ORGANIC LAND CARE

NOFA

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NATURALLY BEAUTIFUL

NOFA Organic Lawn Care Guide

A Publication of the Northeast Organic Farming Association's Organic Land Care Program

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January, 2013

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ctnofa Local and Organic Since 1982

Program sponsored by Long Island Sound Study

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Foreword

Jenna Messier

In the Fall of 2012, the NOFA Organic Land Care Program was notified by the Long Island Sound Futures Fund (LISFF) that they would be funding the proposal, "Establishing a NOFA Organic Lawn Care Certificate Program." We are very grateful for this opportunity to participate regionally to reduce non-point source pollution in the Long Island Sound by educating lawn care service providers about healthier methods of growing lawns and turf.

This new course and book allows the NOFA OLC Program to continue educating professionals and consumers about the benefits and methods of organic land care, which is the mission of our program - ***to extend the practices and principles of organic agriculture to the places where we live our daily lives.*** This project further endeavors to create public awareness that "Organic lawns and gardens keep our water clean!"

I would like to thank Judy Preston from the Long Island Sound Study/CT Sea Grant for originating this project proposal. I am grateful to Diba Khan-Bureau from Three Rivers Community College for initiating our partnership which led to this project. Chip Osborne and Frank Crandall have taught sections of our Accreditation Course for years and also serve on the OLC Advisory Committee. Their enduring support and guidance has been critical for the development and direction of the program.

Lastly, I would like to thank Melissa Gabso for her vibrant graphic design work. The graphics that appear in this book, and on our public awareness campaign's bumper stickers and lawn signs all beautifully demonstrate the connection between grass and water which we seek to protect.

Jenna Messier
NOFA Organic Land Care Program Director
CT NOFA, Oxford, CT
January 11, 2013

Surf and Turf

Making Environmental Connections Between Landscaping and Long Island Sound

Judy Preston

The landscaping trade is part of a growing trend and a growing industry that focuses on ***sustainability***. According to the National Gardening Association, the number of nationwide households that use only all-natural fertilizer and insect and weed controls increased from an estimated 5 million in 2004 to 12 million in 2008, and is projected to keep growing – even in this economy. *Lawn and Landscape Magazine* cites sustainable business practices as the number one trend for 2013, claiming that sustainability is "driving the future of the green industry, because it's what customers want, and it's the right thing to do."

Connecticut and New York played an important role in the early establishment of the lawn care phenomenon in the United States.

Lawns are a part of the American cultural psyche, and New England was central to the beginnings of this trend. The first three patents for mowers established in 1868 came from New York and Connecticut inventors; by 1885, America was building 50,000 lawnmowers a year and shipping them to every country on the globe!

In addition to the model lawns established early on in the United States through the homes of our early presidents (Washington's Mount Vernon and Jefferson's Monticello), 19th century Landscape Architects, including Frederick Law Olmsted, emphasized a suburban landscape that included houses set back from the street, with lawns and trees intended to exemplify the pastoral ideal of America as a garden.

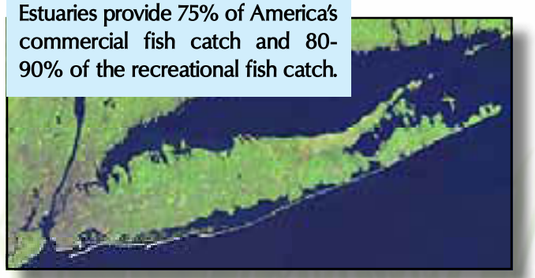
Our love affair with this landscape is not insignificant: each year over 382,850 acres of land are converted into lawns in North America. In fact, turf grasses now cover an area about the size of the New England states in the U.S., and 75% of that is in residential lawns.

Consumer interest in sustainability stems from growing concern about the environment, and public health issues for kids and pets associated with the use of chemicals on lawns. Unsustainable landscaping practices include those that result in excess nutrients and pesticides from fertilizers either washing off lawns and garden landscapes and getting into our streams and rivers and, ultimately, Long Island Sound, or leaching through the soil and making it to the Sound via groundwater.

Long Island Sound is downstream from every maintained lawn, and four centuries of development and population has swollen the Sound's burden of nitrogen to 91,000 tons a year, a 128% increase over the estimated 40,000 tons that flowed to the Sound before European settlement.

This NASA generated map shows satellite-derived estimates of the fractional turf grass (lawn) area across the northeast USA in shades of green. The scientists who produced the map estimate that more surface area is devoted to lawns than to any other single irrigated crop in the country.

Estuaries provide 75% of America's commercial fish catch and 80-90% of the recreational fish catch.



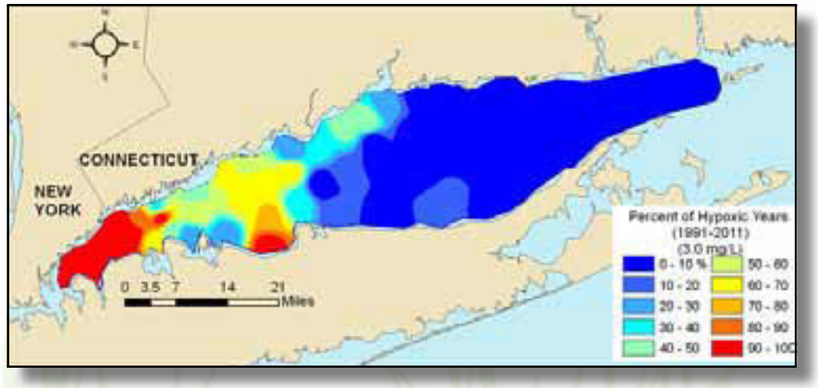
Long Island Sound is an estuary – where fresh waters mix with ocean waters – that is nationally recognized for it's important biological resources.

Nitrogen is easily dissolved in water and once transported to the waters of Long Island Sound the excess can lead to low dissolved oxygen, fish kills, an over abundance of problematic species, such as algae blooms, and the loss of sea grasses that support important animal species, such as scallops. Unfortunately, this condition, known as hypoxia, is not unique to Long Island Sound: over 300 U.S. coastal water bodies now experience stressful or lethal oxygen levels that threaten commercial and

recreational fisheries. In fact, hypoxic events have increased nearly 30-fold since 1960.

Reducing nitrogen inputs from all sources - including lawn and landscaping fertilizer - will ultimately benefit Long Island Sound and the many species - including our own - that benefit from a healthy estuary.

Significant efforts are being made to address the environmental and economic impacts of too much nitrogen getting into Long Island Sound. The Long Island Sound Study (LISS) is a multiple agency, multi-state partnership that seeks collaborative solutions to pressing environmental issues facing the Sound. The Environmental Protection Agency (EPA) coordinates this effort through its LIS office in Stamford, Connecticut. LISS funding made this publication, and the Organic Lawn Care Certificate Program possible, by working with CT NOFA.



Hypoxia is a condition where there isn't enough oxygen in the water. This forces fish to either swim away or die and can suffocate plants living in the water. Hypoxia occurs when there are too many nutrients – particularly nitrogen – in the water.

Sustainable landscaping represents an exciting growth opportunity within the green industry that provides both economic ***and*** environmental incentives. The Organic Lawn Care Certificate is a marketable credential that can help you sell your services and protect Long Island Sound - and that's a marketable message!

TOC

Fertilizers & Pesticides in Fresh Water

Diba Khan-Bureau

What's the Problem with Fertilizers and Pesticides?

Fertilizers help plants grow by adding nutrients to the soil. **Pesticides** (including herbicides) are any toxic substances used to kill insects, animals, or plants. If fertilizers or pesticides are improperly applied, they can wash off your lawn or garden into storm drains that directly reach lakes, rivers, and the ocean. These chemicals can contaminate drinking water, killing fish, wildlife, and plants. Nitrogen and phosphorus in fertilizers also cause algae to grow so quickly that it forms a "bloom", affecting swimming, fishing, and boating. plants.ifas.ufl.edu/guide/2algae.html

What's the Big Deal Ultimately?

Fertilizer is still making its way through soil and water to the sea. Algae and micro-organisms take up the nitrogen, bloom, and suck the oxygen out of coastal waters. Such **dead zones** have appeared seasonally near most major river mouths, including those emptying into Maryland's Chesapeake Bay and in the Gulf of Mexico, where lifeless waters now cover more than 7,700 square miles during the summer months. However, one of the worst dead zone cases as reported by WNPR in 2008 is in L. I. Sound!

Important Terms to Know

Watershed: An area of land that drains or sheds water into a specific receiving water body, such as a lake or a river. It merges with other watersheds to form a set of connecting rivers and streams that continually drain into larger water areas. Everyone lives in a watershed and every watershed has a drainage basin.

Aquifer: An underground lake, often found between saturated soil and rock, that yields water called groundwater to supply wells and springs. Many cities pump water out of an aquifer for human use.

Freshwater: Naturally occurring water on the Earth's surface that has low concentrations of dissolved salts (less than 500 parts per million).

Groundwater: Precipitation that soaks into the ground. Gravity moves water down into the ground between particles of soil, sand, gravel, or rock until it reaches a depth where the ground is filled with water. This area is called the **saturated zone**. The top of this zone is called the **water table**. The water table may be close to the surface or hundreds of feet below.

Stormwater runoff: Non-point pollution from impervious surfaces. Before entering storm drains, precipitation mixes with pollutants like oil, pesticides, fertilizer, pet waste, and other household chemicals. These substances contaminate our freshwater resources and eventually contribute to marine pollution.

Overuse of Fertilizers, Pesticides and Herbicides Has Consequences:

- Possible contamination of drinking water supply
- Negative health effects for humans, especially the young, the old, and pregnant women
- Negative effects on other living organisms
- Closures of beaches, lakes, and rivers that are unsafe for swimming and fishing

Well Water Contamination

The National Ground Water Association recommends testing the quality of your well water annually.

