1975

Summer 1975

G. S. Smith

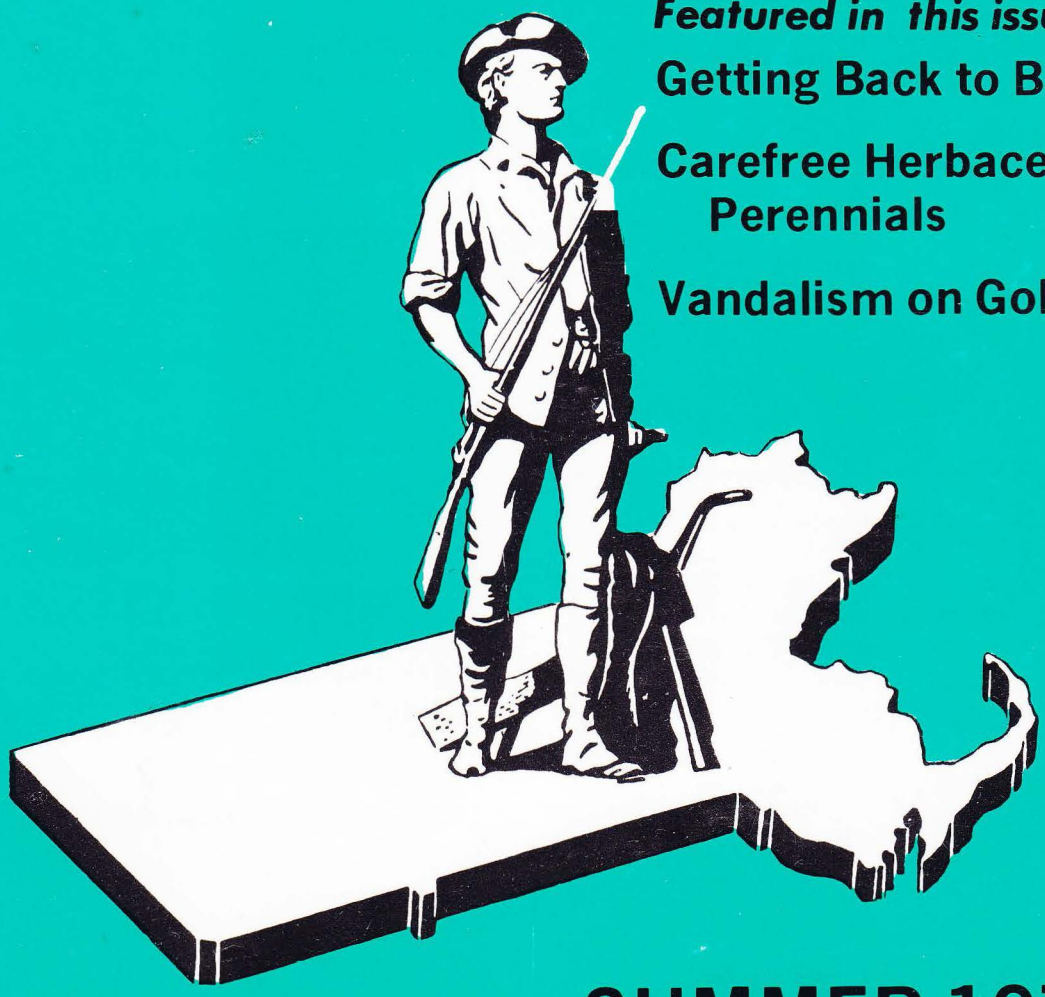
Andrew C. Robinson

Joseph Troll

Frederick J. Swochak Jr.

TURF BULLETIN

MASSACHUSETTS TURF AND LAWN GRASS COUNCIL
INCORPORATED



Featured in this issue:

Getting Back to Basics

Carefree Herbaceous Perennials

Vandalism on Golf Courses

SUMMER 1975

BETTER TURF THROUGH RESEARCH AND EDUCATION

EDITOR
Gerald Moscato
355 South St.
Northampton, Mass.

SECRETARY-TREASURER & ADVISOR
Dr. Joseph Troll
RFD No. 2 Hadley, Mass.

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The Massachusetts Turf and Lawn Grass Council Incorporated is chartered under the laws of the Commonwealth of Massachusetts as a non-profit corporation. The turf council seeks to foster "Better turf through research and education."

More detailed information on the subjects discussed here can be found in bulletins and circulars or may be had through correspondence with the editor.

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UNIVERSITY OF MASSACHUSETTS TURFGRASS FIELD DAY

Our annual field day will be held on July 30 at the Turf plots located on Route 116 in South Deerfield at the base of Mt. Sugarloaf, Exits 25 91 South, 24 91 North. Rain date July 31.

CORRECTION

Conference Issue 1975 should read Vol. 11, No. 1 not Vol. 10, No. 5.

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Getting Back to Basics—Turfgrass Fertilization

By G. S. Smith
IFAS, Ornamental Horticulture, Gainesville

Few horticultural professions involve the variety and complexity of problems one finds on a golf course. Turfgrasses are probably the most intensively managed crop in agriculture and with rigid and complex maintenance programs come problems. If grass management was all that one encountered on a golf course, the problems would be relatively simple. But there is much more than grass to be concerned with. There are soils, fertilizers, machines, trees, shrubs, flowers, weeds, pests, chemicals, irrigation systems, etc., etc. And probably worst of all there are people problems! Thus the professional superintendent must be an agronomist, horticulturist, engineer, nematologist, psychologist, and *ad infinitum.*

For those individuals who look at these complexities as challenges to their knowledge and skill, the job can be exceedingly rewarding. The types of skills and expertise one needs to be a professional superintendent are many and varied. But, one does not have to have a Ph.D. in all these subjects. On the contrary, probably the best turf managers are those individuals who have a broad and general understanding of the basic concepts of plants and soils. It is the "putting together" of all the pieces of basic information, in the right order, which separates a greens keeper from a professional golf course superintendent.

One of the pieces of knowledge which is vital for continued success is a basic understanding of "Turfgrass Fertilization." Proper fertilization involves much more than a superficial knowledge of fertilizers. Proper fertilization must include an understanding of plant nutrition, soil science, and fertilizers. A basic understanding of these three subjects is essential in managing turfgrasses as well as all ornamental plants.

Plant Nutrition

Perhaps the most basic concept one learns in plant science and one of the most important concepts a turf manager must understand is the "Theory of the Limiting Factor."

Six external factors are generally recognized as necessary for normal plant growth. They are:

1. Light—intensity, quality and duration.
2. Heat—proper temperature for growth.
3. Air—for leaves and roots.
4. Water—quantity and quality.
5. Nutrients—around 16 essential.
6. Medium—something to grow in.

