

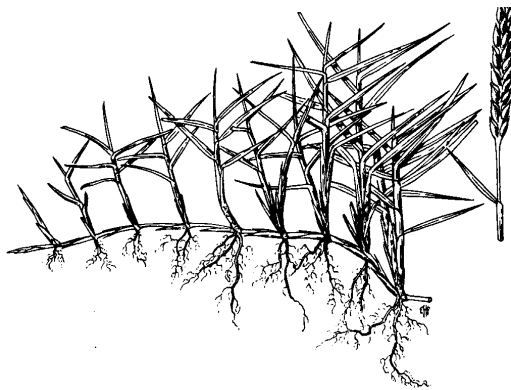
PLANT & PEST ADVISORY

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Low Input, Sustainable Turf Design

Jim Willmott, Camden County Agricultural Agent



The previous issue of this newsletter covered practices to maintain a healthy, low maintenance turf with a minimum of chemical and labor input. In this issue we will discuss how to design and plant low input or sustainable turf.

Designing with Nature

Understanding design begins with understanding ecosystems. Ecosystems contain a variety of organisms living together and relating to one another within a defined area. They are characterized by levels of stability, which resist change from biological, physical and chemical forces of nature. Ecosystems generally move towards higher levels of stability or maturity. In the Northeast, mature ecosystems are mostly deciduous and evergreen forests. Turf is unnatural here - it does not occur naturally or persist without our efforts. Without maintenance (mowing, pest control, fertilization, irrigation, etc.) lawns would progress to forests. First, herbaceous weeds would invade. Then, a succession of woody plants would mature or stabilize as hardwood forests. Reducing maintenance begins with playing by nature's rules. Let's consider some.

Natural ecosystems are stabilized by tremendous genetic diversity: There are numerous species containing individuals of variable genetic composition. Low maintenance sustainable turf design requires selection and planting *genetically diverse turf*. Also in natural ecosystems, plant species are successful only in sites they are well adapted to. Turf often violates this by haphazard planting of species and cultivars in inappropriate sites. Turf managers need to understand and apply the natural rules of diversity and site adaptation when designing new turf.

Before selecting turf species or cultivars, identify site conditions. Each has a unique set of qualities that are essential for selecting compatible turf species and cultivars. Of all the variables, none are more important than those of soil. Soil chemistry is usually considered by managers who think of fertilization or pH. This is important, but don't overlook soil physical properties. Soil texture, aeration and drainage all play a significant role in turf growth. Without good physical properties, proper pH and fertilization will not enhance turf health. Other significant site variables include exposure to sunlight, temperature extremes and the presence of pests - diseases, insects

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Setting the Record Straight: The Firman Bear Report

Joseph R. Heckman, Specialist in Soil Fertility

A study conducted at Rutgers University, known as the "Firman Bear Report", is frequently misquoted as evidence supporting the position that organically grown vegetables are significantly superior in minerals and trace elements to conventionally grown vegetables. The full citation for the study is: Bear, Firman E, Stephen J. Toth and Arthur L. Prince. "Variation in Mineral Composition of Vegetables." Proceedings of the Soil Science Society of America, 13:380-384, 1948.

In reviewing the original publication, one can clearly see that this was not the intention of the study nor does it give support to this premise. The purpose of the study was to compare the mineral composition of vegetables "as one proceeds from south to north and from east to west in the United States." Samples of cabbage, lettuce, snapbean, spinach, and tomato were obtained from commercial fields of these crops and analyzed for mineral composition. A total of 204 samples were examined. The vegetables sampled were usually, but not always, of the same variety. The authors reported in a table, the range in mineral concentration as highest and lowest values observed among the vegetables sampled. These highest and lowest values have been misrepresented as vegetables grown organically and inorganically, respectively, in various organic farming and health food newsletters, which cite the report (copies of the misquotes are available on request).

The authors discussed the influence of soil type, fertilizer practice, and climate on the observed differences in mineral composition. The study only provides a general survey of their possible influence and did not compare synthetic fertilizer and organic practices.

