GREEN GRASS, CLEAR WATER for Professional Landscapers

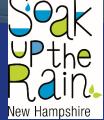
Landscaping for Water Quality March 2023 - Swanzey, NH

Julia Peterson (N.H. Sea Grant Extension)
Amy Papineau (UNH Cooperative Extension)





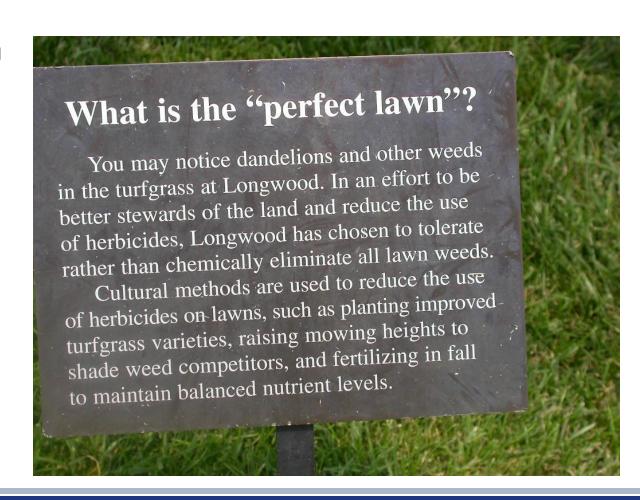




Our goals today:

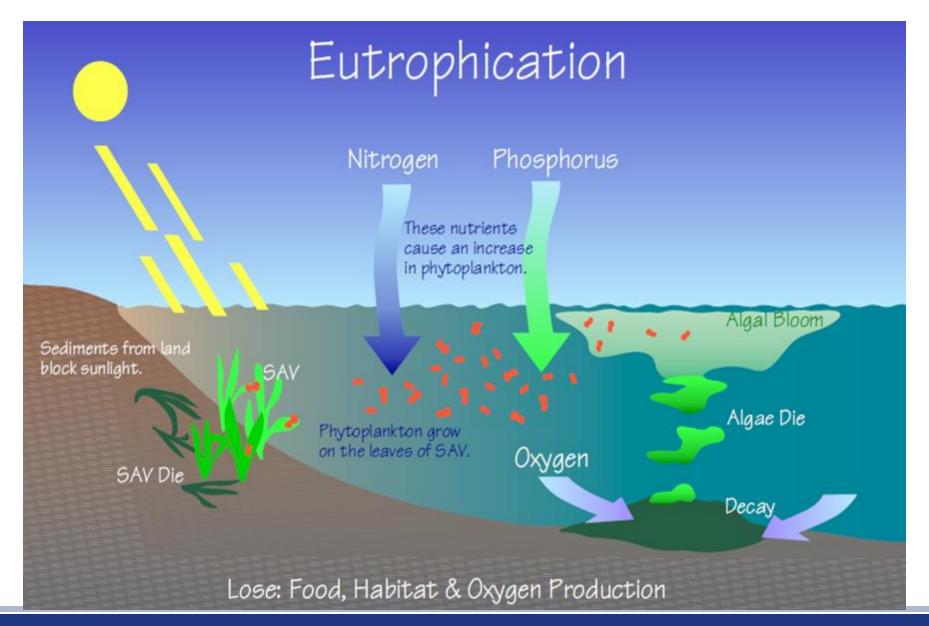
1. Recognize the **connection** between lawn care and clean water

- 2. Learn **cultural practices** that encourage healthy turf and reduce pollution from lawns.
- 3. Promote or adopt at least one new or improved practice for clients.













Nutrients

- Both Phosphorus (P) and Nitrogen (N) need to be managed carefully!
 - Nitrogen enhances eutrophication caused by excess Phosphorus in freshwater lakes and ponds
 - Phosphorus enhances eutrophication caused by excess Nitrogen in estuaries and coastal salt-waters

Conley et al., 2009. Controlling eutrophication: Nitrogen and phosphorus Feb., vo. 323:1014-1015; vol. 324:721-725





Changing Homeowner's Lawn Care Behavior to Reduce Nutrient Losses

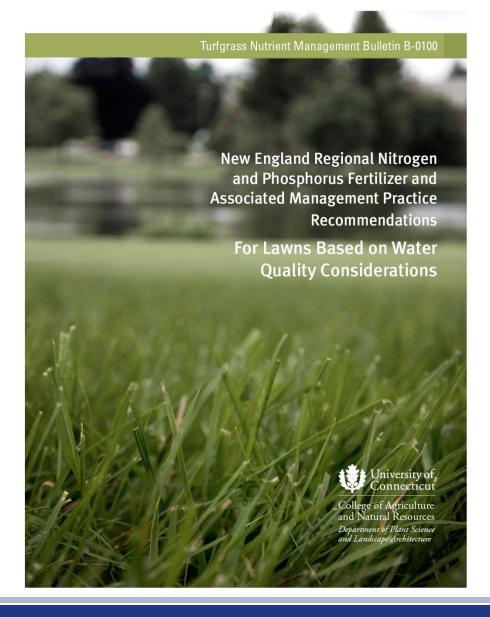
USDA/NIFA 2006-51130-03656











Water Quality Friendly Lawn Care Recommendations







Social Science Results and Recommendations for Outreach

Brian Eisenhauer, PhD Plymouth State University

From Report of Social Science findings from **Changing Homeowner's** Lawn Care Behavior to **Reduce Nutrient Losses in New England's Urbanizing Watersheds**