In Connecticut, approximately 15% of residents receive their drinking water from private wells. In rural areas, that percentage increases to greater than 90%.

University of Connecticut Cooperative Extension System

About 2.3 million people in New England get their water from private wells.

U.S. Environmental Protection Agency

Well water testing in Stamford revealed pesticide contamination in 20% of 835 wells tested since 2008 (Stamford Health Department). Roughly 8% of wells tested contained pesticides in concentrations exceeding the safe "action level" threshold set by state health and environmental officials.

Stamford Advocate

Stamford's testing results revealed the presence of chlordane and dieldrin. Pesticides, historically used on agricultural crops and for termite control, were banned in the late 1970s and 1980s due to "the adverse environmental and human health effects of these substances, including their probable carcinogenicity," according to the federal Environmental Protection Agency's website.

Stamford Advocate

How Can You Help Protect and Conserve Our Water?

- Avoid using excess fertilizers and pesticides
- Transition to using organic amendments
- **Install rain gardens to** reduce and filter stormwater runoff and increase groundwater recharge
- Use rain barrels to collect roof runoff

The Good News

Thanks to federal, state, and local governments as well as landowners, The Long Island Sound Program has made substantial progress in reducing point source nitrogen discharges to Long Island Sound and exceeded the 2010 percentage reduction target toward its 2014 goal. This is great news, but more work needs to be done and we all have to continually do our part to reduce nitrogen levels in the Sound.

Soil and the Soil Ecosystem

Diba Khan-Bureau

Why a Study of Soil is Important

Soil maintenance is the cornerstone of sustainable civilizations. Simply stated, it is the "foundation" of terrestrial life. 90% of the world's food comes from land-based agriculture.

Soil mismanagement in the 1930s caused **The Dust Bowl**: the worst man-made ecological disaster in American history, when the frenzied wheat boom of the "Great Plow-Up" was followed by a decade-long drought that nearly swept away the breadbasket of the nation.

Soil and the Soil Ecosystem

Managing soil health easily and effectively improves the environment and the landscape. Results are often realized immediately, and last well into the future. Using these four basic principles is the key to improving the health of your soil.

1. Keep the soil covered as much as possible with mulch or plant life.
2. Disturb the soil as little as possible to prevent erosion that causes sedimentation.
3. Encourage the presence of organic matter from plant residues. Organic matter is the fuel for the biota (the animal life present in the soil). More fuel means more biological activity.
4. Check soil pH: Microbial activity slows down as soils become more acidic. Earthworms also prefer less acidic environments. The optimal pH is above 5.5.

Where to Get a Soil Test in Connecticut

Per *NOFA Standards for Organic Land Care*: Always get a soil test before supplementing with amendments. Call your local agricultural extension office to locate soil testing labs in your state.

UConn Soil Analysis Lab
6 Sherman Place, U-102
Storrs, CT 06269
soiltest.uconn.edu

UConn Extension Office
562 New London Turnpike
Norwich, CT 06360
extension.uconn.edu

Harrington's Organic Land Care
70 Highland Park Drive
Bloomfield, CT 06002
harringtonsorganic.com

What is Soil?

Soil forms over many thousands of years from weathered rock fragments and the decaying remains of living organisms. The soil ecosystem is composed of soil textures, detritus, humus, and soil organisms.

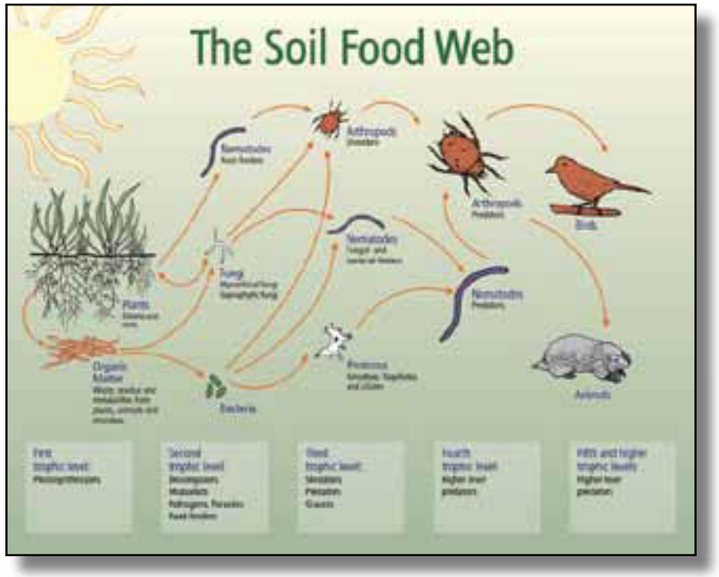
Soil Texture

Soil texture refers to the percentage of each type of particle found in the soil. For example, loam soil is approximately 40% sand, 40% silt, and 20% clay. Sand contains large particles, silt contains small particles, and clay contains the smallest particles of all.

Soil stores 0.01% of the total water on Earth within its pores. A typical healthy soil sample contains 45% minerals, 25% water, 25% air, and 5% organic matter. **Humus**, partly decomposed organic matter, has a high capacity for holding water and nutrients, and is typically found in the O horizon (see page 17).

Soil Food Web

One teaspoon of healthy soil contains billions of organisms - bacteria, fungi, protozoa and nematodes - which are the foundation of a predatory hierarchy called the **soil food web**. This delicate balance of organisms has evolved to cycle fertility to plants. Each organism has an indispensable role to play.



Credit: Soil and Water Conservation Society (SWCS). 2000. Soil Biology Primer. Rev. ed. Ankeny, Iowa: Soil and Water Conservation Society

- **Bacteria:** Soil bacteria are the primary decomposers on our planet, breaking down organic matter and converting minerals into nutrient proteins that they lock up in their bodies.
- **Fungi:** Soil fungi break down hard woods and other complex carbons that bacteria can't handle, converting minerals from the parent material into nutrient proteins.
- **Protozoa:** Soil protozoa begin the process of unlocking nutrients that feed plants. Their main food source is the bacteria that decomposes and converts nutrients.
- **Nematodes:** Some nematodes feast on plant roots and damage crops, but most nematodes use the nutrients they need and expel the excess in a plant useable form.

The creatures living in the soil are critical to soil quality. They affect soil structure and therefore soil erosion and water availability, and can protect crops from pests and diseases. They are central to decomposition and nutrient cycling and thus affect plant growth and amounts of pollutants in the environment. Soil is home to a large proportion of the world's genetic diversity

Earthworms Also Improve the Soil by Providing:

- **Nutrient availability:** By feeding on plant debris, they make this material more available to plants.
- **Drainage:** Worm burrowing loosens and aerates the soil, dramatically improving water infiltration.

As Soil Develops, it Forms Distinct Layers, Known as **Horizons**

- **O horizon:** One-inch thick layer made up of decayed, organic material that feeds the soil and keeps it healthy. Horizon O is the most fertile, productive layer that's also known as humus.
- **A horizon:** Mixture of minerals and humus. It's also part of the topsoil, composed of roots and beneficial microorganisms that feed on the waste materials shed by roots.
- **E horizon:** A layer of leached minerals caused by the eluviation process.
- **B horizon:** Hard subsoil layer of leached minerals from horizons A and E that roots can't penetrate.
- **C horizon:** The parent mineral material (eg. bedrock, volcanic ash, glacial deposits)

When the Soil System Works Well:

- Topsoil build-up - humus
- Water and nutrient-holding capacity
- Aeration
- Soil workability

When the Soil System Works Poorly:

- Mineralization
- Loss of humus
- Erosion
- Reduced agricultural production

Soil Erosion

When soil is not protected, it erodes, or washes away. Severe soil erosion forms gullies, a natural geological process greatly accelerated by poor agricultural practices. Loss of productive topsoil to soil erosion is one of the most pressing problems confronting modern agriculture.

Erosion Rates

- It takes 200 - 1000 years to make 2.5 cm of soil
- Erosion rates on cultivated land: 7.6 tons/acre/year in U.S and Europe or 13.4 to 17.8 tons/acre/year in Asia, Africa, South America
- Annual erosion rates for farmland worldwide are 18 -100 times faster than the renewal rate

How do We Get Life Back Into the Soil?

Tilling destroys the delicate, single celled fungal hyphae that runs through the soil profile. Chemical fertilizers, which are primarily salts, act upon the bacteria and protozoa the same way pouring salt on a snail or slug does. Additionally, over time, applying fungicide to the soil renders it deficient and depleted. The primary tools to reverse this damage are good, aerobically produced compost, mulch and compost teas.

Characteristics of Productive Soil

- Good supply of nutrients and nutrient-holding capacity
- Infiltration, good water-holding capacity, resists evaporative water loss
- Porous structure for aeration
- Near-neutral pH
- Low salt content

Compost makes healthy soil, by adding micro-organisms. Compost feeds your soil, which feeds your plants. Using compost will dramatically increase the amount of soil life that is both visible to the naked eye and, more importantly, that can only be seen through a microscope. Increased microbial activity provides food for hundreds of thousands of different species of fungi, bacteria and other organisms that are food for a whole range of other organisms, which in turn have predators that feed off them.

Start your compost pile today to start building your soil!

TOC

Introduction to Organic Land Care

Chip Osborne

Organic land care helps protect the health of our families, the landscape, and the environment. The guiding principle of organic land care is ecological stewardship. Its watchword, as in the ancient medical tradition, is "First, do no harm".

The word organic, as we use it here, comes from organic agriculture. Organic agriculture's ideas and methods were developed over the last sixty years through a rich global exchange among farmers, researchers, and activists. The mission of the NOFA Organic Land Care Program is to extend the vision and principles of organic agriculture to the landscapes where people spend their daily lives.