To see the report in its entirety, visit the Rutgers Cooperative Extension website at: <http://www.rce.rutgers.edu/pubs/bearreport/index.html>

For further information on this report, contact:

Professor Joseph Heckman

Dept. of Plant Science

Rutgers University, Foran Hall

59 Dudley Road

New Brunswick, NJ 08901

heckman@aesop.rutgers.edu

732-932-9711 Ext. 119

Cultural Practices Can Affect Disease Levels in Wheat

Daniel Kluchinski, Mercer County Agricultural Agent

In most years, wheat diseases are the most common pest problems that can reduce wheat yields or test weights. Organic methods for prevention or control generally involve cultural methods. There are limited, if any, after-planting control methods that can be used. Before wheat varieties are selected and planted this fall, take time to review the best management practices that can be followed to reduce potential losses.

There are six practices that can affect disease levels next spring. These include the use of resistant varieties, crop rotation, tillage system, fertilizer applied, planting date and fungicide seed treatment (check with NOFA-NJ for approved, restricted or prohibitive materials). Some of these practices influence disease levels greatly, while others have only a slight effect. Listed below are the effects of these practices on the more common wheat diseases.

❖ **Wheat spindle streak mosaic virus:** The use of resistant varieties is the principal means of control, with delayed planting resulting in good control when susceptible varieties are used. Plowing and disking all vegetation and crop rotation provide moderate control. Balanced fertility has a slight effect and seed treatment has no effect on disease levels.

❖ **Barley yellow dwarf virus:** Delayed planting is the principal means of control. Resistant varieties and balanced fertility have a slight effect and the other practices have no effect on disease levels.

❖ **Seedling blights:** Seed treatment is the principal means of control, with delayed planting providing moderate control. Crop rotation, plowing and disking, and the use of a balanced nutritional program has a slight effect. No resistant varieties are known.

❖ **Powdery mildew:** The principal means of control is the use of resistant varieties. Using seed treatments and avoiding high nitrogen rates provide good control. Delaying planting has a slight effect, and crop rotation and tillage have no effect.

❖ **Leaf rust:** Resistant varieties are the principal control measure and seed treatment provides good control when the disease appears early in the season. Delayed planting provides slight control and no control is possible with the other practices.

❖ **Tan spot:** The principal control measures include crop rotation and conventional tillage. Resistant varieties, balanced fertility and seed treatment provide slight control. Delayed planting provides no control.

WHEAT DISEASES ON PAGE 3

❖ **Septoria leaf spot and glume blotch:** Resistant varieties, crop rotation, conventional tillage and seed treatment provides moderate control. Balanced fertility provides slight control and delayed planting provides no control.

❖ **Take all:** Crop rotation provides excellent control, and balanced fertility and delayed planting provide good control. Conventional tillage provides slight control, and resistant varieties and seed treatment provide no control.

❖ **Head scab:** Rotation to crops other than corn or sorghum, conventional tillage and seed treatments all provide moderate control. Delayed planting provides slight control and none of the other factors affect control.

❖ **Loose smut:** Seed treatment provides excellent control and resistant varieties provide slight control. The other factors do not affect disease level.

For additional information on resistant varieties, fertilization, and other cultural methods, contact your county agricultural agent. In addition, the 2000 Rutgers Cooperative Extension wheat variety yield trial data is available through your county Extension office. □

DESIGN FROM PAGE 1

and weeds. Good turf design is as simple as reading and writing - "reading" sites and "writing" the appropriate designs. In other words, assess site qualities, consider the intended use and choose the appropriate turf species and cultivars.

Turf Species and Cultivars

University and industry turf breeding programs have enjoyed tremendous success improving turf species. New cultivars have wide ranging qualities offering turf managers opportunities to custom design turf for various sites and purposes. The ability to pick and choose between the various turf species and cultivars presents opportunities to design, but also challenges. Managers must be more informed than ever about turf qualities.

