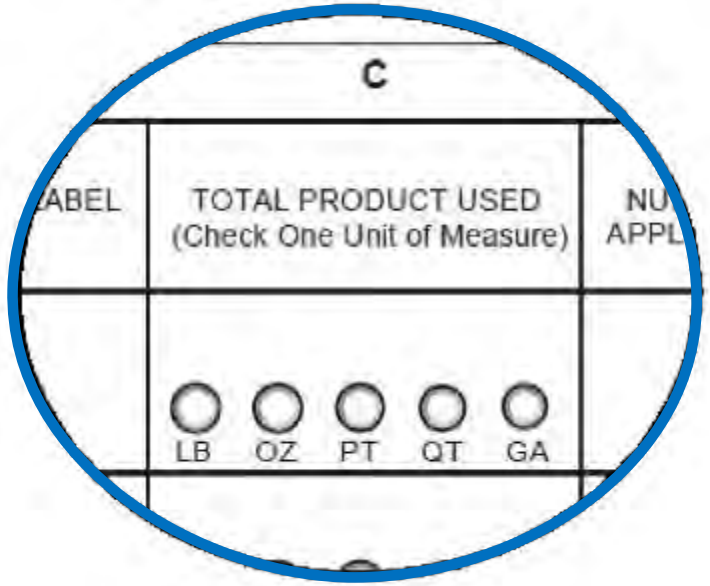


Poll Question

The “TOTAL PRODUCT USED” reported on the Pesticide Use Report is the total amount of

a. spray that was used for the application

b. product concentrate used to make the spray solution



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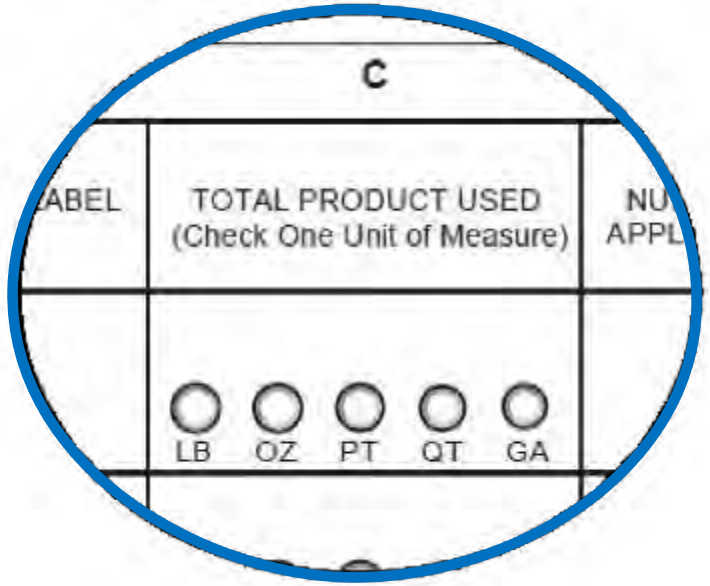

Calibrating Spray Equipment

Method 1- Measure Flow Rate

- Measure rate that liquid flows from sprayer
- Measure the total time spray is applied
- Calculate the volume of spray applied
- The method is the same for battery powered, hand pump, and compression sprayers

