TURFMATTERS
Ingredients For Healthy Growth
EWING
Fall 2007

WHY LEAVES CHANGE COLOR IN AUTUMN

THE GREENS, THE YELLOWS, THE REDS: WHERE DOES COLOR COME FROM?

Jeff Dossett

"Fiery colors begin their yearly conquest of the hills, propelled by the autumn winds. Fall is the artist." — Ikkaku, Hosaka, and Kawabata

For many, the bright pigments of fall are drenched into our memories with splashes of oranges, yellows, reds, purples, and browns. As summer fades into winter and leaves begin to change color, an annual phenomenon occurs. But the question remains, why does this "ode to fall" take place?

To answer, we must understand that several scientif c variables have an impact on the dramatic changes of fall foliage: the leaf's pigment prior to autumn, the length of night, tree species, genetic traits, site environments, and annual weather conditions.

Where do leaf colors stem from?

Leaf color comes directly from **pigment**, a natural substance produced by leaf cells. There are three types of pigments that color leaves: chlorophyll (green), carotenoid (yellow, orange, and brown), and anthocyanin (red and purple).

• **The Greens. Chlorophyll** gives plants their green color. The production of chlorophyll skyrockets during the summer, creating an overabundance of green color that masks all other pigment present in the leaf. Chlorophyll also captures sunlight for photosynthesis—the process by which plants use sunlight to turn water and carbon dioxide into glucose (sugar). Glucose is then responsible for feeding the plants and producing energy for growth.

Chlorophyll is continually produced during the growing season to replace broken-down chlorophyll, and consequently, leaves stay green. As summer bleeds into fall, days grow shorter and nights become longer and cooler; chlorophyll production slows down and eventually stops.

• **The Yellows.** When chlorophyll production stops, the **carotenoid** that has been present all along begins to reveal bright yellows, oranges, golds, and browns Autumn colors remain fairly constant each year because the carotenoid amounts present in leaves do not change in response to weather.

• **The Reds.** Vibrant reds, purples, and their blended combinations, come from the pigment **anthocyanin.** When the days of autumn are warm and bright, and nights are cool and crisp (but not freezing), leaves produce an abundance of sugar. Cool nights prevent the downward movement of sugar, leading to the production of anthocyanin and the onset of crimson colors.

Insights into Shedding

While pigment and climate conditions produce gold and crimson leaves in the fall, leaves soon succumb to the hands of winter, as their anatomical composition is not equipped to endure cold temperatures.

Conversely, stems, twigs, branches, roots, and buds can survive the extreme cold. Tender leaf tissues are not as strong, and freeze during cold weather; they must be sealed off and shed to ensure the tree's survival.

As sunlight diminishes in autumn, the vascular system that carries sap into and out of a leaf gradually close. A separation layer of cells forms at the base of the leaf's stem. When all food transfer has occurred and the separation layer is complete, the leaves fall off the tree. One exception is the Oak; the separation layer rarely f nalizes leaf-loss, and the Oak carries its brown leaves through the duration of winter.

"Ode to fall" with splashes of bright autumn colors.

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ATTAINING HEALTHY TURFGRASS:
A WESTERN PERSPECTIVE

Tim Fernald

Don't commit too quickly when deciding which turfgrass species will best suit your location. Be sure to do your homework, and investigate your options before planting seed or ordering sod for your new lawn. Choosing the right turfgrass takes time, effort, research, and a roll-up-your-sleeves and dig-in approach.

Where do I begin?

Before getting started, it's necessary to become familiar with the conditions of your specific turfgrass environment. What type of soil do you have? Are the grass species adapted to your site? How has the land been developed and maintained? How much natural rainfall occurs? How much light does the site offer? When these questions have been answered, it is then time to address some of the common problems that could hinder the success of your turf. Watch out for issues concerning site management, such as irregular watering, misuse of fertilizer and pesticides, improper mowing, excessive traffic, too much shade, or poor drainage.

