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# Fertilizing with Yard Trimmings

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Farming West of the Cascades

Yard trimmings are a mixture of grass clippings, leaves, woody trimmings, weeds, and soil. Application to agricultural land is an alternative to composting yard trimmings during the spring and early summer months. Most yard trimmings are a beneficial soil amendment because they are a good source of plant nutrients and organic matter. Yard trimmings have been used with a variety of crops in western Washington, including sweet corn, silage corn, rhubarb, flower bulbs, cabbage, and squash.

This publication describes the use of yard trimmings in agriculture, including:

- Nutrient content and properties of yard trimmings
- Estimating N availability from yard trimmings
- Calculating application rates
- Managing yard trimmings applications
- Permits for yard trimmings applications
- Repeated applications

## What nutrients are in yard trimmings?

Yard trimmings are ground and sometimes screened before shipment for agricultural application. Screening and grinding remove sticks and non-degradable material (such as plastic). Some facilities allow the yard trimmings to heat in aerated windrows for several days to reduce the viability of weed seeds.

Nutrient content varies depending on the composition of the yard trimmings. Materials with higher grass content contain more N, P, and K than woodier materials, and they have a lower C:N ratio (Tables 1 and 2). Most yard trim-

***On-farm application of yard trimmings.***

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mings in western Washington fall within the range for mixed materials shown in Tables 1 and 2. Yard trimmings with a lower N content and higher C:N ratio than shown in Table 1 are likely to immobilize N during the year of application, and are better suited as a mulch than a soil amendment.

Yard trimmings contain other plant nutrients, such as calcium, magnesium, boron, and sulfur (Table 3) and small amounts of trace elements (Table 4). Trace element levels are low in yard trimmings, generally less than 10% of the "exceptional quality" limits used for biosolids applications (Table 4).

**Table 1. Typical composition of yard trimmings.[1] Nutrients and organic matter are shown on a dry weight basis.**

| Component | Symbol | Grass[2] | Mixed[3] |
|---|---|---|---|
| Total nitrogen, % | N | 2 to 4 | 1.2 to 2.3 |
| Ammonium nitrogen % | $NH_4$-N | 0.2 to 0.4 | 0.1 to 0.3 |
| Nitrate nitrogen % | $NO_3$-N | < 0.01 | < 0.01 |
| C:N ratio | | 10 to 15 | 15 to 25 |
| Total phosphorus, % | P | 0.3 to 0.6 | 0.2 to 0.3 |
| Total potassium, % | K | 1.3 to 2.3 | 0.5 to 1.0 |
| Organic matter, % | | 65 to 85 | 50 to 60 |
| Salts (dS/m or mmhos/cm) | | < 1 to 3 | < 1 to 3 |
| pH | | 5.5 to 6.5 | 5 to 6 |
| Moisture, % as is | | 60 to 75 | 45 to 65 |

[1] Based on samples collected at four facilities in western Washington over seven dates
[2] Contains more than two-thirds grass
[3] Contains about one-third to two-thirds grass

**Table 2. Primary nutrients and organic matter in yard trimmings, lb/ton "as is."**

| | Grass lb/ton @ 30% solids[1] | Mixed lb/ton @ 50% solids |
|---|---|---|
| Total N | 15 to 21 | 12 to 24 |
| $NH_4$-N | 1.2 to 3 | 1 to 3 |
| $NO_3$-N | < 0.1 | < 0.1 |
| P | 1.2 to 2.4 | 2 to 4 |
| K | 6 to 12 | 5 to 10 |
| Organic matter | 390 to 410 | 500 to 600 |

[1] Solids content = 100 % - moisture %

**Table 3. Typical content of other nutrients in yard trimmings.[1]**

| Element | Symbol | Units | Range (dry weight basis)[2] |
|---|---|---|---|
| Calcium | Ca | % | 0.6 to 1.0 |
| Iron | Fe | % | 0.3 to 1.0 |
| Magnesium | Mg | % | 0.2 to 0.3 |
| Sulfur | S | % | 0.1 to 0.3 |
| Manganese | Mn | mg/kg[3] | 225 to 315 |
| Boron | B | mg/kg | 15 to 30 |

[1] Based on samples collected from 4 facilities in western Washington
[2] Total elemental content. Available element content is a fraction of total content
[3] mg/kg = parts per million (ppm)

