

Nutrient Recommendations for Wildlife Food Plots in Vermont

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These guidelines for UVM soil test recommendations are a supplement to current field crop recommendations:

UVM Extension *Nutrient Recommendations for Field Crops in Vermont* (BR. 1390.3).

The complete guide is located on the UVM Extension website: <https://www.uvm.edu/extension/agriculture>

You can also download the document:

https://www.uvm.edu/sites/default/files/Agriculture/NutrientRecs_BR1390.2.pdf

A UVM Soil Test Report, sent to you after submitting a soil sample for analysis, contains specific recommendations for the crop code entered on the “blue” soil test form.

The following set of tables for nutrient recommendations are used with your UVM Modified Morgan soil test results for different crop mixes that may be grown in that same food plot.

There are many different mixtures and trade names of plants grown for wildlife food plots in Vermont, but they generally fall within the following categories of crop types.

Select the closest representative plant mix or situation and follow the guidelines through each nutrient description. Start with pH and lime, then Nitrogen, Phosphorus, Potassium and other nutrients to consider. The complete details of nutrient recommendations found in the ***Nutrient Recommendations for Field Crops in Vermont*** provides complete details for nutrient recommendation methods.

Conservation Planting - Wildlife Food Plots

Table 1. UVM crop codes for wildlife food plot soil testing and recommendations.

| UVM Crop Code | Wildlife Food Plot Crop Description | Target Soil pH |
|---------------------------------------|--|----------------|
| Annual Crops | | |
| 3B | Corn Grain | 6.2 |
| 3C | Sorghum, Sunflower | 6.2 |
| 3D | Oat, Barley, Wheat, Rye, Millet | 6.2 |
| 3E | Buckwheat, Cowpea, Pea/Radish | 6.2 |
| 3F | Soybean | 6.2 |
| 4BM | Brassica Mix: Kale, Rape, Turnip, Rutabaga (Swede); Radish, Sugar Beet | 6.2 |
| Perennial Crop - Establishment | | |
| 4DE | Alfalfa Mix, 60-100% legume | 6.8 |
| 4CE | Clover, Clover/Chicory mix, Alfalfa (<60%) | 6.2 |
| 4EE | Chicory, other Forb, less than 30% legume | 6.2 |
| 4AE | Warm Season Grasses (WSG) | 6.2 |
| Perennial Crop - Maintenance | | |
| 4DM | Alfalfa Mix, 60-100% legume | 6.8 |
| 4CM | Clover, Clover/Chicory mix, Alfalfa (<60%) | 6.2 |
| 4EM | Chicory, other Forb, less than 30% legume | 6.2 |
| 4AM | Warm Season Grasses (WSG) | 6.2 |

Lime

A soil pH in the range of 6.0 to 7.0 provides the best availability of soil nutrients for food plot growth. UVM recommends lime application to adjust soil pH based on the current acidity (pH) and Aluminum levels in the soil, a minimum pH of 6.2 or 6.8 depending on the crop to be grown as shown in Table 2, **Target Minimum Soil pH**. In very low pH soils, lime applications should be limited to 4 tons per acre for a single application. Lime needs to be broadcast and then mixed with the soil and given sufficient time to react and increase the soil pH before planting a new crop. Topdress applications should be limited to 2 tons per acre in a single application. If Magnesium (Mg) is limiting, use Dolomitic limestone to increase soil Mg levels. If Mg is adequate, use Calcitic Ag Lime to correct pH.

Table 2. Target Minimum Soil pH for Food Plot Crops

| Soil pH (2:1, water) | Food Plot Crops |
|----------------------|--|
| 6.2 | Corn, Sorghum, Warm Season Grass (WSG) Oats, Wheat, Rye, Millet Buckwheat, Cowpea, Pea, Radish Soybean Kale, Rape, Turnip, Swede (Rutabaga) Clover, Chicory, other Forb |
| 6.8 | Alfalfa Sugar Beet |

Lime application rates recommended are based on the effects of both current soil pH and amount of Reactive Aluminum (Al) in soil as shown in this Table 3 from UVM Extension BR1390.3.

