HW 2 Solutions

1) Givens:
   1. 1.5 pt/A Buctril (2.5 lbs ai/gal)
   2. 3.1 MPH
   3. 16.5 Swath
   4. 18” space (16.5/18 = 11 nozzles)

   A) \((1.5\text{pt Buctril/1 A}) \times (1\text{gal/8 pt}) = 0.1875\text{gal buctril/A}\)

   \((0.1875\text{gal buctril/A}) \times (2.5\text{Lbs ai/1 gal buctril}) = 0.46875\text{Lbs ai/A}\)

   B) \(X\text{gpm} = (3.1\text{MPH} \times 12\text{ GPA} \times 18\text{ space})/5940 = 0.1127\text{GPM}\)

   \((0.1127\text{gallons/minute}) \times (128\text{ fl oz/gal}) = 14.429\text{ fl oz/minute}\)

   C) \((0.1127\text{ gal/min}) \times (1\text{ min/60 sec}) \times (3785\text{mL/gal}) = 7.1095\text{ mL/sec}\)

   \(7.1095\text{mL/sec} \times 45\text{ seconds} \times 11\text{ nozzles} = 3519.198\text{ mL in 45 secs for boom}\)

2) Givens:
   85 A
   0.6 a.e./A
   12’ wide
   6 nozzles ((12x12)/6 = 24” space)
   378.5 mL/min

   A) \((378.5\text{mL/min}) \times (1\text{ gal/3785mL}) = .1\text{GPM}\)

   \(.1\text{GPM} = (5\text{MPH} \times \text{GPA} \times 24")/5940\)

   \((.1 \times 5940)/(5 \times 24) = 4.95\text{ GPA}\)

   \(4.95\text{ GPA} \times 85\text{ A} = 420.75\text{ gallons for the field}\)

   B) \((0.6\text{ Lbs a.e./A}) \times 85\text{ A} = 51\text{ Lbs a.e. / pasture} (\text{a.e. stand for acid equivalent and is basically the same thing as active ingredient})\)

   \(51\text{ Lbs a.e./pasture} \times (1\text{gal/4Lbs a.e.}) = 12.75\text{ gallons 2,4-D/Pasture}\)
3) Given:
10 nozzles
15’ boom ((15x12)/10 = 18” space)
200 gal tank
5.5 mph
25 GPA
AIM 50 WG
3 hrs (180 minutes)

A) \[ \text{GPM} = \frac{(5.5 \text{ mph} \times 25 \text{ gpa} \times 18”)}{5940} = 0.41667 \text{ GPM} \]
\[ (0.41667 \text{ gal/min}) \times (1 \text{ min/60 sec}) \times (3785 \text{ ml/gal}) = 26.2849 \text{ mL/sec} \]
\[ 26.2849 \text{ mL/sec} \times 30 \text{ seconds} = 788.547 \text{ mL/30 seconds} \]

B) \[ 5.5 \text{ mph} \times 88\text{ft/min} \times 15’ \text{ swath} = 7260 \text{ sq ft/min} \]
\[ 7260 \times 180 \text{ minutes} = 1306800 \text{ ft/day} / 43560 = 30 \text{ A/day} \]
\[ (30\text{A/day}) \times (.4\text{ai/A}) = 12 \text{ Lbs ai/day} \]
\[ 12 \text{ Lbs ai/day} / .5 = 24 \text{ Lbs AIM 50 WG (.5 comes from 50% ai/Lb AIM)} \]

C) \[ (30\text{A/day}) \times (25\text{gal/a}) = 750 \text{ gal}/200 \text{ gal tank} = 3.75 \text{ tanks (4 times to refill)} \]

D) \[ (24 \text{ Lbs AIM/day}) \times (1 \text{ day/3.75 tanks}) = 6.4 \text{ Lbs AIM 50WG/tank} \]

From part B \hspace{2cm} \text{From part C}

4) Given:
150A
2 Lbs ai/A (atrazine is AI in Aatrex)
50’ swath
20 nozzles ((50x12)/20 = 30” space)
120 MPH

A) \[ (150 \text{ A/field}) \times (2\text{Lbs/A}) \times (1 \text{ Lb Aatrex/.9 Lbs atrazine}) = 333.333 \text{ Lbs Aatrex} \]

B) \[ (3000 \text{ mL/min}) \times (1 \text{ gal}/3785 \text{ mL}) = 0.7926 \text{ GPM} \]
\[ 0.7926 \text{ GPM} = \frac{(120\text{MPH} \times \text{GPA} \times 30” \text{ space})}{5940} \]
\[ (0.7926 \times 5940)/(120 \times 30) = 1.3079 \text{ GPA} \times 150\text{A} - 196.185 \text{ gallons} \]
C) Way 1:

\[ 120 \text{ MPH} \times (88 \text{ ft/1 MPH}) \times (50' \text{ swath}) \times \left( \frac{1 \text{ A}}{43560 \text{ ft}} \right) = 12.1212 \text{ A/min} \]

\[ 150 \text{ A} / 12.1212 \text{ A/min} = 12.375 \text{ minutes} \]

Way 2:

\[ \frac{196.185 \text{ gallons/field}}{0.7926 \text{ GPM} \times 20 \text{ nozzles}} = 12.376 \text{ minutes} \]

(From part B)