

**AGRP 1126 Students:** Use this as a guide to the final exam this term. There will be two 'problems'. The crops, pests, chemicals and sprayer data, of course, will be different! There may or may not be extra credit offered.

## **AGRP 1126 Pesticide Application Spring Semester Study Guide Written Final Exam**

### **PART ONE**

#### **Chemical Selection**

You have a 62 acre field of actively growing bermudagrass you are growing for transplanting.

1. Using the Turfgrass Weed Response to Herbicides section in the GA Pest Management Handbook, find a herbicide that gives good control (rated G, G-E or E) of yellow nutsedge when applied **POST-EMERGENCE**.  
**bentazon (Basagran TO, or Lescogran) or  
glyphosate (Roundup Pro) or  
trifloxysulfuron-sodium (Monument) or  
halosulfuron (Manage, Sempra, Sledgehammer or Sandea) or  
sulfosulfuron (Certainty)**

#### **EXTRA CREDIT (5 points)**

Using the Turfgrass Weed Control for Professional Managers section in the GA Pest Management Handbook, explain why you would **not** choose glyphosate for this application.

**Glyphosate can be applied only to dormant bermudagrass**

2. Using the Turfgrass Weed Control for Professional Managers section in the GA Pest Management Handbook, find the highest recommended rate of the chemical above in formulated product per acre? (If there is more than one chemical listed, **CHOOSE ONE** to continue)  
**Basagran TO @ 2.0 pints  
Monument @ 0.56 oz  
Manage (or others) @ 1.33 oz  
Certainty @ 1.25 oz**

#### **Sprayer Calibration and Application Calculations**

You have a broadcast sprayer, with a 42 foot boom, and 29 nozzles. Your calibration distance is 250 feet, and it took 38 seconds to cover that distance in the field. You filled your sprayer tank to exactly 60 gallons, and sprayed the 250 foot course. There were exactly 57.75 gallons left in the tank. The spray tank holds 110 gallons.

#### **The Refill Method**

3. How much water was needed to spray the calibration distance, in gallons? (*show your calculations*)  
**60 gal - 57.75gal = 2.25gal**

4. What is the volume per acre in gallons (GPA)? (*show your calculations*)  

$$\text{GPA} = \frac{2.25 \text{ gal} \times 43560 \text{ sqft}}{250 \text{ ft} \times 42 \text{ ft}} = \frac{98010}{10500} = 9.33$$
5. How much formulated chemical is needed for the entire area? (*show your calculations*)  
**Basagran TO:** 2.0 pt x 62Ac = 124 pt  
**Monument:** 0.56 oz x 62 Ac = 34.72 oz  
**Manage:** 1.33 oz x 62 Ac = 82.46 oz  
**Certainty:** 1.25 oz x 62 Ac = 77.5 oz
6. How much water do you need for the entire area in gallons? (*show your calculations*)  

$$62 \text{ Ac} \times 9.33 \text{ GPA} = 578.46 \text{ Gal}$$
7. How much formulated chemical is needed per gallon of water? (*show your calculations*)  
**Basagran TO:** 124 pt / 578.46 Gal = 0.214 pt  
**Monument:** 34.72 oz / 578.46 Gal = 0.0600 oz  
**Manage:** 82.46 oz / 578.46 Gal = 0.1426 oz  
**Certainty:** 77.5 oz / 578.46 Gal = 0.134 oz
8. How much formulated chemical is needed per full tank of spray? (*show your calculations*)  
**Basagran TO:** 0.214 pt x 110 Gal = 23.54 pt  
**Monument:** 0.0600 oz x 110 Gal = 6.6 oz  
**Manage:** 0.1426 oz x 110 Gal = 15.686 oz  
**Certainty:** 0.134 oz x 110 Gal = 14.74 oz
9. How many tankfuls will be required to spray the entire area ? (*show your calculations*)  

$$578.46 \text{ Gal} / 110 \text{ Gal in Tank} = 5.258 \text{ tanks}$$
10. How much water is needed for the last tank?  
 A. **5.258 tanks - 5.00 tanks = 0.258 tanks**  
 B. **0.258 tanks x 110 Gal = 28.38 Gal**
11. How much chemical is needed for the last tank? (*show your calculations*)  
**Basagran TO:** 28.38 Gal x 0.214 pt per Gal = 6.07 pt  
**Monument:** 28.38 Gal x 0.0600 oz per Gal = 1.70 oz  
**Manage:** 28.38 Gal x 0.1426 oz per Gal = 4.05 oz  
**Certainty:** 28.38 Gal x 0.134 oz per Gal = 3.80 oz

**Formulas: Refill Method**

Gallons of Water Used = Gallons at start – Gallons remaining

Gallons per Acre (GPA) =  $\frac{\text{Gallons Used} \times 43560}{\text{Distance (ft)} \times \text{Spray Width of whole sprayer}}$

Total Formulation Needed:

Total needed = rate formulation per acre X acres to spray

Total Water Needed:

$$\text{Total gallons of water needed} = \text{acres to treat} \times \text{GPA (gallons per acre of sprayer)}$$

Formulation per gallon of water:

$$\text{Formulation per gallon of water} = \frac{\text{Total formulation needed}}{\text{Total Water}}$$

Quantity of Formulation to add to Tank

$$\text{Formulation to add to Tank} = \text{formulation per gallon} \times \text{gallons water in tank}$$

Number of Full Tanks to Spray Entire Area

$$\text{Total Water Needed} / \text{Gallons in Sprayer Tank}$$

Amount of Water in Last Tank

A) Portion of Tank = (Total Number of Tanks – whole number)  
[For example 2.74 tanks – 2 = 0.74 tanks]  
[This number *always* starts with a zero]

B) Amount of Water in last Tank  
= Portion of Tank  $\times$  Size of Tank (in gallons)

Amount of Formulation in Last Tank = Amount of water in last tank  $\times$  formulation per gallon of water

1 gallon = 4 quarts = 8 pints = 128 fl.oz.

