California Turfgrass Culture

FORMERLY, SOUTHERN CALIFORNIA TURFGRASS CULTURE

OCTOBER 1962 VOLUME 12 - NUMBER 4

Climatic Zones for Turfgrass in California

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Climatic adaptability should be one of the major considerations in selecting grass for the home lawn. Although grasses are very adaptable and can endure in a wide range of climates, use of the climate zone maps to select a naturally adapted "cool season" grass for the temperate zone or a "warm season" grass for the sub-tropical zone will offer more lasting satisfaction.

Home lawns are planted with the expectation that they will endure for years. A grass that fails to persist at least five years with ordinary care cannot be considered well adapted to the climate. Grasses used for home lawns can be divided into two broad groups: temperate zone or "cool season" grasses, and sub-tropical zone or "warm season" grasses.

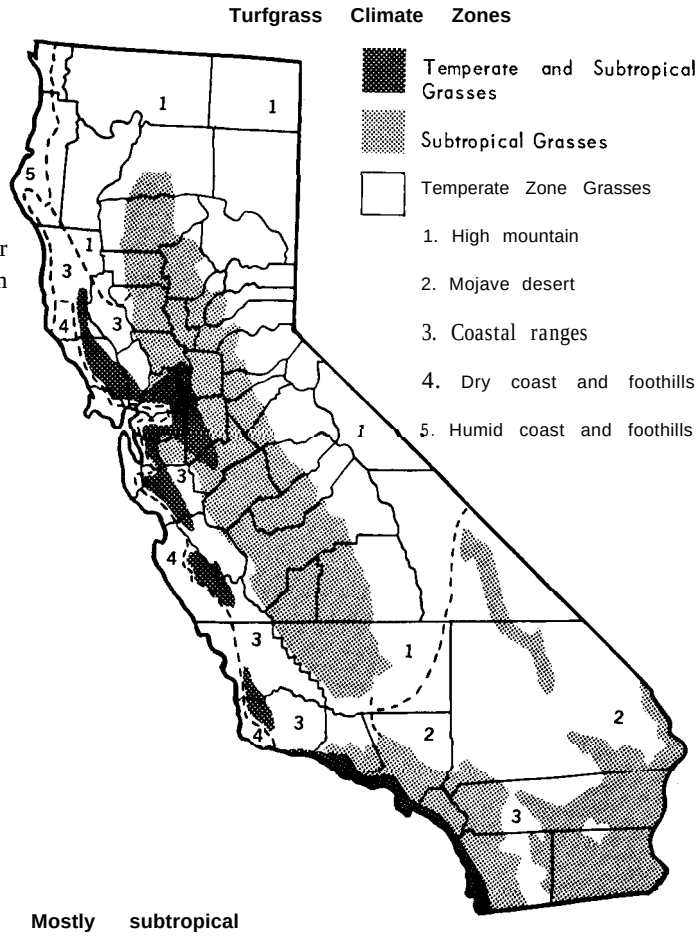
Common lawn grasses included in the temperate zone group are bentgrasses, bluegrasses, fescues, and rye-grasses. These grasses prefer an environment that is relatively cool and at no time continuously hot night and day. Some temperate zone grasses have considerable adaptability. Bluegrass, for example, will do surprisingly well in warm areas, providing nights are cool. Other grasses, however, are more exacting in their requirements.

Subtropical grasses usually grow best in warm hot climates, but some from the high altitude tropics prefer a mild, even climate. The best known subtropical grasses have a dormant season in winter, and include bermuda-grass, and St. Augustine grass.

The exceedingly varied climates of California, ranging from arid subtropical to subalpine, can be broadly grouped into three subdivisions from the standpoint of turfgrass adaptability. The grouping delineates areas where the climate favors grasses of the temperate zone type or of the subtropical type. Transitional areas where either kind of grass can be maintained by careful management are also indicated on the accompanying map.

Zone map

As indicated on the map, the area of best adaptability for temperate zone grasses extends from the Oregon border to the high mountains at the Mexican border. The area best suited to subtropical grasses includes the lower elevations from the Mexican border to the north end of the Sacramento Valley near Redding The critical elevation between the subtropical gradually rises from about 1,500 feet to 2,000 feet at latitude 40° 45'north of Redding to approximately 4,000 feet on the west slopes at latitude 31° 30° south of Julian – a distance of 650 miles.