Primary Goals of the NOFA Organic Land Care Program:

1. Maintain soil health
2. Eliminate the use of synthetic pesticides and fertilizers
3. Increase landscape diversity
4. Improve the health and well-being of the people and web of life in our care

Important Points That Apply to Organic Lawns and Turf:

- No synthetic pesticides, including insecticides, fungicides, and herbicides
- No synthetic fertilizers
- No genetically engineered organisms
- Build healthy soil that can support diverse soil life and healthy grass
- Reduce the potential for nitrogen and phosphorus pollution by limiting the amount and timing of organic fertilizer application
- Use cultural practices to encourage the growth of healthy grass and reduce the need for inputs
- Increase plant cultivar and species diversity depending on lawn use and the client's standards

It's important to manage and maintain lawns with natural, organic fertility products due to the potential damaging effects of synthetic, water-soluble fertilizers. That is not to say that organic fertilizers, improperly used, cannot be a cause for concern. Just because a product is natural or organic does not mean that we can throw caution to the wind.

Organic land care involves the management of the entire ecological system by employing a systems-based approach. Synthetic fertilizers and chemical pesticides are not essential for growing healthy lawns and turf, but when we take synthetics out of the equation, something has to take their place. Healthy soil and good cultural practices, along with natural, organic inputs help us build and create a healthy turf system.

For many people there is a growing awareness about the chemical products used to maintain one's turf. Many people realize the potential impact of these products on the environment and they are aware that some chemicals, even at low dose exposures, may be harmful to public and children's health, and are beginning to seek out practitioners to provide alternative land management practices.

The following is an explanation of the principles and protocols of natural turf management. Our decisions are made based on detailed soil test data, site assessments, and then determining a course of action to best manage a turfgrass system.

It is important first to document the existing physical condition of the turf areas and to establish a baseline soil analysis for soil chemistry. Organic programs are much more site-specific compared to the generalized approach to fertility and weed control present in conventional management. Organic lawn care addresses the needs of individual properties' systems in an appropriate way.

Although products for fertility management and building the soil biomass are important, and the approach addresses the needs of individual properties, service providers may not have many different programs on multiple properties. Rather, organic land care professionals address any deficiencies and allow for the inclusion of strategies that help transition a property to organic as quickly and efficiently as possible.

Key Organic Lawn Care Concepts:

- Understand the client's needs
- Determine the client's expectations for their lawn
- Discuss organic lawn care confidently
- Determine the physical, chemical, and biological characteristics of the site
- Test the soil initially to determine appropriate input levels
- Select grass seed suited to the site and manage existing grasses to their genetic requirements
- Amend the soil to benefit turfgrass
- Employ proper horticultural practices: aeration, irrigation, and mowing
- Minimize inputs by thinking in terms of less is more

Organic lawn care includes different programs with different levels of intensity to meet the needs of individual sites. Each client will have his or her own expectations. Cultural intensity is the amount of labor and material inputs required to meet those expectations. In either a conventional or natural turf management program, minimal product and labor inputs meet low expectations, while higher levels of inputs meet higher expectations. Programs address soil and turfgrass that will meet expectations for the site. An initial site analysis determines the client's expectations before an appropriate program is offered.

The most successful organic lawn care providers have created two or three programs, all based on an initial soil test. Multiple programs provide the opportunity to present a cost-effective offering to a client.

When a natural management program is put in place, a window of time called the transition period exists. During this time frame, new products are put in place and specific cultural practices are adopted. The most important element of the transition is attention to soil - not just texture and chemistry, but the biomass as well. Focusing on the living portion of the soil from the beginning of a natural program ensures success. The length of time required for this process directly relates to the intensity of the conventional management practices currently employed. For an average lawn the transition will be between two and three years.

A natural turf management program aims to create turf that meets aesthetic site objectives while eliminating toxic chemical inputs. This approach builds a soil environment rich in microbiology, producing strong, healthy, stress resistant turf. The natural turf system can better withstand pressures from heavy usage, pests, and drought and heat stress, as long as good cultural practices are followed. Products should enhance and continually address soil biology. While problems can arise in any turf system, they are easier to eliminate from a healthy soil that has the proper microbiology in place.

A systems approach grows healthy turf by paying special attention to soil health and microbiology.

Conventional turf management programs use highly water soluble synthetic fertilizers and pesticides to treat symptoms on an annual basis. Pesticides also by definition kill, repel, or mitigate pests. They do not grow grass. A systems-based approach involving healthy soil, natural organic inputs, and good cultural practices, will grow grass. An organic approach proactively solves problems by creating a healthy soil and turfgrass system. Healthy, vigorously growing grass outcompetes most weed pressures, and a healthy soil biomass will help prevent insect and disease issues.

The Systems Approach is Based on Three Concepts:

- Use of natural organic product governed by soil testing or site considerations
- Acknowledgment that the soil biomass plays a critical role in the fertility and health of the system
- Specific, sound horticultural practices

This "feed the soil" approach centers on natural organic fertilization, soil amendments, microbial inoculants, compost teas, microbial food sources, grass seed, and topdressing as needed with high quality finished compost. The program supports the natural processes that nature has already put in motion. These inputs, along with very specific cultural practices, including mowing, aeration, irrigation, and over seeding, are the basis of a sound natural management program.

An organic lawn care program cannot be a simple product for product swap, which will produce less than desired results. In order to successfully manage a turfgrass system without chemical inputs, the whole system must be addressed. Eliminating pesticides requires synthetic fertilizers to be eliminated as well. It now becomes a thoughtful approach to managing the lawn by addressing the individual aspects of the Systems Approach in the programs that we offer.

Profits with Organic Lawn Care

Frank Crandall

Offering organic lawn care services (and other organic landscape services) can be eco-friendly and can provide your business with a valuable profit center. To meet the increased demand for organic services, consider offering a comprehensive, completely organic lawn care program that will satisfy customers' needs and establish your company as the organic alternative in your market area. Learning the science behind organic methods and techniques is a necessary first step to converting to organic lawn care. Next, you will need to understand the fundamentals of estimating and marketing so you can attract customers and price services for profitability.

This Chapter Covers:

1. Fundamentals of creating profitable estimates
2. Comparing organic, transition (hybrid) and traditional lawn care program pricing over 3 years
3. Proven sales and marketing techniques for selling organic landscape services

Fundamentals of Creating Profitable Estimates

To create an accurate estimate you need to know your labor costs (in dollars per hour), materials costs (costs plus the markup %), equipment & vehicle costs (cost per day including replacement cost) and overhead (% overhead that needs to be added to each estimate to recover those costs). Your markups and overhead expenses will be specific for your particular business.

- **Labor costs:** Labor costs include regular hours, overtime hours, FICA (Federal Insurance Contributions Act), SUI (State Unemployment Insurance), IRA (Individual Retirement Account) or 401-K retirement account, health insurance, workers compensation and uniforms.
- **Material costs:** To price materials and services, take the wholesale cost of a material and add to it by a chosen markup % to get a retail selling price. To find the profit % subtract the wholesale

cost from the selling price and divide by the selling price to arrive at the profit margin %.

- **Equipment & Vehicle Costs:** Each vehicle and piece of equipment has a cost associated with it, including purchase price, maintenance, insurance, licenses, repairs, taxes, fuel, and replacement.
- **Overhead costs:** Overhead costs are business expenses not directly charged to a project, service, or product, all of which need to be recovered during a business fiscal year. Examples are advertising, contributions, depreciation, office payroll (including benefits and insurance), office supplies, printing, professional fees, rent, repairs to office, taxes, telephone, travel, utilities and interest expense. **Determining your overhead percentage to be incorporated into your estimates is essential to ensure you will make a profit at the end of the year.**

3 Year Price Comparison of Organic, Transitional and Traditional Lawn Care

Initial costs will be a significant investment when improving soil health in order to correct years of traditional chemical treatments. However, by the third year of an organic program, the costs can be similar to those of a traditional program while achieving results without chemical fertilizers or harmful pesticides.

Year One

Organic	Transitional	Traditional
Comprehensive soil testing	Comprehensive soil testing	Basic soil test
pH correction	pH correction	pH correction
(spring) Lawn Booster* (8-1-1)	(spring) Lawn Booster (8-1-1)	(spring) fertilizer (25-0-6) w/Team
(late spring) Kelp Booster	(late spring) Perfect Blend (8-4-5)	(late sp.) fertilizer (25-0-8) w/Trimec
(summer) Microbial Soil Conditioner	(summer) Microbial Soil Conditioner	(summer) fertilizer with Merit
(September) Lawn Booster (8-1-1)	Perfect Blend (10-3-7)	(September) fertilizer (28-3-8)
weed spot control with Burnout	broad leaf herbicide (Trimec)	weed control (Trimec)
grub control (beneficial nematodes)	grub control (Dylox or Merit)	grub control (Dylox or Merit)
disease control - cultural practices	fungicide (Granular Eagle; Disarm)	fungicide (Granular Eagle or Disarm)
compost top dressing	compost top dressing	(late fall) fertilizer (20-2-20)
compost tea (4 applications)	compost tea (2 applications)	
aeration and slice seeding	aeration and slice seeding	aeration and slice seeding
TOTAL: $6,921	**TOTAL: $6,520**	**TOTAL: $5,446**

