

# Dry Pesticide Rates for Hand-held Sprayers

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Backpack and handheld sprayers are often used around the farm or home to treat small areas or a few infested trees. However, most pesticide labels focus on mixing and applying pesticides in quantities that far exceed the 1-, 3-, or 5-gallon (gal) sizes of common backpack and handheld sprayers. As a result, accurate conversions must be made to avoid a spray mix or application rate that could result in a treatment that is either stronger than recommended or too weak to be effective.

Two factors influence the accuracy of that conversion:

- properly measuring pesticides (especially dry pesticides) to be added to the mix, and
- applying the correct amount of that pesticide for the desired outcome.

## Formulations

### Liquid Pesticides

The rates for liquid pesticides tend to be easy to convert from large to small quantities because they can be measured in common units such as fluid ounces, tablespoons, teaspoons, or milliliters.

### Dry Pesticides

However, dry chemicals, such as wettable powders or dry flowables, are difficult to measure without accurate scales, which most growers and homeowners do not have.

In addition, since dry materials have different densities, simple conversions are likely to be inaccurate. High-density pesticides occupy a smaller volume compared to low-density pesticides, and using anything other than *actual weights for each product* will result in mixtures that are either stronger or weaker than necessary.

Table 1 lists the actual weights for various dry-formulated pesticides. With this information, spray mixes for dry pesticides can be accurately converted from large to small quantities without the need for scales. See Examples 1 and 2.

### Example 1

#### Penncozeb 75DF

Mix 1 gal of Penncozeb 75DF at a formulation of 1.5 lb per 100 gal.

1. Convert to a 1 gal rate  
**1.5 lb ÷ 100 gal = 0.015 lb/gal**
2. Convert to grams  
(lb x 454 = g)  
(oz x 28 = g)  
**0.015 lb x 454 = 6.81 g/gal**
3. Using Table 1, convert to teaspoons  
(Penncozeb 75DF = 2.84 g/tsp)  
**6.81/2.84 = 2.4 tsp/gal**  
**= 2.5 tsp/gal (after rounding)**

### Example 2

#### Devrinol 50DF

Mix 1 gal of Devrinol 50DF at a formulation of 4 lb at 20 gpa.

1. Convert to a 1 gal rate  
**4 lb ÷ 20 gal = 0.2 lb/gal**
2. Convert to grams  
(lb x 454 = g)  
(oz x 28 = g)  
**0.2 lb x 454 = 90.8 g/gal**
3. Using Table 1, convert to teaspoons  
(Devrinol 50DF = 3.32 g/tsp)  
**90.8/3.32 = 27.35 tsp/gal**
4. Convert as needed to more practical units  
(tsp/3 = tbsp)  
**27.35/3 = 9.1 tbspgal**  
or  
(tsp/48 = cups)  
**27.35/48 = 0.56 cup/gal**  
**= 0.6 cup/gal (after rounding)**

Table 1. Actual weight per teaspoon of dry formulations for various pesticides.

Herbicide	Grams/tsp	Insecticide/ Miticide	Grams/tsp	Fungicide	Grams/tsp
Axiom 68DF	2.66	Ambush 25WP	2.02	Bayleton 50DF	2.75
Chateau 51WG	2.45	Diazinon 50W	1.58	Cabrio 20DF	2.99
Dacthal 75WP	2.49	Dipel 50DF	2.35	Captan 50WP	3.63
Define 60DF	2.81	Dursban 50WP	1.74	Carbamate 76WG	2.19
Devrinol 50DF	3.32	Guthion 50WP	1.50	C-O-C-S WDG	3.30
Direx 80DF	2.8	Imidan 70WP	2.13	Dithane 75DF	2.91
Gallery 75DF	2.21	Kelthane 50WP	1.63	Kocide 2000	3.52
Karmex 80DF	3.23	Lorsban 50WP	1.95	Manzate 75DF	2.97
Kerb 50WP	2.17	Orthene 75S	2.40	Penncozeb 75DF	2.84
Matrix 25WG	3.19	Savey 50DF	1.47	Pristine 38WG	2.54
Maverick 75WG	2.96	Sevin 50WP	2.14	Rally 40 WSP	1.14
Option 35WG	2.75	Thiodan 50WP	2.65	Rovral 50WP	1.50
Pursuit 70WG	3.03			Ridomil 81WP	2.30
Sandea 75DF	3.80			Sovran 50WG	2.82
Sinbar 80WP	2.46			Topsin M 70WP	1.30
Solicam 80DF	3.60				
Spartan 75DF	3.49				

Table 2 provides a quick reference for various pesticides, while Tables 3, 4, and 5 provide the complete range of values. Numbers have been rounded for ease of practical application.

