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Seeding and Fertilization Rate Conversions for Wildlife Food Plots and Small Areas

John Jennings
Professor - Forages

Planting and fertilizing wildlife food plots and small areas with a degree of precision is often difficult due to the large size of equipment normally used to apply fertilizer and seed. Fertilizer and seeding rates are usually given on a per-acre basis, but food plots frequently are sub-acre size, requiring a rate conversion. Without proper rate conversions for small plots, wildlife enthusiasts tend to apply seed and fertilizer well below or well above recommended rates, which leads to poor plant growth or excessive cost.

This publication provides conversions of seeding and fertilizer rates from acre-sized fields to rates per 1,000 square feet. Calculations are provided for determining the size of your food plot. Seed and fertilizer spreading rates and spreading rate conversions for applying seed and fertilizer on small areas are shown in Table 2.

Keep in mind that successful food plot establishment requires proper seedbed preparation. Poorly prepared seedbeds will cause stand failure even if correct seeding or fertilizer rates are used. In general, the site should be well tilled and firmed with a drag or roller to provide a clean, firm seedbed before planting. Rough, cloddy seedbeds or poorly tilled plots with strips of sod remaining do not allow good seed-to-soil contact and make it possible for seed to be planted too deeply. Planting too deeply is a common cause of establishment failure, especially when planting small-seeded forages.

Figure 1. Preparing a seedbed with tillage prior to planting a food plot

Determining Food Plot Size

Use these conversions to determine the area of your food plot for calculating seeding and fertilization rates:

1 acre = 43,560 square feet
1 acre = approximately 209 ft × 209 ft
1,000 square feet = about 32 ft × 32 ft

If you don't know the area of your plot, pace off the length and width. Determine your pace length by walking a pre-measured course a few times.

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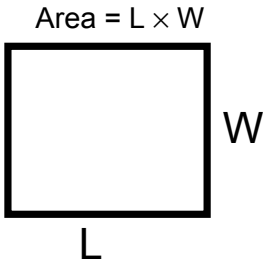
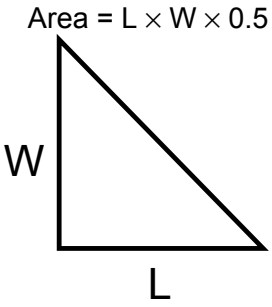
Rectangular, Square or Long Strip Food Plots



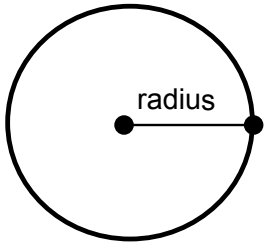
For square, rectangular or long strip food plots, multiply length × width to determine area. For example, if a pace is about 3 ft, then 11 paces × 11 paces = 33 ft × 33 ft = 1,089 square feet. A plot that is 11 paces × 8 paces would be 792 square feet. A square plot that is 50 paces × 50 paces is about 150 ft × 150 ft or about 22,500 square feet or slightly more than one-half acre.

Triangular Plots



The calculation for a triangle is similar to the calculation for a square, but a triangle has only one-half the area of a square. So, for triangular-shaped plots, multiply the length × width × 0.5. For example, a triangular-shaped plot that is 150 ft × 80 ft has an area of 150 × 80 × 0.5 = 6,000 square feet.

Round Plots



Area = 3.1416 × radius squared

For round plots, multiply the radius squared by 3.1416. For example, a round plot with a diameter of 100 feet has a radius of 50 feet. So, 50 × 50 × 3.1416 = 7,854 square feet.