Table 3. Aglime requirement based on soil pH, reactive Al, and target pH.

| Soil pH ¹ | Reactive Al ² | Target pH | |
|----------------------|--------------------------|-----------|-----|
| | | 6.2 | 6.8 |
| | ppm | tons/acre | |
| >6.7 | | 0 | 0 |
| 6.2-6.7 | 0-40 | 0 | 1 |
| | >40 | 0 | 2 |
| 5.6-6.1 | 0-40 | 1 | 2 |
| | 41-70 | 1.5 | 2.5 |
| | 71-100 | 1.5 | 3 |
| | 101-150 | 2 | 3.5 |
| | 151-200 | 2.5 | 4 |
| | >200 | 3 | 5 |
| <5.6 | 0-40 | 1.5 | 3 |
| | 41-70 | 2 | 3.5 |
| | 71-100 | 2 | 4 |
| | 101-150 | 2.5 | 4.5 |
| | 151-200 | 3 | 5 |
| | 201-250 | 3.5 | 5.5 |
| | 251-300 | 4 | 6 |
| | >300 | 5 | 7 |
| >300 | 5 | 7 | |

¹ Soil pH is reported as the equivalent of pH measured in water (approximately 0.6 higher than pH measured in 0.01 M CaCl₂).

² The UVM Soil Test Report refers to reactive aluminum as just aluminum.

Nitrogen

Rates of Nitrogen (N) from fertilizer, manure or other organic matter applied at planting or for crop maintenance vary depending on the anticipated crop yield, described in tons per acre (dry hay forages) or bushels per acre (grain crops). The rates for Nitrogen application in tables 4, 5 and 6 show the recommended base annual rates for several food plot situations. With plant nutrients, too much can be just as bad as too little, potentially causing nutrient and pest imbalances or increasing cost. Split applications of N to increase utilization by crops.

Table 4. Recommended Nitrogen rates for Annual food plots

| UVM Crop Code | Crop | Dry Matter Yield/acre | N to apply, lb/ac | Range of N to apply |
|------------------|--|--------------------------|----------------------|------------------------|
| 3B | Corn Grain | 90 - 120 bu | 120 | 90 - 120 |
| 3C | Sorghum, Sunflower | 60 bu | 80 | 70 - 90 |
| 3D | Oat, Wheat, Cereal Rye, Millet | 1 - 2 ton | 40 | 30 - 60 |
| 3E | Cowpea, Pea, Buckwheat | 1 ton | 30 | 20-40 |
| 3F | Soybean | 1 ton/ 40 bu | 20 ¹ | 20 - 30 |
| 4BM | Brassica Mix: Kale, Rape, Turnip, Rutabaga (Swede); Radish, Sugar Beet | 1-2 ton | 80 ² | 40 - 100 |

¹ Reduce N rate to 0 for soybean or pea if treating seed with the correct strain and amount of legume inoculant at planting, or there is a history of the crop growing in the field within the past three years.

² Apply N in two applications, 30-40 lb N/acre at planting and then 30-40 lb N/acre as a sidedress if the crop is well established and strong growth is expected.

Table 5. Recommended Nitrogen rates - Perennial food plots - Establishment of New Seedings

| UVM Crop Code | Crop | Dry Matter Yield/acre | N to apply, lb/ac |
|------------------|--|--------------------------|----------------------|
| 4DE | Alfalfa Mix, 60-100% legume | 1 - 2 ton | 0 |
| 4CE | Clover, Clover/Chicory mix, Alfalfa (<60%) | 1 - 2 ton | 0 ^{1,2} |
| 4EE | Chicory, other Forb, less than 30% legume | 1 - 2 ton | 40 ^{3,4} |
| 4AE | Warm Season Grasses (WSG) | 1 - 2 ton | 50 ⁴ |

¹ If Chicory is greater than 1/3 of the seeding mix, use a rate of 30 lb N/acre at planting.

² Add 20-30 lb N/acre when planting a cereal grain nurse crop with a new seeding of clover/chicory mix.

³ If good chicory regrowth is expected, make a second application of 30-40 lb N/acre in mid-season.

⁴ For late summer seedings, reduce to 30 lb N/acre.

Table 6. Recommended Nitrogen rates - Perennial food plots - Topdress Maintenance

| UVM Crop Code | Crop | Dry Matter Yield/acre | N to apply, lb/ac |
|------------------|--|--------------------------|----------------------|
| 4DM | Alfalfa Mix, 60-100% legume | 2 - 4 tons | 0 |
| 4CM | Clover, Clover/Chicory mix, Alfalfa (<60%) | 2 - 4 tons | 40 ¹ |
| 4EM | Chicory, other Forb, less than 30% legume | 2 - 4 tons | 50 ¹ |
| 4AM | Warm Season Grasses (WSG) | 2 - 4 tons | 0 |

¹ Suggested N rates vary with crop condition, desired legume percent and expected yield.