## Spray Volume Fungicides and Insecticides

Most labels list the application rate either on a “per acre” basis (derived from 400 gal of diluted spray per acre), or on a “per 100 gal” basis. The 100-gal rate is easier to use, since it doesn’t require determining the acreage to be sprayed. The 100-gal rate is used in this publication in the fungicide and insecticide/miticide tables when determining the amount needed for 1-, 3-, or 5-gal spray volume.

## Herbicides

When it comes to herbicides, label-recommended spray volumes are much smaller, e.g., 5 to 40 gal-per-acre (gpa). In this publication, a 20-gpa rate has been selected in determining the amounts needed for 1-, 3-, or 5-gal spray volumes. This 20-gpa rate is a mid-range value applicable for most herbicides.

Growers and homeowners must make sure that their sprayers are calibrated to deliver a 20-gpa rate. If not calibrated, the error in herbicide delivery will be magnified when using small-volume sprays. For example, a grower spraying the equivalent of 10 gpa will actually apply twice as much pesticide as needed as when spraying with 20 gpa. Calibration must be tested and practiced often to ensure proper application rate. At a 20-gpa rate, 1 gal should cover 1/20 of an acre or 2,173 square feet, or an area of about 46 feet by 46 feet. Growers can measure their spray output and, with practice, can learn to spray close to the desired spray volume.

## Helpful Hints

- Make sure the pesticide concentration and formulation you are using *exactly* matches those found in this publication.
- Some of the pesticides may be out of circulation or may be found in various formulations. If a pesticide is available in more than one dry formulation, do not assume the values presented for one formulation are applicable to all.
- Values are presented in teaspoons for 1 and 3 gal and in tablespoons for 5 gal whenever possible. In some instances where the rate is high, resulting in very large teaspoon values, the numbers have been converted to cups for ease of use.
- Reminder: 1 cup is equal to 16 tsp or 48 tsp.

**Table 2.** Amount of dry-formulated pesticides needed for a 1 gallon spray mix, based on actual dry weights.

Herbicides	Rate/A <sup>1</sup>	Tsp/gal <sup>2</sup>	Insecticides/ Miticides	Rate/A <sup>1</sup>	Tsp/gal <sup>3</sup>	Fungicides	Rate/A <sup>1</sup>	Tsp/gal <sup>3</sup>
Axiom 68DF	8 oz	4.25	Ambush 25WP	3.2 oz	0.5	Bayleton 50DF	2 oz	0.25
Chateau 51WG	6 oz	3.5	Diazinon 50W	2 lb	5.75	Benlate 50WP	2 oz	0.3
Dacthal 75WP	8 lb	1.5 cup	Dipel 50DF	0.25 lb	0.5	Cabrio 20DF	8 oz	0.75
Define 60DF	12 oz	6	Dursban 50WP	1 lb	2	Captan 50WP	3 lb	3.75
Devrinol 50DF	4 lb	0.6 cup	Guthion 50WP	1.5 lb	4.5	Carbamate 76WDG	3 lb	6.25
Direx 80DF	0.75 lb	6	Imidan 70WP	1.3 lb	2.0	C-O-C-S WDG	20 lb	27.5
Gallery 75DF	0.67 lb	6.75	Kelthane 50WP	2.5 lb	7	Dithane 75DF	1.5 lb	2.33
Karmex 80DF	2 lb	14	Lorsban 50W	2 lb	4.67	Kocide 2000	1.5 lb	2
Kerb 50WP	2 lb	21	Orthene 75S	0.3 lb	0.5	Manzate 75DF	1.5 lb	2.33
Matrix 25WG	1 oz	0.5	Savey 50DF	3 oz	0.67	Penncozeb 75DF	1.5 lb	2.5
Maverick 75WG	0.66 oz	0.33	Sevin 50W	2.5 lb	4.25	Pristine 38WG	6 oz	0.67
Option 35WG	1.5 oz	0.75	Thiodan 50WP	2 lb	3.5	Rally 40 WSP	3 oz	0.2
Pursuit 70WDG	1.08 oz	0.5				Rovral 50WP	1 lb	3
Sandea 75DF	0.5 oz	0.20				Ridomil	2 lb	4
Sinbar 80WP	0.5 lb	4.67				Sovran 50WG	3.2 oz	0.33
Solicam 80DF	2.5 lb	15.75				Topsin M 70WP	3.2 oz	0.7
Spartan 75DF	0.25 lb	1.67						

<sup>1</sup> Rates provided here represent the low end of of the labeled rates.