Year Two

Organic	Transitional	Traditional
pH correction	pH correction	Basic soil test
(spring) Lawn Booster (8-1-1)	(spring) Lawn Booster (8-1-1)	pH correction
Kelp Booster	Perfect Blend (8-4-5)	(spring) fertilizer (25-0-6) w/Team
Microbial Soil Conditioner	Microbial Soil Conditioner	(late sp.) fertilizer (25-0-8) w/Trimec
Lawn Booster (8-1-1)	Perfect Blend (10-3-7)	(summer) fertilizer with Merit
weed spot control with Burnout	spot weed control with Trimec	(September) fertilizer (28-3-8)
grub control (beneficial nematodes)	grub control (Dylox or Merit)	(late fall) fertilizer (20-2-20)
compost tea (4 applications)	compost tea (4 applications)	
aeration and slice seeding	aeration and slice seeding	aeration and slice seeding
TOTAL: $4,067	**TOTAL: $4,007**	**TOTAL: $2,846**

Year Three

Organic	Transition	Traditional
Comprehensive soil testing	In year three, transition program converts to a total organic program.	Basic soil test
pH correction		pH correction
(spring) Lawn Booster (8-1-1)		(spring) fertilizer (25-0-6) w/Team
(September) Lawn Booster (8-1-1)		(late sp.) fertilizer (25-0-8) w/Trimec
spot weed control with Burnout		(summer) fertilizer with Merit
compost tea (4 applications)		(September) fertilizer (28-3-8)
aerating and slice seeding		(late fall) fertilizer (20-0-20) + aeration
TOTAL: $2,275	**TOTAL: $2,275**	**TOTAL: $2,220**

The results of a three year sample comparison between organic, transitional and traditional lawn care programs demonstrates that in the third year of all organic management, the soil's health has returned and the traditional and organic programs can approach similar costs. Regardless of the type of program, soil test results are critical to making the correct materials and application choices.

*Examples citing brand names do not constitute an endorsement, they were chosen for educational purposes only.

Sales and Marketing Techniques for Selling Organic Services

Marketing is how you will promote your business, attract customers, and advertise your services and products while firmly establishing your company as a reputable source of lawn care and landscaping expertise. Writing a marketing plan that outlines your financial goals and how you will attain them, and identifies your potential clients will put you in great position to succeed. In your plan, keep in mind your firm's vision, mission, strengths, and weaknesses. To build a strong brand, it will be necessary to consistently incorporate a company logo on everything from your letterhead to lettering on your vehicles, clothing, and signage, and in advertising.

Credit: Chip Osborne

Three Major Marketing Areas: Advertising, Public Relations, and Social Media

1. **Advertising:** This is the area most business owners think of when discussing marketing and it plays an important role in growing your business. An advertising plan must account for customer demographics and determine if a particular form of advertising will reach targeted customers. Do your homework to establish criteria for your target audience and find a reasonably priced ad program that reaches your customers. Some advertising avenues to consider are:

    - Newspapers
    - Cable ads
    - Radio ads
    - Discount coupons
    - Direct mail
    - Newsletters
    - T.V. ads
    - Emailing

2. **Public Relations:** This is an effective, low cost, and possibly more refined method of marketing that can work well with both new and established companies. This category includes free press, becoming a horticultural expert, and civic marketing. Public relations techniques can be low cost for the dollars spent, but time, planning, and follow-up are required to succeed.

    - **P.R.:** Develop relationships with local news reporters and editors by contacting them and providing them with information (printed materials, photos and press releases). Make sure the material you provide is well written, simple and edited!
    - **Becoming an expert:** Establish yourself as an expert in your specialty and contact local garden clubs, environmental groups and other organizations to speak or submit articles to magazines and newspapers for publication.
    - **Civic marketing:** Help others who need assistance in your community by supporting worthy causes so others can have opportunities like those you have had.

3. **Social Media:** Over the last few years, low cost social media techniques like websites, Facebook, LinkedIn, and Twitter have proliferated in use. Social media creates interactive mobile and web platforms where individuals and groups can share, discuss, and modify user-generated content, and has transformed communication between organizations, groups, businesses, and individuals.

    - **Websites:** Most companies today have a website that can help promote their services, share photos of their work and provide contact information. Depending on the nature of your business, websites can be optimized on search engines to drive sales. Working with an expert in this field can increase your sales but can be costly.
    - **Facebook:** Personal Facebook pages have grown significantly over the past 5 years, allowing people to stay in better contact wirh each other. A business Facebook page can funnel contacts to your business, highlight offers, solicit referrals, and gain endorsements from satisfied customers. A built in inventory of contacts provides a ready market for your services and products!
    - **LinkedIn:** Join LinkedIn to increase professional contacts and let people know about your services, expertise and business accomplishments.
    - **Twitter:** Twitter allows you to let people know about special events and happenings in your business, but since twitter messages are limited to 140 characters, you must be direct, clear and concise!

Selling Techniques for Organic Services

Effective salespeople, especially with a new product or service like organics, know the principles of their business, the advantages and challenges of organics, sales techniques, and how to approach their clients. Here are a few suggestions to consider:

- Try selling an organic lawn care program as a comprehensive, soil test driven and soil health program, *not* a 4-step fertilizer plan.
- Discuss and make sure customers clearly understand the expectations of your lawn care program *before* they sign an agreement.
- Customers that request an eco-friendly program will be an easier sell than traditional clients (but it's important to educate *all* customers about the benefits of going organic!)
- Once you have a client following, seek out referrals and written testimonials for use on your website, Facebook page, and as part of your marketing packet for new and potential customers.
- Include in your marketing packet educational handouts explaining organics, your qualifications and background, company information, pictures of completed projects, a referral list, and other information the customer may like to have that demonstrates your professionalism and expertise.
- When preparing to go over an estimate with a client, have answers for potential customer objections to your proposal like price, scope and timing, and be ready with alternatives including adjusting the scope, discounts (only if you know how they will affect your profit margin) and scheduling options. Preparation and a comprehensive and professional marketing packet will separate you from the competition, giving you a better chance to finalize a sale!

Understanding fundamental estimating principles, having a strong knowledge of organic lawn care, creating a marketing plan, and using proven sales techniques with a professional marketing packet will put you in a great position to succeed. Selling, marketing, and estimating are ongoing processes that with practice will help you build a reputable, organized, professional, and profitable company!

Fertility and Turfgrass Nutrition

An Organic Perspective

Chip Osborne

When addressing fertility issues, it is important to look at the needs of the grass itself. Of the three major nutrients used by turfgrass, nitrogen is used in the largest amount, followed by potassium, phosphorus, and other nutrients. Nutrient budgets are based on nitrogen to be delivered to the turfgrass system. Nutrient analysis soil tests point out any deficiencies in the other macro or micronutrients. This information is used to balance soil chemistry with the appropriate amendments during the initial years of transition.

When turf is used, as opposed to just "viewed", the grass is generally under some stress. Grass plants under heavy use often cannot reproduce at a rapid enough rate to maintain maximum turf density. The genetic capabilities of the individual species, combined with nutrient availability, govern the recuperative capacity of the grass plant. For example, Kentucky bluegrass wears poorly under athletic play, but repairs itself from injury more effectively, efficiently, and faster than other cool season turfgrasses. More available nutrients, specifically nitrogen, are required to sustain this type of turf system as opposed to what's needed for a Fescue lawn. Available nitrogen directly stimulates growth, but should be delivered in an appropriate form and in a manner that will support the capabilities of the grass.

Nutrient budgets are based on nitrogen for individual turf systems, and have a direct relationship to the expectations for that grass. If expectations are on the lower side, a lower nitrogen input will satisfy the system. High use, high profile playing fields, or a client with high expectations, require a higher nutrient budget so that the system can reproduce and maintain itself.

Unlike a conventional program, a natural approach doesn't source nitrogen from granular fertilizer alone. Nitrogen from that source, while important, is only a part of a balanced approach including nitrogen from:

- compost topdressing
- liquid fertilizers
- compost tea
- humic substances
- clippings returned to the system

Credit: Mike Nadeau

Some of these products contain actual nitrogen, while others stimulate the soil system to improve nitrogen availability in the biomass. Using products to initially improve soil health builds a system that makes nitrogen naturally available to the grass plant in the future. This approach produces a healthy turf at a lower cost three or four years down the road.

Comparing Conventional and Organic Nitrogen Sources

In a conventional program, when water-soluble nitrogen is delivered at the customary rate of one pound of nitrogen to 1000 ft.^{2}, much of that material makes no beneficial impact on the grass. This type of fertility product is readily available upon contact with moisture, and the nitrogen becomes available within 48 hours of application. Maximum nitrogen release occurs in the 7 to 10 day range. After 4 to 5 weeks, the nitrogen is no longer available because it has been either used by the grass plant, or has moved through the soil profile. This type of fertilization can pose problems for bodies of water in close proximity to the grass area or to groundwater. Nitrogen can leave this system by leaching below the root zone, forming runoff, or through volatilization. For these reasons, in many regions of the country there are restrictions placed on nitrogen applications.

Natural, organic fertilizers can be either granular or liquid. Granular fertility products generally contain insoluble nitrogen. Liquid fertilizers can be water-soluble, but not in the same sense as synthetic fertilizers. Nitrogen in organic fertilizers reaches the grass plant, but unlike synthetic fertilizers, moisture has very little to do with the actual release of nitrogen to the plant.

Synthetic fertilizer is inorganic, and is manufactured during a chemical process that makes it highly water soluble. Under high pressure and temperature, anhydrous ammonia forms urea. It takes five tons of petrochemicals to produce one ton of urea. Urea breaks down on contact with soil moisture and is taken up by the grass plant very rapidly. This causes a quick green up or burst of growth in turf. Synthetic fertilizers, being primarily water-soluble, move rapidly through the soil and can be major contributors to nonpoint source pollution. This process directly feeds the grass plant. Most synthetic fertilizer programs call for numerous applications annually.