USDA CSREES (now NIFA) project # 2006-51130-03565





Social Science Results Summars

Nutrieur losses from common lewn care practices, such as fertilization, have been identified CHINESE NOTICE COMMISSION CARE SAVEL CARE PROCESS. MICH ES DESTINATIONAL MICH COMMISSION COMMISSION NOTICES TO NON POINT SOURCE POllution (NPS) in New England's Watershed SIGNATURES CONTINUED TO COME POINT SOURCE POURTING (CAPS) IN COME REGISTRES & PROPERTY OF CONTINUES TO CASE A CONTINUE POURTING A CONTINUE OF STATE OF CONTINUES AND CASE AND entier to create an expective educations; outreach program to significant the use of more environmentally responsible lawn care practices, and reduce this source of NPS, a significant of the source of NPS, as ignificant of NPS, as ignificant of N amount of locial science research has been conducted to inform the design of a marketing program of social science research has been connected to mitoria the design of a marketing program informed by the principles of community based total marketing. This executive programs hashbalten the base findings from the surgeon of the resident to add in the constant of the resident to the base findings. program informed by the principles of community tosses social marketing. This executive suggests highlights the key findings from the survey portion of the project to aid in the critical program in the critical program

The question of what motivates environmentally responsible behavior in lawn care is impa to the future of environmental health throughout the Northeast. Attempting to get landows to one stones of environmental means throughout the evolutions. Assempting to get announced better the negative impacts lawn care practices have on their watersheds has become a forest characteristic share and the second state of their watersheds has become for an expension affirms characteristic share and the second state of their watersheds has become for all essent the negative impacts sewn care practices have on their watersteen and vectore a secthis goal. Designing an outreach program, movement inner research examine on the special for ex-tending the contract of the process of the process of the contract of the process of the contract of the cont this goal. Designing an outreach program that seams to measurante change in the practices scale landowners the 10 care for their landscapes is a challenge that can best be met through active animovements use to care not ment tamascapes it a chameage that can use the met mirror application of findings from hypotheset-driven social science research. Instigating behavior approximate or findings from hypotheses-curved social science resents, assigning sensitive change among landowners in a watershed can be a complex task because of the myriad is a sensitive of the myriad is a sensitive control of the involved in fostering environmentally responsible behavior, however existent social science priestch provides a framework that can be used to successfully structure this inquiry.

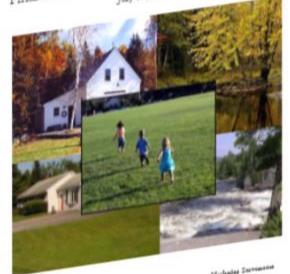
The social science research was conducted using methodological mangulation by engagin qualitative, in-depth interviews with that care opinion leaders throughout New England to observation to basing valuable information in the page also have called a decimal to the perceptions of, and opinions about, critical run (are issues selected to Water by Address to be address to be address to be address to be addressed and the beautiful to the page to the place of the perceptions of the perceptions of the perception ascertain men perceptions of, and opinions soons, critical that care issues related to waited in addition to being valuable information in its own right, the data collected and analyzed. allo used to inform the quantitative stage of data collection. The social science research se

- The project was designed with 4 goals

 Explore primary drivers of do-it-yourselfers. (DTYs) lawn care choices and practice and provided the second of designed and provided the second of the second o expecte primary crivers or so-n-yourseless. (LECV) laws care choices and practic especially with regard to fertilizer application. Information from non-DIVs will also of the project was designed with 4 goals ematyzed. Investigate perceived barriers and benefits to adoption of more water quality-friend
 - Examilia relative measures of trust and frequency of contact for various sources of
 - care information by neighborhood residents.

Changing Homeowner's Lawn Care Behavior to Reduce Nutrient Losses in New England's Urbanizing Watersheds

Final Social Science Project Evaluation Report



Course for The Earnes.

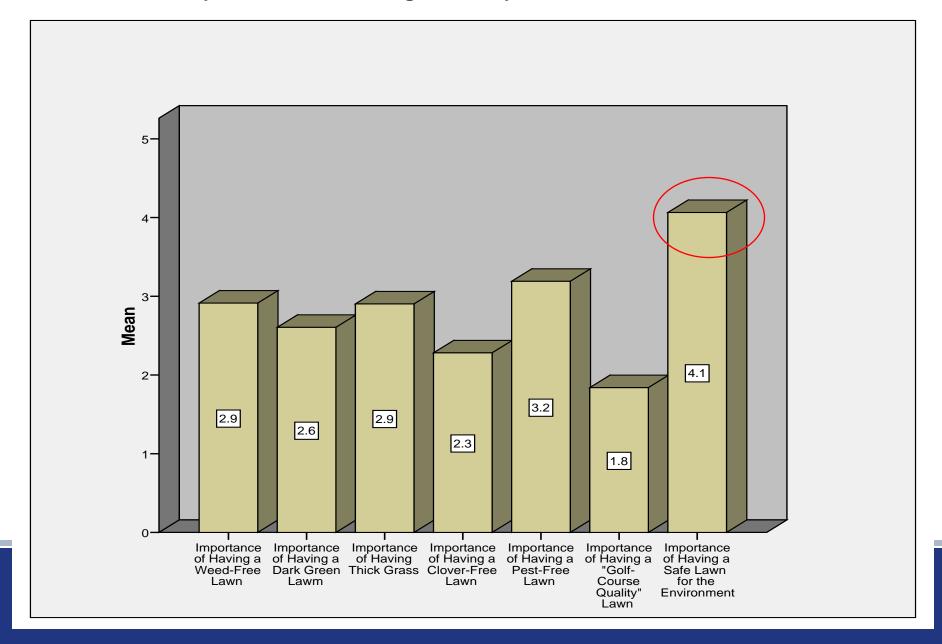
Estation Spendist 20H See Genet University of 28pm Massipalaire





Respondents Mean Rating of the Importance of Each Lawn Issue

What Matters to People in New **England** Regarding Lawns?