<sup>2</sup> Values are calculated based on a 20 gpa spray mix rate.

<sup>3</sup> Values are calculated based on the 100-gal spray mix rate.

**Table 3.** Herbicides.

Rate	Spray Output (gpa)	Spray Mix Volume		
		5 gal	3 gal	1 gal
<b>Axiom 68DF</b> (cup) (cup) (tsp)				
20 oz	30	0.75	0.5	7
	20	1	0.6	10
	10	2	1.25	21
16 oz	30	0.5	0.3	5.5
	20	1	0.5	8.5
	10	1.75	1	17
8 oz	30	0.25	0.2	2.8
	20	0.5	0.3	4.25
	10	1	0.5	8.5

<b>Chateau 51WG</b> (cup) (cup) (tsp)				
12 oz	30	0.5	0.25	4.5
	20	0.75	0.5	7
	10	1.5	0.75	14
10 oz	30	0.5	0.25	4
	20	0.6	0.5	6
	10	1.25	0.75	11.5
6 oz	30	0.25	0.2	2.5
	20	0.5	0.3	3.5
	10	0.75	0.4	7

<b>Dacthal 75WP</b> (cup) (cup) (cup)				
12 lb	30	7.6	4.5	1.5
	20	11.5	7	2.5
10 lb	30	6.3	4	1.5
	20	9.5	6	2
8 lb	30	5	3	1
	20	7.5	4.5	1.5

<b>Define 60DF</b> (cup) (cup) (tsp)				
20 oz	30	0.75	0.5	7
	20	1	0.6	10
	10	2	1.25	20
16 oz	30	0.5	0.25	5
	20	0.75	0.5	8
	10	1.75	1	16
12 oz	30	0.5	0.25	4
	20	0.67	0.5	6
	10	1.25	0.75	12

<b>Devrinol 50DF</b> (cup) (cup) (cup)				
8 lb	40	2.75	1.75	0.5
	30	4	2.25	0.75
	20	5.75	3.5	1
6 lb	40	2	1.25	0.4
	30	2.75	1.75	0.6
	20	4.25	2.5	1
4 lb	40	1.5	0.75	0.3
	30	2	1	0.4
	20	2.75	1.75	0.6

Herbicides, continued

Rate	Spray Output (gpa)	Spray Mix Volume		
		5 gal	3 gal	1 gal
<b>Direx 80DF</b> (cup) (cup) (tsp)				
6 lb	40	2.5	1.5	24
	30	3.25	2	32
	25	4	2.5	39
3 lb	40	1.25	0.75	12
	30	1.75	1	16
	25	2	1.25	19
0.75 lb	40	5 tbsps	3 tbsps	3
	30	6.33 tbsps	4 tbsps	4
	25	0.5	5 tbsps	5

<b>Gallery 75DF</b> (cup) (cup) (tsp)				
1.33 lb	30	1	0.5	9
	20	1.5	0.75	14
	10	3	1.5	27
	1 lb	30	0.75	0.5
1 lb	20	1	0.75	10
	10	2.25	1.25	21
	0.66 lb	30	0.5	0.25
0.66 lb	20	0.75	0.5	7
	10	1.5	0.75	14

<b>Karmex 80DF</b> (cup) (cup) (tsp)				
4 lb	40	1.5	0.75	14
	30	2	1	19
	25	2.25	1.5	23
3 lb	40	1	0.5	11
	30	1.5	0.75	14
	25	1.75	1	17
2 lb	40	0.75	7 tbsps	7
	30	1	0.5	9
	25	1.25	0.75	11