Natural, organic fertilizer products work in a completely different way. Nature has put in place a system that makes nutrients available to plants. For example, no one fertilizes a mature forest, yet healthy, adequately nourished plant material grows. Because a turfgrass area is a closed system, however, we must add fertilizer or other nutrients to meet the needs of the grass in the same way that fallen leaves meet the needs of the tree. With high turf expectations, grass as a horticultural crop needs more nitrogen than nature can provide. Grass can obtain the nutrients it needs from soil organic matter, the biomass, and minerals in the soil, but not enough nitrogen can be made available to produce a high quality turf system, so nitrogen must be added. Lower expectations can be satisfied with nitrogen made available by nature only, but nitrogen applications should never be excessive in order to meet high expectations. Think in terms of less is more.

Microbial life in the soil makes nutrients available to grass plants in a natural program. A handful of soil contains billions of mostly beneficial living organisms that nature put in place for the sole purpose of growing plants. Since these organisms make nutrients available, they form the foundation for the feed the soil approach.

Nutrients in organic fertilizers can be plant, animal, or mineral based. Nitrogen is derived from plants (grains like corn, soy, alfalfa) or animal byproducts (manure, feathers, bones, blood). However, the nutrients that make up fertilizer products, either synthetic or natural, are not plant food, but are rather catalysts in the process of photosynthesis. Grass responds in multiple ways to nitrogen introduction. One response is a greening of the plant which means an increase in chlorophyll density.

Compost can be either vegetative or animal manure based.

Turf managers must provide growing conditions that will enable grass to photosynthesize at its maximum rate. As photosynthesis improves, more carbohydrates are produced for the plant, which are used for the grass' immediate growth and stored in the crown for future growth. Some carbohydrates are exuded through the root zone into the soil environment, which provide nourishment for microbes that colonize and live in the rhizosphere and in turn help support the turfgrass plant in the soil.

Assessing Nitrogen Fertilizers

With so many fertilizers and formulations on the market, it can be difficult to differentiate between the products. As a rule, the percentage of nitrogen in the product indicates the type of fertilizer in the bag. The three numbers on the bag represent nitrogen, phosphorus, and potassium, in that order, stated as a percentage of each nutrient in 100 pounds of fertilizer. Nitrogen is the benchmark because it is used in the largest amount by turfgrass.

- If the nitrogen value is under 10, the product is most likely a natural, organic product
- If the number is between 11 and 16 it is probably a bridge product
- Bridge products contain both synthetic and natural sources of nitrogen, and/or biosolids (sewerage sludge)
- If the nitrogen percentage is greater than 17 or 18 the product is probably synthetic

There are exceptions to these guidelines, like an organic fertilizer powder that, when reconstituted with water, has a nitrogen analysis of 16%. This new technology has broken the protein bond which allows organic nitrogen to be more readily mineralized.

Fertilizer Summary

- Synthetic and natural fertilizers work in completely different ways, but can produce similar results
- Synthetic fertilizers can be harsh to the biomass and counterproductive to building a healthy microbial soil population
- Because synthetics work rapidly and organics work more slowly, we must set our expectations appropriately
- Organic liquids can produce more results in the short term and sustain them for the long term
- Timing of the applications is critical
- Granular urea reacts in 48 hours and is done in a month or so
- A granular, organic reaction will take 10 to 12 days and lasts for 8 to 10 weeks
- Organic liquid will show results in 4 to 5 days and then for several weeks
- Because liquids are in a soluble form, organic nitrogen is more rapidly processed by the biomass through the process of mineralization

Credit: Mike Nadeau

TOC

Cultural Practices

Tom Barry

Organic lawn care requires diligent detective work by the turf manager. Routine scouting and monitoring are necessary to identify potential threats to the health of the grass, and without the convenience of pesticides, underlying conditions must be rectified prior to the death of the turfgrass. Creating and maintaining healthy, dense turf through proper cultural practices is at the core of the organic lawn care program.

Cultural practices that manage turfgrass can be broken down into primary and secondary categories:

- **Primary** cultural practices like mowing, irrigation and fertilization are performed on a regular basis
- **Secondary** cultural practices including aerification, dethatching, topdressing, and overseeding supplement primary cultural practices when problems arise like compaction, thatch accumulation and/or a non-uniform surface.

Mowing

Unlike most plants, turfgrasses tolerate regular mowing because the point from which all growth initiates, the crown, is located at the base of the plant below the path of the mower blade. However, mowing leaf tissue from a turfgrass plant places it under unnatural stress and has a direct, negative impact on rooting. When done properly, however, stress from mowing can be limited, creating a dense, attractive stand of turf. Here are a few guidelines to follow that limit damage caused by mowing to a turfgrass plant:

- Mow at the appropriate height.
- Mow at the appropriate frequency.

Credit: Steve Rackliffe

- Mow with the appropriate mower and a sharp blade.
- Mow in varying directions.
- Return clippings whenever possible to recycle nutrients back to the soil.

Mowing heights for lawns range from 1 ½ to 3 ½ inches, but mowing at the higher end of the range is often recommended for a few reasons. First, rooting depth directly relates to mowing height, so the higher the cut the deeper the roots grow. A deep root system increases drought tolerance and reduces dependence on irrigation water. Additionally, more leaf surface left on the plant increases its photosynthetic capability. Food produced from photosynthesis can be stored in the plant and saved for periods of stress. Lastly, a longer leaf blade can reduce weed encroachment. Weed seeds in the soil require sunlight to germinate. Shading the soil with longer leaves inhibits germination of unwanted weeds.

Time of year also affects mowing height. Cool-season grasses require higher mowing during summer stress. Raising the mowing height during high temperature periods helps reduce root loss. Additionally, during the late fall or "last mowing", it's best to mow the grass down to about 2 inches. Leaving too much of the leaf blade exposed during the winter can increase damage caused by fungus and desiccation. Lastly, the amount of shade that exists on a lawn affects mowing height. Shading turfgrasses limits their exposure to sunlight, reducing photosynthesis and food production. Higher mowing increases the leaf surface area available to absorb sunlight.

The rule that dictates mowing frequency is called the one-third rule: never remove more than one-third of the leaf blade in a single mowing. To determine when to mow, divide the mowing height by 2 and then add this length to the mowing height. For example, grass to be cut at 3 inches should be mowed when it is 4 ½ inches high.

$$3 \text{ in} \div 2 = 1\,\tfrac{1}{2}$$
$$3 \text{ in} + 1\,\tfrac{1}{2} \text{ in} = 4\,\tfrac{1}{2} \text{ in}$$

Using this guide, mowing frequency will vary depending on mowing height and growth rate. Lower mowing heights require more frequent mowing. For example, athletic turf mowed at 1 ½ inches needs to be mowed more frequently than a 3 inch lawn. Growth rate (which is influenced by time

of year), fertility levels, and the type of grass also affect mowing frequency. For example, spring and fall exhibit prolific growth that may require mowing 2 times per week, but in summer, reduced growth may only require mowing once a week or less.

Credit: Steve Rackliffe

Turfgrass should always be mowed with a sharp mower blade. A dull blade creates a tear rather than a clean cut and leaves the plant more vulnerable to disease and water loss. When mowing with a dull blade, the lawn will have a silvery appearance, so visual inspection after each mowing will help determine when blades should be sharpened or replaced.

The direction the lawn is mowed in should also change on a regular basis. Consistently mowing in the same direction can cause compaction from the wheels of the mower. Additionally, grain (when a grass blade lays in certain direction) can result in a less even cut because the grass blades are not standing up.

Clippings should also be returned to the lawn whenever possible to recycle nutrients back into the soil, supplementing one fertilizer application per year. As long as the one-third rule for mowing is followed, clippings will not be noticeable on the lawn. Consider collecting clippings only when disease and/or weed seeds are present to help prevent their spreading.

Irrigation

A useful tool in organic lawn care, irrigation can supplement natural precipitation in periods of drought. When used improperly, however, it can lead to shallow turf roots, increased fungus and compaction. The most sustainable option for organic lawn care is not to irrigate the lawn at all, as conserving water can be both economically and environmentally advantageous. Grasses can naturally survive long periods of drought by entering a state of dormancy.

Irrigation Controller; Credit: Steve Rackliffe

Frequency

It's preferable to irrigate organic lawns deeply and infrequently which provides just enough water to avoid drought stress while allowing enough volume to soak the entire root zone. This encourages deep roots, reduces foliar diseases and weed seed germination. Determining how infrequently and deeply a lawn can be irrigated requires some experimentation. Here are some suggestions:

- Creating programs with alternating days, on and off, can be useful when reducing frequency
- Try switching the frequency from every day for ten minutes to only irrigating on odd days for 20 minutes
- Monitor the lawn as often as possible during this period to avoid any excessive wilting
- Continue reducing frequency slowly until the turf starts suffering from drought
- Monitor how long sprinklers can run before puddling and runoff occur. Certain slow-draining soils might require irrigating in cycles (water for 10 minutes, wait half an hour, then water for 10 more minutes).

Some variables can affect irrigation needs, including type of grass, time of year, soil type and depth. Irrigation inputs should match the needs of the specific grass variety. Fescues, for instance, have greater drought resistance than bluegrasses and ryegrasses, and thus require less watering. The lawn's irrigation needs also change with seasons. Most irrigation controllers have a seasonal adjustment feature that allows an increase in the percentage on the program. For example, going from spring to summer there might be a need to increase the watering from 80 to 100 percent. Lawn care providers should include at least a monthly visit to each property to inspect and adjust irrigation systems.

Rain Sensor; Credit: Steve Rackliffe

Soil types also greatly affect the watering requirements. Most soil testing labs can perform a textural analysis to determine the makeup of the soil. Keep in mind that:

- Sandy soils drain quickly and require more frequent irrigation, but can handle larger volumes of water at a time.
- Finer textured soils (silt & clay) hold on to moisture longer, requiring less frequent watering.