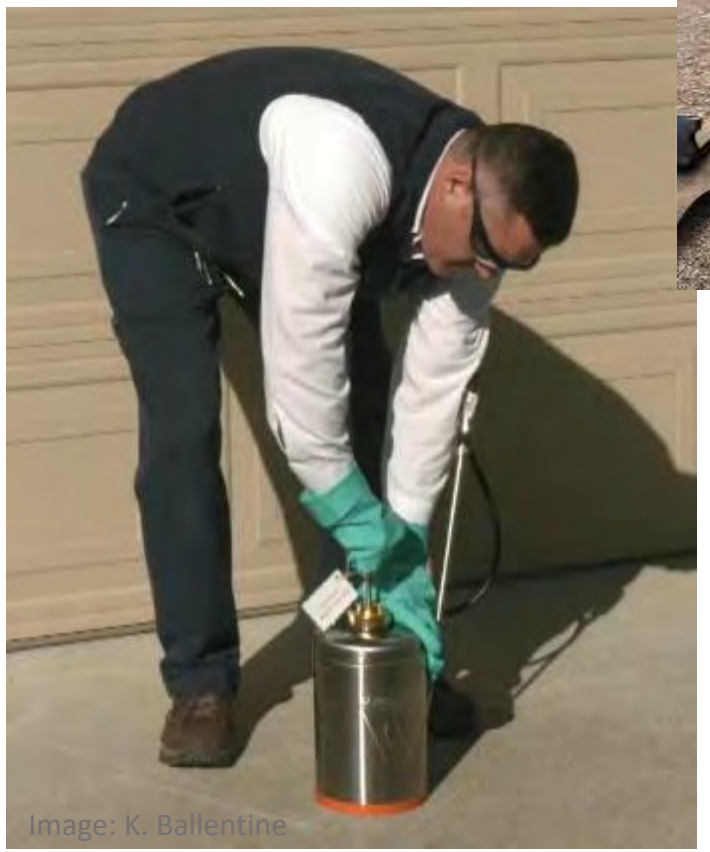
Image: K. Ballentine

Photo: L. Oki


Photo: L. Oki

Method 1- Measure Flow Rate

Equipment needed

1. Sprayer
    a. Back pack
        a. Battery
        b. Hand pump
    b. Hand can

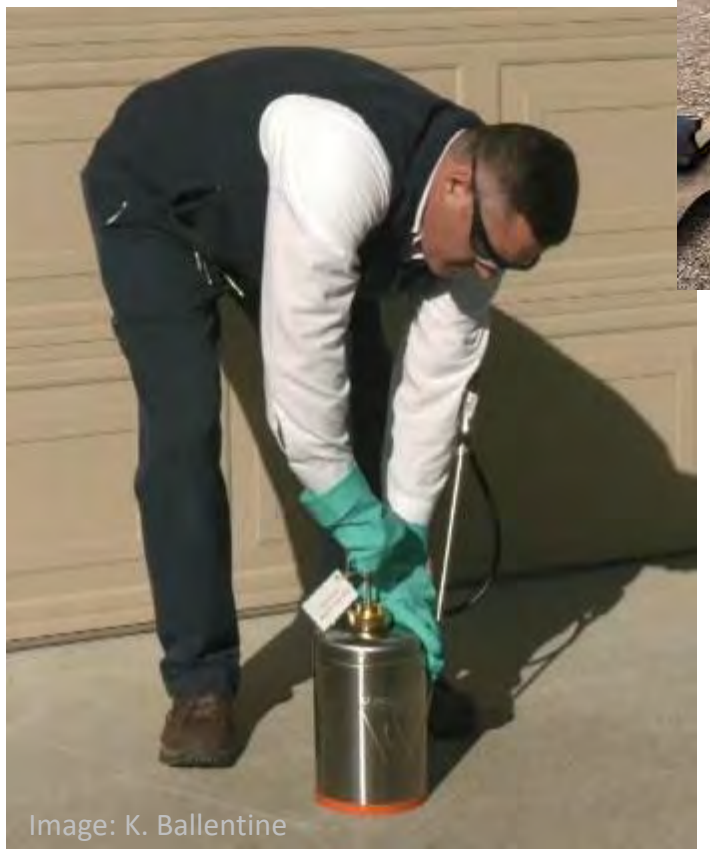

Image: K. Ballentine

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Method 1- Measure Flow Rate

Equipment needed

1. Sprayer
    a. Back pack
        a. Battery
        b. Hand pump
    b. Hand can
2. Spray tip
    a. Fan or pin

Method 1- Measure Flow Rate

Equipment needed

1. Sprayer
    a. Back pack
        a. Battery
        b. Hand pump
    b. Hand can
2. Spray tip
    a. Fan or pin
3. Measuring container
    a. 2 qt is best
    b. Measures fluid ounces

Method 1- Measure Flow Rate

Equipment needed

1. Sprayer
    a. Back pack
        a. Battery
        b. Hand pump
    b. Hand can
2. Spray tip
    a. Fan or pin
3. Measuring container
    a. 2 qt is best
    b. Measures fluid ounces
4. Timer
    a. Smartphone
    b. Kitchen timer
    c. Stop watch
    d. Set for 30 seconds

Photo: L. Oki

Measure Flow Rate

Measuring the Flow Rate

1. Fill sprayer with water

Measure Flow Rate

Measuring the Flow Rate

1. Fill sprayer with water
2. Close the tank

Measure Flow Rate

Measuring the Flow Rate

1. Fill sprayer with water
2. Close the tank
3. Turn on the power

Measure Flow Rate

Measuring the Flow Rate

1. Fill sprayer with water
2. Close the tank
3. Turn on the power
4. Place wand into container

Image: K. Ballentine

Measure Flow Rate

Measuring the Flow Rate

1. Fill sprayer with water
2. Close the tank
3. Turn on the power
4. Place wand into container
5. Start timer set for 30 sec.