<b>Kerb 50WP</b> (cup) (cup) (cup)				
8 lb	50	3.5	2.0	0.75
	40	4.5	2.5	1
	30	6	3.5	1.25
	20	9	5.0	1.75
4 lb	50	1.75	1	6 tbsps
	40	2.25	1.25	9 tbsps
	30	3	1.75	0.5
	20	4.5	2.5	14 tbsps
2 lb	50	1	0.5	3 tbsps
	40	1	0.75	2.5 tbsps
	30	1.5	1	0.25
20	2	1.25	7 tbsps	

<b>Matrix 25WG</b> (cup) (cup) (tsp)				
1.5 oz	30	0.75	1.5	0.5
	20	1	2.25	0.75
	10	2.25	4.5	1.5
1.25 oz	30	0.75	1	0.5
	20	1	1.75	0.6
	10	1.75	3.5	1.5
1 oz	30	0.5	1	0.3
	20	0.75	1.5	0.5
	10	1.75	3	1

Herbicides, continued

Rate	Spray Output (gpa)	Spray Mix Volume		
		5 gal	3 gal	1 gal
<b>Maverick 75WG</b> (cup) (cup) (tsp)				
0.67 oz	20	0.5	1	0.3
	10	1	2	0.6
	5	2	4	1.3

<b>Option 35WG</b> (cup) (cup) (tsp)				
1.5 oz	30	0.75	1.5	0.5
	20	1.25	2.25	0.75
	10	2.5	4.5	1.5

<b>Pursuit 70WDG</b> (cup) (cup) (tsp)				
2.16 oz	30	1.25	2	0.75
	20	1.67	3	1
	10	3.5	6	2
1.62 oz	30	0.75	1.5	0.5
	20	1.25	2.25	0.75
	10	2.5	4.5	1.5
1.08 oz	30	0.50	1	0.33
	20	0.75	1.5	0.5
	10	1.75	3	1

<b>Sandea 75DF</b> (cup) (cup) (tsp)				
1 oz	30	0.42	0.75	0.25
	20	0.62	1.12	0.37
	15	0.83	1.49	0.50
0.75 oz	30	0.31	0.56	0.19
	20	0.47	0.84	0.28
	15	0.62	1.12	0.37
0.5 oz	30	0.21	0.37	0.125
	20	0.31	0.56	0.20
	15	0.42	0.75	0.25

<b>Sinbar 80WP</b> (cup) (cup) (tsp)				
4 lb	40	2	1	18
	30	2.5	1.5	25
	25	3	2	30
2 lb	40	1	0.5	9
	30	1.25	0.75	12
	25	1.5	1	15
0.5 lb	40	0.25	7 tsp	2
	30	0.3	9 tsp	3
	25	0.4	11 tsp	4

<b>Solicam 80DF</b> (cup) (cup) (tsp)				
10 lb	30	4.5	2.5	42
	20	6.5	4	63
7.5 lb	30	3.3	2	32
	20	4.75	3	47
2.5 lb	30	1	0.6	10
	20	1.75	1	16

<b>Spartan 75DF</b> (cup) (cup) (tsp)				
8 oz	30	3.5	6.25	2.1
	20	5.5	9.75	3.25
	10	11	19.5	6.5
6 oz	30	3	5.25	1.75
	20	4	7.5	2.5
	10	8.5	15	5
4 oz	30	1.75	3	1
	20	2.5	4.5	1.5
	10	5.5	9.75	3.25

**Table 4.** Insecticides/Miticides.

Rate/100 gal	Spray Mix Volume		
	5 gal	3 gal	1 gal
<b>Ambush 25WP</b>	(tbsp)	(tsp)	(tsp)
12.8 oz	3	5.5	2
8 oz	2	3.5	1
3.2 oz	0.8	1.5	0.5

<b>Diazinon 50W</b>	(tbsp)	(tsp)	(tsp)
4 lb	20	36	12
2 lb	10	18	6
0.5 lb	2.5	4.5	1.5

<b>Dipel 54DF</b>	(tbsp)	(tsp)	(tsp)
2 lb	6.5	12	4
1 lb	3	6	2
0.25 lb	0.75	1.5	0.5

<b>Dursban 50WP</b>	(tbsp)	(tsp)	(tsp)
2 lb	8.3	15	5
1 lb	4.2	7.5	2.5
0.5 lb	2.1	3.75	1.25

<b>Guthion 50WP</b>	(tbsp)	(tsp)	(tsp)
2 lb	10	18	6
1.75 lb	9	16	5.5
1.5 lb	7.5	14	4.5