It is very important to remember that plant growth is dependent upon a favorable level and combination of these factors and that any one of them, if lacking or out-of-balance, can reduce or even stop plant growth. Furthermore, the factor which is *least optimum* will determine the level of growth. This theory of limiting factors can be simply stated as follows:

> "The level of turf production (quantity and quality) can be no greater than that allowed by the most limiting of the essential growth factors."

Perhaps several examples will further stress this important concept in turf management.

First, consider the situation of a very shady tree. Obviously the grass is growing poorly. But why? The limiting factor concept gives the answer (see Figure 1). In figure 1, let the level of turf quality be represented by the level of water in the barrel. The water level (turf quality) can rise no higher than allowed by the limiting factor which is light. All other factors are adequate but quality is limited by this one essential factor. If the tree is thinned and the grass receives more light, the level of turf quality can rise accordingly. Now in this example, the level of quality is limited by nutrition.

Before considering a further example, let us be more specific about turfgrass nutrition.

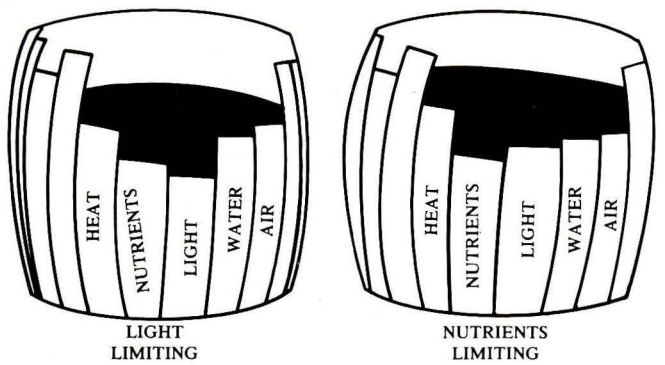

Figure 1.

Essential Nutrients

All plants require certain chemical elements. These nutrients are called the essential elements. For an element to be regarded as essential it must fulfill the following requirements:

1. Without the element, a plant cannot complete its life cycle.
2. The action of the element must be specific; no other element can wholly substitute for it.
3. The element must be shown to be directly involved in the nutrition of the plant.
4. The element should be shown to be required for higher plants in general.

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Around 1900 there were only 10 elements listed as being essential for plants. Today we recognize six additional essential elements so the list reads as follows:

Carbon	Nitrogen	Iron Manganese
Hydrogen	Phosphorous	Zinc
Oxygen	Potassium	Copper
	Calcium	Molybdenum
	Magnesium	Boron
	Sulfur	Chlorine

The first step in proper fertilization is to realize that *all* turfgrasses require *all* 16 essential elements. The nutrients must be present in adequate amounts and proportions. The next two points to consider are: (a) Where do these elements come from; and (b) What do you do if one or more are lacking?

Figure 2 lists the sources of the essential elements. Higher plants obtain most of their carbon and oxygen from the air. The hydrogen is derived from water. All of the other essential elements are obtained from the soil

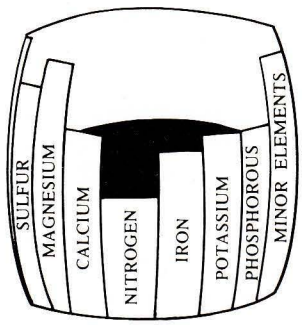
ESSENTIAL ELEMENTS

MACRONUTRIENTS			MICRONUTRIENTS	
AIR WATER	SOIL		SOIL	
Carbon	Nitrogen	Calcium	Iron	Copper
Hydrogen	Phosphorous	Magnesium	Manganese	Molybdenum
Oxygen	Potassium	Sulfur	Zinc	Boron
				Chlorine

Figure 2. Essential Elements Required by Turfgrasses and Their Sources.

via plant roots, in most situations. We have very little influence over the supply of carbon, hydrogen and oxygen and fortunately these three elements are seldom limiting. Ordinarily, from 94-99% of the plant is made up of these three elements and only 1-6% of a plant is composed of the other elements. In spite of this fact, it is the nutrient elements obtained from the soil which usually limit turf production. Fortunately, we can have a direct effect on the essential elements supplied by the soil solution. All of these elements can be added to the soil and thus to the plant through the application of various fertilizers.

Now let us return to the limiting factor concept as it relates to turf nutrition and fertilization. Assume in this second example that all factors for growth are adequate except for nutrition (Figure 3). A good example would be



NITROGEN LIMITING GROWTH
IRON SECOND MOST LIMITING

Figure 3.

a sod suffering from lack of nitrogen. Here is the situation as portrayed by the barrel where nitrogen is the limiting factor (Figure 3). Turf quality can be no higher than that allowed by the level of nitrogen. If one is lucky enough to know that nitrogen is deficient, the problem is easily corrected by adding a nitrogen fertilizer. But now what happens? Turf quality rises until it is limited again by the most limiting factor. In this case, iron. So to increase quality any further, iron must be applied.

Of course this example could be carried on and on. But where does it lead us? It leads to this conclusion.

> "All factors needed by plants—light, heat, air, water, and nutrients—*must* be available in adequate supplies and proper proportions before optimum quality can be achieved."

One or more factors or combinations will always limit turf growth. The job of a turf grower is to maintain adequate levels of all growth factors so that turf production is always at an acceptable level.

Soil Science

Basic soil science is a second subject one must be familiar with when planning a fertilization program. So far it has been agreed that optimum quality can be realized once all essential growth factors are supplied in adequate amounts and in proper proportions. This sounds very simple but can actually be rather complex. We know which elements plants require but the problems then become:

(1) How much of each essential element is adequate or optimum?

(2) How can these elements be supplied? In what form and how often?

Soil Testing

Over the last twenty years, research in Florida has fairly well defined the minimum and optimum levels of several of the essential elements in both turfgrasses and soils. Table 1 summarizes the desirable soil pH range and minimum nutrient levels of several elements in soils. If these levels are maintained in the soil, deficiencies of these four elements should not occur.

TABLE 1. SUGGESTED SOIL pH RANGES AND MINIMUM NUTRIENT LEVELS FOR FLORIDA LAWN GRASSES*

Grass	pH	Pounds Per Acre CaO (Calcium)	MgO (Magnesium)	P_2O_5 (Phosphorus)	K_2O (Potassium)
Bermuda St. Augustine Zoysia	6.0-6.5	1200	150	50	150
Bahia Carpet Centipede	5.5-6.0	600	100	40	100

* Based on acid ammonium acetate extraction.