**Table 4. Content of selected trace elements in yard trimmings compared with EPA exceptional quality standards for biosolids.**

| Element | Symbol | Yard trimmings[1] mg/kg (dry weight)[2] | EPA biosolids standards mg/kg |
|---|---|---|---|
| Arsenic | As | 4 to 6 | 41 |
| Copper | Cu | 20 to 60 | 1,500 |
| Nickel | Ni | 15 to 50 | 420 |
| Lead | Pb | 10 to 50 | 300 |
| Zinc | Zn | 60 to 140 | 2,800 |

[1] Total element content
[2] mg/kg = parts per million (ppm)

Yard trimmings tend to be slightly acid (pH 5.2 to 6.5), but their application has little effect on soil pH. Salt levels are generally low (1 to 3 dS/m) and will not affect crop growth. The moisture content of yard trimmings generally ranges from 50 to 70% by weight, with fresher, grassier materials containing more moisture (Table 2). Bulk density increases with moisture content (Table 5).

## Nitrogen availability

Nitrogen availability is the key to estimating annual application rates for yard trimmings. Yard trimmings application rates are typically based on N, because N is usually the nutrient needed in the largest amount for crop growth.

Yard trimmings contain N in organic and ammonium forms. Organic forms of N are not immediately available to plants, but are released slowly as the yard trimmings decompose in the soil. The ammonium N is immediately available to the plant. Nitrogen availability from yard trimmings increases as N content increases and C:N ratio decreases. Materials with a higher N content generally contain more ammonium N and more organic N in forms that are easily decomposed in the soil. Woody yard trimmings with low N content (less than 1.2%) and high C:N ratio (greater than 22:1) tend to immobilize rather than release N during the first season after application. These woody materials are best used for mulching on the soil surface.

Tables 6 and 7 and Figure 1 show alternative ways of estimating N availability. Table 6 gives estimates of first-year available N as a percentage and as lb per cubic yard based on N analysis, C:N ratio, or estimated grass content. Table 7 estimates available N from a 40-ton-per-acre (wet weight) yard trimmings application based on N analysis. Figure 1 gives estimates of N availability in graphical form.

**Table 5. Estimating the bulk density of fresh yard trimmings from moisture content.**

| Moisture content (% by wt) | Typical Bulk density (lb/yd$^3$) |
|---|---|
| 50 | 1000 to 1100 |
| 60 | 1100 to 1200 |
| 70 | 1300 to 1500 |

## Calculating application rates

Because of variability in N availability from yard trimmings, a conservative application approach may be appropriate where nitrate leaching is a concern. A conservative target for yard trimmings is an application estimated to meet 50 to 75% of the crop N requirements. About 30 days after the yard trimmings application, sample the soil at a depth of 0 to 12 inches to determine the soil nitrate concentration. This is a presidedress nitrate test. It was developed for corn, but is useful for estimating N availability for other long-season annual crops as well. If soil nitrate-N is less than about 25 mg/kg at this time, the crop is likely to benefit from additional N fertilizer. If soil nitrate-N is greater than 25 mg/kg, additional N is unlikely to improve crop yield. This approach to yard trimmings management will reduce the potential for over-application of plant available N, and give growers confidence that available N supply will meet crop needs.

Typical application rates of yard trimmings supply large amounts of total potassium (K) and moderate amounts of total phosphorus (P). If initial soil K levels are low, and a light rate of yard trimmings is applied, supplemental K may be needed. Phosphorus in yard trimmings may not be available enough in cold soils to substitute for starter P fertilizer. Yard trimmings will usually supply adequate P later in the season.

The yard trimmings application rate calculation is based on (1) the N content of the yard trimmings, (2) estimated availability of the yard trimmings N, and (3) crop

**Table 6. Estimating available N from the grass content of yard trimmings.**

| Grass (% of pile volume) | Typical total N (%) | Typical C:N | Estimated available N (%) | Estimated available N (lb N/cu yd) |
|---|---|---|---|---|
| 0 | Below 1.2 | Above 22 | -10 to 10 | 0 |
| 30 | 1.2 to 1.8 | 18 to 22 | 10 to 20 | 1 |
| 50 | 1.8 to 2.3 | 15 to 18 | 15 to 30 | 2.2 |
| 70 | 2.3 to 2.8 | 13 to 15 | 20 to 35 | 2.7 |
| 100 | Above 2.8 | 11 to 13 | 20 to 45 | 4.8 |