Lush green turfgrass perfectly accentuates the beauty of San Francisco's Golden Gate Bridge.

Work with Mother Nature

Like most of the United States, the Northern California and Southern Oregon regions go through several climate changes throughout the year. In these areas, it's important to understand how grass species adapt to seasonal variations and soil conditions, as well as the appropriate nutrients required to maintain healthy turf. The best permanent species for cool season lawns, golf courses, parks, cemeteries, and athletic fields in Northern California and Southern Oregon are Kentucky bluegrass, Turf-type Tall Fescue, Perennial Ryegrass, Bentgrass, and the Fine Fescues.

Selecting a Species

Drought tolerant species such as Fine Fescues are frequently included in mixtures with Kentucky bluegrass for sandy sites. Kentucky bluegrass is best adapted to loam soils, but will do well on heavy soils with proper management. Turf with full sun exposure must be watered more frequently, and may be more susceptible to some fungus diseases. Bentgrasses will grow at lower pH levels than Kentucky bluegrass, and Tall Fescue will tolerate wet sites better than Kentucky bluegrass. Heavy clays and loams are subject to compaction under heavy traffic. Sandy soils will need more frequent irrigation, fertilization, and lime applications.

Being aware of climate conditions and soil type is essential for selecting the correct turfgrass species; it is equally important to choose the best fertilizer. There is not a "one-size-fits-all" approach for determining the right type and amount of fertilizer.

The Role of Fertilizer

With the wide variety of choices on the market, it can be challenging to select the best fertilizer for maintaining the quality of your turf. Bentgrasses on golf course greens are normally fertilized in the spring and fall, with very little being applied during the hot summer months. Fertilizer with a 3-1-3 or a 3-1-2 ratio of nitrogen, phosphorus, and potash usually provides optimum fertilization. Most superintendents try to provide an adequate quantity of phosphorus and potash, and adjust the nitrogen in relation to color and the production of clippings. Nitrogen can range from 5-15 pounds per 1,000 square feet each year, depending on soil tests and management philosophy.

Kentucky bluegrass (Poa prantensis), Fine Fescues (Festuca rubra, Festuca rubra var. commutata, and Festuca ovina), Tall Fescue (Festuca arundinacea), and Perennial Rye (Lolium perenne) are the primary lawn species found in Northern California and Southern Oregon. These species are used in lawns, parks, cemeteries and athletic fields, and fertilizer requirements will vary depending on soil test results and usage of the turf. In these areas, an average maintenance fertilizer program usually consists of an application approximately four times per year. Areas with heavy traffic require higher levels of phosphate and potash. Cool season grasses, such as Ryegrass and Bentgrass, require nitrogen, phosphate, and potash in an approximate 2-1-1 or 3-1-2 ratio, while warm season grasses, such as Bermuda, require a ratio of 4-1-2.

Your Keys to Success

Regardless of seed variety or fertilizer choice, quality turf can be attained as long as you understand the basics of nutrition. Knowing the attributes of your soil, and understanding local weather patterns, can help you become an expert in achieving professional quality turf.

> **An excess of nitrogen can leach into the environment, impacting our water sources and water quality. — ALAN HOLLEN**

FALL FERTILITY FOR WARM SEASON TURFGRASS:
A SOUTHEASTERN PERSPECTIVE

Alan Hollen

The great lawn care debate continues this season: What is the proper approach to achieving fall fertility for warm season grasses?

Today, it is common for lawn care providers to "extend" the growing season in the hope of achieving rich, green turf that lasts all season long and greens up faster come spring. Conversely, there is an increasing resistance towards this practice due to the negative consequences that may occur, such as the depletion of carbohydrates, which can impact greening in the spring, or the potential for nitrates leaching into ground water. Beyond the misconceptions and misinformation that often exist, there are a few things you should know about the fall fertility of warm season turfgrass.