These soil nutrient levels are one of the measurements you should use when determining a good fertilization program. Soil testing is not, however, the cure-all for all your problems. Rather it is only one tool at your disposal.

A few cautions need to be stated at this point. There are many laboratories which analyze soils and most are reliable. Choose one lab and let them do the testing and give recommendations. Do not try to compare labs and their recommendations. Testing procedures vary from lab to lab and from state to state and their fertilization recommendations are based on their own testing procedures. Soil tests are only useful if they have been

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correlated with turf responses. So, again, use one reputable lab and follow their programs unless they seem way out of line.

The University of Florida Soil Testing Lab will routinely give you the following information: soil texture, organic matter, pH, and the pounds per acre of calcium, magnesium, phosphorous and potassium. Nitrogen is also reported but values are of little use. The example shown here would be a very good nutritional level for growing bermudagrass. Use your soil analysis results to help you decide on a fertilizer program.

An obvious shortcoming of soil testing is this—it only tells you the levels of Ca, Mg, P, K and soil Ph. It does not provide information of levels of S, Fe, Mn, Zn, Cu, Mo, B and gives little useful data on N in the soil. Luckily, these elements, with the exception of nitrogen, are required in relatively small amounts and need be supplied fairly infrequently. Also, they are often applied as constituents of other fertilizers such as natural organics.

Fertilizers

A detailed discussion of all the fertilizers used on turf is beyond the scope of this paper. For information on basic turf fertilizers I would refer you to the paper by Mr. Ralph F. Jones entitled "Fertilizers—Basic Chemicals," published in the 1969 FT-GA Proceedings. For a very comprehensive publication on fertilizers, obtain a copy of "Fertilizers and Fertilization," by Dr. G. M. Volk, Soils Chemist, University of Florida. This Extension Bulletin may still be available from your County Extension Service. Specific turfgrass fertilization recommendations can be found in the Extension Circular 357, "Turfgrass Fertilization" by H. G. Meyers and G. C. Horn.

The remainder of this discussion will cover general types of fertilizers used on turfgrasses, understanding the fertilizer tag and sources and characteristics of primary plant foods.

The Fertilizer Tag

First of all let us take a close look at a fertilizer tag. An understanding of the fertilizer label can prevent many problems such as waste of money, waste of materials, damage to turf and needless expenditures for materials containing unnecessary components or the wrong kind of ingredients.

Fertilizers are identified by analysis and/or by brand name. The more common commercial fertilizers are usually known by the analyses numbers such as 6-6-6 or 16-4-8. Many specialty fertilizers are referred to by brands such as Blue Chip, Milorganite, Turf Special, etc. Regardless of how the material is named, the important information must be printed on the label.

The analyses numbers, such as 6-6-6 or 16-4-8 give the percent nitrogen, available phosphoric acid, and water-soluble potash, respectively. The numbers represent percentages or units in fertilizer terminology. Thus a 100-pound bag of 16-4-8 contains 16 pounds of nitrogen, 4 pounds of available phosophoric acid and 8 pounds of water-soluble potash. These three elements are called the available primary plant foods and are often used as the name of the fertilizer, for example, 16-4-8.

In addition to the primary elements, the fertilizer may contain secondary plant foods. These are also reported on the label, at the bottom, if they are guaranteed present. The secondaries include calcium, magnesium, sulfur, manganese, zinc, copper, boron, iron and molybdenum. The last six (Cu, Mn, Zn, B, Fe, Mo) are called micronutrients.

The label also gives you the materials from which the fertilizer has been made. This information is listed beside the *derived from* statement. Chlorine content is also listed since it may be injurious to some plants.

Sources and Characteristics of Primary Plant Foods

With a closer look at the fertilizer label you will see that the percent nitrogen is subdivided into four different forms. Since nitrogen is the backbone of your fertilization program and the major expense, it is critical to understand the different types of nitrogen and the advantages and disadvantages of each. In most instances, a satisfactory fertilization program can be achieved using any one or combination of many nitrogen materials. However, it is absolutely essential to understand the characteristics of each material and to use them accordingly.

The four forms of nitrogen listed on the label are: nitrate N, ammoniacal N, water-soluble organic N (a very misleading form of N) and water-insoluble N.

Rather than discussing these forms individually, let's look at the types of N fertilizers as they are related to turf availability and response. For ease of discussion, nitrogen fertilizers may be divided into three groups: (1) immediately soluble and available sources, (2) synthetic organic sources, and (3) natural organic sources.

In the immediately available group is ammonium nitrate, ammonium sulfate, calcium nitrate, nitrate of soda, and urea, a material often listed as a synthetic organic source. This form of nitrogen, urea, should be considered as equivalent to ammoniacal N since it is readily available. It should never be thought of as a slowly available organic nitrogen source. These fertilizers are often called soluble, readily available, inorganic or chemical N fertilizers. They contain nitrate and/or ammoniacal nitrogen and they have the following advantages and disadvantages:

Inorganic Nitrogen Sources

Advantages	*Disadvantages*
Readily available N	Leach readily
Low cost per unit of N	High salinity potential
Can easily control N levels	Danger of fertilizer burn
Little problem of residual N	Must be applied at low rates, frequently
May have greater efficiency	High Labor costs since frequently applied
	Acid forming

In the natural organic category are materials such as activated and digested sewage sludges, guano, cottonseed meal, castor pomace, and certain animal by-products. Practically all of the nitrogen in these products is water-insoluble N. Water-insoluble Nitrogen cannot be used directly by the plant but must be converted to ammoniacal and nitrate nitrogen by soil micro-organisms.

Natural Organic Nitrogen Sources

Advantages	*Disadvantages*
Slow release of N, thus no rapid growth flushes; less subject to leaching	May be very expensive
Seldom burn turf	Don't release N in cool weather
Can apply more at one time so reduced labor costs	Usually low in N so large volume must be handled
Supply P, K and Micronutrients	Less control over N levels

The last group to consider are the synthetic organic nitrogen materials. If urea is not considered in this group for reasons already covered, it includes only two types, urea formaldelyde and isobutylidine diurea. The former is commonly called UF or ureaform, while the latter is known as IBDU.

Ureaform is a material containing about 38% nitrogen made by chemically combining urea and formaldelyde. This material must be converted to ammoniacal and nitrate nitrogen by soil organisms before it can be used by plants. However, it does contain some simple urea whose nitrogen is immediately available. For the most UF materials, approximately one-third of the nitrogen is rapidly available, one-third moderately available, and one-third so slowly available that it must be built up to considerable quantity in the soil to release nitrogen in significant amounts.

