

## The Science of Mowing

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**G**OOD MOWING practices are perhaps the most important single factor contributing to a well-groomed appearance and the longevity of any turfgrass.

Grass cutting is perhaps the major time consuming operation in the maintenance of turfgrass. The manner in which grass is cut also will greatly influence its health, vigor and density. These factors, along with an adapted grass, proper fertilization, aeration and judicious watering will determine the ultimate quality of turfgrass. All are instrumental in the degree of weed invasion which may occur and, collectively, they control the overall appearance of the lawn.

An understanding of the basic growth habits and characteristics of grass is essential for the development of proper mowing techniques.

### Growth Habits

On the basis of growth type, grasses may be classified into three general groups:

Bunch-type grasses, such as ryegrass and chewing fescue, produce

new shoots which grow inside the sheaths of the previous stem growth. Stoloniferous grasses, such as bentgrass, spread by runners or stolons which develop from shoots that push through the sheath and run along the surface of the ground, rooting at the nodes (joints). Kentucky bluegrass, a rhizomatous type of grass, develops shoots at the underground nodes.

Some grasses, such as bermudagrass and zoysiagrass, spread by both rhizomes and stolons. This is one reason why bermudagrass is such a vigorous grower and is so difficult to control and keep out of flower beds, gravel walks and similar areas. There are, also, intermediate types with decumbent stems which root at the nodes, such as crabgrass, nimblewill and some fescues.

The grass leaf is adapted for intercepting a maximum of sun rays, which are essential for photosynthesis. The long flattened grass blades provide a maximum of exposure with a minimum amount of protoplasm, thus making efficient use of the living tissue.

A reduction in the plant leaf area exposed to sunlight reduces the plant's capacity to carry on photosynthetic activity. This is a vital and

basic consideration in determining the frequency and height of cut of turfgrasses.

The ability of grasses to withstand frequent and relatively close cutting is related to certain peculiarities of the grass family.

Grasses exhibit basal growth, as opposed to terminal growth found in most other plants. Basal growth means simply that growth initiates at the base rather than at the tip of the blade or stem. From a practical standpoint, this means that normal and frequent mowing does not cut off the growing areas of the grass leaf. Removal of too much leaf surface at any one cutting may, however, destroy some of the growing points.

### Height of Cut

The height at which a given perennial grass can be cut and still survive for extended periods is directly related to its ability to produce sufficient leaf surface for the photosynthetic activity required for its growth.

Basically this ability is related to the inherent type and habit of growth found in the grass. The length of internodes, the number of stolons or rhizomes, and the number

of basal buds all influence the amount of leaf mass produced by a given grass; hence, affects its ability to withstand low heights of cut.

Creeping-type plants, such as bentgrass and bermudagrass, when properly fertilized and watered, are able to produce adequate leaf surface at very low heights of cut (3/16 inch). Buffalograss, although a creeper, cannot produce sufficient leaf mass at low heights because too few basal buds exist and, therefore, cannot withstand low clipping. For this same reason, Kentucky bluegrass and fescue must be cut relatively high (1 to 1½ inches). If bunch-type grasses are cut close, too much leaf surface is removed, and the plant can no longer carry on sufficient photosynthetic activity to sustain satisfactory growth.

#### Frequency of Cut

Frequency of mowing also is an important consideration in the maintenance program. Infrequent clipping allows the grass to elongate to such a degree that any subsequent clipping removes an excessive amount of leaf surface.

*At no time should clipping amounts in excess of ¼ to ⅓ of the*

*total leaf surface be removed at a given mowing on lawns.*

Removal of large amounts of leaf surface will result in a physiological shock to the plant, cause excessive graying or browning of the leaf tips, and greatly curtail the photosynthetic production of food. While this may not seriously damage the plant, it does cause the lawn to look "butchered."

In addition, the accumulation of excessive clippings may smother the grass and provide excellent environmental conditions for disease organisms and insects. The frequency of clipping must be governed by the amount of growth, which in turn is related to weather conditions, season of the year, soil fertility, moisture conditions and the natural growth rate of the grasses.

#### Stage of Growth

The stage of growth of turfgrass plays a major role in mowing practices. Young tender growth in the spring is generally soft and succulent. The moisture content of young immature turfgrass is much higher than that of mature grass. Likewise, the fiber content of young grass is much lower than that of

mature grass. Such a condition influences mowing practices.

Tender young grass must be cut with a sharp, well adjusted mower to avoid mechanical damage. The early growth must be cut frequently to avoid the problems associated with high moisture.

Mowing practices during the early stages of growth exert a material influence on density of turfgrass. Cutting at heights somewhat lower than normal during early spring will encourage lateral growth which, in turn, promotes density and helps prevent weed invasion. Such may cause a reduction in root depth and should not be continued indefinitely.

#### Mower Selection

Good mowers are characterized by high maneuverability, easy adjustment, durability and adequate horsepower for size and usage. In addition to these inherent design features, the ready availability of parts and service is important.

Two basic types of mowers are available—reel and rotary. Choice of a given type will be governed by the particular duties the unit will be expected to perform. Each type has certain advantages and limitations



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which should be carefully considered before final selection of a mower is made.

**Reel-type mowers** are always recommended for the cutting of formal and semi-formal turf areas, including golf greens, tees, fairways and lawns cut less than one inch. Reel-type gang mowers are, also, the most efficient and economical for mowing large open areas such as airfields and parks. The cutting action of the reel is like that of a pair of scissors.

Reels, when sharp and properly adjusted, give a clean even cut which cannot be equalled by any other type of mower. Certain kinds of grass should always be cut with reel type mowers. Bentgrasses and bermudagrasses used on putting greens are an example.

