

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 one gallon of Penncozeb 75DF at a formulation of 2 lb per 100 gal.

1. Convert to a 1 gallon rate
 $2 \text{ lb} \div 100 \text{ gal} = 0.02 \text{ lb/gal}$
2. Convert to grams
($\text{lb} \times 454 = \text{g}$)
($\text{oz} \times 28 = \text{g}$)
 $0.02 \text{ lb} \times 454 = 9.08 \text{ g/gal}$
3. Using Table 1, convert to teaspoons
(*Penncozeb 75DF* = 2.84 g/tsp)
 $9.08/2.84 = 3.19 \text{ tsp/gal}$

Example 2

Devrinol 50DF

Mix one gallon of Devrinol 50DF at a formulation of 4 lb at 40 gpa.

1. Convert to a 1 gallon rate
 $4 \text{ lb} \div 40 \text{ gal} = 0.1 \text{ lb/gal}$
2. Convert to grams
($\text{lb} \times 454 = \text{g}$)
($\text{oz} \times 28 = \text{g}$)
 $0.1 \text{ lb} \times 454 = 45.4 \text{ g/gal}$
3. Using Table 1, convert to teaspoons
(*Devrinol 50DF* = 3.32 g/tsp)
 $45.4/3.32 = 13.67 \text{ tsp/gal}$
4. Convert as needed to more practical units
($\text{tsp}/3 = \text{tbsp}$)
 $13.67/3 = 4.6 \text{ tbsp/gal}$
or
($\text{tsp}/48 = \text{cups}$)
 $13.67/48 = .28 \text{ cups/gal}$

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	Benlate 50WP	1.87
Dacthal 75WP	2.49	Dipel 50DF	2.35	Cabrio 20DF	2.99
Define 60DF	2.81	Dursban 50WP	1.74	Captan 50WP	3.63
Devrinol 50DF	3.32	Guthion 50WP	1.50	Carbamate 76WG	2.19
Direx 80DF	2.8	Imidan 70WP	2.43	C-O-C-S WDG	3.30
Gallery 75DF	2.21	Kelthane 50WP	1.63	Dithane 75DF	2.91
Karmex 80DF	3.23	Lorsban 50WP	1.95	Kocide 2000	3.52
Kerb 50WP	2.17	Orthene 75S	2.40	Manzate 75DF	2.97
Matrix 25WG	3.19	Savey 50DF	1.47	Nova 40W	2.15
Maverick 75WG	2.96	Sevin 50WP	2.14	Penncozeb 75DF	2.84
Option 35WG	2.75	Thiodan 50WP	2.65	Pristine 38WG	2.54
Pursuit 70WG	3.03			Rovral 50WP	1.50
Sandea 75DF	3.80			Ridomil 81WP	2.30
Sinbar 80WP	2.46			Sovran 50WG	2.82
Solicam 80DF	3.60			Topsin M 70WP	1.30
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 (which is 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 of water-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 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 about an area 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 matches *exactly* those found in this publication.
- Some of the pesticides may be out of circulation or may be found at various formulations. If a pesticide is available in more than one dry formulation, do not assume the values presented for one is 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 were 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 ¹	Tsp/gal ²	Insecticides/ Miticides	Rate/A ¹	Tsp/gal ³	Fungicides	Rate/A ¹	Tsp/gal ³
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	2.5	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	Nova 40W	3 oz	0.5
Maverick 75WG	0.66 oz	0.33	Sevin 50W	2.5 lb	4.25	Penncozeb 75DF	1.5 lb	2.5
Option 35WG	1.5 oz	0.75	Thiodan 50WP	2 lb	3.5	Pristine 38WG	6 oz	.67
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	1 lb	3.5
Spartan 75DF	0.25 lb	1.67						

¹ Rates provided here represent the low end of of the labeled rates.

² Values are calculated based on a 20 gpa spray mix rate.