Since UF fertilizers are high analyses, light weight, slow release materials they combine easy handling, safety in application and low application costs. Their disadvantages include high cost per unit of nitrogen, poor effectiveness in cold, wet periods, and high residual levels needed for prolonged nitrogen release.

IBDU is a relatively recent addition to the synthetic organic nitrogen category. It contains 31% nitrogen and releases nitrogen slowly as the particle dissolves in the soil water. IBDU releases nitrogen even in cool weather since it is not directly dependent on soil microorganisms for conversion to an available form. Several advantages of IBDU are its lack of superfluous, rapidly available nitrogen which produces excessive flushes of growth and its apparent safety even when applied at high rates. IBDU is not, however, the perfect material for turf fertilization. It has a high cost per unit of nitrogen and releases nitrogen constantly as long as soil moisture is available. This means that too much nitrogen could be released during rainy periods or under heavy irrigation, even when turf may be needing little nitrogen. Also, a satisfactory fertilization program with IBDU will be dependent upon a well designed and operating irrigation system.

Now just a few comments on phosphorous and potassium fertilizers. These materials are applied much less frequently than nitrogen. They may be applied in combinations with nitrogen in complete fertilizers or individually in various materials.

Available phosphorous comes mainly from superphosphate, ammonaited superphosphate and triple superphosphate. Maintain the soil P level at 50 pounds per acre as determined by our soil test. Most golf greens contain enough P from complete fertilizations in the past to last many years.

Potassium levels can be adjusted as indicated by soil tests by addition of materials like muriate of potash, sulfate of potash magnesia, nitrate of potash, sulfate of potash and nitrate of soda potash. A general rule of thumb to remember is to apply 2 1/2 to 5 pounds of K per 1,000 sq. ft. per year or about 1 pound of potassium for every 3-4 pounds of nitrogen applied.

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Sometimes it's better to hear it from someone else...

"I use Baron for every acre of bluegrass I grow. Baron gives what you guys call in your advertising. . . a tight-fisted root system. It holds together. . .I can shake it like a rug."

Here's what Berkley Carter of Tuckahoe Turf Farms,* Slocum, R.I. has to say about

baron KENTUCKY BLUEGRASS

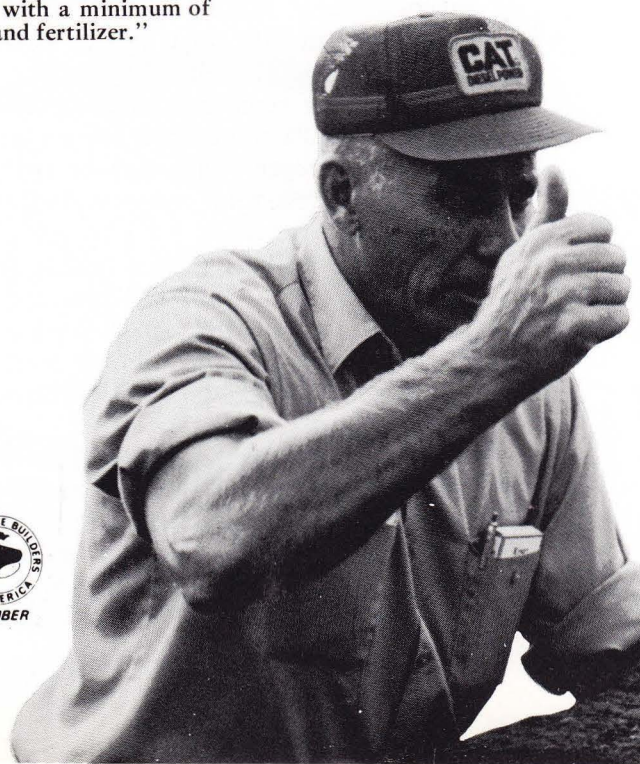
U.S. Dwarf Variety Plant Patent No. 3186

"Of all the bluegrasses, Baron is resistant to more diseases. I've had two different bluegrass fields side by side and Baron always shows more resistance. It holds up its color throughout the season with a minimum of water and fertilizer."

"When I need a herbicide, Baron can take the shocks better without streaks or setbacks. It is an aggressive grass needing only minimum maintenance practices."

"Baron comes up fast. . . that's important to me. I want to see fuzz in 7 days so that the soil is protected as soon as possible."

"It's hard enough getting the seedbed ready; I'm not going to spoil everything with a poor quality seed. I don't know why every sod grower doesn't use Baron."



"And your Jamestown Fescue is great too."

Jamestown is perfect for a bluegrass blend, particularly Baron. It has great eye appeal and when sod is needed for sun and shade areas Jamestown/Baron really go well together.

One more comment from Berkley. . . *"When you've got a good thing going – stick with it."*

There's not much more we can add except that Lofts Pedigreed Seed Company or any authorized distributor is nearby wherever you grow sod.

LOFTS

Exclusive North American Grower and Distributor:

Lofts Pedigreed Seed, Inc.

Bound Brook, N.J. 08805 / (201) 356-8700

*Tuckahoe Turf Farms, growers of 600 acres of cultivated sod is one of the largest sod farms in New England.

GOLF COURSE BUILDERS OF AMERICA MEMBER

(Continued from Page 7)

Summary

If I can possibly summarize this discussion on turf fertilization, it might be something like this:

A healthy, well-maintained golf course can be a beautiful landscape which has great functional and aesthetic value. However, such an environment doesn't just happen! It is the result of a lot of hard work and is realized only if its plants are grown under near ideal conditions. This includes adequate light, air, water, proper temperatures, a suitable soil to grow in and a supply of essential nutrients.

A good fertilization program is a vital part of your management system and one tool you have control over. Proper fertilization involves a basic understanding of plant nutrition, soil science and fertilizers.

There is probably *no single magical* fertilizer or fertilization program even though there are frequent claims to that effect. First, realize that all plants require the same essential elements in proper amounts and proportions. Several nutrients like nitrogen, phosphorous and potassium are required in much greater quantities that others but all 16 are essential. Secondly, use soil testing only as a guide to help you decide when and how much phosphorous, potassium, calcium and magnesium are needed and if soil pH needs to be adjusted. And finally, design a nitrogen fertilization program to produce acceptable quality turf for your particular golf course. In most instances, a satisfactory nitrogen fertilization program can be achieved using one or several materials. The critical thing is to understand the characteristics of each material and to use them accordingly. One material may be easier to apply, safer, less expensive to buy or apply, or more effective than another in any given situation. But, there is no perfect recipe for all turf. You must formulate your "best" program for your conditions. You can achieve this goal if you understand the basic principles we have covered in this discussion.