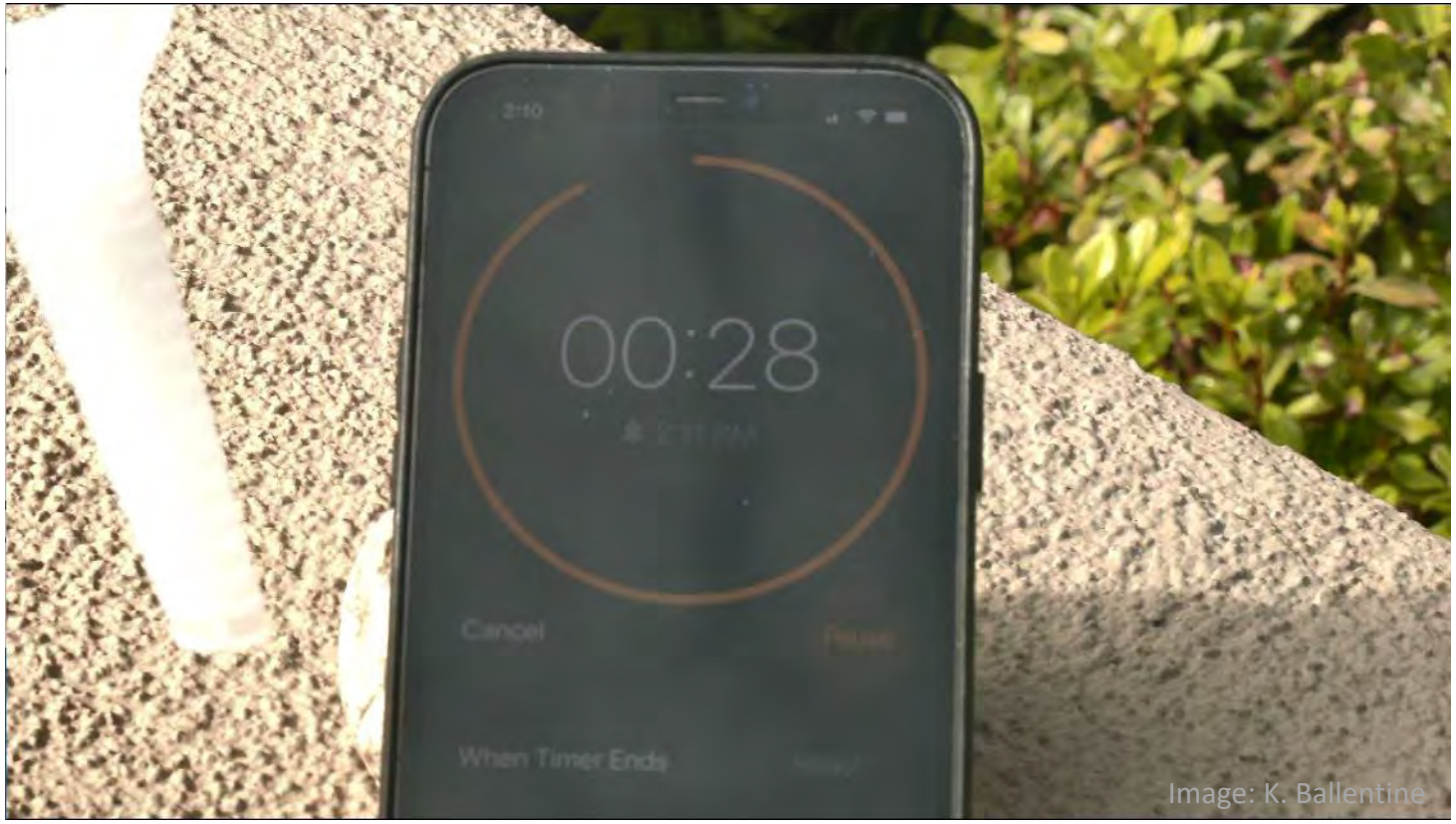

Image: K. Ballentine

Measure Flow Rate

Measuring the Flow Rate

1. Fill sprayer with water
2. Close the tank
3. Turn on the power
4. Place wand into container
5. Start timer set for 30 sec.
6. Start spraying

Measure Flow Rate

Measuring the Flow Rate

1. Fill sprayer with water
2. Close the tank
3. Turn on the power
4. Place wand into container
5. Start timer set for 30 sec.
6. Start spraying
7. Stop at 30 seconds

Image: K. Ballentine

Measure Flow Rate

Measuring the Flow Rate

1. Fill sprayer with water
2. Close the tank
3. Turn on the power
4. Place wand into container
5. Start timer set for 30 sec.
6. Start spraying
7. Stop at 30 seconds
8. Measure volume

Image: K. Ballentine

Measure Flow Rate

Example:

Measured rate is:

32 ounces in 30 seconds

Flow rate per minute is:

64 ounces per minute

Image: K. Ballentine

Measure Time to Apply

Then measure the time it takes to make the spray application.

This one was almost exactly 30 seconds to the front of the house.

And that includes the time to skip the garage doors and walkways.

Record the total time for the application at the job site.

Calculate Total Spray Volume

In the video clip, the flow rate was 64 fl oz/min.

Total application time in minutes × 64 = total volume applied in ounces.

Example: For a 5.5 minute application:

5.5 × 64 = 352 ounces

Since there are 128 ounces per gallon, divide by 128 to get gallons.

352 ÷ 128 = **2.75 gallons**

2.75 gallons of spray was applied at the job site.

Image: K. Ballentine

The importance of converting to gallons will come up later.