Recommendations, part 1

Without fertilizer





Simple Recommendations for Every Lawn

- 1. Right place, right plants
- 2. Choose the right grass seed varieties
- 3. Mow smart
- 4. Don't overwater
- 5. Test your soil
- 6. Dispose of yard waste properly





1. Limit lawn areas to play and picnic places









Expectations: turf seasonal cycle

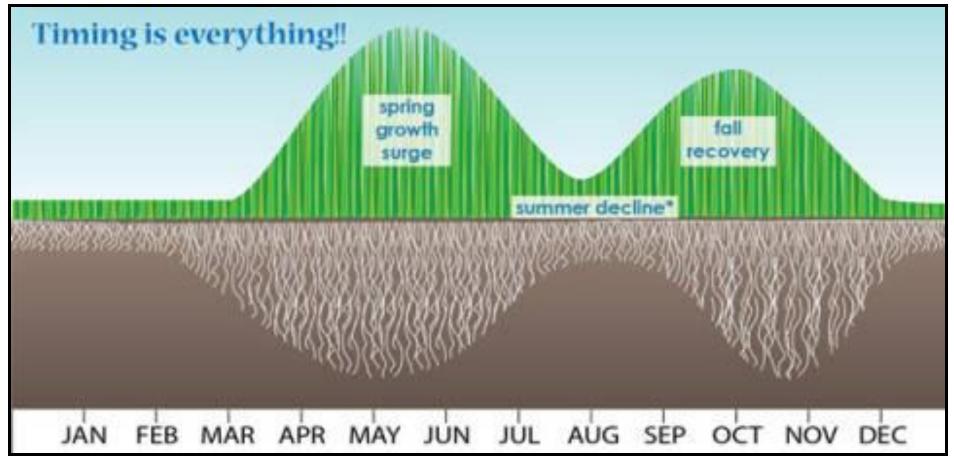


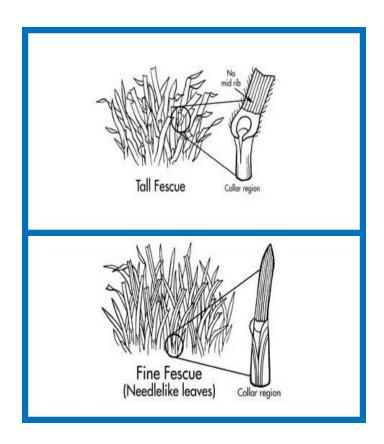
Image: University of Minnesota, Cornell University





2. Plant low maintenance grass varieties.

- Use recommended grass mixes
- Overseed when needed
- Plant new lawn in the early fall for best results (less weeds)





Selection of Species – Higher vs. Lower Maintenance Requirements

https://ntep.org/







Choose the Right Seed Mixes

Turf Species Color and Best Conditions Tolerances Limitations Heat and drought tolerant **TALL FESCUES** Slow to establish "New" ones are finer textured and darker green. (turf-type) Fair recovery potential Best in well drained soils & Fairly shade tolerant sun Very tolerant of low pH and low Don't perform well under Narrow-leaf, medium to **FINE FESCUES** fertility, drought and shade hot, humid conditions with dark green (creeping red, high fertility chewings, hard, sheep Become semi-dormant in heat Ideal for low maintenance & drought but recover quickly Fine to medium leaf texture Germinates rapidly and is quick Can be competitive **PERENNIAL** to establish – good for and dark green color **RYEGRASS** overseeding Not tolerant of shade and Best on well drained soils drought Tolerant of wear and heat with moderate fertility Susceptible to ice cover injury High tolerance for cold and Fine to medium leaf texture Requires higher amounts of **KENTUCKY BLUE** N fertilizer and dark green color wear **GRASS** Moderate tolerance for heat May produce thatch Best in well drained, sunny and drought areas Becomes semi-dormant in heat

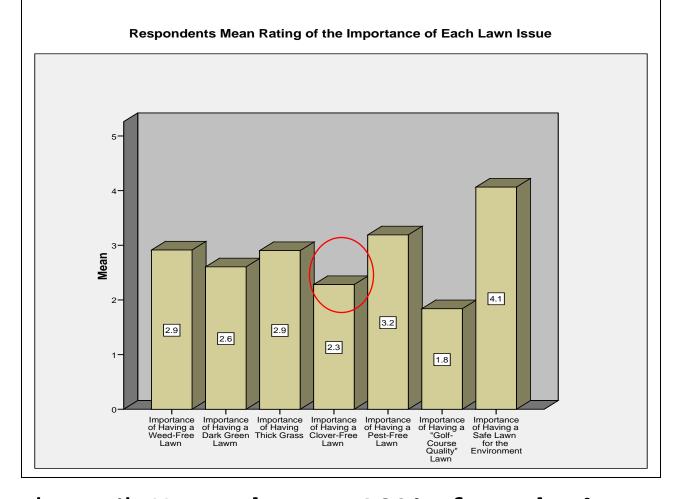
and drought; can recover

Source: http://extension.umass .edu/turf/factsheets/selectiongrasses



Incorporate clover.



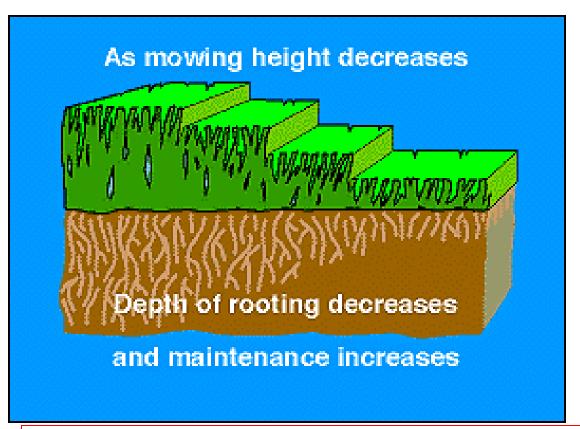


Clover fixes nitrogen naturally in the soil. **Keep clover <10% of seed mix.** Disregard if there are allergies to bee stings in the household.