Carefree Herbaceous Perennials For Gardens and Borders

By Andrew C. Robinson

A carefree herbaceous perennial is a plant that is grown mainly for its attractive flowers or foliage, that dies back to ground level in the winter, and resumes growth in the spring. It lives for three or more years and is relatively undemanding in its cultural requirements.

It must be remembered that a carefree perennial does require some form of attention (water during drought periods, pruning off dead flowers), as do all plants, but this attention can be minimized through the proper selection of plant material.

Following is a list of the guidelines which I used for selecting carefree herbaceous perennials:

1. Fully hardy in Massachusetts.
2. Will not have to be divide for at least five years, usually longer, or only when an increase is desired.
3. Have no serious insect or disease problems.
4. Require no staking or support under normal conditions.
5. Tolerate different soil types and light conditions.
6. Grow well in soil of average fertility.
7. Have foliage that remains attractive throughout the growing season.
8. Are not invasive.
9. Relatively long-lived.

Consideration should be given to the following variables:

1. Severely cold or wet winters can kill or set back herbaceous plant material.
2. Insects or disease may be more prevalent some years and therefore require some form of control.
3. Some plants may require staking or support if in a windy location, or if luxuriant growth has been induced by over-fertility of the soil.
4. Sometimes certain perennials become invasive when encouraged by over-fertility of the soil, or over-watering.
5. Herbaceous perennials are long-lived but do not necessarily live forever.

The following list of herbaceous perennials for the border or garden is organized by plant family. They are

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Back and Beyond

by Joseph Troll
University of Massachusetts

There was very little winter injury of turfgrass last year. Some evidence of ice damage was noted but it was inconsequential. Grey Snow Mold was severe in some areas, especially on fairway turf, and several turf managers reported that Chlorneb failed to prevent it.

Late winter and early this spring rainfall was ample, but the month of May was probably one of the driest and hottest on record. Lack of natural precipitation, if any consolation, can help reduce the number of turf maintenance problems that arise because of excessive rainfall. One problem is disease. The one disease that appeared early this Spring was Leaf Spot caused by a species of Helminthosporium. There are a number of Helminthosporium species and most fine turfgrasses are infected by one or more of them. One species, most damaging to Kentucky bluegrass, causes a disease known as "melting-out".

There can be two stages of development of the melting-out disease. Leaf Spot is first seen as a small purple dot anywhere on the leaf. The infected area can enlarge and, as it does, the center of the lesion turns brown. Lesions also occur on the sheath which, when severe, girdle it and the leaf falls off. The leaf spot phase is favored by cool, wet weather occurring in the spring or fall. According to Couch[1], the disease is favored by high nitrogen fertilization and injury is greater under close mowing. When conditions continue to favor disease development, the crowns and roots of new grass plants can become infected in the spring. In warm, relatively dry summer weather the second stage can develop. The organism infects the crown, rhizomes and roots causing plants to rot.

Another Helminthosporium species causes a leaf spot on Kentucky bluegrass, annual bluegrass, creeping bentgrass, and creeping red fescue. Infection takes place during warm humid weather, generally in late spring, and becomes severe when the weather turns warm and wet. The leaf lesions of the disease, Helminthosporium Leaf Spot, are similar in appearance to spots of "melting-out" but infection of the sheath is not common. The organism also infects the crowns and roots of the plant.

Still another species of Helminthosporium causes a disease known as "Red Leaf Spot". The fungus infects most bentgrasses. Red leaf spot is favored by wet weather and is first seen in late spring, becoming most prevalent in July and August. Leaf lesions are circular, light tan-colored, and have a reddish-brown border. Infected leaves can wither and plants appear drought stricken, particularly following periods of prolonged wet weather.

There are several other different Helminthosporium organisms, each of which can cause an infection of a specific grass species. Ryegrass, Bermudagrass and others are susceptible to at least one of these organisms. There are cultivars of Kentucky bluegrass resistant to both "melting-out" and Helminthosporium Leaf Spot disease but their resistance is not necessarily the same for both diseases. Any one of a number of chemicals will control the leaf spot stage of the various Helminthisporium-caused diseases. However, if the weather continues to favor leaf spot infection it may be necessary to apply a fungicide every 5 to 7 days.

The warm days in May caused an early appearance of other turfgrass pests. Crabgrass, sod-web worm, chinch bug and, in some areas, beetle grubs were noted.

There have been reports of Chlordane-resistant grubs found in New Haven, Connecticut, and several sections of New York State. If you suspect or find Chlordane resistance, Diazinon can be used but its residual life is short.

I want to again thank both the alumni and the golf clubs who contributed to our turfgrass research fund. I also want to remind and to invite all turf managers and other interested people to the University of Massachusetts' Second Annual Turf Field Day. It will be held July 30 (rain date July 31) on our South Deerfield plots.

[1] Couch, H. B. 1973. Diseases of Turfgrasses. Robert E. Krieger Publishing Co., New York.

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arranged in order of their development, following L. H. Bailey's 'Manual of Cultivated Plants'. The list of plants is based on my observation of said plants growing in my own herbaceous perennial garden and at the University of Massachusetts Suburban Experiment Station Perennial Garden, 240 Beaver St., Watham, Mass.

The list does not include all the species, varieties or cultivars of a given genus or species, as this would make the list too complex, even though, without questions, there are many more species of valuable merit.

The different species mentioned, therefore, are only those herbaceous perennials that I am familiar with or that are most commonly grown in gardens.