Recommended Seeding Rates

For planting commercial food plot seed mixes, follow the recommended seeding rates found on the seed package. Otherwise, **typical seeding rates for single-species fall food plots are** wheat, 2-4 bushels per acre; rye, 2-4 bushels per acre; ryegrass, 25-30 pounds per acre; white clover, 3-5 pounds per acre; arrowleaf clover, 10-15 pounds per acre; and crimson clover, 25-30 pounds per acre. **Typical seeding rates for single-species summer food plots are** soybean, 60-100 pounds per acre; grain sorghum, 4-6 pounds per acre; cowpea, 100-120 pounds per acre; annual lespedeza, 20-25 pounds per acre; and millet, 20-25 pounds per acre. For seed mixtures including only two forages, use the lower rates shown above for each species. When planting mixtures of three or more forages, especially summer species, reduce seeding rates of each species by one-third to one-half. **Seeding summer species at excessive rates will lead to poor growth and little grain development.**

Keep in mind that wildlife benefits from plots with a diversity of plant species, including native plants, or "good weeds" in your area. So, planting at low seeding rates, compared to recommended agricultural seeding rates, can be beneficial for wildlife. Consider rotating annual planting so that only one-third of your food plot sites are planted each year. Plots left fallow over the second and third year will produce many weeds and native plants that will improve the quality of your wildlife habitat overall, plus you will have more time and money to invest in successful establishment on the one-third of the food plot areas planted that year.

Calculating Fertilizer Spreading Rates Using Common Fertilizer Materials

Fertilizer rates should be determined by soil testing of the food plot site prior to planting. (See your local county Extension office for information about taking soil samples and interpreting results.) Low fertilizer and limestone applications lead to poor forage growth, but excessive nutrient application can create adverse environmental impacts. The analysis of common fertilizer materials is shown in Table 1.

Table 1. Analysis of Common Fertilizer Materials

Fertilizer Source	% Nitrogen (N)	% Phosphate (P_2O_5)	% Potash (K_2O)
Ammonium nitrate	34	0	0
Urea	46	0	0
Ammonium sulfate	21	0	0
Diammonium phosphate (DAP)	18	46	0
Triple superphosphate	0	46	0
Muriate of potash	0	0	60
13-13-13	13	13	13
10-20-10	10	20	10
19-19-19	19	19	19

Many fertilizer sources can be mixed to obtain the recommended rates of nitrogen, phosphate and potash. To calculate the total amount of fertilizer needed to deliver the recommended nutrient rate per

acre, divide the amount of nutrient recommended per acre by the percentage of nutrient in the selected fertilizer material. Following are examples of this calculation.

- **Recommended nutrient rate per acre:** 50 lb each of nitrogen, phosphate and potash
  Fertilizer source: 13-13-13
  Calculation: Divide 50 by 13% because this fertilizer contains 13% of each nutrient
  Fertilizer spreading rate per acre: Amount of 13-13-13 fertilizer needed to apply 50 lb of each nutrient is 50/0.13 = 385 lb per acre

- **Recommended nutrient rate per acre:** 50 lb nitrogen
  Fertilizer source: Ammonium nitrate
  Calculation: Divide 50 by 34% because ammonium nitrate contains only 34% nitrogen
  Fertilizer spreading rate per acre: Amount of ammonium nitrate needed to apply 50 lb nitrogen per acre is 50/0.34 = 147 lb per acre

- **Recommended nutrient rate:** 50 lb phosphate
  Fertilizer source: Diammonium phosphate (DAP)
  Calculation: Divide 50 by 0.46 because DAP has 46% phosphate, but DAP also has 18% nitrogen (see Table 1). The amount needed to supply 50 lb of phosphate is 50/0.46 = 109 lb per acre. But since DAP also has nitrogen, the plot will also receive 109 × 0.18 = 19.6 lb of nitrogen.

Nitrogen

For crops such as wheat, sorghum or sunflowers, nitrogen fertilizer applications should be at least 50 pounds of actual N per acre. There is seldom any need to apply more than 100 pounds nitrogen per acre in one application. There is no need to apply nitrogen to legumes because bacteria in legume root nodules fix nitrogen from the air. Legumes include peas, beans, clover, lespedeza and alfalfa. Instead of fertilizing legumes with nitrogen, legume seed should be coated with seed inoculant to ensure root nodulation and nitrogen fixation. Inoculant for specific legumes can be purchased at many farm supply stores.

Limestone

Many food plots need lime to increase soil pH. It is especially important to take a soil test before planting and not assume that lime is needed. Applying too much lime on small plots can have an adverse affect, and applying too little will not adequately improve soil pH. Lime should be plowed or disked in during seedbed preparation for best results.