**Table 7. Estimated available N in a 40-ton/acre as-is application of yard trimmings.**

| Total N analysis (%) | Estimated volume applied (cubic yard/acre) | Estimated available N (lb/acre) |
|---|---|---|
| Below 1.2 | 80 | -40 to 40 |
| 1.2 to 1.8 | 73 | 50 to 100 |
| 1.8 to 2.3 | 67 | 100 to 200 |
| 2.3 to 2.8 | 62 | 120 to 210 |
| Above 2.8 | 53 | 160 to 350 |

**Table 8. Converting yard trimmings nutrient content from dry weight to as-is basis.**

*Note: Unshaded cells in table are information from lab analysis. Shaded cells are calculations you make.*

| Nutrient | Example | | Your value | |
|---|---|---|---|---|
| | Lab analysis (%, dry weight) | As-is basis (lb/ton wet weight)[1] | Lab analysis (%, dry weight) | As-is basis (lb/ton wet weight) |
| N | 1.8 | 14 | | |
| P | 0.3 | 2.4 | | |
| K | 1.0 | 8 | | |

| | Fraction, wet weight | Fraction, wet weight |
|---|---|---|
| Moisture | .60 | |
| Solids[2] | .40 | |

[1] lb/ton = dry weight % x 20 x solids fraction
[2] Solids fraction = 1.0 - moisture fraction

N requirements. You can obtain the N content of the yard trimmings from a lab analysis (see sidebar). Lab analyses for N, P, and K are usually reported in percentage on a dry weight basis. To convert to lb per ton on an as-is (wet weight) basis, multiply the dry weight percentage by 20 and multiply the result by the solids content (Table 8). Estimate N availability using Tables 6, 7, or Figure 1. Use fertilizer guides or recommendations from agronomists to determine crop N requirement. Table 9 gives an example application rate calculation.

If a current lab analysis is not available, you can estimate N content and availability based on the estimated grass content of the yard trimmings (Table 6). This estimate should be done by someone familiar with the appearance of yard trimmings at different grass contents.

# Managing yard trimmings applications

## Site selection

The best sites are on productive farmland that can benefit from the nutrients and organic matter in the yard trimmings. The site must be accessible to delivery equipment (typically a semi-trailer) and have space for holding the delivered material. Avoid areas with poor drainage. Yard trimmings are not suitable for established pastures because the relatively high application rates may smother the pasture crops. They are suitable for annual and some perennial row crops.

## Odor control

Apply yard trimmings promptly after delivery, to prevent buildup of odors in the pile. If the pile sits too long, foul odors may affect neighbors during application. The local permitting authority may specify a time limit between delivery of the material and completion of application. The time limit is typically a week or less.

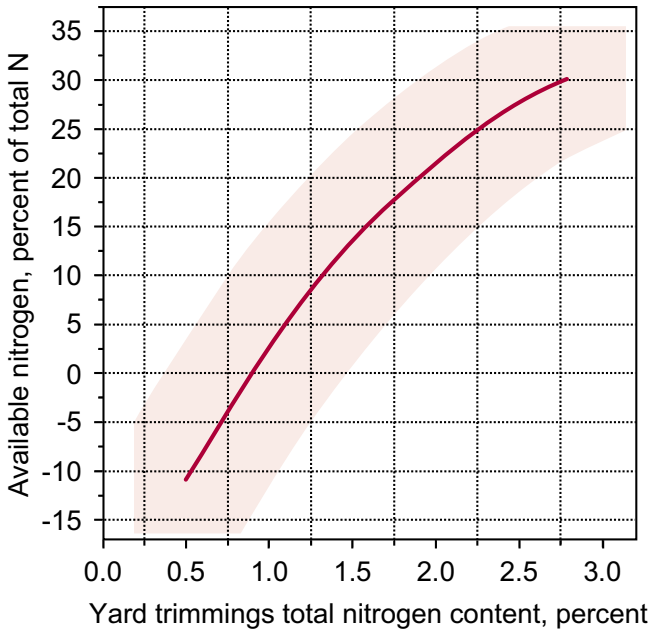


**Figure 1. Estimated N availability based on total N content.**

## Fresh yard trimmings compared with compost

Fresh yard trimmings are similar to compost in that both are organic materials that can improve soil productivity. Fresh yard trimmings differ from composted materials in that they are less processed, less stable, and more biologically active. The comparisons below show key differences between fresh and composted yard debris. Consider these comparisons when deciding to use fresh or composted yard trimmings on the farm.