SCIENTIFIC NAME —FAMILY—	COMMON NAME
Commelinaceae	
Tradescantia virginiana	Common Spiderwort
T. bracteata	
Liliaceae	
Hemerocallis sp.	Day-Lily
Hosta plantaginea	Fragrant Plantain-Lily
H. ventricosa	Blue Plantain-Lily
H. glauca	Short-Cluster Plantain-Lily
H. fertunei	Tall-Cluster Plantain-Lily
H. erromena	Midsummer Plantain-Lily
H. lancifolia	Narrow-Leaved Plantain-Lily
H. undulata	Wavy-Leaved Plantain-Lily
H. decorata	Blunt Plantain-Lily
Iridaceae	
Iris sibirica	Siberian Iris
Caryophyllaceae	
Gypsophila puniculata	Babys-Breath
G. repens	
Lychnis chalcedonica	Maltese Cross
L. viscaria	German Carchfly
Saponaria ocymoides	Soapwort
Ranunculaceae	
Aconitum carmichaelii	Monkshood
A. napellus	
Cimicifuga dahurica	Dahurian Bugbane
C. racemosa	Bugbane
Helleborous niger	Christmas Rose
H. orientalis	
Paconia sp.	Peony
Thalictrum aquilegifolium	Columbine Meadowrue
T. dipterocarpum	Ynnon Meadowrue
T. minus	Low Meadowrue
T. rocquebrunianum	Lavender Mist
T. speciosissimum	Dusty Meadowrue
Trollius asiatius	
T. europaeus	Globe Flower
T. ladebouri	Ledebour Globe Flower
T. pumilus	Dwarf Globe Flower
Berberidaceae	
Epimedium grandiflorum	Barrenwort
E. pinnatum	
Fumariaceae	
Dicentra canadensis	Squirrel Corn
D. cucullaria	Dutchmans-Breeches
D. eximia	False Bleeding-Heart
D. spectabilis	Bleeding-Heart
Crassulaceae	
Sedum spectabile	Showy Stone Crop
Saxifragaceae	
Astilbe arendsii	Astilbe
A. chinensis	
Bergenia cordifolia	Heartleaf Bergonia
B. crassifolia	Leather Bergonia
Heuchera sanguinea	Coral Bells
Rosaceae	
Aruncus sylvester	Goats-Beard
Filipendula hexapetala	Dropwort
F. purpurea	
F. rubra	Queen-of-the-Prairie
F. ulmaria	Queen-of-the-Meadow
Poterium obtusum	Burnet
Leguminosae	
Baptisia australis	False Indigo
Cassia marylandica	
Thermopsis caroliniana	False Lupine
Geraniaceae	
Geranium cinereum	Cranesbill
G. dalmaticum	
G. endresii	
G. grandiflorum	
G. ibericum	
G. sanguineum	
Rutaceae	
Dictamnus albus	Gas Plant
Euphorbiaceae	
Euphorbia corollata	Spurge
E. epithymoides	
E. myrsinites	
Malvaceae	
Hibiscus moscheutos	Rose Mallow
Sidalcea sp.	
Lythraceae	
Lythrum salicaria	Loosestrife
L. virgatum	

(Continued on Page 13)

(Continued from Page 11)

Umbelliferae	
Ernygium alpinum	Eryage
E. amethystinum	Sea Holly
E. bourgatii	
E. planum	Eryage
Primulaceae	
Lysimachia clethroides	Gooseneck Loosestrife
L. punctata	Yellow Loosestrife
Plumbaginaceae	
Limonium latifolium	Sea-Lavender
L. tataricum	
Apocynaceae	
Amsonia tabernaemontana	Amsonia
A. Ciliata	
Asclepiadaceae	
Asclepias tuberosa	Butterfly Weed
Polemoniaceae	
Polemonium caeruleum	Jacobs-Ladder
P. reptans	Creeping Jacobs-Ladder
Beraginaceae	
Brunnera macrophylla	Siberian Bugloss
Pulmonaria angustifolia	Lungwort
P. saccharata	Bethlehem-Sage
Labiatae	
Stachys lanata	Lambs-Ears
S. macrantha	Big Betony
Scrophulariaceae	
Chelone glabra	White Turtlehead
C. lyonii	Pink Turtlehead
C. obliqua	Rose Turtlehead
Penstemon sp.	Penstemon
Veronica sp.	Speedwell
Dipsacaceae	
Scabiosa eaucasica	Seabiesa
Campanulaceae	
Adenophora confusa	Ladybells
Campanula glomerata	Clustered Bellflower
C. lactiflora	Milky Bellflower
C. latifolia	Great Bellflower
C. persicifolia	Peach-Leaved Bellflower
Platycodon grandiflorum	Balloon Flower
Compositae	
Achillea filipendulina	Fernleaf Yarrow
A. millefolium	Common Yarrow
Anaphalis yedoensis	Japanese Pearly Everlasting
Artemisia schmidtiana	Silver Mound Artemisia
Centaurea dealbata	Persian Centaurea
C. macrocephala	Globe Centaurea
C. montana	Mountain Bluet
C. ruthenica	
Chrysthanthemum coccineum	Painted Daisy
Echinacea angustifolia	Coneflower
E. purpurea	Purple Coneflower
Echinops 'Taplow Blue'	Globe Thistle
E. ritre	Steel Globe Thistle
E. spaerocephalus	Common Globe Thistle
Helenium autumnale	Snnezewood
H. hoopsei	
Heliopsis helianthoides	Heliopsis
H. serabra	
Inula ensifolia	Inula
Liatrus pycnostachya	Gayfeather
L. scariesa	Tall Gayfeather
L. spicata	
Ligularia clivorum	Groundsel
Solidage hybrids	Goldenrod
Stokesia laevis	Strokes Aster

Special appreciation goes to Professor A. W. Boiscourt, Plant and Soil Science Department of the University of Massachusetts at Amherst, Mass., for his assistance in the compilation of this list and for his guidance and enthusiasm which spurred my own interest in this field of study.

TURF NEWS

New Lifting Technique Accepted

The "Safety Tips" article, in the 1973 March-April issue of *Fertilizer Solutions*, contained the then-accepted most popular technique for lifting an object. This technique was taught, and its use was advocated, by most professional trainers. The problem with the technique was that, in many instances, it was not effective enough.

Dr. B. T. Davies, an English physician and authority on body mechanics, has developed a new technique for lifting. It involves seven steps in the use of the body to form a perfect lifting unit. The technique is gaining wide acceptance in many industries, and it should be used by anyone who, even occasionally, is required to perform manual lifting. The technique is easily learned by reference to different body parts, as follows:

The Feet

Feet should be parted, with one foot along side the object being lifted and the other slightly back. If the feet are comfortably spread, greater stability is achieved, and the rear foot is in position for the upward thrust of the lift.

The Back

Use the squat-down position and keep the back straight—but remember that straight does not mean vertical. A straight back keeps the spine, back muscles, and organs of the body in correct alignment. It minimizes the compression of the stomach that can cause hernia.

The Chin

Tuck in the chin so the neck and head continue the straight line. Tucking the chin helps keep the spine straight and firm.

The Palm

Using the palm of the hand is one of the most important elements of correct lifting. The fingers and the hand are extended around the object you are going to lift—using the full palm. Fingers alone have very little power—you need the strength of your entire hand.

The Arms and Elbows

The load should be drawn close, and the arms and elbows should be tucked into the side of the body. When the arms are held away from the body, they lose strength and power. Keeping the arms tucked in also helps keep body weight centered.

Body Weight

The body should be positioned so that the weight of the body is centered over the feet. This provides a more powerful line of thrust and also ensures better balance. The lift is started with a thrust of the rear foot.

The Legs

Lift straight up by straightening your legs.

