Factors Limiting Turf Quality

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Quality can be evaluated quantitatively for most plants: However in the case of turf, measurements such as protein content or yield of dry matter have little meaning in relation to turf quality. While some quantitative measurements are made, visual observations serve as an important facet in turf quality evaluation studies.

There are many factors which can affect turf quality, both favorably and unfavorably. Of the more prominent, one should consider the variety or species of turfgrass used; the soil, both from a physical and chemical standpoint; water, amount available and movement; insects; weeds; and diseases. Several considerations should be made relative to each of these.

Variety or Species

In many cases improved turfgrass varieties or hybrids respond better to fertilizer, resist diseases better, and are more cold and drought tolerant than the commonly used type. Certain grasses are better adapted to light intensities and day lengths of one locale than to another. These factors plus others should be considered when selecting the plant necessary for producing the best quality turf.

Soil — Physical Conditions

According to Baver (1956) "the mechanical behavior of the soil mass is referred to as the 'physical properties' of soils." Soil is made up of solid, liquid, and gaseous materials. The solid may be organic or mineral; the liquid is the soil water which may fill part or all the spaces between soil particles and which varies in chemical composition and freedom of movement; the gaseous portion of the soil is the air in the soil. Of utmost importance is the relationship of these components one to the others in the complex soil system. However, each can produce adverse effects of itself if altered from its ideal state.

Compaction affects turf quality in several ways, most of which are indirect. The compacted surface not only encourages weed growth but is unfavorable for optimum growth of turfgrasses. As soil is compacted the capillary pore space is increased, the noncapillary pore space is decreased, thus reducing the air space. Conditions such as these are not conducive to optimum growth and should be prevented as much as possible.

As part of the solid material, the clay fraction plays a vital role in the exchange capacity of the soil. Soils containing high percentages of clay are usually fertile because such a soil is capable of holding relatively large amounts of the fertilizer elements. Under traffic where compaction occurs, a large amount of clay in the soil can become detrimental, thus reducing the noncapillary pore space and increasing the capillary pore space. Compaction of soil can be much less of a factor causing poor turf quality if the percentage of the clay content is kept low enough that it does not fill all the noncapillary pore space.

Coarse sand, which resists compaction, doesn't enter into the nutritional picture because it has less ability to absorb or adsorb nutrients. Consequently, soil of a sandy texture generally must be managed differently than soil of a fine texture.

The voids (or pores) between soil particles play a vital role in the water-holding capacity of the soil as well as its degree of aeration. As soil is compacted its structure is altered. Turf quality is lowered by the actual wear during compaction but this wear is usually visible immediately while the effects of compaction may not be expressed until the problem has become critical.

Soil — Chemical Condition

Of the many essential elements used by plants there are three that are most often lacking because they are used in relatively large quantities: nitrogen, phosphorus, and potassium. While none of these elements may be deficient as determined by a soil test, one or more may be out of balance with respect to the other or others. This is to say that not only is the minimum level to be considered but also the overall nutrient balance.

Water

Turf quality is not only affected by the amount of water applied but also by its movement in the soil after application.

Assuming optimum amounts are applied, let us consider some causes for poor turf quality attributed to water management.

Salty water can greatly affect turf quality. Often when such water must be used it is necessary to periodically flush the turf area well with great quantities of water in an attempt to move the salts down and if possible out of the root zone. Sodium in the soil water not only affects plant growth but it may also contribute to the breakdown of soil structure and thereby impede drainage and percolation.

Impeded movement of water through the soil as a result of layering often affects turf quality. A coarse-textured surface layer generally will tend to dry much sooner than a fine-textured surface. Because of a difference in the surface tension characteristics of coarse-textured and fine-textured soils, water movement is affected by any abrupt textural change.

The ideal situation for optimum water movement through the soil is a uniform structure down to a layer somewhat coarser in texture. Water will enter the coarse layer after all the soil has reached field capacity and the lower portion becomes saturated. Conditions such as these limit the possibilities of poor turf quality caused by water-logged soil, salt accumulation, and poor aeration, which seem to invite disease and weed invasions and ultimate turf destruction.

Weeds

Weeds limit turf quality in several ways. They use nutrients and water which could have been used by the turf. In many cases their life span is not the same as that of the turf, consequently when the weeds die there are barren spots left in the turf.

Often weeds can be eliminated from the list of causes of poor turf quality by practices such as using clean seed, sterilized topdressing, judicious irrigation, and the use of herbicide applications when necessary and when possible to do so safely.

Insects

Turf quality is often lowered as a result of insect damage. Some of these pests are surface feeders and as such they chew the foliar parts of the plant. Others are subterranean feeders and feed on roots and rhizomes. Each should be controlled during its most vulnerable stage of life, if possible. For example, should the insect feed mostly at night, the insecticide should be applied in late afternoon and allowed to remain overnight. Should the insect be a root feeder, the insecticide should be applied late to move it down into the pest's habitat.