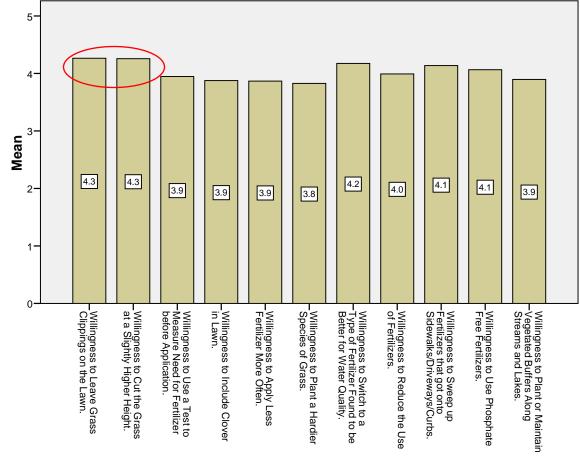




3. Mow Smart



Respondents' Mean Levels of Willingness to Engage in Practices to Reduce Nutrient Leaching and Runoff from Their Lawn (1=Not willing; 5=Very Willing)



Mow high 3" and leave clippings on the lawn.





 Return the Clippings to the Turf **Turfgrass Quality and Clipping Management** 7.5 Removed 7.0 Returned **Quality Rating** 6.5 Same quality with 4 6.0 lbs + returned as 6 lbs + removed Same quality with 2 5.5 lbs + returned as 4 lbs + removed 5.0 392 98 196 294 (2 lbs/M) (4 lbs/M) (6 lbs/M) N Rate (kg/ha) Kopp and Guillard (*Crop Sci.* 42:1225-1231, 2002)





4. Water wisely





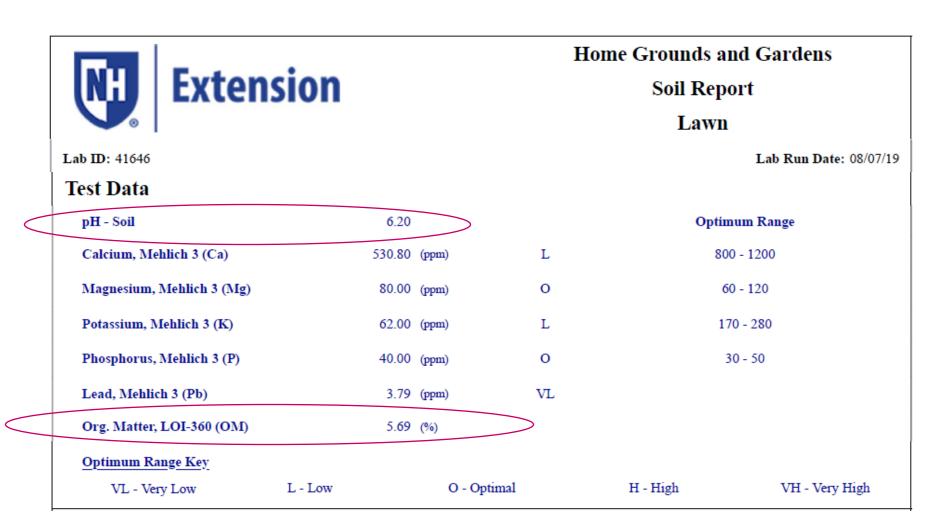






5. Test Soil

Note pH and Organic Matter

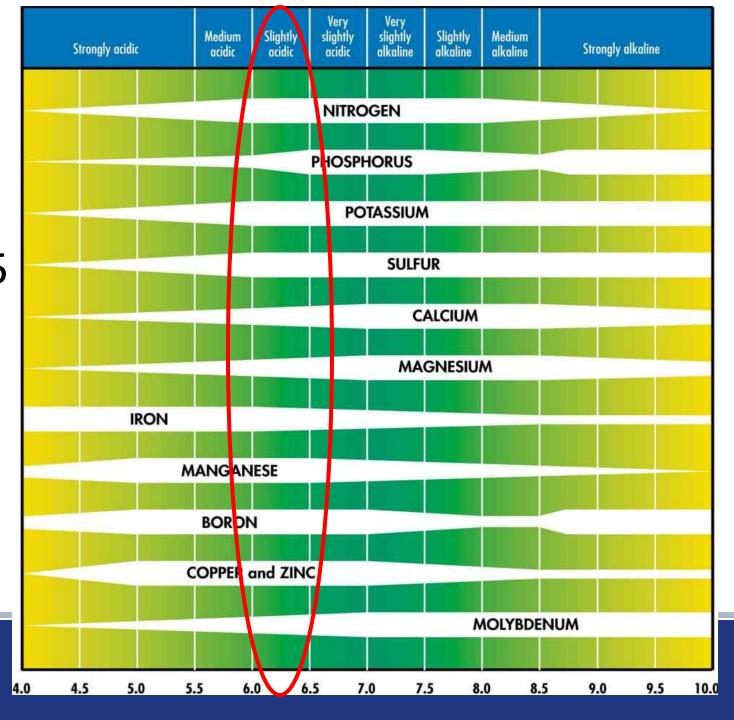






Soil pH

Ideal = 6.0-6.5







Soil Organic Matter: For NEW turf

Incorporate compost or another organic matter source to raise the organic matter content to at least 3%-5%.*

(NOTE: compost can have high phosphorus levels.)





Soil Organic Matter: For EXISTING lawn

Build up soil organic matter by **top dressing** with compost.

¼ inch layer, gently raked in







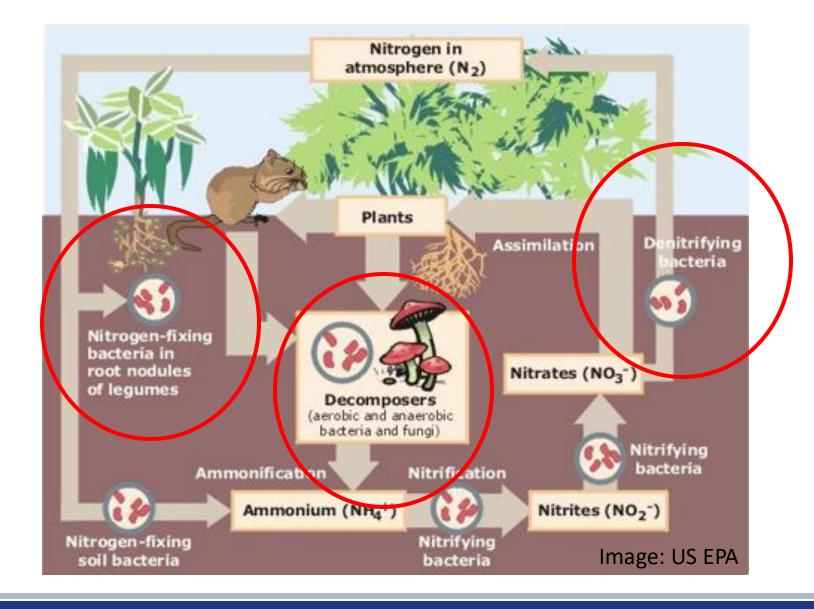
6. Manage yard waste properly

- LEAVE clippings on the lawn *OR* COMPOST them if very heavy
- COMPOST leaves OR SHRED for mulch
- NEVER rake grass clippings, leaves, or plant material into a waterbody, drainage area or stormdrain catch basin