Poll Question

- To calculate the amount of spray applied by measuring the flow rate, you need to know both of these:
  - The flow rate of the sprayer
  - The total time of the application

a. True
b. False

Poll Question

- To calculate the amount of spray applied by measuring the flow rate, you need to know both of these:
  - The flow rate of the sprayer
  - The total time of the application

a. True
b. False

Other Flow Rate Considerations

Things to think about:

- When using a hand can, the pressure will affect flow rate
  - Higher flow rates just after pumping
  - Flow decreases as spraying continues and pressure drops
  - Measure flow at both high and low pressures, then average

Other Flow Rate Considerations

Things to think about:

- Be sure to measure flow with both fan and pin stream nozzles
- Be aware of drains and adjust your application accordingly!
  - Survey area before making the application to locate drains, doorways, and other features that need to be avoided

Other Flow Rate Considerations

Things to think about:

- Be sure that the material used is appropriate for impervious surfaces.
  - There are specific restrictions for bifenthrin

Calibrating Spray Equipment

Method 2- Sprayer Weight

- Weigh sprayer before application
- Weigh sprayer after application
- The difference in weight is the amount of spray applied

Method 2- Sprayer Weight

Equipment needed:

Digital Scale

- 10^{ths} of pounds (00.0)
- 50 pound capacity **minimum**
- 100 pound capacity **is better**

4 gal spray = 32 lb

Birchmeier Iris 15 = 10.4 lb
FlowZone Typhoon 2.5 = 16 lb

Photo: L. Oki

Sprayer Weight

Process:

1. Weigh before spraying
2. Weigh after spraying
3. weight before
   - weight after
   = weight applied
4. Convert weight applied to volume applied

Sprayer Weight

Convert weight applied to volume

Weight*	Volume
1 pound	16 fluid ounces
1 pound	1 pint
2 pounds	1 quart
8 pounds	1 gallon

"A pint's a pound the world around"

Divide the weight applied by 8 to get gallons applied:

Gallons applied = applied wt ÷ 8

"Find the weight, divide by eight"

The importance of converting to gallons will come up later.

*Note that this conversion to weight is not exact, but is really close.

Sprayer Weight

Example:

1. Weigh before = 35.0 lb

   make application

2. Weigh after = 21.3 lb
3. Calculate the amount applied
   (wt before – wt after= wt applied)

35.0	wt before
– 21.3	wt after
13.7 lb	wt applied

4. Convert weight applied to volume

   13.7 lbs ÷ 8 = **1.7 gal**

Photo: L. Oki

Calibrating Spray Equipment

- Method 1- Measure Flow Rate
- Method 2- Weight

Try both ways.
See which one
you like better.

Also:
If you choose
one, use the
other to check


Image: K. Ballentine


Photo: L. Oki

Poll Question

- The purpose of calibration or weighing is to determine the amount of spray solution that was applied at a job site.

a. True
b. False

Poll Question

- The purpose of calibration or weighing is to determine the amount of spray solution that was applied at a job site.

a. True
b. False

Convert Spray Volume to Product Used

- Multiply the volume of spray applied times the dilution rate

Talstar® P
PROFESSIONAL
INSECTICIDE

To control pests indoors and outdoors on residential, institutional, public, commercial, and industrial buildings, greenhouses, animal confinement facilities/livestock premises, kennels, food handling establishments, and lawns, ornamentals, parks, recreational areas and athletic fields.

When used as a termiticide, individuals/firms must be licensed by the state to apply termiticide products. States may have more restrictive requirements regarding qualifications of persons using this product. Consult the pest control regulatory agency of your state prior to use of this product.

Provides up to 1 month residual control of house flies
Kills fleas for up to 3 months

EPA Reg. No. 279-3206 **EPA Est. 279-NY-1**

Active Ingredient:	**By Wt.**
Bifenthrin*	7.9%
Other Ingredients:	92.1%
	100.0%

Talstar® P Professional Insecticide contains ⅞ pound active ingredient per gallon.
*Cis isomers 97% minimum, trans isomers 3% maximum.

KEEP OUT OF REACH OF CHILDREN

CAUTION

FIRST AID	
If swallowed	• Call poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by the poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If inhaled	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. • Call a poison control center or doctor for further treatment advice.
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.
If in eyes	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.

HOTLINE NUMBER

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-(800)-331-3148 for Emergency Assistance.

NOTE TO PHYSICIAN

This product is a pyrethroid. If large amounts have been ingested, the stomach and intestine should be evacuated. Treatment is symptomatic and supportive. Digestible fats, oils, or alcohol may increase absorption and so should be avoided.

For Information Regarding the Use of this Product Call 1-800-321-FMC (1362).