Mostly subtropical

Most California residents live in areas where sub-tropical grasses are best adapted. By learning to manage one of the adapted species, home owners can have a green turf the greater portion of the year and save money and effort otherwise required to fight a continual and losing battle to maintain poorly adapted grasses. With proper management and overseeding in late summer, ber-mudagrass can present a green surface at least 11 months of the year in the entire subtropical grass area. In areas favoring temperate zone grasses, a cool season grass will give better performance.

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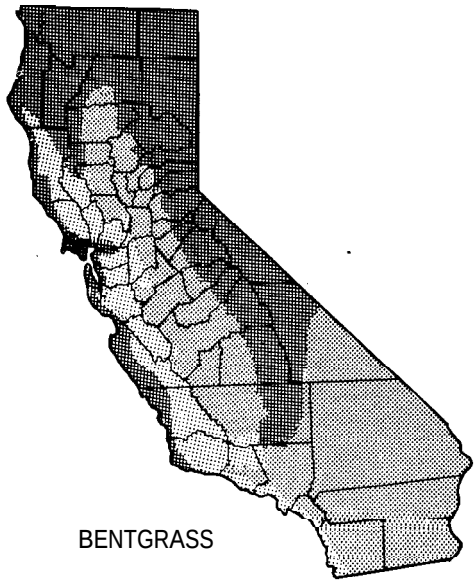
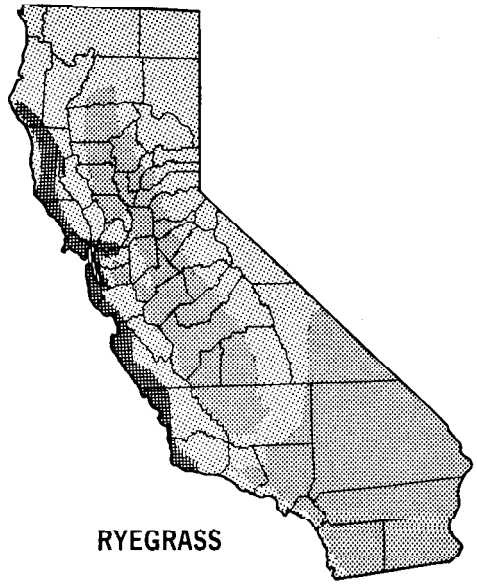
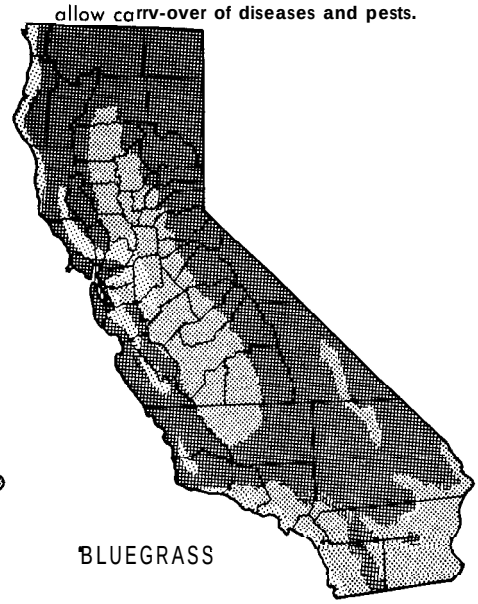
BENTGRASS-Naturally adapted to cool, moist, north coast.



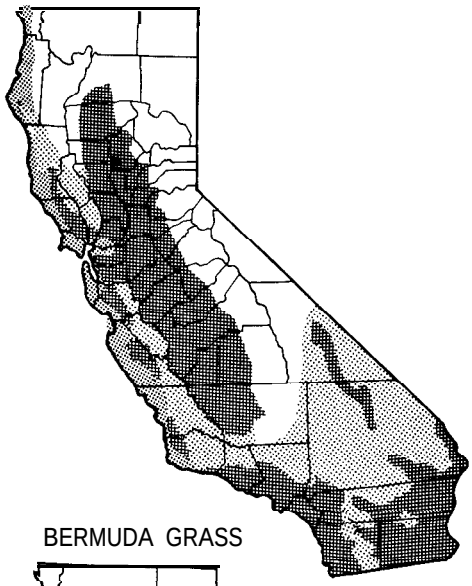
RYEGRASS-Thrives in coastal winter climate, Survives summer in the cooler areas.