Nitrogen Cycle







Recommendations, part 2

With fertilizer use





Recommendations for Lawns That Need Fertilizer

- 1. Know which nutrients are needed and which are not
- 2. Determine how much to apply
- 3. Know when and where to apply
- 4. Choose the right fertilizer for the situation





1. Know the soil nutrients



N = **nitrogen** for growth and greening

P = phosphorus for new roots and shoots

K = potassium for stress resistance

Goal is to have enough nutrients for healthy growth, but NONE in excess.





Soil Testing Services

http://extension.UNH.edu



Trusted Analytics & Recommendations to Help You Grow

Videos :



How to Take a Soil Sample for Soil Testing

YouTube · UNH Extension Sep 13, 2019

I had my soil tested...but what do the results mean?

TUESDAY, SEPTEMBER 12, 2017

SHARE @ 4 in 💆 0



Given the way this winter has gone so far, it's possible the ground will thaw soon if it hasn't already. That gives gardeners a prime opportunity to take their spring soil samples earlier than normal. But, sending in the sample is only the first step, next you will need to make sense of the results that come back.

Soil Testing Form - Commercial Landscape & Grounds Maintenance - Page 2

Sampling instructions

The soil sample should be representative of the area for which you want recommendations. Avoid areas that have an obvious difference in soil type, drainage, or plant growth. Take samples from at least 6-8 spots in each planting bed or lawn area you want tested and combine in a bucket.

Take samples to a depth of 6"-8" for trees and shrubs and 3 - 4" for lawns. If sampling for established trees, take samples from several spots within and just beyond the dripline. The sample can be taken with a spade, shovel, trowel, soil probe or auger.

Mix well, air dry, and remove stones and other debris. Submit ONLY 1 cup of dry soil in a clean zip-lock bag for testing. Name each sample and label each bag clearly (e.g. "front lawn", "oak tree", etc.). If requesting texture class, send 2 cups of soil.

Test descriptions

Standard Test includes conventional fertilizer and lime recommendations, based on pH, calcium, magnesium, potassium, and phosphorus levels.

Organic Test includes organic fertilizer and lime recommendations, based on pH, calcium, magnesium, potassium, phosphorus levels and organic matter.

Organic Matter includes the % organic matter content.

Texture Class includes % sand, silt & clay particles. Send 2 cups of soil for this test.

Micronutrients includes extractable copper, iron, manganese and zinc.

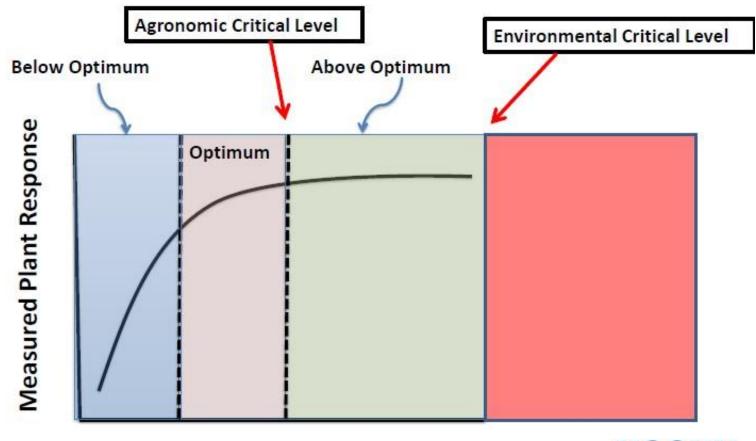
Crop Codes

- 1 Annual flower beds
- 2 Perennial gardens
- 3 Azaleas & Rhododendrons, broadleaf evergreens
- 4 Deciduous trees & shrubs
- 5 Narrowleaf evergreens (pine, spruce, fir, juniper, etc.)
- 6 Lawn/turf area
- 7 Other:

Soil Testing for New Hampshire

Since the early 1900s, UNH and UNH Cooperative Extension have been providing soil analysis and nutrient recommendations to researchers, farmers and homeowners. Our soil testing procedures are best suited to typical New England soil types and may not be appropriate for samples submitted from other regions of the United States. The recommendations that you will receive are based on the latest research conducted in New Hampshire and the northeastern states. We do accept samples from neighboring states.

Turfgrass Response to Soil Test Phosphorus



Extractable Soil P Concentration







Soil Test Results - pH

Test Data					
pH - Soil	6.20			Optimum Range	
Calcium, Mehlich 3 (Ca)	530.80	(ppm)	L	800 - 1200	
Magnesium, Mehlich 3 (Mg)	80.00	(ppm)	O	60 - 120	
Potassium, Mehlich 3 (K)	62.00	(ppm)	L	170 - 280	
Phosphorus, Mehlich 3 (P)	40.00	(ppm)	O	30 - 50	
Lead, Mehlich 3 (Pb)	3.79	(ppm)	VL		
Org. Matter, LOI-360 (OM)	5.69	(%)			
Optimum Range Key					
VL - Very Low	L - Low	O - Optimal		H - High VH - Very High	

Recommendations

Home Lawn (Target pH Range: 6.0 - 6.5)

Lawn Seeding

Lime: No Lime or Sulfur required at this time.