Phosphorus

Base recommendations for crops are shown in this copy of Table 9 from UVM BR1390.3, a complete explanation of phosphorus rate calculations is included there. The upper and lower application limits are shown as shaded areas in this table. The base P₂O₅ recommendations (corn) must then be adjusted for each specific crop situation as shown in **Table 7. Phosphorus (P₂O₅) rate adjustments** for food plot crops.

(Table 9 from UVM BR1390.3) - Recommended base phosphorus rates

| Reactive Al | Available P soil test | | | | | | |
|-------------|---|-----|--------|-----|----------------------|-------------------|-----------|
| | Low | | Medium | | Optimum ¹ | High ² | Excessive |
| | 0.5 | 1.5 | 2.5 | 3.5 | 4.1-7 | 7.1-20 | >20 |
| ppm | P ₂ O ₅ to apply, lb/acre | | | | | | |
| 10 | 60 | 60 | 40 | 40 | 20 | 0 | 0 |
| 20 | 65 | 60 | 40 | 40 | 20 | 0 | 0 |
| 30 | 75 | 55 | 40 | 40 | 20 | 0 | 0 |
| 40 | 90 | 65 | 40 | 40 | 20 | 0 | 0 |
| 50 | 100 | 70 | 45 | 40 | 20 | 0 | 0 |
| 60 | 110 | 80 | 50 | 40 | 20 | 0 | 0 |
| 70 | 120 | 90 | 55 | 40 | 30 | 0 | 0 |
| 80 | 120 | 95 | 60 | 40 | 30 | 0 | 0 |
| 90 | 120 | 105 | 65 | 40 | 30 | 0 | 0 |
| 100 | 120 | 115 | 70 | 40 | 30 | 0 | 0 |
| 110 | 120 | 120 | 75 | 40 | 30 | 0 | 0 |
| 120 | 120 | 120 | 80 | 40 | 30 | 0 | 0 |
| 130 | 120 | 120 | 85 | 40 | 30 | 0 | 0 |
| 140 | 120 | 120 | 90 | 40 | 30 | 0 | 0 |
| 150 | 120 | 120 | 95 | 40 | 30 | 0 | 0 |
| 160 | 120 | 120 | 100 | 40 | 30 | 0 | 0 |
| 170 | 120 | 120 | 105 | 40 | 30 | 0 | 0 |
| 180 | 120 | 120 | 110 | 40 | 30 | 0 | 0 |
| 190 | 120 | 120 | 115 | 40 | 30 | 0 | 0 |
| 200 | 120 | 120 | 120 | 40 | 30 | 0 | 0 |

Table 7. Phosphorus (P₂O₅) rate adjustments for food plot crops

| | | Available P soil test level | |
|--|---|--|------------------------|
| | | Low - Medium (0-4 ppm) | Optimum (4.1-7 ppm) |
| | | ----- lb P ₂ O ₅ /acre ----- | |
| Annual Crops | | | |
| 3B | Corn for Grain | No Change | No Change |
| 3C | Sorghum, Sunflower | Subtract 20 | No Change |
| 3D | Oats, Wheat, Rye, Millet | | |
| 3E | Pea, Bean, Buckwheat | | |
| 3F | Soybean | | |
| 4BM | Brassica Mix: Kale, Rape, Turnip, Rutabaga (Swede); Radish, Sugar Beet | Subtract 20 | No Change |
| Perennial Crops - Establishment | | | |
| 4DE | Alfalfa, 60-100% legume | Add 40 | Add 20 |
| 4CE | Clover, Clover/Chicory mix, Alfalfa (<60%) | | |
| 4EE | Chicory, other Forb, less than 30% legume | | |
| 4AE | Warm Season Grasses | Subtract 30 | Subtract 20 |
| Perennial Crops - Maintenance | | | |
| 4DM | Alfalfa, 60-100% legume | No Change | No Change |
| 4CM | Clover, Clover/Chicory mix, Alfalfa (<60%) | Subtract 20 | No Change |
| 4EM | Chicory, other Forb, less than 30% legume | | |
| 4AM | Warm Season Grasses | Subtract 30 | Subtract 20 |

Potassium

Recommendations for potassium applications shown are for typical crop yields for food plots and may vary with site and crop yield conditions. Typical crop yields are included in tables 4, 5 and 6 for N recommendations.