For low maintenance sites, the fine fescues are best. Generally they require the least fertilization, irrigation and mowing. Fine fescues include hard, chewings and creeping red fescues. In New Jersey trials, the improved cultivars of hard fescues perform best due to good resistance to red thread and dollar spot which is more troublesome on other species - especially creeping red fescue. Hard fescues form a dense, attractive, dark green turf under low maintenance conditions and perform nicely in mixes with improved chewings fescues. Fine fescues perform well in sun or shade. Other species, even certain Kentucky bluegrass cultivars, have roles in reducing mainte-

nance. Turf researchers at Rutgers University have classified various Kentucky bluegrass cultivars by growth characteristics. Common and Mid-Atlantic types are recommended for lower maintenance turf since they are better adapted to summer stress than most other Kentucky bluegrass cultivars. Perennial ryegrass is not a good low maintenance species due to its high mowing needs. Also, it is not tolerant of drought. Finally, tall fescues are able to tolerate dry conditions and lower fertility than many other species. They are frequently planted on droughty sites in southern areas of the northeast, but may suffer winter injury in northern sites.

Endophytic Grasses

Low maintenance turf design should include turf with endophytes, which are beneficial fungi that live in grasses. Turf containing endophytes has increased resistance to surface feeding insect pests such as billbugs, sod webworms and chinchbugs. Research also demonstrates increased tolerance to physiological stress from heat and drought and reduced damage from some infectious diseases.

Generally the top performing grasses today contain endophytes. You can find them in perennial ryegrasses and tall and fine fescues. None are available yet in Kentucky bluegrass. Tables 1 and 2 on page 4 list some of the best performing endophytic grasses in Rutgers University Trials.

Slow Growth Grasses

Considering various turf maintenance inputs, mowing is the most costly, accounting for as much as 60% of a seasonal turf maintenance budget. Costs may range from \$100 per to \$400 per acre. Large commercial, institutional or municipal grounds represent the lowest costs relative to higher cost sites like residential lawns and golf course greens. So besides mowing faster and using bigger mowing equipment, how can one reduce costs?

Slower growing species and cultivars are the best answer. When maintained properly, with reduced levels of nitrogen and irrigation, they will free up money in a turf management budget. In recent years, there have been tremendous improvements in some of the slowest growing species including chewings, sheeps and hard fescues. Many cultivars also contain endophytes (see Table 1 on page 4) that give resistance to chinch bugs, billbugs and sod webworms. Additionally, many cultivars have demonstrated resistance to important fine fescue diseases like leaf spot, red thread, pink patch and dollar spot. While the fine fescues have reduced mowing needs, other species often grow vigorously and require as much as three times more mowing.

In a 1992 Cornell Cooperative Extension trial, mowing requirements were evaluated for several

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different turf mixes and blends. All mixes containing perennial ryegrass were prolific. A mix of dwarf tall fescue was almost equal. Compared to the mixes containing exclusively fine fescues, these produced from two to three times the quantities of clippings. The highest yielding mixes would have required two mowings per week while the lowest would have required one mowing every nine days. Newer tall fescue cultivars have slower growth rates and may reduce mowing needs.

Pest Management

Pest management is also a significant maintenance issue for turf. Good turf design should be the foundation of integrated pest management programs. It is a preventative tactic that minimizes pest damage and the need for pesticide applications. Before planting, evaluate existing pest problems. Identify key pests which have a history of causing damage on a site, and plant “pest tolerant” turf by selecting disease resistant and endophytic cultivars.

Turf Establishment

After completing an accurate site assessment and selecting well adapted, diverse species and cultivars, you are on your way to designing a low maintenance sustainable turf. The job is not complete though! Proper seed bed preparation and maintenance during the establishment period is critical. Keep in mind that even low maintenance species such as fine fescues need higher maintenance until they are established. Insure proper soil chemistry by testing soil before planting. Soil fertility test recommendations will recommend proper pH adjustment and fertilization. Consider incorporating organic matter. Research at Penn State University demonstrated improved turf establishment with various composts. Many municipalities and even some landscape supply companies are offering quality organic soil amendments. Also, good soil properties not only favor turf growth, but also beneficial organisms add to turf ecosystem diversity and play significant roles in reducing turf maintenance.