The use of reel type mowers may be limited in some turf areas because they require relatively smooth ground upon which to operate, and they will not cut tall, rank growing weeds. In addition, the cost of maintenance is somewhat higher than that of other types of mowers.

**Rotary mowers** are widely used. They are versatile and adapted for use on most home lawns. They are always recommended for rough con-

ditions and on areas where control of grass, rather than appearance, is the predominant consideration.

Rotaries also may be used to grind up leaves, cut tall stemmy weeds, and to trim. The rotary cuts by impact similar to the cutting action of a scythe. For this reason, a sharp, properly balanced blade is necessary to avoid ragged tearing of the grass blade and to prolong engine life.

Cutting with a dull blade generally results in a graying and subsequent browning of the leaf tip. When selecting a rotary mower, give particular attention to the safety features, the type of blade and method of blade mounting, ease of adjustment and horsepower.

Power requirements—the highest of any type of mower—and scalping on uneven or rough terrain, are the major limitations of rotary mowers. The cost of maintenance is low on the rotary unit, although the cost of engine maintenance may be much higher than on reel units, particularly if the unit is underpowered or used under dusty conditions.

#### **Dashboard Effect**

Turfgrass areas regularly cut with power mowers or gang mowers



sometimes develop a series of wave-like ridges running at right angles to the direction of mowing.

The development of this washboard effect may be prevented or partially remedied by regularly changing the direction of mowing (diagonal or right angles). Alternate directions of cut will partially control runners of creeping grasses and aid in the prevention of grain and thatch.

## *Prison Inmates Study Plant Care*

Horticulture and arboriculture are part of the curriculum of Stateville Penitentiary, near Joliet, Ill.

Arborist-humanitarian Archibald E. Price of Glenview, Ill., became interested in rehabilitative prison work eight years ago, when he volunteered to organize and instruct classes in plant care. Since then, class membership has grown from 17 to 140, and instruction covers a complete range of horticultural subjects from gardening to greenhouse care.

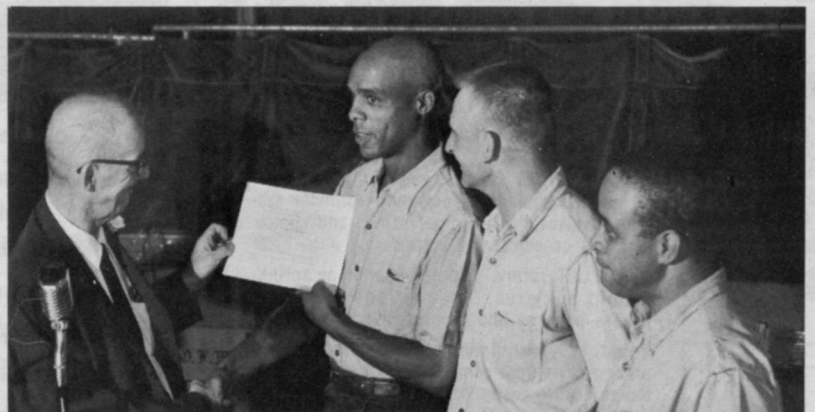
At the end of the 26-week course, Certificates of Completion are presented to those inmates who have finished the series.

Recently, Price received two awards recognizing his contribution to penal rehabilitation. These are the John Howard Association 1969 Award, and the Award of Outstanding Laymen in Correction, presented by the Illinois Probation, Parole and Correc-

tional Association.

The latter reads: "Citation to Archibald Enoch Price, in recognition of his humanitarian contribution and deep interest in the correctional process throughout

the State of Illinois penal system. The vocational training and guidance in the field of horticulture has been beneficial to a multitude of men returning to the community."



Archibald E. Price, left, Illinois arborist, presents Certificates of Completion to three men for their participation in the Stateville Penitentiary horticulture course. Price has been conducting a 26-week class in plant care at the Joliet, Ill., prison since 1961.



A very similar washboard appearance is often observed on turf areas, but is no fault of the mowing equipment or the operator. Many times land is plowed for seedbed preparation and not properly disked and leveled prior to seeding. Settling then takes place in the plow furrows and unevenness develops.

Such a situation may be reduced in severity over a period of years by heavy aeration followed by

dragging. The dragging operation generally will remove most of the soil cores from the high areas and deposit them in the low areas.

#### Wet Conditions

Mowing wet grass should be avoided as much as possible, although available labor and time often make it impractical to do so. Dry grass cuts more easily, does not ball up and clog the mower, and gives a much finer appearing lawn. Timing tests show that mowing dry grass requires less time than mowing wet grass.

#### Uneven Terrain

Mowers are not built for grading purposes. Turf areas containing high areas which are continually scalped should be regraded so they may be cut properly and to reduce the wear and possible damage to mowing equipment.

Inadequate insect control can become a serious mowing problem. Areas heavily infested with earthworms or ants will have many soil mounds caused by their activity which will result in a poor appearing area and will cause damage to

mowing units. Mounds of earth thrown up by gophers and other soil burrowing animals will have the same result.

#### Improper Operation

Irregular or uneven cutting often occurs from the bobbing motion of mowing units. This may be caused by mowing at excessive speeds or by equipment not built correctly for the grass it is cutting. This often occurs where the grass is extremely heavy or dense and the mower, because of insufficient weight and/or cutting ability, bobs up as the mower hits heavy grass.

On specialized areas, such as putting greens, bowling greens, lawn tennis courts, etc., improper handling of the mower on turns will result in turf damage through bruising and wearing of the grass.

#### Terraces and Banks

Terraces and banks offer a difficult mowing problem. Scalping generally will occur if the bank or terrace is mowed across the slope. Up and down mowing generally is the most satisfactory method of cutting these areas.

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