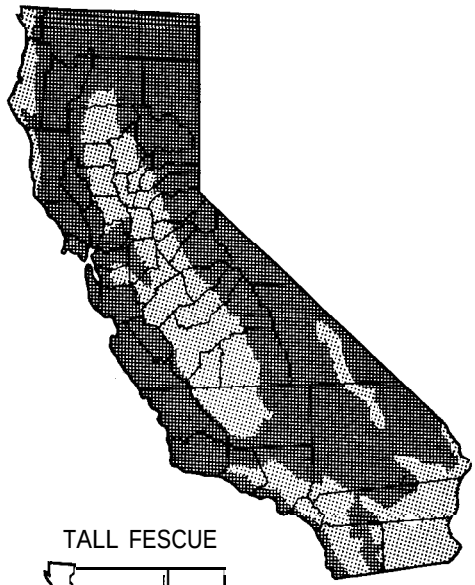
BLUEGRASS-The standard, can be grown where nights are cool, but mild winters may allow carrv-over of diseases and pests.



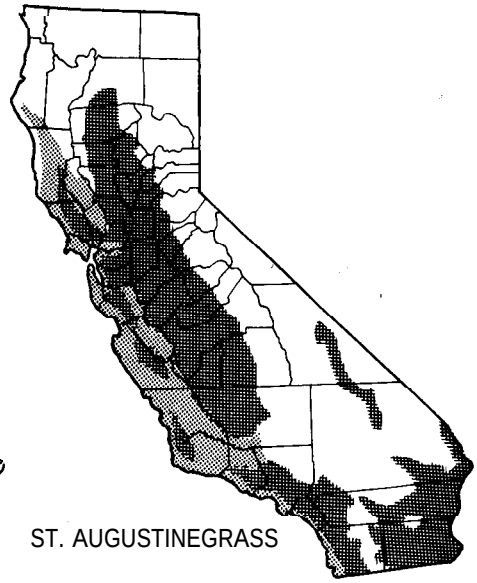
BERMUDA-Dense subtropical sod-forming grass. Makes a beautiful summer lawn, which is overseeded for winter beauty.

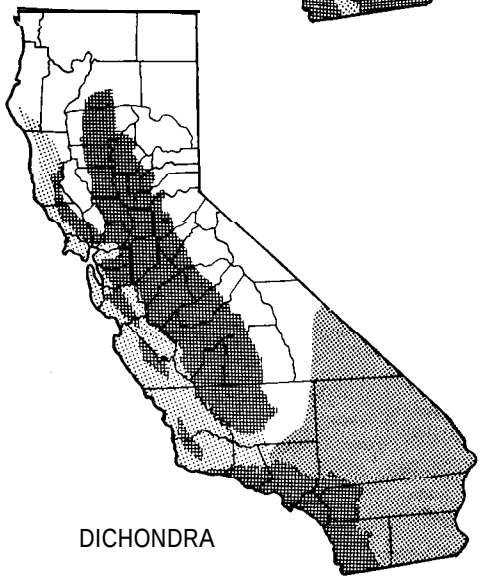


TALL FESCUE-Somewhat coarse, but a tough, deep-rooted grass with few problems.

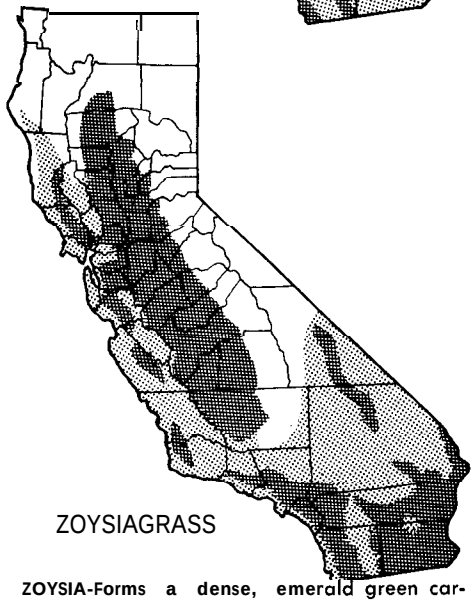


ST. AUGUSTINE-A coarse, shade-tolerant grass well suited to hot climates.