Fertilizer: For any single application, apply up to 0.9 lbs of total nitrogen per 1,000 sq. ft. of lawn using a fertilizer ratio of 1:1:1 or equivalent. Refer to the maintenance schedule below to determine how many applications you should make in 1 year. Do not apply more than 3.25 lbs of total nitrogen per 1,000 sq. ft. per year.

Lawn Maintenance

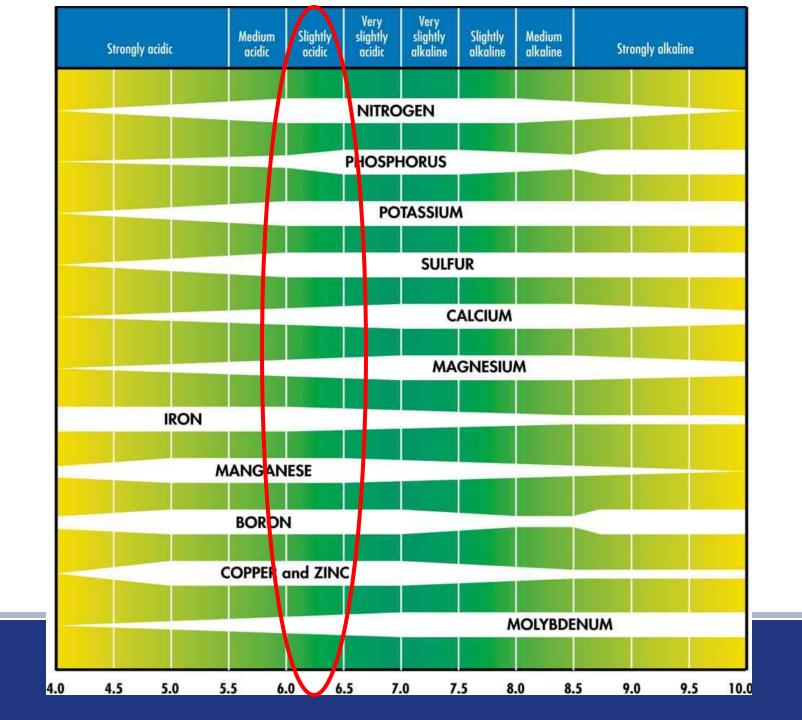
Lime: No Lime or Sulfur required at this time.

Fertilizer: For any single application, apply up to 0.9 lbs of total nitrogen per 1,000 sq. ft. using a fertilizer ratio of 3:0:3 or equivalent. Refer to the maintenance schedule below to determine how many applications to make in one year.

For spring and fall applications at least 25% of the total nitrogen in the fertilizer should be derived from slow release nitrogen. For a mid-summer fertilizer application at least 50% of the total nitrogen in the fertilizer should be derived from slow release nitrogen sources. Read the label on the back of the bag to see how much of the total nitrogen is in slow release form (which may be called water insoluble nitrogen on the label).







Extension

Soil Test Results -Nutrients

Where's the Nitrogen result?

Test Data						
pH - Soil	6.20			Optimum Range		
Calcium, Mehlich 3 (Ca)	530.80	(ppm)	L		800 - 1200	
Magnesium, Mehlich 3 (Mg)	80.00	(ppm)	О		60 - 120	
Potassium, Mehlich 3 (K)	62.00	(ppm)	L		170 - 280	
Phosphorus, Mehlich 3 (P)	40.00	(ppm)	0		30 - 50	
Lead, Mehlich 3 (Pb)	3.79	(ppm)	VL			
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<u>Optimum Range Key</u> VL - Very Low	L - Low	O - Optimal		H - High	VH - Very High	

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Water Quality Friendly Recommendation:

Apply NO MORE than 0.9 pounds N per application Apply NO MORE than 2 pounds N per year*

* For lawns greater than 10 years old where clippings are left.

$$0.9 + 0.9 + 0.9 + 0.9 = 3.6$$
lbs N / 1000 ft² annually. > 2lbs N per year

Apply one-half to one-third of amount recommended on fertilizer bag.

$$0.45 + 0.45 + 0.45 + 0.45 = 1.8$$
lbs N / 1000 ft² annually. ≤ 2 lbs N per year

$$0.3 + 0.3 + 0.3 + 0.3 = 1.2$$
 lbs N / 1000 ft² annually. ≤ 2 lbs N per year

$$0.9 + 0.9 = 1.8$$
lbs N / 1000 ft² annually. ≤ 2 lbs N per year





NH Turf Fertilizer Law: RSA 431

When applied according to the label, NO turf fertilizer sold at retail shall:

- exceed 0.7lb/1,000ft² of soluble nitrogen per application
- exceed 0.9lb/1,000ft² of total nitrogen per application
- exceed an annual application of 3.25lb/1,000ft² of total nitrogen
- exceed a content level of 0.67% available phosphate
 - unless specifically labeled for establishing new lawns, for repairing a lawn, for seeding, or for use when a soil test indicates a phosphorus deficiency.
- exceed an application rate of 1lb/1,000ft² annually of available phosphate



proper amounts at appropriate times during the growing season,

owns will thrive and the risk of fertilizer nutrients entering our

runoff, the New Hampshire legislature passed a bill in 2013

athletic fields and sod farms are exempt from the restrictions.

waterways will be reduced. Because of concerns over lawn fertilizer

regulating the use of nitrogen and phosphorus in turf fertilizers that

are sold at retail.1 The goal is to help homeowners maintain healthy

lawns without applying unnecessary fertilizer. Golf courses, parks,

phosphorus (as phosphate), and potassium (as potash) contained in that fertilizer. These three nutrients are not available in sufficient quantities in many existing soils so we add them to the soil in the form of fertilizer. Nitrogen is associated with leafy green growth. Nitrogen Summary⁸
When apptied according to the label, no turf fertilizer sold at retall shall

- exceed 0.7 pounds per 1,000 square feet of soluble nitrogen per application
 exceed 0.9 pounds per 1,000
- square feet of total nitrogen per application • exceed an annual application of 3.35 pounds per 1,000
- All fertilizers sold in New Hampohire are labeled with a guaranteed analysis consisting of three numbers such as 22-0-3. These unmbers such for the percent, on a dry weight basis, of nitrogen,



Water Quality Friendly Recommendation:

Apply NO MORE than 0.9 pounds N per application Apply NO MORE than 2 pounds N per year*

* For lawns greater than 10 years old where clippings are left.