| Fresh yard trimmings | Yard trimmings compost |
|---|---|
| • Fast and slow release forms of nitrogen | • Slow release form of nitrogen |
| • About 40% of organic matter degrades rapidly; the remainder is similar to compost organic matter | • Organic matter in slowly-degradable forms |
| • May contain viable weed seeds or other weed propagules (e.g., stolons, rhizomes) | • Less likely to contain viable weed seeds |
| • Low cost | • More expensive |
| • Cannot be stored; must be applied shortly after delivery to the field | • Can be stored |
| • Particle size less uniform; sometimes not screened | • Large debris removed by screening |
| • Permits may be required for land application | • Land application permits not required |

## Application and incorporation

Farmers usually apply yard trimmings using rear- or side-delivery manure spreaders. Some farmers have adapted spreaders to deliver yard trimmings between the rows of perennial crops such as rhubarb. After application, incorporate the yard trimmings promptly as part of normal field preparation.

Proper calibration of spreaders is critical for applying the desired amount of yard trimmings uniformly across the field. For step-by-step instructions on calibrating spreaders refer to *Fertilizing with Manure*, PNW0533, part of the "Farming West of the Cascades" series.

## Timing of application and planting

Fresh yard trimmings contain easily degradable organic matter. About 40% of the organic matter in yard trimmings is decomposed by soil organisms during the first two to four weeks after incorporation in the field. The soil organisms consume large amounts of oxygen as they degrade the yard trimmings. A lack of oxygen in soil can damage crops. To avoid crop damage, wait two to four weeks after incorporating high rates of yard trimmings before seeding or transplanting crops. Yard trimmings have been incorporated between the rows of standing perennial crops such as rhubarb without any evidence of harm to the crop.

## Soil testing

Taking soil test samples and observing your crops can help you determine if yard trimmings application rates are adequate or if they need adjusting. The *pre-sidedress nitrate test* is an in-season test that indicates if the yard trimmings will supply enough available N for the crop, or if additional N fertilizer is needed. The *report card* soil test helps determine if you are applying too much yard trimmings. The report card test measures nitrate-N remaining in the soil in the fall. If you apply too much yard trimmings, nitrate-N will accumulate in the soil, unused by the crop. When

**Table 9. Example calculation for yard trimmings application rates based on laboratory analysis.**

*Note: Unshaded cells in table are information about yard trimmings and crop. Shaded cells are calculations you make.*

| Step | Units | Example | Your value |
|---|---|---|---|
| A. Crop | sweet corn | | |
| B. Desired N application rate | lb N/acre | 100 | |
| C. Yard trimmings N content, from laboratory analysis and Table 8 | lb N/ton as-is | 14 | |
| D. Phosphorus content, from laboratory analysis and Table 8 | lb P/ton as-is | 2.4 | |
| E. Potassium content, from laboratory analysis and Table 8 | lb K/ton as-is | 8 | |
| F. Bulk density, from Table 5 | lb/cubic yard | 1150 | |
| G. Plant availability of N in yard trimmings, from Table 6 or Figure 1. | percent | 15 | |
| H. Calculate available nitrogen **Line C x (line G / 100)** | lb N/ton as-is | 2.1 | |
| I. Calculate application rate (tons/acre) **Line B / line H** | tons/acre as-is | 48 | |
| J. Calculate application rate (yards3/acre) **Line I x 2,000 / Line F** | cubic yards/acre as-is | 83 | |
| K. Calculate amount of phosphorus applied **Line I x line D x 2.3** | lb $P_2O_5$/acre | 265 | |
| L. Calculate amount of potassium applied **Line I x line E x 1.2** | lb $K_2O$/acre | 460 | |

fall and winter rains come, the nitrate will leach from the soil and become a potential contaminant in ground or surface water. Excess N can also harm some crops, by delaying fruiting and increasing the risk of disease damage, freeze damage, and wind damage.

For a pre-sidedress nitrate test, sample the soil one month after applying yard trimmings. To do a report card test, sample the soil (also 0- to 12-inch depth) between August 15 and October 1. Timing is critical. You want to sample after most crop uptake of N has occurred, but before the fall rains leach nitrate from the soil. Take a report card sample as you would any other soil sample, collecting soil cores at multiple spots in the field, and combining the cores together into a composite sample. A pre-sidedress test is done the same. For details on soil sampling procedures, refer to *Soil Sampling*, Bulletin 704, available from University of Idaho Cooperative Extension.