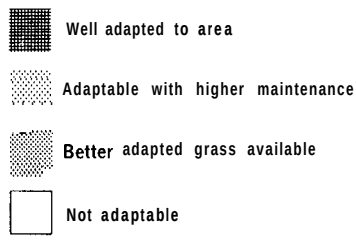




DICHONDRA-A successful ground cover in warm areas in clean soils free of weeds.



ZOYSIA-Forms a dense, emerald green carpet, somewhat shade tolerant and requiring heat for good growth.



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Dichondra will grow in all of the subtropical and transitional areas with the exception of the low-elevation deserts in the extreme southeastern portion of the state – the Coachella, Imperial and Colorado River valleys. There, it will survive only in partial shade. Dichondra is moderately suited to subclimate 4 of the temperate zone grass area.

As the turfgrass distribution map indicates, it is impossible to discuss grasses (or, for that matter, any other crop) from the standpoint of "northern" California or "southern" California. Crop adaptation must be discussed in accordance with the climatic zones.

Eight of the grasses grown for turf in California have been selected to illustrate the use of the turfgrass climate zones. The subtropical grasses are: bermudagrass; St. Augustine grass; zoysiagrass; and a ground cover, dichondra, which is a low spreading, broadleafed plant used to a considerable extent for home lawns. The temperate zone grasses are: tall fescue (altaa fescue); bentgrass; bluegrass, and perennial ryegrass.

Adaptability ratings

Grasses are very adaptable and can endure in a wide range of climates. The small maps included here show the geographical areas of special climatic adaptability for these seven grasses and dichondra. Four ratings are given:

Well adapted grasses will perform satisfactorily with the maintenance normally required by the grass species.

Adaptable with higher maintenance rating includes grasses that will require more skillful and persistent maintenance to overcome the effects of climate on growth.

Better adaptable grass available rating indicates weak growth permitting invasion of more adaptable grasses and weeds. These lawns tend to deteriorate unless expert maintenance is practiced.

Not adaptable rating indicates the grass will not survive.

The turfgrass maps provide a guide in selecting the grass for a home lawn. Small areas exist within all of these principal climatic zones where micro-climates may altar selections. All climatic boundaries must be considered somewhat flexible. Home owners may obtain greatest satisfaction by selecting grasses climatically adapted to their areas, and learning how to manage them.

Patterns of Mowing

Dr. J. R. Watson
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Today, a rapidly increasing population, coupled with more leisure time than at any period in history, is placing heavy demands on all types of recreational facilities and services. Increasing economic and production efficiencies will, unquestionably, result in even more leisure time in the future. From the standpoint of usage, this will exert still more pressure on existing turfgrass areas and necessitate the construction of new facilities. In the face of rising labor costs and with user demands for higher quality playing conditions, it seems mandatory that the organization (whether it's a golf course, park, school, highway, airport or cemetery) charged with maintaining turfgrass must either increase budgets or increase efficiency in its operations. Growing resistance to higher budgets indicates that rising labor costs must be offset by more efficient operations. Efficiency, in this case, implies the development and maintenance of the highest possible degree of turfgrass quality and user acceptance commensurate with a given expenditure of time, energy and money.

Adequate, modem equipment contributes to efficient operation and maintenance of turfgrass areas. Since labor is the biggest expense item in a yearly budget (estimates vary from 65 to 75 per cent), this means, primarily, that hand operations must be keyed to the use of not only more mechanized equipment but also to equipment which will produce a greater number of work units per man hour.

As an example, let us compare labor costs involved when using 30-inch and 76-inch mowers.

1. A 30-inch mower (walk) at 3 m.p.h. will cut 6 1/2 acres in 8 hours; therefore, two such mowers will cut 13 acres in 8 hours. Assuming $2.00 per hour for each operator, or $32.00 per operator per day, labor costs to cut 13 acres would figure approximately g2.46 per acre.
2. A 76-inch Triplex mower (riding) at 3 m.p.h. will cut 17 acres in 8 hours or, at 31/2 m.p.h., 19 acres in 8 hours. Figuring one machine with one operator at $2.00 per hour, or 616.00 per day labor cost and using 18 acres, would amount to an average cost of $ .88 per acre.
3. Looking at these two units in another way, the 76-inch Triplex at 3 m.p.h. would cut 6 1/2 acres in 3 1/2 hours. The 30-inch mower would cut 6 1/2 acres 8 hours. Use of the 76-inch Professional-type mower would free the operator for 41/2 hours to perform work in other areas.
4. Looking at the basic costs of the two units, the 76-inch Triplex would cost approximately $750.00 more than the 30-inch unit. Using 916.00 a day labor savings for one operator for 5 days a week would require only 9 to 10 weeks or save the additional cost of the larger unit.