Other important points to remember during the manual handling of equipment or material are as follows:

Twisting during a lift is one of the most common causes of back injury. By simply turning the forward foot out and pointing it in the direction of the eventual movement, the greatest danger of injury by twisting is avoided.

Avoid awkward body positions while lifting. Shift your body until you can make a straight lift by pushing up with the more powerful leg muscles; never lift with your back.

If the object(s) has to be lifted to a position above the waist, do not try to do it in one motion. First, get the load waist high, then rest it on a support while you change your grip. Bend your knees again to get your leg muscles into the final lift.

When an object is being carried, do not try to change its position or adjust your grip while you are in motion. Stop and rest the load on a support. Then make the change.

To set the load down, just follow the lifting procedure *in reverse*. Bend your legs, not your back. Always set one corner down first, then slide your hands out so they will not get pinched.

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Vandalism on Golf Courses

**By Superintendent; Frederick J. Swochak Jr.,
of Amherst Country Club, Amherst, MA.**

Vandalism: Willful or malicious destruction or defacement of public or private property.

I think one of our most destructive social diseases is vandalism and can be classified up there in the top ten. Thousands and probably millions of dollars a year are lost to vandals and their desire to destroy whatever they get their hands on.

The finger is pointed at the younger generation when it comes down to a lot of the destruction but you can't blame them for all of it. It's probably just a reflection of the family and the people who brought them up.

Littering of golf courses and parks with beer cans, candy wrappers and cigarettes are not the fault of the younger crowd. These are responsible people that are not even aware that they are defacing property with their garbage. This is picked up by the people who watch them the most, their kids.

If you live in the poorer parts of the cities, you will bear a lot of the vandalism. Most of the problems stem from deep frustration from within the families that are trapped there. It's not there fault that they were brought up poor, but it's making there dilemma more pronounced, by causing more damage.

I can relate to some of this activity as a kid. Halloween is a time of the year when the chief of police should take a leave of absence. In fact he should take all his belongings too. Putting s--- and leaves in a mailbox and setting it on fire was one trick. Throwing water balloons at passing cars was another. The waxing and breaking of windows always seemed to become popular at that time.

This activity stems from the old saying that boys will be boys. Well I think a lot of it is happening because there isn't enough outlets for not only young people but the older generation. If you have a bad day, don't take it out on a green or a tree, but beat the heck out of your women.

Golf courses have always been hit hard by vandalism. It's not an invigorating subject to write about but I think you should be enlightened to the bear facts about this disease.

Millions of rounds of golf are played each year throughout the world, and the number is increasing. The traffic alone is enough for the superintendent. The unfixed ball marks, and the scuffing of spikes on greens is a problem. Unreplaced divots in tees and fairways don't even count as vandalism.

Ten percent of your budget is disappearing before your eyes because of vandalism each year. Money usually isn't alotted for this destruction. It's usually passed down the line and the members of the club have to cough up the money in the end.

In the following I will be giving a short story of several golf courses that weathered quite a bit of vandalism. The types and extent of damages will be mentioned. At the end I will give an average loss per year per golf course. The name of the golf course will be used but the name of the superintendent will be left out in most cases.

Ludlow Country Club.

The setting of this course makes it a good spot for vandals. It's an older course with a lot of houses lining different holes. This *Super* has been here Five years. He has been at war with the vandals the same number of years.

Spring cleanup will be complicated for him this year

(Continued on Page 17)

Order turfgrass seed, crownvetch ground cover and fertilizer products from the Stanford Seed Company.

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Weed and Feed	(10-6-4)	(lawn fertilizer with 2,4-D and Silvex)
Crabgrass Killer	(10-6-4)	(lawn fertilizer with pre-emergence crabgrass killer)

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15 CONVENIENTLY LOCATED PLANTS AND WAREHOUSES

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because he has three of his best specimen trees with ax disease. The trees cannot be replaced.

Minibikes are a favorite. They drive everywhere. You would think that they had a homing device because they always seem to end up ripping the tees and greens. In the latter months when the first frost hits, the bikes really do a good job.

Cars and snowmobiles also wonder off their trails and do a number. No trespassing signs mean nothing. If a sign is put up it usually ends up on the ground. He told me that a sign was put up in a tree so they couldn't get at it. They cut the tree down.

Other tidbits of information; Rain shelters knocked down, Water turned on greens and tees left on all night. A fifteen thousand dollar snack bar burned down, Friday, Saturday, and Sunday, teemarkers, pins, are stolen, and ballwashers and benches smashed. One weekend can run $80.00.

There are people wondering around the golf course all the time. You can't tell friend from fow. They hide in the woods and hit when no one is around. One night they tricked the super onto a road with flashlights. What he didn't know was that it was a trap. They had boards lined across the road with spikes. All four tires were punchered.

Hiss average loss per year was $9,00 - $12,00. No money alotted for vandalism. The club house and pro shop didn't receive much vandalism.

Franconia Golf Club.

Superintendent Bob D. The cups and pins are stolen constantly. Divots are taken out of the greens like they belong there. The kids like to slide on the greens. They had a few motorcyclists come out and perform on #4 green. A car did a U-turn on #11 green.

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Benches are always making there way to the pond. You can be playing a great round of golf banging in all sorts of long putts and on one hole pull s - - - out of the hole with your ball.

Ballwashers and signs are destroyed. Ballwashers are stolen to clean balls picked out of the pond. Eventually they are sold back to the pro shop.

One day a horse got its directions screwed up and put some different markings on some of the greens.

The maintenance building has been robbed. The Club house has an alarm but they break in anyway.

Specimen trees have been destroyed. Some of the nicer birches set on fire.

Forty pins with flags stolen. July 4th they've gotten into the habit of blowing up cups. Love making usually happens on #16, 18, 15 greens.

The Springfield Parks Department has $100,00 damage per year. Elmcrest story told by Bob D. They used pitchforks and took sod away. #12, and 9 greens with gas wrote - - - - you. They did $10,000 worth of damage.

Mt. Snow Vt., Super. Bob M.

Bob said that he has been at the club for ten years and never had any vandalism until this year. He had some batteries and some gas stolen, along with the maintenance building being broken into. Joy riding with golf carts was a popular sport. The vandals would take the carts out and ride on the greens, tees, in the traps and demolish them like a demolition derby.

Pins and water coolers were stolen. Dimes and nails were put in some of the greens to screw up the greens mowers. One night on a cool frosty night someone went for a joy ride in the four wheel drive truck.

Deer Jacking was attempted by hiding in traps. A few times trucks came right out to the course and cut firewood to sell. Xmas trees were also borrowed from the club.