Irrigation timing is also important. It is best to irrigate early in the morning between 5:00 and 8:00 AM when water can soak into the soil without staying on the leaf for long periods, limiting the chance of foliar diseases. Late night watering is the second best option. Avoid afternoon or early evening watering - especially during hot, humid weather - to reduce the potential for evaporation and disease outbreaks.

Organic lawn care providers should be stewards of the environment. Misuse of irrigation systems is not only detrimental to the lawns, but can also devastate the environment by filling waterways with polluted runoff. New irrigation technology allows for more responsible, efficient watering. Grey water, subsoil irrigation systems, rain sensors, and ET (evapotranspiration) monitors are just a few of the new technologies that help to reduce potable water usage, and should be included in management whenever possible.

Aeration

Soil compaction is common in heavily trafficked turf. An ideal soil contains 50 percent solids (45% mineral & 5% organic matter) and 50 percent pore space (25% air & 25% water). However, compacted soils have significantly- reduced pore space, resulting in insufficient oxygen for turfgrasses. Lack of oxygen within a soil creates an anaerobic condition that greatly reduces beneficial microbial populations. The lack of pore space also makes it difficult for roots to grow deeply into the soil, and can lead to increased surface runoff due to reduced infiltration and percolation rates. This increases stormwater flooding and waterway pollution.

Aerator; Credit: Steve Rackliffe

Certain weeds, including broadleaf plantain, goosegrass, and annual bluegrass can proliferate in, and thus are indicators of, compacted soils.

Soils must be aerated in order to alleviate compaction. There are many methods for aerifying lawns, but the most common is core aerification. This process involves mechanically removing cores from the soil to a depth of 3 to 6 inches. Since the majority of the compaction occurs in the top few inches, this process is effective at increasing oxygen levels and infiltration rates.

Core Aerification is Most Effective When:

- Holes are made as deep and often as possible
- Aerification should be done in two directions as well as in a crisscross pattern to get the greatest compaction relief
- Once the cores are removed they can be left on the surface to break up over time, or a metal drag mat can be used to break them up
- There are also situations where compaction exists deeper in the soil profile (often in new developments where heavy equipment is used for grading), and more aggressive cultivation, such as deep tining, is needed.

Timing

Depending on the amount of traffic, lawn aerification should be performed once per year. The best time to aerate is in the late summer or early fall when the turf is actively growing and there is limited weed competition. Other practices like overseeding and topdressing can be performed during this time in conjunction with aeration. Spring is the second best time for core aerification but is not ideal in organic lawn care because opening up the soil at this time of the year increases the chance for summer annual weeds to germinate.

Dethatching

Thatch is a layer of undecomposed and partially decomposed organic material, primarily roots and stems, located above the soil surface. A thin layer of thatch (less than ½ inch) can be beneficial to a lawn by providing cushioning and insulating the crown of the plant. Excessive thatch, however, can

be detrimental to the health of a lawn, sometimes causing:

- increased disease and insect pest occurrence
- shallow rooting
- reduced infiltration
- increased mower scalping

Dethatching; Credit: Steve Rackliffe

The common misconception that thatch accumulates from returning mower clippings to the lawn is not true. Thatch accumulates with any practice that promotes growth in excess of decomposition. Therefore, thatch accumulation is more common in an intensely managed lawn than a neglected one. Additionally, conventional lawn care results in greater thatch accumulation than organic since pesticides kill many of the microbial populations that break down organic matter, and nitrogen in fast release synthetic fertilizer produces excessive top growth. Reducing irrigation and fertilizers and encouraging beneficial biology can culturally reduce the accumulation of thatch. There are, however, situations where excessive thatch exists (greater than 1 inch) and must be removed. This can be done through a process known as dethatching.

Dethatching Can be Done:

- Mechanically, by using a metal leaf rake or using tines called a power rake that go on the front of a mower. This method typically does not remove large amounts of thatch and needs to be performed frequently for sufficient removal.
- Using a vertical mower, for more aggressive dethatching. This machine has knives mounted on a horizontal shaft which cut down into the thatch layer and pull the material up to the surface
- Biologically throughout the season by applying fungi (compost teas) and fungal foods (kelp, humates and fish). These microbes produce organic acids and enzymes that break down and digest plant residues.

Just like aeration, the best time for mechanical dethatching is in late summer or early fall.

Compost Topdressing

Topdressing is the process of spreading a thin layer (between 1/8 and 1/2 inch) of soil mix over a turf area, and its benefits make it a staple in organic lawn care. Mature compost adds organic material and beneficial organisms to the soil, making it an excellent soil amendment, and can also be a great nutrient source once soil microbes break it down. The best results are achieved from topdressing in conjunction with aeration because the compost is incorporated down into the soil profile.

Compost Topdressing

Compost is Broken Down Into Two Categories: Leaf and Manure Based

Leaf compost is abundant in the Northeast in the fall, and although it tends to be lower in nutrients than manure based compost it is full of beneficial microbes. Manure based composts come from various animals including cows and horses. They have higher nutrient contents than leaf composts but can harbor dangerous pathogens (i.e. E. coli). *Sewage sludge, or biosolids, is generally considered unsuitable and is prohibited in the NOFA Standards because of potential contaminants such as heavy metals and pharmaceuticals.

Know Your Compost!

Regardless of the compost's source, always have it tested by a certified lab. The first thing to test for is maturity since poorly aged compost can damage turfgrass. Steam from heat-causing microbial decomposition is a strong indicator of immaturity. Compost should also be tested for potential contaminants and pathogens.

Compost topdressing frequency and rate depend on the soils that are being amended. Soils with low organic matter (below 3 percent) may need more frequent topdressing to bring the organic content up. Once a soil's organic matter content reaches 5 percent, the frequency of application can be reduced.

A Good Recommendation for Soils Low in Organic Matter Is:

- Adding a 1/4 inch topdressing per year
- Requiring 3/4 cubic yard of compost to top-dress a 1,000 square foot area at a depth of 1/4 inch
- This can be split in two applications, one in the spring and one in the fall

However, every time compost is applied it adds nutrients to the soil, so just as with synthetic fertilizers, too much can negatively affect the environment. Perform a soil test every year to monitor the soil nutrient levels.

There are several different ways to apply compost to lawns. High quality compost has some moisture in it so choosing the appropriate method of application is imperative. For small lawns, a wheelbarrow and shovels can get the job done. For larger applications, use topdressers or compost spreaders made specifically for compost. A mulch blower is another effective application tool, but wet compost tends to get caught in the corrugated hosing.

Overseeding

Overseeding is the process of putting seed into an existing turf, and **is the most effective weed control tool in the organic turf manager's toolbox**. Weeds are pioneer plants that will grow in areas where turfgrass is unable to. Any void in the turf creates the potential for weed seeds in the soil to germinate. Overseeding on a regular basis increases the chance of having new turfgrass plants germinate in the void space rather than a weed.

- Proper turfgrass selection is essential to the survival of the plant. For organic lawns, it is typically better to overseed with a mixture of grass species to increase diversity and reduce the potential for complete devastation.
- A cool-season seed mixture for a lawn may combine bluegrass, fescues and ryegrass.
- Perennial ryegrass establishes very quickly at cooler temperatures, making it a better selection for early and late in the season.
- Tall fescue requires higher soil temperatures to germinate, so it would be a better choice for late spring seeding.
- Be sure to buy certified seed with varieties that perform well in your region (visit ntep.org for a list of varieties).

There is a saying in organic turf care that the best time to overseed your lawn is anytime there is a bare spot. Always carry a bag of seed and a rake to spot seed bare areas. Lawn care providers can also make up "divot mixes" (soil, seed and organic fertilizer) for their crews so that bare spots can be immediately overseeded. Overseeding thin turf, however, is a larger task and often requires more complex equipment.

Grass seeds require good seed to soil contact to germinate. Spreading seed over the top of an existing lawn results in poor germination because the seed must be worked down into the soil to protect it from the elements. This can be done through slice-seeding or in conjunction with aeration and topdressing.

A slice seeder is similar to a vertical mower, mechanically making slits into the turf and soil. A hopper on the back holds seed, and can be opened to drop seed into the slits. This is a great tool for overseeding thin turf or renovating an existing lawn. Seeding following aeration is also an excellent way to get seed into the soil. However, a drag mat sometimes must be used to drag the seed into the holes. Compost topdressing following overseeding can also increase the seed to soil contact and ultimately improve seed germination. **Overseeding should be done at a rate of 6 to 10 pounds per 1,000 square feet and followed with an organic fertilizer.**

On Left: Slice Seeding; **On Right:** Turf after slice seeding

An organic lawn care program relies heavily on creating and promoting a healthy, operating system. The catalyst for this system is an adept turf manager carrying out cultural practices in an effective manner. These properly performed cultural practices create a healthy lawn equipped to survive the elements. Cultural practices can also alleviate underlying conditions and can therefore reduce the necessity for synthetic fertilizers and pesticides.

Dealing with Pests in Turf

Chip Osborne

Insects

Learning about insect habits and life cycles is the key to managing them. Early intervention can prevent later damage. The presence of insect pests does not necessarily require corrective action. Before taking steps to control a pest, sample the insect population to estimate total numbers, identify the species, and evaluate the condition of the turf. Action thresholds vary considerably based on turf health and client needs. Thus, the following thresholds should be used simply as guidelines, and not exact measures. When talking with clients, learn their thresholds for insect damage by asking questions. Can they tolerate small brown patches? Is the appearance of the turf of critical importance, as it is on a golf course?

