CALIBRATION QUIZ

TPSS/PEPS 481 FALL 2011

(SHOW ALL WORK AND EQUATIONS, NO CREDIT WITHOUT EQUATIONS)

Useful conversions: 1 mile = 5280 ft. 1 acre = 43,560 ft.²
1 gallon = 128 oz. = 4 quarts = 3785 ml 1 pound = 454 grams

16-16-16 = 16% N  molecular weights of elements
16% P₂O₅
16% K₂O
O = 16.0g

Part 1. (10 PTS) Solve for X in the following equations (2 PTS EACH FOR 1 - 5 BELOW):

1. \( \frac{5}{100} = \frac{24}{X} \)
   \( X = 480 \)

2. \( \frac{36}{107} = \frac{18}{X} \)
   \( X = 53.5 \)

3. \( \frac{X = 90}{6} = \frac{1500}{100} \)

4. \( \frac{X = 14}{7} = \frac{.68}{.34} \)

5. \( \frac{43,560}{137} = \frac{245}{X} = 0.77 \)

Part 2. (75 PTS)

You are hired as an experimentalist for the Hawaii Pineapple Grower’s association. New high-sugar pineapple cultivars have been developed to replace older cultivars used primarily for canning. Since the new cultivars have not been tested for herbicide tolerance you must design and execute an experiment to determine the proper rates of application of diuron (Direx 4L) for weed control in new plantings.

Use the Direx 4L label as your starting point for identifying herbicide rates for the experiment. You must fill in the table below and provide the proper amount of Direx 4L to be placed into the spray tank. Read the sprayer details provided below very carefully and provide the information described in the “Answer Key” section below.

Details of experimental sprayer: You will conduct your research with a battery powered back pack sprayer. You will be spraying with a 3 nozzle boom which provides a 5 foot spray width that is drawing finished spray from a 2.5 gallon tank. The sprayer is calibrated to deliver 40 gallons per acre. Read the Direx 4L label and decide upon your lowest experimental rate (i.e. 1X) of application. Then fill in the table below.

Table 1, amount of Direx 4L needed to conduct pineapple experiment.

<table>
<thead>
<tr>
<th>Treatment description</th>
<th>Amount of Direx 4L Quarts/a</th>
<th>Liquid volume of Direx 4L into a 2.5 gallon tank Ans. = ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>1X-Direx 4L</td>
<td>1.6 qt/x ml = 4qt/3785 ml X = 1514</td>
<td>1514 ml/40 gal = x ml/2.5 gal X = 94.6 ml</td>
</tr>
<tr>
<td>2X-Direx 4L</td>
<td>3.2</td>
<td>X = 189.2 ml</td>
</tr>
<tr>
<td>4X-Direx 4L</td>
<td>6.4</td>
<td>X = 378.4 ml</td>
</tr>
</tbody>
</table>

Answer key for Part 2:
1. Fill in the empty cells in columns 2 and 3 in Table 1. above. Carefully provide a derivation of your answer on the back of this quiz.
2. Provide a brief justification for your selection of the 1X rate in the area provided on the next page. Read the label and make a decision.
3. What is the total linear feet you can cover with the 2.5 gallon tank using the 5 ft. boom, provided answer below.
Justification of 1X rate: (10 points for justification)

Name: __________________________

The Direx label indicates the lowest effective rate for pineapple is 1.6 qt, so this is my 1X for the experiment.

Total Linear footage with 2.5 gallon tank: (5 points)

Since the sprayer is calibrated to deliver 40 gallon per acre, 2.5 gallons will cover 2755.5 ft². 40 gal/43,560 ft² = 2.5 gal/X, X = 2755.5 ft².

With a 5 nozzle boom the total linear feet you can cover with a 5 ft wide boom is 2775. ft²/5 = 544.5 linear feet. As an equation 2755.5 ft² = 5*X, X = 544.5

Part 3. (15 PTS)

6. You will observe the amount of materials applied to the 1 ft. x 1 ft. sheet of black plastic weed mat and attempt to duplicate that same rate on a 3 ft. x 3 ft. sheet of black plastic weed mat with a bulk applicator. After you make your best application to the plastic sheet, the amount you applied will be weighted. Answer the following questions below.

6(a). At an 80 pounds/a rate, how much material was added to the 1 ft. x 1 ft. square. Provide your answer in grams.

\[
80 \frac{(454)}{43,506} \text{ ft}^2 = x/1 \text{ ft}^2, X = 0.83 \text{ grams.}
\]

6(b). What was the amount of material that you actually applied to the 3 ft. x 3 ft. sheet of plastic?

7.8 grams, each student will have a slightly different answer. What was the rate of your application in terms of pounds/acre.

\[
7.8 \frac{g}{9 \text{ ft}^2} = Xg/43,560, X = 37,753 \text{ grams on 1 acre.}
\]

Lb/a = 37,753/454 = 83.15 lb.

6(c). If the material you were applying 10-30-10 fertilizer, how many pounds of phosphorus did you apply on a pounds/acre basis. Provide your answer in pounds of P/a.

83.15 lb of 10-30-10 amounts to 83.15 * (.30) = 24.9 lb P₂O₅,

\[
\%	ext{ of P in P}_2\text{O}_5 = \frac{(2*30.9)}{(2*30.9) + (5*16)} = 43.5% \]

pounds of P in 24.9 lb P₂O₅ = 24.9 * (.435) = 10.8 lb. P.
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