Bob said that cross country skiing helped save $2-3,000.00. The club also made ten percent from the deal.

Stanley Park Westfield Ma., Super., Louie L.

Louie says there isn't much vandalism there due to a lot of natural fences like screen plantings. They also have a few big gates around the entrance.

Last year a restroom was vandalized. The window was smashed, the light was broken and the toilet smashed. Total of $2,000.00.

Greenwich Country Club Super.; Leo J.

Leo told me about vandalism on the different golf courses he has been associated with.

Leo had the basics at Lake Wright like driving on greens with cars and some out of the ordinary butes like writing on a 12,000 ft. sq. green with gas in broad daylight F - - - y - -. What was beautiful about this was that it happened the day of the Ladies Open. Leo cut the words out with a sod cutter and fixed it up, leaving the pin in front of the green.

Motorcycles and trail bikes had a habit of getting on the course. One night he caught a sports car on the course. Leo had two entrances with huge anchor chains in the

entrances. One was let down because he was watering and they got in. Joe had his truck with him, so he couldn't really get around. He parked his truck and went over and pulled up the chain. The car ran into the chain and hit the front tires. There were two girls and two boys. They did $5,000.00 worth of damage. The anchor chain that was used had links that were six inches in diameter.

Utica N.Y.

One night he caught two young people doing there thing by the pool. He also caught them making love by the maintenance shed. They ran away leaving their clothes behind.

Fool proof system for Vandalism. Shepards and Doberman were used in this system. These dogs came from a Canine School that was right next to the golf course.

The course put up an eight foot fence all around the course, at a cost of $15,000.00. The fence meant nothing to the vandals. They would just cut their way through and do their thing. The Golf Course took there problem to the Police and they said that they could use the dogs. Another fence was put up at a cost of $15,000.00 but three feet from the other fence. Twenty dogs were let free inside that three foot path inside the two fences. If anyone got caught there the dogs would detain them until help arrived. The first night they caught six people, nineteen years old and down. Two more were caught next week. The following week the word go out and no more vandalism. The first year the vandals did $40,000.00 worth of damage. This was the the Lake Wright Golf Course.

Greenwich Golf Course

There is usually just small stuff until school starts in September. The number one problem is breaking golf carts. In four years at Greenwich, Leo has had zero luck catching them. There is usually $3,000 - $4,000.00 on the greens alone.

They usually follow a pattern of stealing 3-6 carts and ride on the greens, tees, in the traps and then have a demolition Derby, completely destroying the carts. For this evaluation the club house would be tapped for beer.

The most recent vandalism of March 75 was when they cut cables then locked the maintenance building and screwed up the seed, fertilizer and destroyed some benches that had nuts and bolts stored in them. The Ditch-witch was started and run right through the wall.

Parks Dept. Two buildings were burned down. Cars ride on the ball fields. This damage is caused by high class kids, usually if caught the parents are able to get them out of it.

One last incident was when the compressor was destroyed for the hockey rink melting all the ice for the state playoffs.

Albany Country Club. Super.; J. Smith

The usual vandalism of driving on the course with a real nice thick frost for starters. A battery charger was stolen, along with teemarkers, pins, and Turf School Books with drafting equipment.

What took the cake that year was right after the Northeast Superintendents Association had there outing at the course, a teenager drove a ¾ ton Ford truck across #10 green. About a month and a half later a small car did the same thing. The total for the year was $2,000.00.

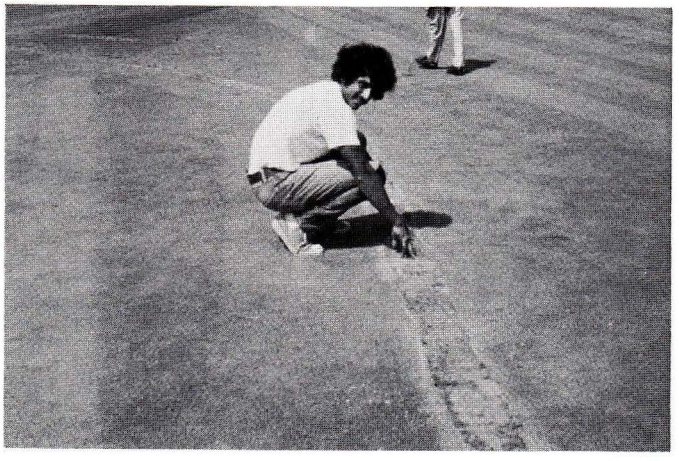
Cited in this brief survey of vandalism were damages ranging from $2,000 to 1,000,000 dollars. The latter was a Springfield Park System and "low man on the totem pole" was Stanley Park from Westfield.

There is no quick and easy solution to vandalism, for it is a "PEOPLE PRESSURED DISEASE" that is generally caused by circumstances beyond the Super's control. I've found that one thing to keep in mind is actions taken to check vandalism, for over-reaction on the Super's part may cause increased damage by the vandals.

A little personal touch.

What you see is self explanatory. This is what I meant by running over the tenth green with ¾ ton Ford.

This picture I took in the morning going by the green to work. I was just baffled, dumbfounded or whatever adj. that you can think of.



Techniques in bringing this tragedy back to normalcy.

(Continued on Page 20)

FROM

MASSACHUSETTS TURF AND LAWN GRASS COUNCIL INCORPORATED

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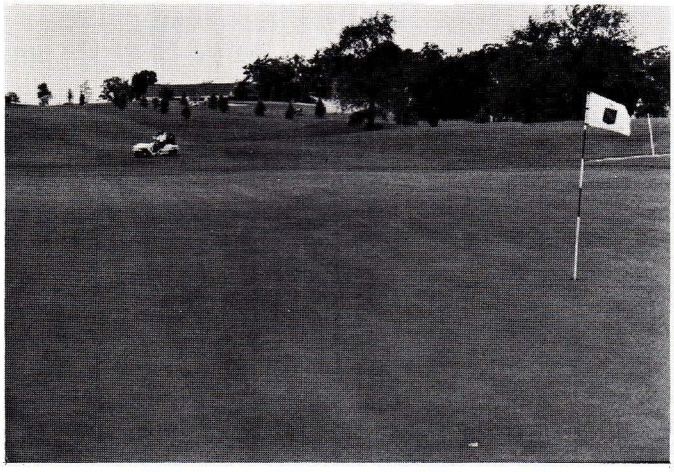
(Continued from Page 19)



A few weeks later.

University of Massachusetts Turfgrass Research Fund

We would like to take this opportunity to thank the following for their generous contribution to the Massachusetts Turf and Lawn Grass Council and apologize to those we have failed to mention.

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