Centipedegrass *(Eremochloa ophiuroides)*

Centipedegrass has been described as a "lazy man's grass" because of its low maintenance requirements. It should be cultivated at a low rate of fertility (1-2 lbs N/1000 ft2/year) with the vast majority of the nitrogen required in the highly active growing season (late April to late August, depending on your location).

St. Augustine grass *(Stenotaphrum secundatum)*

This variety requires more nitrogen than Centipedegrass at 4-6 pounds per annum, but has a stoloniferous growth habit just like Centipedegrass—leaving it exceptionally susceptible to environmental stresses, such as "cold snaps". Second only to nitrogen, potassium is essential for stress tolerance, transpiration, respiration, and general plant health. With St. Augustine and Stenotophrum grass species, a very low nitrogen, high potassium fertilizer—such as a 5-5-25 with a preemergent herbicide—is recommended. If no preemergent will be applied, use sulfate of potash (0-0-50).

Zoysia *(Zoysia japonica)*

Compared to St. Augustine grass, Zoysia grows with a strong base of stolons and rhizomes to provide greater cold tolerance, and better resistance to other environmental stresses.

Bermudagrass *(Cynodon dactylon)*

Common Bermudagrass is also stoloniferous and rhizomateous in habit. Recently, the practice of extending the green season by integrating late applications of nitrogen to Bermuda has increased. This method is growing in popularity as homeowners demand top turfgrass conditions throughout the season. While homeowners want the perfect green lawn year-round, another area of concern is the health of the environment. The growth of warm season grasses slows in the fall due to the decrease in temperature and sunlight, which reduces the need for nitrogen. An excess of nitrogen can leach into the environment, impacting our water sources and water quality.

By familiarizing yourself with fertilizer treatments for the warm season turfgrass, your turf—and the environment—will not suffer.

The success of any turfgrass is dependant on the conditions of the soil.

ABIOTICS: DISORDERLY CONDUCT

Tim Fernald

What is an abiotic disorder? How can I identify one?

You're on a jobsite and notice wilted, discolored, distorted, and dying foliage. The plants are receiving regular irrigation, fertilizer, and pesticide treatments—so what's the problem? An abiotic disorder may have taken up residency.

Abiotic is defined as a non-living or non-infectious disorder induced by adverse environmental conditions, often resulting from human activity. Causes include nutrient deficiencies or excesses pertaining to salt, cold, heat, herbicides, pesticides, or under/over watering. Abiotic disorders can predispose trees and shrubs to attacks by insects and pathogens. Activities that compact soil, change soil grade, or injure trunks or roots also cause abiotic disorders.

The Good News

Abiotic disorders can be remedied by distinguishing the initial cause of damage. Was it insects, pathogens, or a reaction to inappropriate watering? All produce similar symptoms, making diagnosis difficult. Paying attention to size, shape, and other characteristics of foliage can help. For example, over-watering smothers roots; as roots die, plants produce smaller leaves. Dying foliage appears throughout the canopy, resulting in easy identification of your problem.

For assistance in diagnosing problems, email Ewing at **turfproducts@ewing1.com.**

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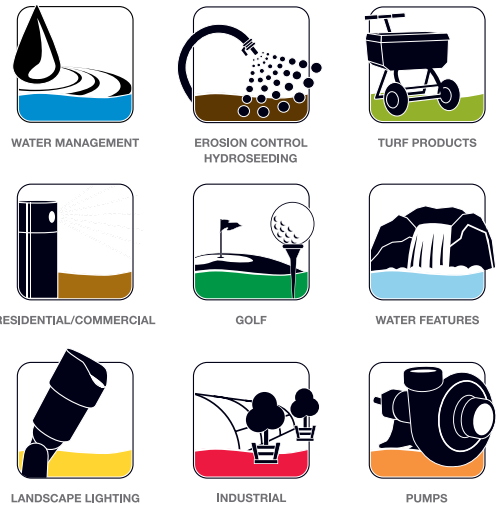

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