As you improve the overall health of the grass, it can withstand more feeding by insect pests without suffering visible damage. For example, in a well-maintained lawn of tall fescue (a grub tolerant grass species), 50 grubs per square foot may not cause turf damage, even though 5 to 10 grubs per square foot is generally considered the action threshold. Insects feeding on stressed turf or on susceptible species will produce visible damage at lower insect densities.

Insect pests can be sucking insects, above ground chewing insects, or below ground chewing insects. In the Northeast, the most damaging sucking insects, above ground chewing insects, and below ground chewing insects are chinch bugs, sod webworms, and white grubs, respectively.

Chinch Bug

Chinch bugs are less than 1/4 inch long as adults. They are black with shiny white wings folded over their backs. The nymphs first appear bright red and then turn orange, brown, and black before molting to become adults. Both nymphs and adults feed by using their piercing-sucking mouthparts to remove fluids and inject toxins that clog the water conducting tissues

of the grass. Damaged lawns turn yellow and then brown in irregular patches. Nymphs, which are active from June to September, do most of the damage. Chinch bugs are most likely to case damage during periods of hot, dry weather in lawns with a thick thatch layer that are exposed to full sun.

Adults become active in the spring when temperatures rise above 45° F. There are usually two generations per year in the Northeast; in June and August. The threshold is 20 insects per square foot. The bugs are found in the greatest numbers where damaged grass meets healthy turf.

To detect chinch bugs in turf, use the flotation method. Remove both ends of a coffee can, pound it into the ground half way, and fill it with water. Any chinch bugs will float to the surface. Count them, and distinguish chinch bugs from big eyed bugs, which are beneficial predators of chinch bugs. As implied by the name, big eyed bugs have eyes that are much larger in relation to their heads than are those of chinch bugs.

To prevent problems with chinch bugs, eliminate thatch and use endophyte enhanced grass seed. Conserve chinch bug predators by avoiding the use of broad-spectrum insecticides, which often destroy a big eyed bug population entirely but only mitigate a portion of the chinch bugs. Thus, the surviving chinch bugs emerge with no natural predators left in the system. Irrigation can also help control chinch bugs by inducing an outbreak of Beauvaria bassiana, a naturally occurring fungus that kills chinch bugs. Neem can be used as an insecticide in spot treatments where needed.

Sod Webworm

Sod webworm moths are white, gray, or tan and measure up to 3/4 inch long. They have snout-like mouthparts, and the wings are rolled up and tubelike when the moths are at rest. When disturbed, they fly short distances in a zigzag pattern. The larvae (caterpillars) are 1/2 inch to 3/4 inch long when fully grown. They vary in color from green to brown or gray, with brown heads and a dozen or so brown dots irregularly distributed along the body segments. The larvae hide in tubes made of silk and plant debris.

Young larvae feed on the surface of leaves and cause little damage. Older larvae may do more damage, chewing notches in leaf blades or cutting off the blades above the crown.

Sod webworm damage does not generally kill the crown, so the grass plants have some capacity to recover if adequate moisture is available. Sod webworm damage is seen most often in grass grown under high maintenance conditions, and looks like small irregular brown patches. Preferred hosts include Kentucky bluegrass, perennial ryegrass, and fine fescues.

Most species of sod webworm over-winter as larvae. The first generation of sod webworm moths mature between mid-May and mid-June, with two to three generations per year.

To detect sod webworm larvae, use a soapy drench. Add 1 to 2 tablespoons of liquid dishwashing detergent to 1 gallon of water. Pour over 4 square feet of grass. Wait 5 to 10 minutes before counting the larvae as they come to the surface. They will be very active. Thresholds vary widely, but one guideline is 5 to 10 larvae per square foot. Lawns that are adequately watered and grow vigorously can tolerate high populations of sod webworms with little observable injury. Thin lawns that grow poorly may be seriously damaged. Often, sod webworm injury is more noticeable along sidewalks and other areas that are warmer and under more drought stress.

To prevent problems with sod webworms, eliminate thatch and use endophytically enhanced grass seed. Control the early larval stages with Bt (bacillus thuringensis), Conserve, or beneficial nematodes. Pyrethrum can be used against later stage larvae. Irrigate carefully to maintain proper soil moisture and help the plants recover from the damage.

Bluegrass Billbug

While not seen widely in the Northeast, these tiny bugs can present a large problem. Adult billbugs are gray, black, or brown weevils, 1/4 to 3/8 inch long, with chewing mouthparts at the end of a long snout, elbowed antennae, and hard wing covers. The larvae, which are very small in the first instar (first stage after hatching), look like a grub but are not curled up and have no legs. They are 1/3 inch long when fully grown. The larvae burrow down grass stems and as they grow feed on the crown of the plant, killing individual stems, and then whole clumps of turf. Damage looks like irregular brown patches of grass, similar to chinch bug damage and many other kinds of stress or disease. Look for fine, white sawdusty frass at the base of the plants. Billbug damage typically becomes apparent in late June or July near a sidewalk or driveway. Kentucky bluegrass is the primary host, although other grasses are susceptible.

Bluegrass billbugs have one generation per year, overwintering as adults. Adults become active beginning in late April. Detect billbugs by observing adults on pavement. The threshold is met if one or more adults is seen per minute of walking. The eggs hatch in late May, and the larvae are increasingly active and damaging until they pupate in August.

Prevention involves using endophytically enhanced grass seed and reducing thatch layers. Since billbugs feed mainly on bluegrass, diversifying grass species also helps. Billbugs are very hard to control, but a liquid spray of diatomaceous earth, 2 to 3 applications of Pyrethrum, and beneficial nematodes all have some efficacy in billbug control.

White Grubs

White grubs are the most important lawn and turf insect pests in the Northeast, where there are 11 species. Some species are limited to small geographic areas and others occur only in certain turf conditions. Exotic species are the most common: Oriental beetle, Japanese beetle, Asiatic garden beetle, Green June beetle, European chafer beetle, and Masked chafer beetle.

General Identification

White grubs mature into scarab beetles that all have several characteristics in common: hard wing covers, chewing mouthparts, and antennae ending in clubs of tight flat plates. They range in size from 1/4 to nearly 1 inch. Adults

do not feed on turfgrass, but some species, such as the Asiatic garden beetle and Japanese beetle, can be significant ornamental plant pests.

All white grub species have three larval stages. The larval body consists of a brown head capsule with chewing mandibles, a thorax with three pairs of short, jointed legs, and an abdomen. Thorax and abdomen are gray-white to cream colored, but the hind part of the abdomen often appears darker due to ingested soil and plant material. The wrinkled skin is covered with scattered, short brown hairs. Feeding or resting grubs assume a characteristic C shape. Mature larvae range in length from 3/4 inch to 2 inches. Species are identified by examining the raster - a pattern of spines, hairs, and bare spaces on the underside of the abdomen just in front of the anus. The shape of the anal slit also varies among species.

Damage, Signs, and Symptoms

White grubs damage turf by chewing off roots close to the soil surface. The voracious feeding of late second and third stage grubs, when combined with hot and dry conditions, can result in quick and extensive loss of turf from late August through mid October. In spring, damage is less common, and occurs only under exceptionally warm and dry conditions. All cool season grasses are susceptible to white grubs, but tolerance to damage varies.

Noticing white grub infestation symptoms can avoid extensive damage. First signs of infestation include gradual thinning, yellowing, and wilting in spite of adequate soil moisture, and the appearance of scattered, irregular dead patches that can grow together until large turf areas are affected. Infested turf feels spongy underfoot due to larval tunneling and can be pulled up like a carpet, exposing the C shaped larvae. Secondary, often more severe damage can be caused by vertebrate predators - crows, skunks, raccoons, and moles - that tear up or tunnel under the turf to feed on the grubs, even if grub densities don't cause turf damage on their own.

Seasonal History and Habits

Adult beetles emerge between June and August, and can feed very little or extensively on many different plants. After mating, females return to the soil to lay eggs individually or in small batches (total of 20 to 60) over a period of 2 to 4 weeks, typically at a depth of 1 to 4 inches. The egg

stage, first larval stage (instar), and second instar each last about 2 to 3 weeks. Most of the grubs will molt to the third instar during the month of September, but can be delayed until October.

When the soil is warm and moist, grubs may feed throughout the root zone. The majority of grubs are no more than 1 to 2 inches below the thatch layer. As the soil cools in October, the grubs move to deeper soil layers where they overwinter in an inactive state. However, European chafer grubs continue feeding later into fall and resume feeding earlier in spring than the other species. As the soil warms in spring, the grubs return to the root zone to feed for another 4 to 6 weeks in April and May before pupating in the soil at a depth of 2 to 8 inches. After 1 to 2 weeks, the new beetles emerge to restart the lifecycle.

Monitoring

Monitor for white grub populations in mid August. Adult beetles generally prefer to lay their eggs in sunny locations on well-managed and well watered turfgrass, so focus sampling on those areas. In areas of suspected infestation, low tolerance areas, or areas with a history of grub infestation, take a sod/soil sample with a golf cup cutter or a flat blade trowel to a depth of 3 inches and look for grubs. Record the number and species (check raster pattern). Place the soil and sod back and irrigate if conditions are dry to promote turf recovery.

Take several samples in a grid pattern to help identify hot spots or areas with high grub populations. Alternatively, cut one square foot of turf and peel it back. Remove soil from the roots and check the soil to a depth of 3 or 4 inches. Counting the grubs determines the number per square foot. Damage thresholds are 6 to 10 grubs per square foot for the Japanese beetle, European chafer, and Oriental beetle and 15 to 20 for the Asiatic garden beetle. However, well-maintained turf with an extensive root system can tolerate higher grub densities. Only treat areas where grub densities exceed the damage threshold.