Table 8. Recommended Potassium (K₂O) fertilizer rates for wildlife food plot crops

| | | K soil test (ppm) | | | | | | |
|--------------------------------------|--|---|-------|--------|--------|---------|---------|-----------|
| | | Low | | Medium | | Optimum | High | Excessive |
| | | <25 | 26-50 | 51-75 | 76-100 | 101-130 | 131-160 | >160 |
| Annual Crops | | ----- K ₂ O to apply (lb/acre) ----- | | | | | | |
| 3B | Corn for Grain | 120 | 80 | 40 | 30 | 20 | 20 | 0 |
| 3C | Sorghum, Sunflower | 120 | 100 | 80 | 60 | 40 | 0 | 0 |
| 3D | Oats, Barley, Wheat, Rye, Millet | | | | | | | |
| 3E | Buckwheat, Cowpea, Pea | | | | | | | |
| 3F | Soybean | | | | | | | |
| 4BM | Brassica Mix: Kale, Rape, Turnip, Rutabaga (Swede); Radish, Sugar Beet | 120 | 100 | 80 | 60 | 40 | 0 | 0 |
| Perennial Crops - New Seeding | | | | | | | | |
| 4DE | Alfalfa, 60-100% legume | 220 | 180 | 140 | 100 | 60 | 0 | 0 |
| 4CE | Clover, Clover/Chicory, Alfalfa <60% | 180 | 140 | 100 | 80 | 60 | 0 | 0 |
| 4EE | Chicory, other Forb, (<30% legume) | | | | | | | |
| 4AE | Warm Season Grasses | 80 | 60 | 40 | 0 | 0 | 0 | 0 |
| Perennial Crops - Maintenance | | | | | | | | |
| 4DM | Alfalfa, 60-100% legume - Establishment | 220 | 180 | 140 | 100 | 60 | 0 | 0 |
| 4CM | Clover, Clover/Chicory, Alfalfa <60% | 220 | 180 | 140 | 100 | 60 | 0 | 0 |
| 4EM | Chicory, other Forb, (<30% legume) | | | | | | | |
| 4AM | Warm Season Grasses | 80 | 60 | 40 | 0 | 0 | 0 | 0 |

Other Nutrients to Consider

Deficiencies of sulfur, calcium, magnesium and boron in the soil can reduce crop productivity and lower the quality of forages produced. Attention to these 'secondary' nutrients is warranted on forest soils that have not been recently farmed with field applications of lime or manure.

Calcium applications for legumes (clover, alfalfa, peas, beans, vetch) from lime, wood ash, Flue Gas Desulfurization (FGD) gypsum, mined gypsum (calcium sulfate), 27-0-0 CAN (calcium ammonium nitrate) and liquid lime products. Desired Ca base saturation range is 40 - 80%.

Magnesium deficiency in broccoli, another cold hardy brassica, shows up on older leaves as chlorosis (yellowing due to lack of chlorophyll) between the veins. (The Fertilizer Institute, soil fertility manual. p.A-7 photo). Vermont lime deposits contain a wide range of magnesium and Hi-Mag lime can be specified when soil test levels are low. Desired Mg base saturation range is 10 - 30%.

Sulfur deficiency in canola, a brassica, shows up as interveinal chlorosis on much of the plant, with new leaves that are small, reddish and stunted, and a failure to set seed in extreme cases. (The Fertilizer Institute, soil fertility manual. p.A-6 photo). A symptom of sulfur shortage includes a pale leaf color similar to nitrogen deficiency, but since sulfur is not mobile the youngest leaves show symptoms first whereas a shortage of nitrogen needed by younger leaves is supplied by the plant as N is transferred from the older leaves where the deficiency signs will be seen like the N is being sucked out of the leaf. (corn example)

Most sulfur in the soil is tied up in the organic matter, humus and applied livestock manures can keep sulfur levels up. If no manure is used, or test levels drop, several fertilizer materials contain sulfur and are much easier to apply than elemental sulfur, including 21-0-0-24 ammonium sulfate (24% S), 0-0-18-22 Sul-Po-Mag (potassium-magnesium-sulfate (22% S), and FGD gypsum (20% S). If soil needs sulfur, apply small amounts with these products. 15 ppm sufficiency level, applications up to 15 to 30 S lb/ac.

Boron deficiency symptoms in white clover includes orange-red and pale green colored leaves, red leaf margins, leaf texture leathery, and poor seed head development. (The Fertilizer Institute, soil fertility manual. p.A-6 photo). I see this marginal coloring in clovers and brassicas and have attributed this to low pH at the plot sites, yet Boron is equally available across the pH range of 5.5 to 6.5.

A soil test for can indicate the relative amount of Boron in the soil (ppm or lb/acre) and if you know the cutoff value for application, an application rate of 3 to 4 lbs/acre mixed into the soil before planting may be required to correct a very low soil test (< 0.1 ppm). An annual application should be limited to 1 to 2 lbs/acre and use caution to avoid toxicity from excess in soil. 0.5 ppm sufficiency level in soil.