Converting Spreading Rates for Plot Application

To convert seed, fertilizer or limestone rates from pounds per acre to pounds per 1,000 square feet, divide the rate by 43.56. For example, 100 pounds per acre converts to 100/43.56 = 2.3 lb per 1,000 square feet. Limestone rates are much higher but are converted using the same calculation. For example, if the recommended rate of lime is 5,000 pounds per acre, the converted rate would be 5,000/43.56 = 115 lb lime per 1,000 square feet.

Table 2 (page 4) lists the conversion rates for spreading seed or fertilizer in a 1,000 square foot area. Use Columns 1 and 5 to find the number of pounds that most closely matches the rate per acre. Look across that row under Columns 2, 3 and 4 or Columns 6, 7 and 8 to find the converted rate per 1,000 square feet in pounds, ounces and grams. Multiply this amount by the number of thousand square feet in your plot for the final spreading rate of fertilizer or seed. For example:

- **Plot size:** 100 ft × 100 ft = 10,000 square feet = 10 thousand square feet
  Seed: wheat, 3 bushels = 180 lb per acre
  Desired seeding rate (Table 2): 180 lb per acre = 4.1 lb per 1,000 square feet. For a 10,000 square foot plot, multiply 4.1 × 10 = 41 lb of seed for the plot.

- **Plot size:** 90 ft × 90 ft = 8,100 square feet = 8.1 thousand square feet
  Fertilizer: 385 lb per acre of 13-13-13 fertilizer
  Desired fertilizer rate (Table 2): 385 lb per acre is between 8.7 and 9 lb per 1,000 square feet, so a rate of 8.8 lb per 1,000 square feet would be close to the desired spreading rate. For a plot of 8,100 square feet, multiply 8.8 × 8.1 = 71 lb of 13-13-13 fertilizer for the plot.

To avoid hauling scales and extra equipment to remote food plot sites, measure seed and fertilizer in the field using a container that you pre-measured to hold a known weight of fertilizer or seed.

Table 2. Conversion of Rates Per Acre (lb) to Rates Per 1,000 Square Feet (lb, oz and g)[1]							
Rate Per Acre	**Rate Per 1,000 Square Feet**			**Rate Per Acre**	**Rate Per 1,000 Square Feet**		
Pounds (lb)	Pounds (lb)	Ounces (oz)	Grams (g)	Pounds (lb)	Pounds (lb)	Ounces (oz)	Grams (g)
2.5	0.06	1	26	230	5.3	84	2,399
5	0.1	2	52	4 bushels wheat 240	5.5	88	2,504
10	0.25	4	104	250	5.7	92	2,608
20	0.5	7	208	260	6	96	2,712
30	0.7	11	313	270	6.2	99	2,817
40	0.9	15	417	280	6.4	103	2,921
50	1.1	18	522	290	6.7	107	3,025
1 bushel wheat 60	1.4	22	626	300	6.9	110	3,129
70	1.6	26	730	310	7.1	114	3,234
80	1.8	29	835	320	7.3	118	3,334
90	2.1	33	939	330	7.6	121	3,442
100	2.3	37	1,043	340	7.8	125	3,547
110	2.5	40	1,147	350	8	129	3,651
2 bushels wheat 120	2.75	44	1,252	360	8.3	132	3,755
130	3	48	1,356	370	8.5	136	3,860
140	3.2	51	1,460	380	8.7	140	3,964
150	3.4	55	1,565	390	9	143	4,068
160	3.7	59	1,669	400	9.2	147	4,172
170	3.9	62	1,773	1 ton ag lime 2,000	46	735	20,863
3 bushels wheat 180	4.1	66	1,878	3,000	69	1,102	31,295
190	4.4	70	1,982	2 tons ag lime 4,000	92	1,469	41,726
200	4.6	74	2,086	5,000	115	1,837	52,158
210	4.8	77	2,190	3 tons ag lime 6,000	138	2,204	62,590
220	5.1	81	2,294				

[1]Rates have been rounded to the nearest easily measured increment.

DR. JOHN JENNINGS is professor - forages, University of Arkansas System Division of Agriculture, Animal Science Department, Little Rock.

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