If your report card nitrate-N results are greater than 15–20 mg/kg, this suggests you are supplying more N than your crop needs, and you can reduce application rates. Report card nitrate-N levels greater than 30 mg/kg are excessive.

When interpreting report card results, also consider the performance of your crop. If crop growth was poor because of drought, pests, or poor growing conditions, crop N uptake may have been less than expected, resulting in excess N remaining in the soil profile even if yard trimmings applications were on target for a normal crop.

You can use basic soil tests to evaluate the soil for sufficiency or excess of other nutrients. A basic soil test includes P, K, calcium (Ca), magnesium (Mg), boron (B), pH, and a lime recommendation. If you have excessive levels of P and K, you may need to decrease or cease yard trimmings applications.

## Herbicides and yard trimmings

Most herbicides currently available to the public for broadleaf weed control in turfgrass (example: 2,4-D) are rapidly degraded to non-toxic compounds by microbial activity in soil. A few persistent herbicides (example: clopyralid) that are available for use by lawn care professionals may be a concern in yard trimmings that contain a large proportion of grass clippings. A few cases of clopyralid damage to garden plants that were grown in yard trimmings compost have been reported. To date, herbicide damage has not been reported after application of fresh yard trimmings as a soil amendment. Research is currently under way to assess if clopyralid poses risks to crop production. Information will be posted on the web as it becomes available: http://www.puyallup.wsu.edu/soilmgmt/Clopyralid.htm

## Permits

Because yard trimmings are usually handled under solid waste regulations, the permitting authority (the local health department in Washington State, or the Department of Environmental Quality in Oregon) may require a permit for land application. The supplier of the yard trimmings is usually responsible for completing the permit application. The purpose of the permit is to ensure that yard trimmings are applied to a suitable site at an appropriate application rate, and that the site is managed to protect ground and surface water. Specific information and management requirements may differ, depending on the locality.

The permit will usually specify an application rate and timing based on soil, crop, and yard trimmings information, and estimated yard trimmings N availability. The permit may require subsequent testing, such as report card nitrate tests, to determine if yard trimmings applications need to be adjusted in future years. Other information may also be required, depending on site conditions.

### Laboratory analysis of yard trimmings

Yard trimmings suppliers are usually responsible for obtaining laboratory analyses for their product. A typical analysis includes total-N, ammonium N, total P, total K, pH, electrical conductivity (EC), moisture content, and C:N ratio.

Proper sample collection, handling, and shipping are critical to obtaining usable results. The sample must be fresh and it must be representative of the material. Do not dry samples before shipping to the laboratory. Drying causes ammonia loss. Refrigerate samples if they will be delivered to the lab by hand; otherwise, freeze them before shipping. Refer to *Fertilizing with Manure*, publication PNW0533 in the "Farming West of the Cascades" series, for details on sample collection, shipment, and analytical laboratories.

## Repeated applications of yard trimmings

Repeated applications of yard trimmings increase soil organic matter content and the soil nutrient pool. As the pool of slow release nutrients increases, the amount of yard trimmings needed to meet crop needs will decline.

When yard trimmings applications are based on nitrogen need, the application usually supplies K in excess of crop needs. Yard trimmings may also supply excess P. As a result, P and K can accumulate in soils over time, and may eventually reach excessive levels. Excess levels of soil P can increase the amount of P in runoff, increasing the risk of surface water degradation. Many crops can handle high levels of K, but livestock can be harmed by nutrient imbalances if they consume a diet of forages with high K levels.

If you apply yard trimmings repeatedly to the same fields, it is important to have a regular soil testing program to track nutrient levels. If P and K reach excessive levels, you will need to move yard trimmings applications to other fields with lower P and K levels.

## Summary

Yard trimmings are a beneficial soil amendment that supply plant nutrients and organic matter. They have been successfully used in the production of a variety of annual and perennial crops. Keys to the successful use of yard trimmings include compatibility with the cropping system, appropriate application rates and timing, and attention to soil tests and equipment calibration.

## Additional Resources

### Yard trimmings

Washington State University Web Site:
http://www.puyallup.wsu.edu/soilmgmt/Clopyralid.htm

### Spreader calibration, sample handling, and analysis

Bary, A.I., C.G. Cogger, and D.M. Sullivan. 2000. *Fertilizing with Manure*. PNW0533. Washington State University Cooperative Extension.
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