PRECAUTIONARY STATEMENTS
Hazards to Humans (and Domestic Animals)
CAUTION

Convert Spray Volume to Product Used

- Multiply the volume of spray applied times the dilution rate
- 0.5 fl oz Talstar per gal spray

So,

Volume of spray
× 0.5
= fl oz Talstar

Example:

1.8 gal of spray applied
× 0.5
0.9 fl oz of Talstar

Nuisance Ants Outdoors: For best results, locate and treat ant nests. Apply Talstar® P Professional Insecticide to ant trails around doors and windows and other places where ants have been observed or are expected to forage. Apply a perimeter treatment using either low or high volume applications described in the "Pest Control on Outside Surfaces and Around Buildings" section of this label. The higher dilutions and/or application volumes, as well as more frequent applications, may be necessary when treating concrete surfaces for ant control. Maximum control is generally achieved using the following procedure:

The following procedure must be followed to help achieve maximum control of the pest:

1) Treat non-porous surfaces only in areas protected from rainfall and spray from sprinklers with low volume applications using 0.5 to 1.0 fluid oz. of Talstar® P Professional Insecticide per gallon of water and applying this dilution at the rate of one gallon per 1,000 square feet.
2) Treat porous surfaces and vegetation with high volume applications (usually 5 to 10 finished gallons per 1,000 square feet) using dilutions that are calculated to deliver 0.5 to 1.0 fluid oz. of Talstar® P Professional Insecticide per 1,000 square feet (refer to the Talstar® P Professional Insecticide Dilution Chart).
3) For maximum residual control, dilute 1.0 fluid oz of Talstar P Professional Insecticide per gallon of water and apply at a rate of up to 10 gallons of dilution per 1,000 square feet.

Poll Question

- To determine the amount of spray to apply to a porous or vegetated area, it is important to measure the size of the area where the application is to be made.

a. True
b. False

Poll Question

- To determine the amount of spray to apply to a porous or vegetated area, it is important to measure the size of the area where the application is to be made.

a. True
b. False

Porous Surfaces and Vegetated Areas

Information you need

- Application rate
  - gal/area
- Dilution rate
  - How to mix the solution
- Area
  - How large is the area
    - How much to apply
- Time
  - How long it should take to apply

Porous Surfaces and Vegetated Areas

- 5 to 10 gallons of solution per 1,000 square feet
- 0.5 to 1.0 fl oz Talstar per 1,000 square feet
- 0.5 fl oz Talstar in 5 gal
- Calculate the area to be treated to determine the volume to apply
- Calculate the time it will take to apply the volume needed

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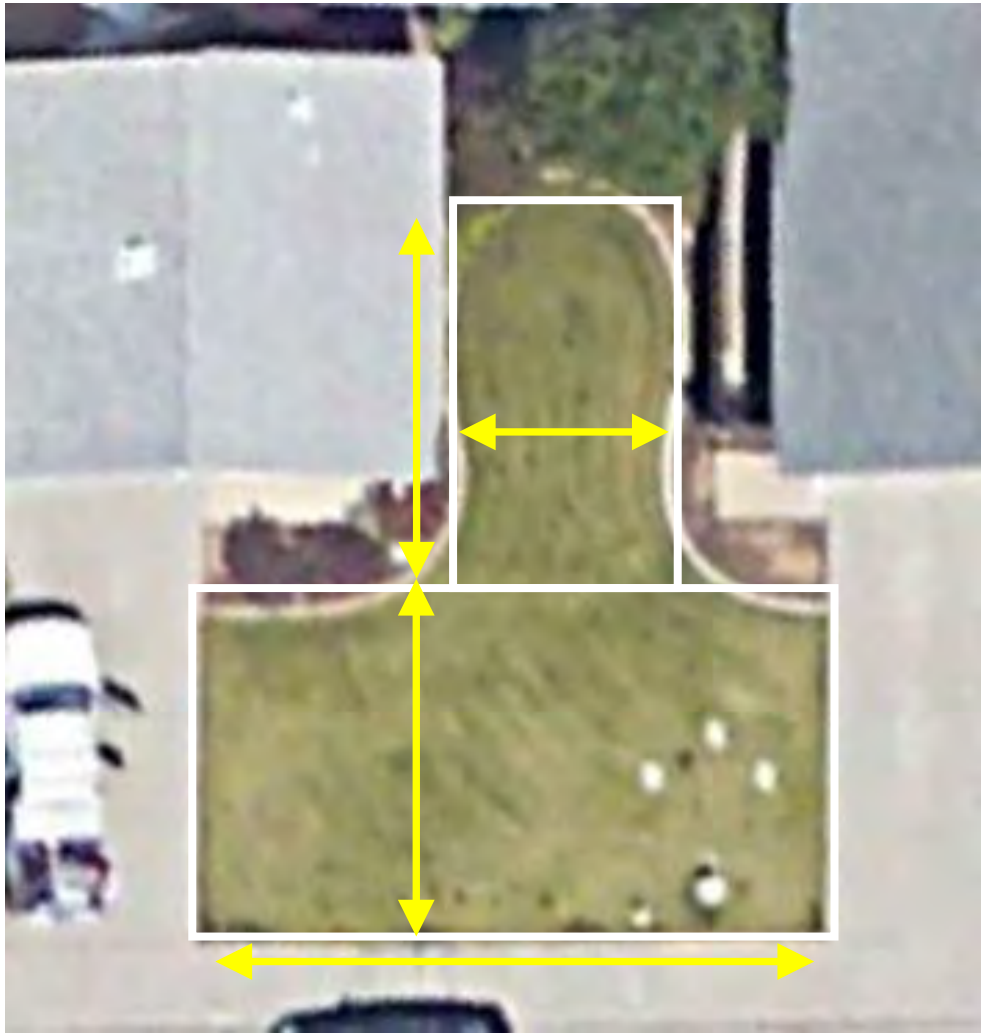
Porous Surfaces and Vegetated Areas