Great strides have been made in this respect during the past two decades, but still greater strides must be made if our turfgrass recreational facilities and services are going to maintain even their current level of acceptance.

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Patterns of Mowing

Machinery and equipment requirements for modem turfgrass culture and management depend on the available labor force, the level of maintenance, the size, landscaping, kind of grass, and use for which the area is designed. These considerations are basic when determining the size, number, and types of mowing equipment needed for efficient and economical operation on turfgrass areas. The selection, procurement, use, and maintenance of mowing equipment should be approached on the same basis as the over-all operation of the organization; i.e., a planned and organized approach with proper supervision.

Planning for Adequate Equipment

The direction for increased efficiency through adequate equipment does not necessarily lie in the development of new equipment, non-existant today. Rather, increased efficiency may (and probably does) lie in the development and execution of programs built around mowers presently available, or in the later stages of development. Certainly, the greatest immediate potential for increasing efficiency calls for such an approach in our thinking. This means planning.

Planning is actually a management function, but I should like to touch briefly on its importance in respect to requirements for mowing equipment,

Planning for adequate equipment begins with a detailed study of the layout of the turfgrass area or areas. Ideally, a scaled layout of the golf course, park, school grounds, etc., should be prepared. If more than one park, campus or cemetery is involved, all should be mapped individually and then brought together (on a reduced scale) on a master layout. Such a layout should show the various landscape and terrain features; roadways and bridges; and the location, size and shape of special features such as ball fields and greens. From the layout, and with a knowledge of the necessary maintenance practices and capabilities of the machines to be used, plans for increasing efficiency through adequate equipment may be developed. These should be developed along two lines – an "immediate or current" program and a "long-range" program.

Immediate Program.

The objective of this program should be to determine if the area or areas concerned, in their present condition, are being maintained as efficiently as is possible with equipment on hand or available for purchase. This involves, among other things, an examination of the capacity, mobility, maneuverability, sturdiness, durability –– and in the case of certain mowing units, trimmability -- as well as a study of the maintenance records on each piece of equipment to determine annual service and repair costs. When contemplating the purchase of new or replacement equipment, satisfy yourself that you are making a wise choice. Record the actual time involved in cutting and in transporting between cutting areas. Compare the performance of the old versus the new. Determine, for example, how many independent 30-inch cutting units can be replaced by one tractor with integrally mounted, hydraulically operated 30-inch cutting units. For that matter, compare the savings in time and labor between one such 7-unit mower with two conventional pull-type 5-unit setups. Do not forget to consider the difference in the number of operators and the fact that, in the latter example, you tie up one tractor instead of two. Replacement of inadequate and costly equipment (from the standpoint of operation) with units which will produce more work per man hour of operation will contribute materially to efficiency; however, since equipment purchases are essentially capital expenditures, and certain types may last from 5 to 15 years, no equipment should be purchased except within the framework of a long-range program.

Long-Range Program.

This approach is basically a modernization program. Many of our turfgrass areas were designed and constructed during an era when labor costs were negligible and mechanization of little importance. This created many time-consuming operations which, today, require tbe use of low capacity, and often costly equipment. Landscaping may not have been planned; it may have grown haphazardly over the years with little thought to the maintenance demands being created (often in accordance with the whims and fancies of some particular individual). Shrubs and trees requiring specialized care in spraying, trimming, etc., and often located in such a manner as to interfere with large capacity mowing equipment (thus requiring additional time-consuming operations to maintain surrounding turfgrass) do not contribute to efficient operation. Such areas are due for a face lifting.

