

USEFUL FORMULAS AND CONVERSION FACTORS

Useful Formulas

Spray Rates

$\text{GPM (Per Nozzle)} = \frac{\text{GPA} \times \text{MPH} \times W}{5,940}$	GAL/1000FT^2 — Gallons Per 1000 Square Feet
$\text{GPM (Per Nozzle)} = \frac{\text{GAL/1000FT}^2 \times \text{MPH} \times W}{136}$	MPH — Miles Per Hour
$\text{GPA} = \frac{5,940 \times \text{GPM (Per Nozzle)}}{\text{MPH} \times W}$	W — Nozzle spacing (in inches) for broadcast spraying
$\text{GAL/1000FT}^2 = \frac{136 \times \text{GPM (Per Nozzle)}}{\text{MPH} \times W}$	— Spray width (in inches) for single nozzle, band spraying or boomless spraying
GPM — Gallons Per Minute	— Row spacing (in inches) divided by the number of nozzles per row for directed spraying
GPA — Gallons Per Acre	

Nozzle Spacing Equivalents

20"	
Other Spacing (inches)	Conversion Factor
8	2.5
10	2
12	1.67
14	1.43
16	1.25
18	1.11
22	.91
24	.83
30	.66

30"	
Other Spacing (inches)	Conversion Factor
26	1.15
28	1.07
32	.94
34	.88
36	.83
38	.79
40	.75
42	.71
44	.68

40"	
Other Spacing (inches)	Conversion Factor
28	1.43
30	1.33
32	1.25
34	1.18
36	1.11
38	1.05
42	.95
44	.91
48	.83

Nozzle Selection Formula

$$\frac{\text{GPA} \times \text{MPH} \times \text{Nozzle Spacing in inches}}{5940} = \text{GPM per nozzle}$$

Then go to any nozzle chart regardless of nozzle spacing and find the nozzle that matches the PSI and that is the correct size.

$$\frac{10 \text{ GPA} \times 12 \text{ MPH} \times 20"}{5940} = .40 \text{ GPM per nozzle}$$

Use 04 nozzle, no matter the type.

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Low Limit Formula

Use this formula to determine the low limit (in gallons per acre) for all nozzles and boom lengths.

$$0.06 \times \text{Last Digit in Nozzle Number} \times \text{Number of Nozzles} = \text{Low Limit (GPM)}$$

Example

The following calculation uses nozzle number 8004 and a 90' boom with 20" spacing.

$$0.06 \times 4 \times 54 = 12.96, \text{ approximately } 13 \text{ GPM}$$

Spraying with Liquids with a Density Other Than Water

All the previous tabulations are based on spraying water, which weighs 8.34 lbs per US Gallon (1 kg per Liter). Conversion factors must be used when spraying liquids that are heavier or lighter than water to select the correct nozzle. Refer to the following table:

Weight of Solution	Specific Gravity	Conversion Factor
7.0 lbs/gal.	0.84	0.92
8.0 lbs/gal.	0.96	0.88
8.34 lbs/gal.	1.00 (water)	1.00
9.0 lbs/gal.	1.08	1.04
10.0 lbs/gal.	1.20	1.10
10.65 lbs/gal.	1.28 (28% nitrogen)	1.13
11.0 lbs/gal.	1.32	1.15
12.0 lbs/gal.	1.44	1.20
14.0 lbs/gal.	1.68	1.30

To determine the proper sized nozzle for liquids heavier or lighter than water, first multiply the desired GPM or GPA by the water rate conversion factor, then use the converted GPM or GPA rate to select the proper nozzle size.

$$\text{GPA} \times \text{Conversion Factor of Liquid to be Sprayed} = \text{Equivalent GPA of Water}$$

Example

The following calculation uses a desired application of 20 GPA of 28% nitrogen.

$$20 \times 1.13 = 22.6 \text{ GPA}$$

In this example, a nozzle that supplies 22.6 GPA of water at the desired pressure, will supply 20 GPA of 28% nitrogen at the same pressure.

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Additional Conversion Factors

One Acre	= 43.560 square feet = 43.56 1000FT ² blocks = 0.405 Hectare
One Hectare	= 2.41 Acres
One Gallon Per Acre (GPA)	= 2.9 Fluid Ounces per 1000FT ² = 9.35 Liters per Hectare
One Gallon Per 1000FT ²	= 43.56 GPA
One Mile	= 5,280 Feet = 1,610 Meters = 1.61 Kilometers
One Gallon	= 128 Fluid Ounces = 8 Pints = 4 Quarts = 3.79 Liters = 0.83 Imperial Gallon
One Pound Per Square Inch (PSI)	= 0.069 bar = 6.896 Kilopascals