³ 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
Axiom 68DF (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

Chateau 51WG (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

Dacthal 75WP (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

Define 60DF (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

Devrinol 50DF (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
Direx 80DF (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 tbsp	3 tbsp	3
	30	6.33 tbsp	4 tbsp	4
	25	0.5	5 tbsp	5

Gallery 75DF (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

Karmex 80DF (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 tbsp	7
	30	1	0.5	9
	25	1.25	0.75	11

Kerb 50WP (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 tbsp
	40	2.25	1.25	9 tbsp
	30	3	1.75	0.5
	20	4.5	2.5	14 tbsp
2 lb	50	1	0.5	3 tbsp
	40	1	0.75	2.5 tbsp
	30	1.5	1	0.25
	20	2	1.25	7 tbsp

Matrix 25WG (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
Maverick 75WG (cup) (cup) (tsp)				
0.67 oz	20	0.5	1	0.3
	10	1	2	0.6
	5	2	4	1.3

Option 35WG (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

Pursuit 70WDG (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

Sandea 75DF (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

Sinbar 80WP (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

Solicam 80DF (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

Spartan 75DF (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
Ambush 25WP	(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
Diazinon 50W	(tbsp)	(tsp)	(tsp)
4 lb	20	36	12
2 lb	10	18	6
0.5 lb	2.5	4.5	1.5
Dipel 54DF	(tbsp)	(tsp)	(tsp)
2 lb	6.5	12	4
1 lb	3	6	2
0.25 lb	0.75	1.5	0.5
Dursban 50WP	(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
Guthion 50WP	(tbsp)	(tsp)	(tsp)
2 lb	10	18	6
1.75 lb	9	16	5.5
1.5 lb	7.5	14	4.5
Imidan 70WP	(tbsp)	(tsp)	(tsp)
2.1 lb	6.5	12	4
1.7 lb	5.5	9	3
1.3 lb	4	7	2.5
Kelthane 50WP	(tbsp)	(tsp)	(tsp)
2 lb	10	18	6
1 lb	5	9	3
1/2 lb	2.5	4.5	1.5
Lorsban 50W	(tbsp)	(tsp)	(tsp)
3 lb	12	21	7
2.5 lb	10	18	6
2 lb	8	14	5
Orthene 75S	(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
Savey 50DF	(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
Sevin 50W	(tbsp)	(tsp)	(tsp)
4 lb	13.0	24	8
2 lb	7	12	4
1 lb	3.3	6	2
Thiodan 50WP	(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
Bayleton 50DF	(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
Benlate 50WP	(tbsp)	(tsp)	(tsp)
16 oz	4	7.5	2.5
8 oz	2	4	1.3
2 oz	0.5	1	0.3
Cabrio 20DF	(tbsp)	(tsp)	(tsp)
16 oz	2.5	4.5	1.5
12 oz	2	3	1
8 oz	1.25	2.25	0.75
Captan 50WP	(tbsp)	(tsp)	(tsp)
4 lb	8.5	15	5
3.5 lb	7.5	13	4.5
3 lb	6.5	11	4
Carbamate 76WDG	(tbsp)	(tsp)	(tsp)
3 lb	10	19	6
C-O-C-S WDG	(tbsp)	(tsp)	(tsp)
4 lb	10	18	6
3 lb	7	12	4
2 lb	5	9	3
Dithane 75DF	(tbsp)	(tsp)	(tsp)
6 lb	15	28	9
3 lb	8	14	5
1.5 lb	4	7	2
Kocide 2000	(tbsp)	(tsp)	(tsp)
6 lb	13	23	8
3 lb	6.5	12	4
1.5 lb	3	6	2
Manzate 75DF	(tbsp)	(tsp)	(tsp)
4 lb	10	18	6
3 lb	8	14	5
1.5 lb	4	7	2.5

Fungicides, continued

Rate/100 gal	Spray Mix Volume		
	5 gal	3 gal	1 gal
Nova 40WP	(tbsp)	(tsp)	(tsp)
5 oz	1.1	2.0	0.7
3 oz	0.7	1.2	0.4
1 oz	0.2	0.4	0.1
Penncozeb 75DF	(tbsp)	(tsp)	(tsp)
3 lb	8	14	5
2 lb	5.3	10	3
1.5 lb	4	7	2.5
Pristine 38WG	(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
Ridomil 81W	(tbsp)	(tsp)	(tsp)
2.5 lb	8.33	15	5
2 lb	6.67	12	4
Rovral 50WP	(tbsp)	(tsp)	(tsp)
2 lb	10	18	6
1.5 lb	7.5	13.5	4.5
1 lb	5	9	3
Sovran 50WG	(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
Topsin M 70WP	(tbsp)	(tsp)	(tsp)
2 lb	12	21	7
1.5 lb	9	16	5
1 lb	6	10.5	3.5