A long-range program of redesign in keeping with modern trends will, unquestionably, contribute to efficiency. Such a program might call for landscaping to eliminate problem trees and shrubs; substitution of species requiring minimum maintenance, located to accommodate equipment with greater capacity; replacement with greater capacity; replacement of obsolete irrigation systems with modern automatic or semi-automatic systems; and, perhaps most important, the construction of specialized, intensively used areas such as golf greens and athletic fields by employing the latest materials and techniques developed through research. Such a program may require several years for completion but, with competent direction, supervision, and adequate equipment, it may be accomplished with only a reasonable increase in operating budgets. Continuity of direction, attainable through a longer tenure of office for managers and supervisors, is basic to the success of an efficient operation.

Mowing,

Grass cutting is probably the major time-consuming phase of the grass-maintenance program. Good mowing practices are perhaps the most important single factor contributing to the well-groomed appearance of turfgrass. Proper mowing encourages more rapid coverage of turf-

grass, promotes density and vigor, and serves to check the growth of weeds. For these reasons, the selection and care of the mower are particularly significant.

Mowers.

Are available in varying widths and with numerous features. Requirements of a good mower are mobility, maneuverability, easy adjustment, durability, sturdiness and adequate horsepower for the size and usage expected.

A mower, as with any equipment, is only as good as the service organization behind it, from the owner-operator through the local distributor to the manufacturer. Therefore, in addition to the inherent design features, the ready availability of parts and service is a most important consideration when selecting a mower.

Most manufacturers build two lines of equipment – "consumer" and "institutional". Consumer equipment is designed and constructed for cutting home lawns. It operates satisfactorily when used for a few hours a day or a few days a week. Institutional equipment, on the other hand, is built to stand up under eight-hour-a-day, five-day-a-week usage for extended periods. Institutional equipment is of rugged construction and functional design and is capable of performing under continuous use if cared for properly. Obviously, there is a considerable cost differential between the two lines but, as with most items, cost is a function of value received.

Patterns of Mowing.

On well-landscaped plots, irrespective of the area involved, the mobility, maneuverability, size and design of mowers are of utmost importance from the standpoint of efficiency of operation. Unless the plantings –– trees, shrubs and flower beds –– are laid out to accommodate wide mowers, it may be much more efficient to choose two or even three small-sized units than to attempt to cut with one wide mower or tractor-drawn units. Delays encountered in maneuvering larger equipment around mowing obstacles, that tie up more expensive equipment and possibly higher paid workers, plus the time required to "clean up" inaccessible areas, often may consume more man hours than would be required to operate the smaller equipment. On such areas, mowers that will trim along borders, around trees, and, especially, those that will cut under low-hanging branches without damage will save additional cleanup and trimming time. Combinations of large and small units working in teams are generally the most efficient method of handling areas landscaped in such a manner. As stated earlier, the long-range approach to efficient maintenance of such areas may be to remodel the landscape to permit the use of greater capacity mowers.

Four basic types of mowers are available – reel, rotary, sickle and vertical. Choice of a given type will be governed by the particular duties expected from the mower. Each type has certain advantages and certain 1imitations which need to be carefully considered before the selection is made. Consultation with the manufacturer or his representative is always helpful in this respect. The reliable manufacturer always backs up his equipment.

Maintenance of Equipment.

Lasting and satisfactory operation of mowing equipment may be obtained by following a routine program of care. When a large expenditure for maintenance on a relatively new piece of equipment occurs, it is the duty of the supervisor to find out why. In some instances the trouble may be inherent in the machine and cannot be prevented, but many times accelerated wear is caused by lack of ordinary care and maintenance.

The maintenance of equipment, like the selection of equipment, embodies more than just the actual mechanics of doing the job. Maintenance and the facilities for maintenance must be planned and programed. The plans should include regularly scheduled programs for training operators to properly use the equipment and, perhaps most important, to acquaint them with the over-all objectives and policies of the organization. Maintenance plans also include programs for securing adequate storage and painting facilities, and procurement of the correct tools.

Record Keeping on every piece of equipment is another important phase of maintenance. A record showing, among other things, the accumulated running hours and parts and labor for repairs, will be helpful in determining the efficiency of your maintenance program and may serve to justify either new equipment or, in conjunction with studies on efficiency, indicate replacement with larger capacity equipment.

Mowers, as most other equipment, are wheeled vehicles; they have the same maintenance requirements and should receive the same type care given commercial trucks, cars and tractors.