- Calculate the area to be treated
- Overlay shapes-
  - Rectangles and circles

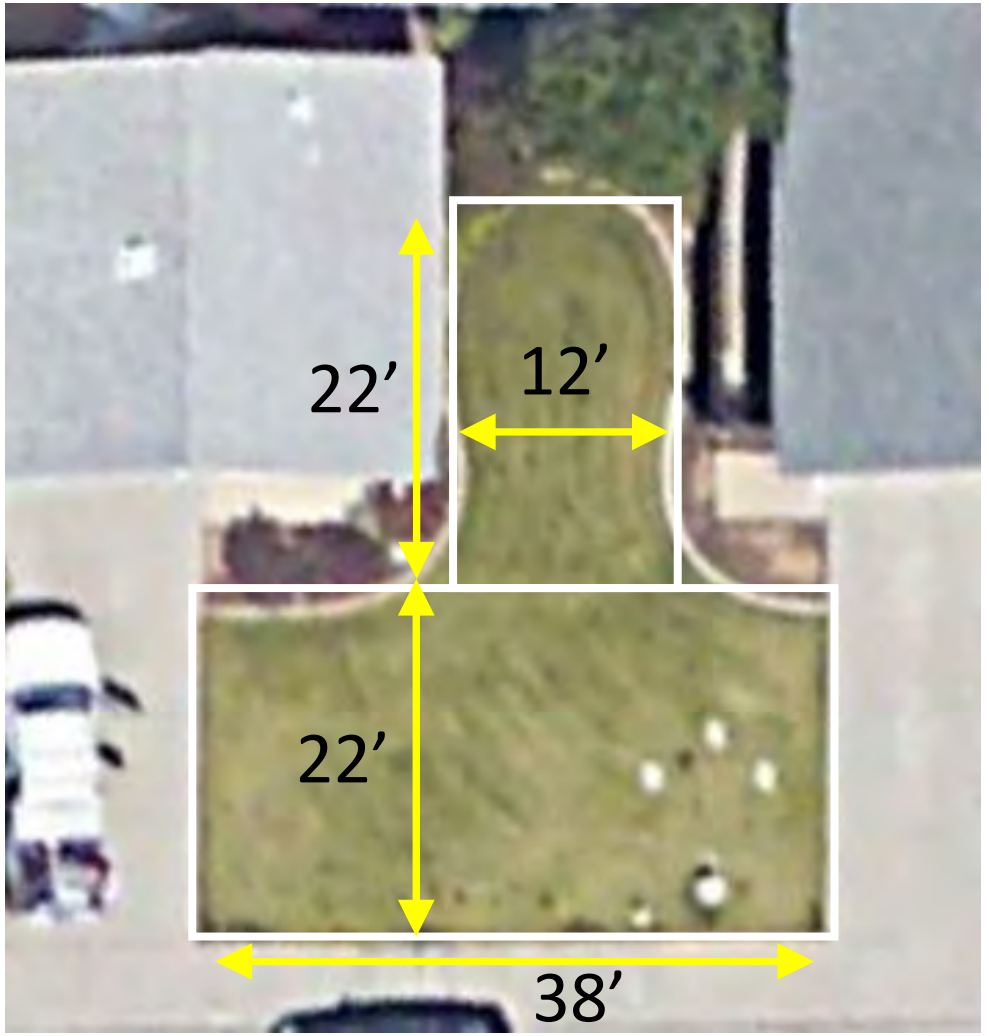
Porous Surfaces and Vegetated Areas

- Calculate the area to be treated
- Overlay shapes-
  - Rectangles and circles
  - Measure dimensions



Porous Surfaces and Vegetated Areas

- Calculate the area to be treated
- Overlay shapes-
  - Rectangles and circles
  - Measure dimensions
    - Reduce for impervious surfaces