The surface feeders leave discolored scars on the above-ground parts of the plant. The usually irregular feeding scars desiccate and die, leaving a generally unsightly and weakened turf. The density of the turf can be affected directly by the surface feeders.

The subterranean feeders utilize the plant parts below the ground. For this reason their presence may go undetected for a longer time than the surface feeders. However, should their numbers be sufficient the damage will be evident.

Diseases

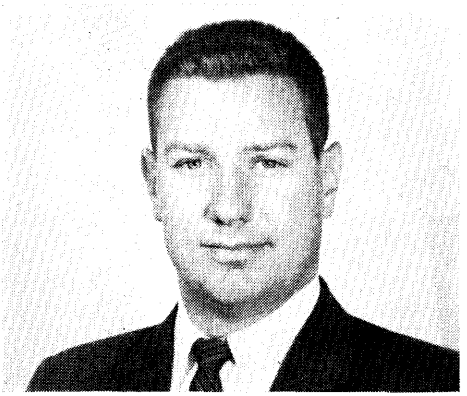
Many plant diseases are known to affect turf quality. In some cases, obtaining a stand is not possible as a result of seedling diseases. It goes without saying that if a stand is not obtained turf quality will be poor.

While healthy turf is capable of withstanding and overcoming attacks by some pathogenic organisms, severe damage sometimes occurs. Turf is very often affected by disease to the extent of a complete loss. Sound turf management is sometimes the major key to disease prevention, but quite often fungicides are necessary for preventative and control programs. Diseases for which cures are known should never be allowed to deprive us of desired turf quality. Even though many pathogens are extremely prolific, keen observations can often detect their presence soon enough to begin control measures before damage occurs.

In summary, as we compare each of the factors mentioned to links of a chain, we readily see the contribution of each toward producing turf of maximum quality. Not only can each factor be critical when singled out but also of importance is the interrelationship of all these factors.

The excellence of turf will be related to the ability of the manager to overcome the factors which are detrimental to turf quality. Any one of the limiting factors discussed may prevent good practices in every other facet of management from producing high quality turf.

Joins Green Section Staff



Charles E. Croley

Charles E. Croley has been appointed an Agronomist in the Southwestern Office of the USGA Green Section. The office is at Texas A and M College, College Station, where Mr. Croley is studying toward a Master of Science degree in Turf Management.

He received the Bachelor of Science degree in Agronomy at Virginia Polytechnic Institute in 1960. While at V.P.I., he assisted in the establishment of the Institute's turf research program. He was also employed by the Virginia Department of Highways and the V.P.I. Agronomy Department to assist in their joint highway turf research program.

Mr. Croley, a native of Houston, served in the U. S. Army's Transportation Corps during 1954-56.

Turfgrass

The use of turfgrass seed on a national basis each year illustrates the importance of turfgrasses. The annual usage of seed of those grasses, primarily considered turfgrasses, exceeds 104 million pounds. Included in this list are the Kentucky bluegrass varieties, chewings and creeping red fescue, bentgrasses, and a portion of the ryegrass varieties. Over 60 percent of this total poundage of grass seed was produced in the Northwest states. In Washington, turfgrasses account for 56 percent of the total grass seed production. It is expected this industry will become more important.

—Alvin G. Law

Larus Argentatus Smithsonianus

As golf extends over our land, the problems of the Green Superintendent vary from freeze-up to crabs and rattlesnakes.

To the golf courses, bordering on the ocean, or salt water inlets, unique problems present themselves during the winter.

The Great Scavenger

To the non-ornithologist, the title above is the Latin name for the Herring Gull, who is the great scavenger of our salt water coasts. Gulls live on any form of decayed matter, or meat or fish. When the cold winter comes, they tread for clams and mussels. When they find a hard shell clam, the problem is how to open the shell to secure the succulent contents. This is how it is done—with the clam gripped in its bill, the gull flies as high as one hundred feet in the air and drops the clam. Where do they drop it? On the smooth hard frozen surface of a putting green. As the surface of the green is solid, no dents or cuts are inflicted but before the hardy golfers start their play, the greenkeeper uses a scoop to clear bushels of broken shells from the green.

This is not all. The droppings from the gulls are highly fertile and when the spring thaw comes, each dropping creates a burnt spot about one inch in diameter but bordering the burnt spot is a beautiful circle of strong green grass, twice the size of the burned out spot.

During the Spring high tides and a hurricane like Donna, many fairways on the low lying coastal courses are completely covered with salt water. Worms do not like the salt. According to H. Burton Musser, "earthworms aid in aerating the soil and thus are beneficial to turf."

Descent for a Feast

As the salt forces the worms out of the soil, they float in the salt water and thousands of gulls descend on the course and feast on earthworms. The destruction of a single worm is a contribution to compaction.

—Gilbert Tompkins