CALIFORNIA TURFGRASS CULTURE is sponsored by the Federated Turfgross Council of California and is currently financed by the Southern California Golf Association. Communications should be sent to the editor, Dr. Victor B. Youngner Cepartment of Floriculture and Ornamental Horticulture, 300 Veteran Avenue, University of California, Los Angeles 24, California. The Federated Council consists of the officers of the three regional councils. Subscription to this publication is through membership in one of the regional councils listed below:

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WHICH IS THE BEST TURFGRASS?

Victor B. Youngner, Department of Floriculture and Ornamental Horticulture, UCLA.

This question con be answered only if we know how the turf is to be used, where it is to be grown ond what is desired in management and appearance.

No gross variety is perfect os all hove certain good and bad features. We must learn these cha r-octeristics, decide whot is required in the turf to be planted and then choose the variety which most ne arly meets these requirements.

Following is on evoluotion of some of the most important characteristics and requirements of common turfgrosses.

I. HIGH TEMPERATURE TOLERANCE

High
- Zoys io
- Improved and common bermudas
- St. Augustine
- Toll fescue
- Dichondro
- Meadow fescue
- Kentucky bluegrass
- Red fescue
- Ryegrass

Low
- Bentgrosses

II. TEXTURE -LEAF-BLADE WIDTH

Coarse
- Tall fescue
- St. Augustine
- Meadow fescue
- Common bermuda
- Kentucky bluegrass
- Perennial rye grass
- Zoysia (Emerald and Matrella)
- Improved bermudos (Tifgreen, Sunturf
- Colonial bentgrass
- Creeping bentgrass

Fine
- Red fescue

III. DISEASE TOLERANCE

high
- Toll fescue
- Zoysia
- Improved bermudas
- Common bermuda
- Perennial ryegrass
- St. Augustine
- Meadow fescue
- Kentucky bluegrass
- Red fescue
- Dichondra

Low
- Bentgrasses

IV. SHADE TOLERANCE

Shade
- Red fescue
- Zoysia
- St. Augustine
- Dichondro
- Bentgrasses
- Tall fescue
- Meadow fescue
- Kentucky bluegrass
- Perennial ryegrass
- Improved bermudas

Sun
- Common bermuda

V. WEAR RESISTANCE

High
- Zoysia
- Improved bermudas
- Toll fescue
- Common bermuda
- Perennial ryegrass
- Meadow fescue
- Kentucky bluegrass
- Red fescue
- St. Augustine
- Bentgrasses

Low
- Dichondra

VI. COOL TEMPERATURE TOLERANCE (winter color)

H h
- Perennial rye grass
- Kentucky bluegrass
- Bentgrasses
- Red fescue
- Tall fescue
- Meodow fescue

} Temperate climate grasses

- Dichondra
- St. Augustine
- Zoysia (Matrella and Emerald)
- Improved bermudos

} Subtropical climate grasses

W
- Common bermuda

VII. SALINITY TOLERANCE

- Improved and common bermudas
- Zoysia
- St. Augustine
- Tal l fescue
- Creeping bentgross
- Perennial ryegrass
- Meadow fescue
- Red fescue
- Kentucky bluegrass
- Colonial bentgrass

Low
- Dichondra

VIII. TOLERANCE OF CLOSE CLIPPING

Low cut
- Improved and common bermudas, 1/4" or less
- Creeping bentgross
- Colonial bentgrass
- Zoysia
- St. Augustine
- Dichondra
- Toll fescue
- Red fescue
- Meadow fescue

High cut
- Perennial ryegrass
- Kentucky bluegrass, 1 1/2" or more

CONTINUED

IX. DROUGHT TOLERANCE

High
- Improved bermudas
- Zoysia
- Common bermuda
- Tall fescue
- Red fescue
- Kentucky bluegrass
- Perennial ryegrass
- Meadow fescue
- St. Augustine
- Colonial bentgrass
- Dichondra

LOW
- Creeping bentgrass

X. RECOVERY FROM MODERATE WEAR

Fast
- improved bermudas
- Common bermuda
- Creeping bentgrass
- St. Augustine
- Tall fescue
- Kentucky bluegrass
- Perennial ryegrass
- Meadow fescue
- Red fescue
- Dichondra
- Colonial bentgrass

Slow
- Zoysia

XI. NITROGEN FERTILITY REQUIREMENT

Low
- Zoysio
- Red fescue
- Tall fescue
- Meadow fescue
- Perennial ryegrass
- St. Augustine
- Kentucky bluegrass
- Improved bermudos
- Common bermud
- Dichondro
- Colonial bentgrass