## **PART TWO**

### **Sprayer Calibration and Application Calculations**

You have a broadcast sprayer, with a 18 foot wide pattern, and 12 nozzles. Your calibration distance is 150 feet, and it took 18.5 seconds to cover that distance in the field. Your sprayer is delivering 6.5 fl.oz. per nozzle in 15 seconds. The sprayer has a 250 gallon tank.

#### **The Flow-Rate Method**

12. What is the gallons per minute (GPM) of a single nozzle?

$$15 \text{ sec} / 60 \text{ sec per minute} = 0.25 \text{ minutes}$$

$$\text{GPM} = (6.5 \text{ floz} / 128) / 0.25 \text{ minutes} = 0.203 \text{ GPM}$$

13. What is the spray width of a single nozzle in inches?

$$\frac{18 \text{ ft} \times 12 \text{ in per foot}}{12 \text{ nozzles}} = 18 \text{ inches}$$

14. What is the speed of the applicator in MPH (show your calculations)?

$$\frac{60}{88} \times \frac{150}{18.5} = 0.68181 \times 8.108 = 5.53 \text{ mph}$$

15. What is the GPA being applied (show your calculations)?

$$\text{GPA} = \frac{0.203 \text{ gpm} \times 5940}{5.53 \text{ mph} \times 18 \text{ in}} = \frac{1205.82}{99.54} = 12.11$$

## Chemical Selection

You have a 58 acre field of peanuts.

16. Using the Peanut Insect Control section in the GA Pest Management Handbook, find an insecticide to control Beet Armyworm. If there is more than one material listed, pick ONE to continue.

**Steward**                      **or**                      **Tracer**

17. What is the **highest** recommended rate in formulated product per acre?

**Steward : 11.3 fl.oz**                      **or**                      **Tracer: 3 fl.oz**

18. How much formulated chemical is needed for the entire area?

**Steward: 11.3 fl.oz x 58 Ac = 655.4 fl.oz**

**Tracer: 3 fl.oz x 58 Ac = 174 fl.oz**

19. How much water do you need for the entire area in gallons?

*(Use GPA calculated in question 15 above)*

**58 Ac x 12.11 GPA = 702.38 Gal**

20. How much formulated chemical is needed per gallon of water?

*(Use the insecticide you chose above)*

**Steward: 655.4 fl.oz / 702.38 Gal = 0.93311 fl.oz**

**Tracer: 174 fl.oz / 702.38 Gal = 0.2477 fl.oz**

21. How much formulated chemical is needed per full tank of spray?

*(Use the information in Part 2 and the insecticide from above)*

**Steward: 0.93311 fl.oz x 250 Gal = 233.27 fl.oz**

**Tracer: 0.2477 fl.oz x 250 Gal = 61.92 pt**

22. How many tankfuls will be required to spray the entire area? *(show your calculations)*

**702.38 Gallons / 250 Gallons per tank = 2.810 tanks**

23. How much water is needed for the last tank?

A. Portion of a Tank: **2.810 - 2.000 = 0.810**

B. Gallons in Last Tank: **0.810 tanks x 250 Gallons per tank = 202.5 Gal.**

24. How much chemical is needed for the last tank? *(show your calculations)*

**Steward: 202.5 Gal. x 0.93311 fl.oz per gallon = 188.548 fl.oz**

**Tracer: 202.5 Gal. x 0.2477 fl.oz per gallon = 50.159 fl.oz**

## Formulas: Flow Rate Method

Gallons per minute (GPM) =  $\frac{\text{ounces collected} / 128}{\text{Minutes}}$

Width of one nozzle in inches =  $\frac{\text{width of boom in ft.} \times 12 \text{ inches per foot}}{\text{Number of nozzles}}$

MPH =  $\frac{60}{88} \times \frac{\text{calibration distance (ft)}}{\text{calibration time (sec)}}$

$$\text{GPA} = \frac{\text{GPM} \times 5940}{\text{MPH} \times \text{spray width (inches)}}$$

Total Formulation Needed:

$$\text{Total needed} = \text{rate formulation per acre} \times \text{acres to spray}$$

Total Water Needed:

$$\begin{aligned} \text{Total gallons of water needed} = \\ \text{Acres to treat} \times \text{GPA (gallons per acre of sprayer)} \end{aligned}$$

Formulation per gallon of water:

$$\text{Formulation per gallon of water} = \frac{\text{Total formulation needed}}{\text{Total Water}}$$

Quantity of Formulation to add to Tank

$$\text{Formulation to add to Tank} = \text{formulation per gallon} \times \text{gallons water in tank}$$

Number of Full Tanks to Spray Entire Area

$$\text{Total Water Needed} / \text{Gallons in Sprayer Tank}$$

Amount of Water in Last Tank

$$\begin{aligned} \text{A) Portion of Tank} &= (\text{Total Number of Tanks} - \text{whole number}) \\ & \quad [\text{For example } 2.74 \text{ tanks} - 2 = 0.74 \text{ tanks}] \\ & \quad [\text{This number } \underline{\text{always}} \text{ starts with a zero}] \end{aligned}$$

$$\text{B) Amount of Water in last Tank} = \text{Portion of Tank} \times \text{Size of Tank (in gallons)}$$

$$\text{Amount of Formulation in Last Tank} = \text{Amount of water in last tank} \times \text{formulation per gallon of water}$$

$$\underline{1 \text{ gallon} = 4 \text{ quarts} = 8 \text{ pints} = 128 \text{ fl.oz.}}$$