Management

Good turf management results in turf with deep, extensive root systems that can tolerate higher grub

densities. Turfgrass species that have deeper root systems and higher heat and drought tolerance are generally more tolerant of grub feeding. Among cool season grasses, tall fescue is the most grub tolerant species, followed by Kentucky bluegrass, fine fescues, and perennial ryegrass. Compost and organic fertilizers may attract the egg laying females of some beetle species, encouraging higher larval densities, so avoid fertilizing or topdressing during adult beetle activity. Watering during summer also attracts egg laying females and increases the survival of eggs and young larvae, especially when the soil and surrounding area is dry, but later in the summer and fall, irrigation makes the grass more tolerant of feeding by larger, more drought resistant grubs.

If sampling shows a Japanese beetle infestation, milky spore disease, a commercially available strain of bacteria, can infect and control the white grub of the Japanese beetle, but is ineffective against the grubs of most other beetle species. Commercially available parasitic nematodes can also be used for grub control, but some species of grubs are more susceptible than others. Spray applications of cedar oil can also provide some measure of control. With any control product for white grubs, the optimal timing for an application must be followed. The best time to apply most nematode species for white grubs is from mid-August to early September. Application after mid-September or in spring is usually ineffective because the application needs to coincide with the developmental stage of the grub. Grubs are only susceptible to control during the first or second instar, but there are materials under development that may provide greater control in the future.

Fungal Disease

Fortunately, turfgrass diseases usually only develop on turf that is under stress as a result of poor management, site, or use. Following management strategies aimed at maximizing plant health and vigor will prevent many turf diseases.

Snow Mold

Fungal diseases in turfgrass indicate prolonged excess moisture conditions combined with stress or incorrect management techniques. Poor techniques include mowing too short or in wet conditions, applying too much lime, using synthetic pesticides or fertilizers, fertilizing incorrectly, overwatering, frequent shallow watering, or watering at night. These can all result in stress and predispose turfgrass to disease.

Red Thread

It is important to identify the disease and treat the cause, not just the visible symptoms. While some diseases do little more than cosmetic damage to a grass plant, all diseases interfere with the ability of grass blades to photosynthesize. Some diseases cause the death of the plant very quickly, while others become chronic problems, especially under moist conditions.

Turfgrass growing in organically managed soils with a high percentage of organic matter seldom succumb to fungal diseases. When they do occur, diseases can generally be managed by following good cultural practices such as:

1. Conducting regular soil and soil bioassay tests and adjusting the soil biology accordingly
2. Topdressing with compost or applying compost teas to enhance soil biology
3. Watering appropriately - deeply and early in the morning - to allow grass to dry during the day
4. Maintaining sharp mower blades and tools
5. Mowing when grass is dry

Disease damage can also be minimized by planting and over seeding with disease resistant grass varieties. Many different cultivars available can be found in the catalogues of seed supply companies.

Fungal Diseases in the Northeast:

- Brown patch
- Dollar spot
- Fairy ring
- Fusarium blight
- Leaf spot
- Necrotic ring spot
- Powdery mildew
- Pythium blight
- Red thread
- Rust
- Smut
- Snow mold
- Summer patch

Pythium Blight

All of these fungal diseases require a film of moisture, a specific host, and certain temperature conditions. This is called the disease triangle. When these three factors come together and a pathogen is present, a fungal disease can develop. Routine organic maintenance tries to remove one of these factors from the triangle. Some factors can be controlled and others cannot, but good regularly scheduled cultural practices and a healthy biologically active soil will minimize most fungal issues.

Dollar Spot

Weeds

The definition of a weed changes over time since it is a matter of personal taste. Simply defined, a weed is a plant that is unwanted. Current popular lawn convention in the United States defines a weed as anything that is not turfgrass. Even certain turfgrasses may be considered weeds if they are not wanted in a particular situation.

A lawn that does not include a diversity of plants is a difficult to maintain ecosystem prone to pest invasions. One should not expect to create a monoculture of turfgrass with absolutely no weeds, but rather a turf system exhibiting weed pressures at about 3% per acre. This realistic goal is a fair tradeoff for improving the health of both people and the environment.

To minimize weeds in turf, plant grasses suited to the site, topdress bare spots with compost, overseed in the spring and fall, water infrequently but deeply, especially during the hottest months of the summer, and mow as high as possible.


Broadleaf Plantain


Pineapple Weed

Maximum turf density will usually crowd out most simple perennial broadleaf weeds, but compound perennial broadleaf weeds tend to be more difficult to control, in either a chemical or organic program.

Weeds tend to thrive where grass is stressed or is not experiencing optimum sunlight, soil conditions, nutrient availability, or soil density.

Lawn care providers must read the weeds to learn about the site. Some weeds indicate compaction while others are opportunistic, rapidly taking over bare spots where turfgrass is absent. Different weeds require different control methods, but ultimately, attention to good cultural practices, including aggressive over seeding, establishes turf density and keeps most weed pressures under control.

Soil Conditions and the Weeds They Favor:

- Wet, Poorly Drained Soil: algae, annual bluegrass, nut sedge, plantain, sedges
- Droughty, Extremely Dry Soil: birds foot trefoil, crabgrass, quack grass, clover, Yarrow
- Low Soil pH: Moss, clover, wild strawberry
- Low Nitrogen: chickweed, clover
- Compacted Soil: ajuga, annual bluegrass, broadleaf plantation, chickweed, crabgrass, ground ivy, pineapple weed, prostrate knotweed
- Low Mowing Height: annual bluegrass, chickweed, purslane, crabgrass, bentgrass, dandelion, ground ivy
- Too Much Shade: chickweed, Moss, violets, ground ivy

For detailed descriptions and photographs of all of these weeds, purchase a copy of Weeds of the Northeast by Richard H. Uva, Joseph C. Neil, and Joseph N. DiTomaso. This text details all of the descriptions and management strategies for every lawn weed in the Northeast plus more.

Resources

Mary-beth Hart

Lawn Care

- Department of Energy and Environmental Protection (DEEP) Organic Lawn Care Program
  - ct.gov/dep/cwp/view.asp?a=2708&q=382644&depNav_GID=1763
- DEEP Municipal Organic Land Care Program
  - ct.gov/dep/cwp/view.asp?a=2708&q=379676&depNav_GID=1763
- DEEP Pesticide Management Program
  - ct.gov/dep/cwp/view.asp?a=2710&q=324266&depNav_GID=1712
- DEEP Pesticide Certification/Licensing Information
  - ct.gov/dep/cwp/view.asp?a=2710&q=324260&depNav_GID=1712
- Connecticut's Lawn Care Pesticide Ban: Information for Schools and Day Care Centers
  - ct.gov/dep/lib/dep/p2/government/turf_mgt_without_pesticides_final_%282%29.pdf

Long Island Sound Study "Sound Gardening" Series

- longislandsoundstudy.net/get-involved/what-you-can-do/around-your-backyard/sound-gardening/
- Milford, CT Freedom Lawn Website
  - milfordecc.com/freedom_lawn/info.html

Controlling and Treating Stormwater with Plants

- DEEP Resident's Guide to Rain Gardens
  - ct.gov/dep/lib/dep/water/watershed_management/wm_plans/lid/what_is_a_rain_garden.pdf
- DEEP Resident's Guide to Vegetated Riparian Areas
  - ct.gov/dep/lib/dep/water/watershed_management/wm_plans/lid/what_is_a_vegetated_riparian_area.pdf

Backyard Habitat Information

- DEEP Habitat Management Fact Sheets - Attract Wildlife to Your Property
  - ct.gov/dep/cwp/view.asp?a=2723&q=326212&depNav_GID=1655
- DEEP CT Native Tree and Shrub List

  - ct.gov/dep/lib/dep/wildlife/pdf_files/habitat/ntvtree.pdf
- DEEP Native Plant Garden at 79 Elm Street
  - ct.gov/dep/cwp/view.asp?a=2702&q=322452&depNav_GID=1641
- DEEP Sessions Woods Wildlife Management Area, Burlington
  - ct.gov/dep/cwp/view.asp?a=2723&q=326220&depNav_GID=1655
- Sessions Woods Trail Map
  - ct.gov/dep/lib/dep/wildlife/pdf_files/maps/maps_other/swtrail.pdf

  (Beaver Pond Trail includes a "Backyard Wildlife Area" displaying native plants that can be used in backyard habitats)

Nitrogen, Phosphorus and Water Quality

- DEEP Nitrogen Control Program for Long Island Sound
  - ct.gov/dep/cwp/view.asp?a=2719&q=325572&depNav_GID=1635
- DEEP Phosphorus Reduction Strategy
  - ct.gov/dep/cwp/view.asp?a=2719&q=474130&depNav_GID=1654
- DEEP List of Waters Not Meeting Water Quality Standards [303(d) List or "Impaired Waterbodies List" incorporated into the State's Integrated Water Quality Report]
  - ct.gov/dep/lib/dep/water/water_quality_management/305b/ctiwqr10final.pdf
- Long Island Sound Study Hypoxia Information
  - longislandsoundstudy.net/about/our-mission/management-plan/hypoxia/
- Nitrogen Contamination in Private Drinking Water Wells
  - ct.gov/dph/lib/dph/environmental_health/pdf/16_Nitrogen_Contamination_in_PDWW.pdf
- List of Drinking Water Contaminants
  - water.epa.gov/drink/contaminants/index.cfm

Composting and Organics

- DEEP Composting and Organics Recycling Information
  - ct.gov/dep/cwp/view.asp?a=2718&q=325344&depNav_GID=1645

NOFA Standards for Organic Land Care

- organiclandcare.net/sites/default/files/upload/standards2011.pdf

NOFA Organic Lawn and Turf Handbook

- organiclandcare.net/store/nofa-organic-lawn-and-turf-handbook

TOC

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Thanks for helping out!

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