High
- Creeping bentgrass

XII. RECOVERY FROM SEVERE INJURY

Complete
- Improved and common bermudas
- Zoysio (slow but complete)
- St. Augustine
- Dichondra
- Creeping bentgrass
- Kentucky bluegrass
- Colonial bentgrass
- Red fescue
- Meadow fescue
- Tall fescue

Partial
- Perennial ryegrass

} Tend to become bunchy

XIII. COMPACTED SOIL TOLERANCE

High
- Tal l fescue
- Improved bermudos
- Common bermudo
- Zoysio
- Perennial ryegrass
- Meadow fescue
- St. Augustine
- Red fescue
- Kentucky blue$_g$rass
- Dichondra
- Colonial bentgrass

LOW
- Creeping bentgross

XIV. RATE OF ESTABLISHMENT

Fast
- Improved bermudas (stolons)
- Common bermudo
- Perennial ryegrass
- Creeping bentgross (stolons)
- St. Augustine
- Meadow fescue
- Tall fescue
- Kentucky bluegrass
- Bentgras ses from seed
- Red fescue
- Dichondro

Slow
- Zoysia

The grasses in these lists may change order slightly as more is learned about them. Their positions may vary also according to climate, weather, soils and other environmental factors. However, their general location (high, low, or intermediate on a list) is not likely to change and should be carefully noted when varieties are selected for planting.

Tree Health and Beauty Improved from Vertical-Mulching

by Wayne c. Morgan
University of California
Agricultural Extension Service

Trees must have adequate moisture and air throughout the depth of the root zone. If the soil is allowed to become dry around the deeper roots, trees may be permanently injured even though there may be abundant moisture near the surface.

Soil compaction, sloped areas where water runs off, or soils which resist water-infiltration make it difficult to maintain suitable soil air-moisture relations at lower depths. Sometimes shallow impermeable layers which may overlap open, permeable soils, impede drainage, resulting in unfavorable conditions for plant root growth and activity.

Field trials conducted in cooperation with the University of California Agricultural Extension Service in Los Angeles County during the past two years have shown strikingly that vertical-mulching around trees growing in such problem areas can greatly improve tree health and beauty.

At Forest Lawn Memorial Park in Glendale, where many of the trials were conducted, results were so encouraging that a program of vertical mulching was started for all specimen trees.

It is believed that these improvements were the combined result of both better water infiltration into the

lower depths and improved soil aeration. This is especially important in fine soils such as clay.

Trees are vertical-mulched by drilling holes through the soil around them and filling the holes with organic matter. The porous channel of organic matter created by vertical-mulching provides a pathway for water to move through compact, impermeable layers. This allows a better distribution of air and water throughout the soil. Vertical-mulching exposes more soil surface to receive and store water during irrigation. With more available moisture stored in the soil for plant use, the plant can then draw water more uniformly from a greater thickness of soil.

Drilling of the holes beneath the trees may be done by hand or power-driven augers. Experience has shown it is best to have these holes slanted at an angle in towards the tree. These should be started far enough away from the tree to prevent injury to the trunk or larger roots. For mature trees this is usually two to two and one half feet.

It is most effective to use an auger two to three inches in diameter. Start inside, near the trunk, and stagger the holes out to the dripline of the branches. As a guide, one 2-inch hole pet square foot area is recommended.

Depth of holes can range from 10 to 18 inches or even deeper with deep-rooted trees.

Almost any type of organic matter may be used for filling the holes, although materials that decompose slowly, such as rice hulls and redwood shavings, are most desirable for they tend to hold the holes open for a longer period of time. Residues that decompose more rapidly may be useful in conditioning the soil about them.

An excellent means for fertilizing the trees is provided by mixing fertilizer with the material used for filling the holes. The one-hole-per-square-foot of area will give good distribution and guard against high concentrations of the fertilizer in limited areas. Care must be used not to over fertilize small trees. Keep the fertilizer at least two and one half inches below the top of the hole in turf areas to prevent burning of the grass. Watering after applying will help prevent injury to turf.

If vertical-mulching can increase water-penetration into problem areas of soil compaction and water infiltration, and thus improve conditions encouraging root growth and activity, this practice should be a great aid for anyone trying to grow trees under such conditions.

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