Look for results...

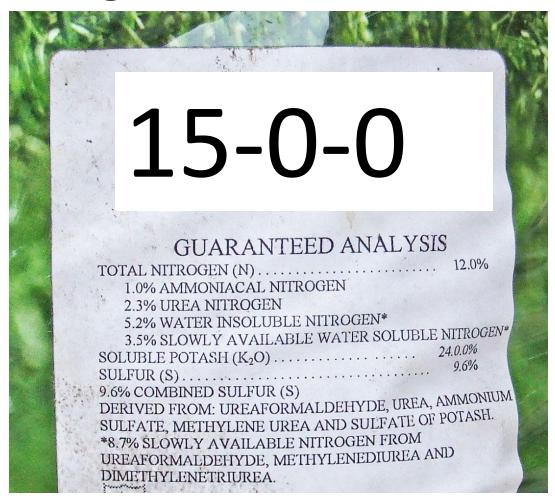
- quick release within a couple weeks
- slow release over many weeks

Reapply at reduced rate only if lawn response is unacceptable.





Reading a Fertilizer Label:



N-P-K

When would this product be appropriate?





How Much to Apply?



- A. Measure the <u>dimensions</u> to calculate AREA in square feet.
- B. Read label.
 - It states **how many pounds of product** to put down for each 1000ft² of lawn.
 - It assumes a rate of .9 pounds of N per application (in NH).
- C. Anticipate how many times you will apply this year (1-4).





Do people know the square footage of their lawns?

Does Respondent Know the Square Footage of their Lawn?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	399	52.9	55.4	55.4
	Yes	321	42.6	44.6	100.0
	Total	720	95.5	100.0	
Missing	Not Applicable	8	1.1		
	Missing	26	3.4		
	Total	34	4.5		
Total		754	100.0		





Poll: If you apply fertilizer, what do you do with leftover fertilizer?

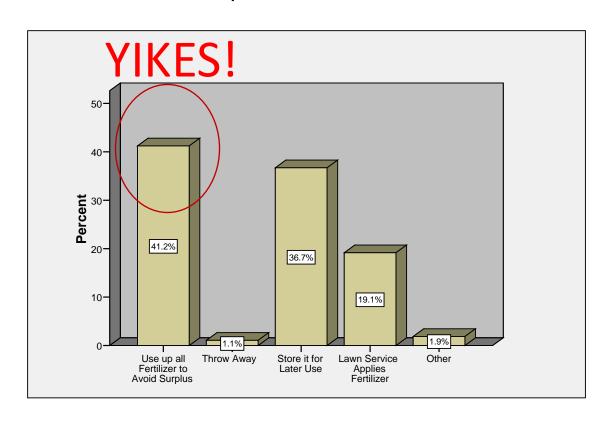
- ☐ Use up all fertilizer to avoid surplus
- ☐Throw it away
- ☐Store it for later use
- ☐A lawn service applies my fertilizer
- **□**Other





Use Only What You Need - Store or Give Away Extra

What Does Respondent do with Left-Over Fertilizer?



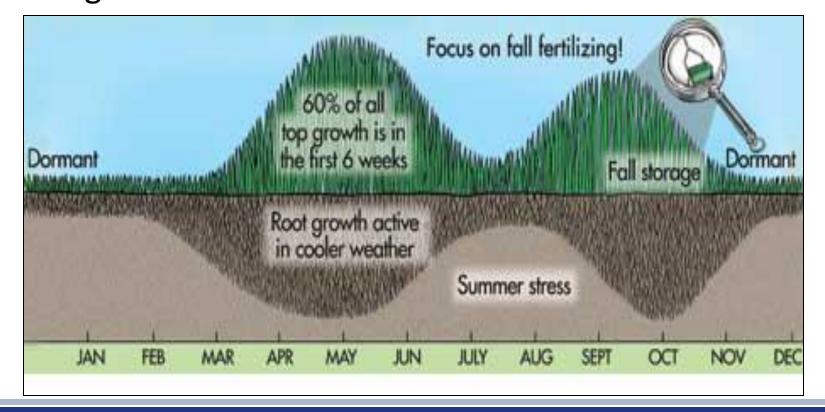






3. Know When to Apply

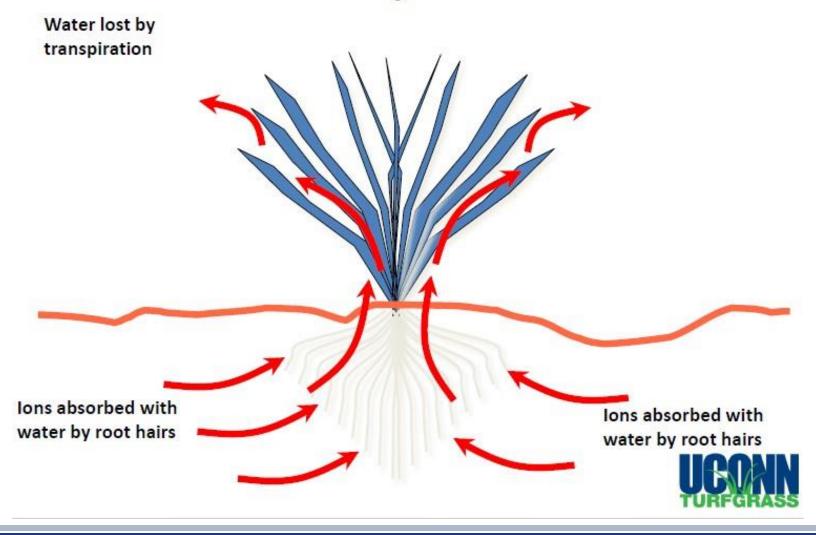
If needed, fertilize after spring green-up and no later than mid September. Avoid fertilizing in the mid-summer.