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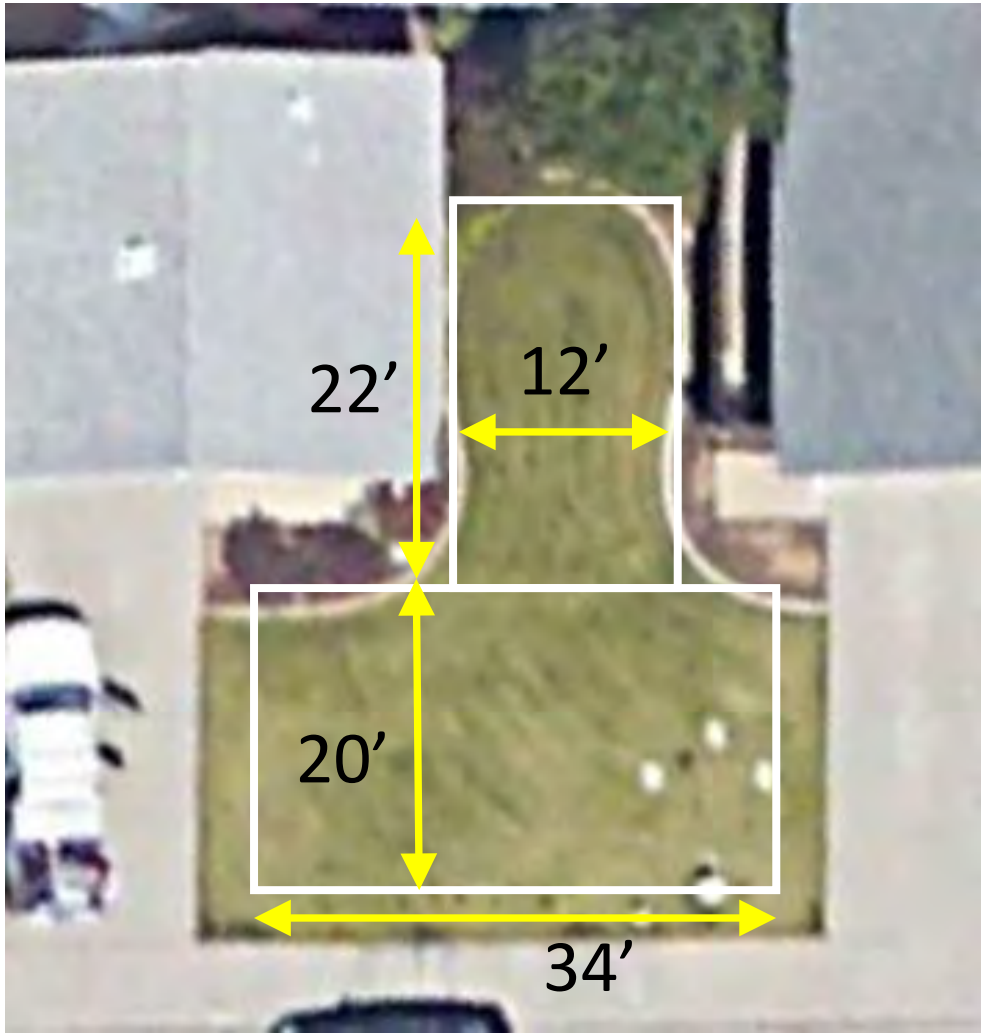
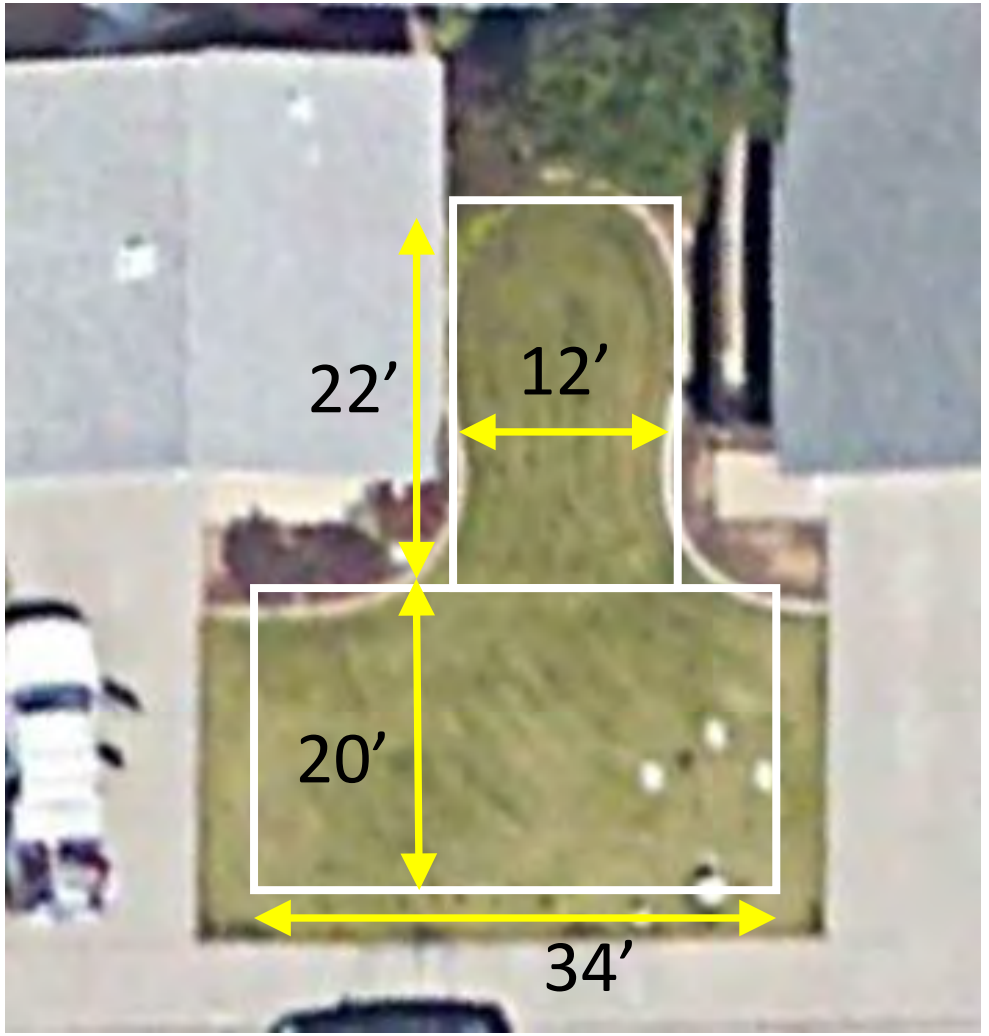