Turf managers need to follow nature’s rules of diversity and proper siting of plants. Good design reduces maintenance for all types of turf. The best species for low maintenance, sustainable turf are the fine fescues, but even high maintenance cultivars of species such as Kentucky bluegrass or creeping bentgrass need more care if planted as single cultivars or on inappropriate sites. Low maintenance sustainable turfgrass is the most environmentally, economically and socially responsible answer for those con-

cerned over turf maintenance risks.

For further information on selecting turfgrass species and cultivars, consult with Cooperative Extension Agents in your area. Also, consider subscribing to the National Turfgrass Evaluation Program (NTEP). For a modest subscription fee, you will receive the results of turf cultivar evaluations from throughout the United States. Visit their web site at: <http://hort.unl.edu/ntep/>. Recommendations from Rutgers University will soon be available at: <http://www.cook.rutgers.edu/~turf/index.html>. □

Table 1. Fescue Cultivars with High Incidence of Endophyte Infection and Good Performance in Rutgers University Trials

| Tall Fescues | Creeping Red Fescues | Hard Fescues | Chewings Fescues |
|------------------|----------------------|--------------|------------------|
| Coronado | Fenway | Aurora E+ | Ambassador |
| Houndog V | Jasper | Discovery | Banner II |
| Mesa | SR 5200 | Nordic | Brittany |
| Rebel Sentry | | Oxford | Jamestown II |
| Shenandoah | | Reliant II | Shadow II |
| SR 8200 | | SR 3100 | Shadow E+ |
| SR 8300 | | Warwick | Southport |
| Tar Heel | | | SR 5000 |
| Titan & Titan II | | | SR 5100 |
| Wolfpack | | | Victory |

Table 2. Perennial Ryegrass Cultivars with High Incidence of Endophyte Infection and Good Performance in Rutgers University Trials

| | | |
|----------------|----------------|--------------|
| Advent | Manhattan II E | Secretariat |
| Affinity | Navajo | Seville |
| APM | Palmer III | SR 4000 |
| Assure | Pinnacle | SR 4100 |
| Brightstar | Prelude II | SR 4200 |
| Calypso II | Pennant II | SR 4300 |
| Dandy | Premier II | Yorktown III |
| Delaware Dwarf | Prizm | |
| Elf | Quickstart | |
| Gettysburg | Repell II | |
| Legacy | Saturn | |

Rutgers Cooperative Extension - NJAES
U.S. DEPARTMENT OF AGRICULTURE
Rutgers - The State University of New Jersey
Plant & Pest Advisory
18 College Farm Road
Cook College
New Brunswick, N.J. 08901-8551

PLANT & PEST ADVISORY ORGANIC EDITION CONTRIBUTORS

Rutgers Cooperative Extension Specialists

Stephen A. Garrison, Ph.D., Vegetable Crops
George Hamilton, Ph.D., Pest Management
Joseph R. Heckman, Ph.D., Soil Fertility
Bradley A. Majek, Ph.D., Weed Science
Jeremy Singer, Ph.D., Field and Forage Crops

RCE County Agricultural Agents and Program Associates

Gloucester, Michelle Infante-Casella (856-307-6450)
Hunterdon, Win Cowgill (908-788-1338)
Martha Maletta, Horticultural Consultant
Mercer, Daniel Kluchinski (609-989-6830)
Ocean, Deborah Smith-Fiola (732-349-1246)
Steven Rettke, Program Associate IPM

Vegetable IPM Program (732-932-9802)

Joseph Ingerson-Mahar, Vegetable IPM Coordinator
Kristian E. Holmstrom, IPM Program Associate
Sarah Walker, IPM Program Associate

Newsletter Production

Jack Rabin, Assistant Director, NJAES
Cindy Rovins, Editor and Designer
Mary Ann Hughes, Assistant Editor

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