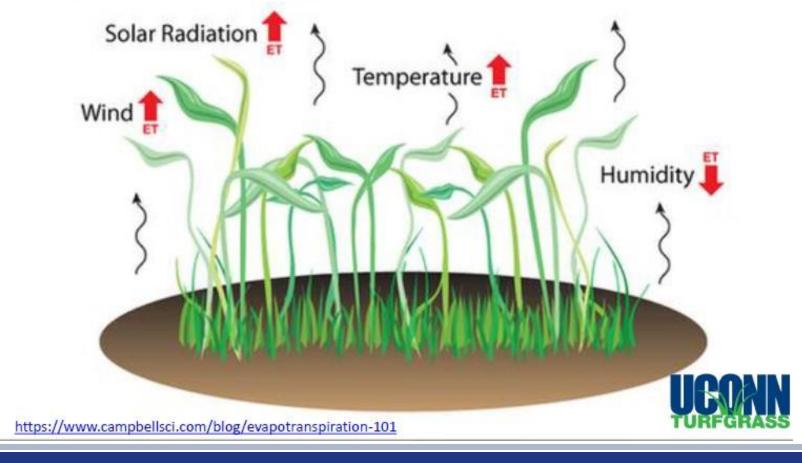
Mechanism of Nitrogen Uptake Related to Transpiration and Mass Flow







What is Likelihood of Sufficiently High Transpiration Rates in Late Fall to Drive Uptake of Large Volume of Soil Water?







4. Choosing fertilizer

- SLOW RELEASE is generally preferable for water quality considerations.
 - look for > 50% water insoluble nitrogen (win).
 - nutrient releases based on temperature, moisture levels or microbial activity depending on type.
 - comes in synthetic and organic forms.
- •NORMAL RELEASE SYNTHETIC may be preferable under very specific conditions
 - + Temperature is getting too low for slow release and supplement is needed
 - + Need to push growth quickly to prevent erosion
 - + Is typically less expensive
 - Is more prone to salt burn
 - Is more susceptible to leaching





ORGANIC – is a slow release option

- +non-petroleum based, is from natural sources in a plant or animal-based carrier
- +good source of micronutrients
- +feeds microbes
- +adds organic matter
- may lead to over-applying P in order to get adequate levels of N for turf

AVOID – combination products (often herbicide and fertilizer, aka weed and feed) unless you are certain it's needed.





Just Because Fertilizer is Organic Doesn't Mean No Threat to Water Quality

- Once nutrients mineralized to ionic forms, they can runoff or leach
- Doesn't matter if original source synthetic or organic
- Excess is Excess

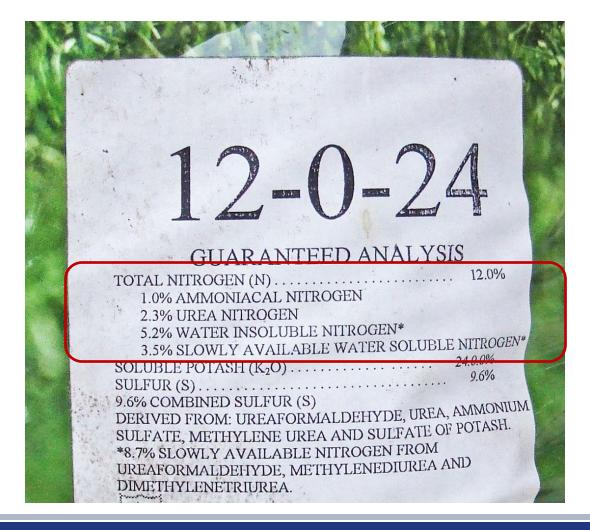






Reading a Fertilizer Label – % slow release / WIN

Look for products with 50% Slow Release / Water Insoluble Nitrogen







What is this soil test result telling you about P and K?

Test Data					
pH - Soil	6.40			Optim	num Range
Calcium, Mehlich 3 (Ca)	695.70	(ppm)	L	80	0 - 1200
Magnesium, Mehlich 3 (Mg)	63.00	(ppm)	0	6	0 - 120
Potassium, Mehlich 3 (K)	72.00	(ppm)	L	17	0 - 280
Phosphorus, Mehlich 3 (P)	97.00	(ppm)	H	3	0 - 50
Lead, Mehlich 3 (Pb)	3.72	(ppm)	VL		
Org. Matter, LOI-360 (OM)	1.78	(%)			
Optimum Range Key					
VL - Very Low	L - Low	0 - 0	ptimal	H - High	VH - Very High

Fertilizer: For any single application, apply up to 0.9 lbs of total nitrogen per 1,000 sq. ft. using a fertilizer ratio of 1:0:1 (or 4:0:3) or equivalent. Refer to the maintenance schedule below to determine how many applications to make in one year.





Choose the best fertilizer based on soil test results (P and K) AND water quality goals (hint: >50% WIN)

est Data					
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Potassium, Mehlich 3 (K)	72.00 (ppm)	L
Phosphorus, Mehlich 3 (P)	97.00 (ppm)	Н

18-24-12

- 9.4% Ammoniacal Nitrogen
- 8.6% Urea Nitrogen

8-0-5

- 0.1% Ammoniacal Nitrogen
- 1.2% Other Water Soluble Nitrogen
- 6.7% Water Insoluble Nitrogen

6-3-0

- 4.75% Water Insoluble Nitrogen
- 1.25% Water Soluble Nitrogen

24-0-11

- 13.2% Urea Nitrogen
- 10.8% Slow Release Urea Nitrogen





Additional Information:

• https://extension.unh.edu/tags/landscaping-water-quality - includes video clips, manuals, fact sheets

- https://extension.unh.edu/
 search by any lawn or gardening topic
 - Videos, blogs, fact sheets, manual, etc.