Porous Surfaces and Vegetated Areas

- Calculate the area to be treated
- Overlay shapes-
  - Rectangles and circles
  - Measure dimensions
    - Reduce for impervious surfaces
- Calculate area
  - 22 × 12 = 264
  - 20 × 34 = 680
  - 264 + 680 = 944 sq.ft.



Porous Surfaces and Vegetated Areas

- 5 to 10 gallons solution per 1,000 sq ft
- 0.5 to 1.0 fl oz Talstar per 1,000 sq ft
- 0.5 fl oz Talstar in 5 gal
- Calculate the area to be treated to determine the volume of solution to apply
  - 944 sq ft

Porous Surfaces and Vegetated Areas

- 5 to 10 gallons solution per 1,000 sq ft
- 0.5 to 1.0 fl oz Talstar per 1,000 sq ft
- 0.5 fl oz Talstar in 5 gal
- Calculate the area to be treated to determine the volume of solution to apply
  - 944 sq ft
- Calculate volume of solution

- Volume = $\frac{5 \text{ gal}}{1000 \text{ sq ft}} \times 944 \text{ sq ft}$ = **4.7 gal**

Porous Surfaces and Vegetated Areas

- 5 to 10 gallons solution per 1,000 sq ft
- 0.5 to 1.0 fl oz Talstar per 1,000 sq ft
- 0.5 fl oz Talstar in 5 gal
- Calculate the area to be treated to determine the volume to apply
  - 944 sq ft
  - 4.7 gal
- Calculate the time it will take to apply the volume needed

- Example
  - Measured flow rate is 64 oz/min
  - One gallon is 128 oz
  - One gallon will take 2 minutes
- If you have to spray 944 sq ft
  - You will need 4.7 gallons
  - It should take 9.5 (9.4) minutes

- Time = $\frac{2 \text{ min}}{\text{gal}} \times 4.7 \text{ gal} = 9.4 \text{ min} \approx \mathbf{9.5 \text{ min}}$

Porous Surfaces and Vegetated Areas

- 5 to 10 gallons solution per 1,000 sq ft
- 0.5 to 1.0 fl oz Talstar per 1,000 sq ft
- 0.5 fl oz Talstar in 5 gal
- Calculate the area to be treated to determine the volume to apply
  - 944 sq ft
  - 4.7 gal
- Calculate the time it will take to apply the volume needed
  - 9.5 minutes

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- Walk the area without spraying
  - Adjust your walking speed to cover the area in 9.5 minutes
  - Use a timer
- Make the application

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- How much Talstar P?

- Volume = $\frac{0.5 \text{ fl.oz. TalstarP}}{5 \text{ gal}} \times 4.7 \text{ gal} = 0.47$

Talstar P = 0.47 fl. oz.

Calibrating Application Equipment

Summary

- Why it needs to be done
- Method 1- Measure Flow Rate
- Method 2- Sprayer Weight
- Converting to Product Use
- Other considerations during applications
- Porous surfaces


Photo: L. Oki

Calibrating Application Equipment

Summary

- Be sure to read the label
- Look for proper use
  - Targeted pest
  - Restricted applications

Photo: L. Oki

Poll Question

If 7.5 gallons of spray were used for all of the spray applications in a day and 7.5 fluid ounces of Talstar P were used to make that spray, what TOTAL PRODUCT USED amount would be reported on the Pesticide Use Report to DPR?

a. 7.5 gallons

b. 7.5 fluid ounces

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Image: K. Ballentine

Thank you

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Image: K. Ballentine