<b>Imidan 70WP</b>	(tbsp)	(tsp)	(tsp)
2.1 lb	6	10.5	3.5
1.7 lb	5	8	2.5
1.3 lb	3.5	6	2

<b>Kelthane 50WP</b>	(tbsp)	(tsp)	(tsp)
2 lb	10	18	6
1 lb	5	9	3
1/2 lb	2.5	4.5	1.5

<b>Lorsban 50W</b>	(tbsp)	(tsp)	(tsp)
3 lb	12	21	7
2.5 lb	10	18	6
2 lb	8	14	5

<b>Orthene 75S</b>	(tbsp)	(tsp)	(tsp)
1.3 lb	4	7.5	2.5
0.6 lb	2	3.5	1
0.3 lb	1	2	0.5

<b>Savey 50DF</b>	(tbsp)	(tsp)	(tsp)
6 oz	2	3.5	1.2
4 oz	1.3	2.3	0.75
3 oz	1	1.75	0.5

<b>Sevin 50W</b>	(tbsp)	(tsp)	(tsp)
4 lb	13.0	24	8
2 lb	7	12	4
1 lb	3.3	6	2

<b>Thiodan 50WP</b>	(tbsp)	(tsp)	(tsp)
2 lb	6	10.5	3.5

**Table 5.** Fungicides.

Rate/100 gal	Spray Mix Volume		
	5 gal	3 gal	1 gal
<b>Bayleton 50DF</b>	(tbsp)	(tsp)	(tsp)
6 oz	1	2	0.75
4 oz	0.75	1.5	0.5
2 oz	0.3	0.75	0.25

<b>Cabrio 20DF</b>	(tbsp)	(tsp)	(tsp)
16 oz	2.5	4.5	1.5
12 oz	2	3	1
8 oz	1.25	2.25	0.75

<b>Captan 50WP</b>	(tbsp)	(tsp)	(tsp)
4 lb	8.5	15	5
3.5 lb	7.5	13	4.5
3 lb	6.5	11	4

<b>Carbamate 76WDG</b>	(tbsp)	(tsp)	(tsp)
3 lb	10	19	6

<b>C-O-C-S WDG</b>	(tbsp)	(tsp)	(tsp)
4 lb	10	18	6
3 lb	7	12	4
2 lb	5	9	3

<b>Dithane 75DF</b>	(tbsp)	(tsp)	(tsp)
6 lb	15	28	9
3 lb	8	14	5
1.5 lb	4	7	2

<b>Kocide 2000</b>	(tbsp)	(tsp)	(tsp)
6 lb	13	23	8
3 lb	6.5	12	4
1.5 lb	3	6	2

*Fungicides, continued*

Rate/100 gal	Spray Mix Volume		
	5 gal	3 gal	1 gal
<b>Manzate 75DF</b>	(tbsp)	(tsp)	(tsp)
4 lb	10	18	6
3 lb	8	14	5
1.5 lb	4	7	2.5

<b>Penncozeb 75DF</b>	(tbsp)	(tsp)	(tsp)
3 lb	8	14	5
2 lb	5.3	10	3
1.5 lb	4	7	2.5

<b>Pristine 38WG</b>	(tbsp)	(tsp)	(tsp)
10.5 oz	2	3.5	1.2
8.25 oz	1.5	2.75	1
6 oz	1	2	0.7

<b>Rally 40WSP</b>	(tbsp)	(tsp)	(tsp)
5 oz	0.6	1.1	0.4
3 oz	0.4	0.6	0.2
1 oz	0.1	0.2	0.05

<b>Ridomil 81W</b>	(tbsp)	(tsp)	(tsp)
2.5 lb	8.33	15	5
2 lb	6.67	12	4

<b>Rovral 50WP</b>	(tbsp)	(tsp)	(tsp)
2 lb	10	18	6
1.5 lb	7.5	13.5	4.5
1 lb	5	9	3

<b>Sovran 50WG</b>	(tbsp)	(tsp)	(tsp)
6.4 oz	1	2	0.6
4.8 oz	0.75	1.5	0.5
3.2 oz	0.5	1.0	0.3

<b>Topsin M 70WP</b>	(tbsp)	(tsp)	(tsp)
8 oz	3	5.2	1.75
5.3 oz	2	3.5	1.2
3.2 oz	1.2	2.1	0.7