Southern California Turfgrass Culture

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A. METHOD FOR MINIMIZING COMPACTION IN PUTTING GREENS

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Soil Compaction in putting greens is widespread and often makes management difficult. Some specialists consider compaction to be the major factor contributing to the loss of turf on putting greens (2). The soil property which probably has the greatest effect on plant growth in putting greens is its capacity to permit gas exchange with the atmosphere. As the oxygen supply in the soil approaches extremely low values root growth comes to a standstill. It is a common observation on putting greens to find but few active roots below a depth of two inches. A consideration of the effects of soil compaction and other data discussed below suggest strongly that lack of oxygen in putting greens is a major factor in limiting root growth to shallow depths. At any rate, it is quite apparent that when grass roots are restricted largely to the top inch or two of soil, frequent irrigation and fertilization are necessary. Undoubtedly grass is also much more vulnerable to disease under these conditions.

While compaction in putting greens is an important factor, it is not the only feature of putting greens which might limit aeration. In many greens in Southern California a plug of the soil will reveal one or more distinct layers of coarse sand. A distinct sand layer in finer textured soil 'acts as a barrier to the movement of water. When drainage is reduced in a soil, so is the air space. ,It is often possible to cut a plug from a green and observe the pattern of "aerifier" holes at the points where mats of roots have penetrated the sand layer. When cultivation tools cut holes through a sand layer the drainage of water above the sand layer is not affected. The perforations are well aerated and this permits roots to grow densely in them and to penetrate a perforated sand layer. Figure 1 shows that a sand layer in finer textured soil is a barrier to the movement of water.

Usually the compacted layer in putting greens which has been induced by foot traffic is only about two inches deep. Figure 2, which shows a graph of the resistance offered by a soil at various depths to a probe being forced into the soil, is typical of putting greens.* The maximum resistance occurred in the top inch and one half. While there is general agreement among investigators that some

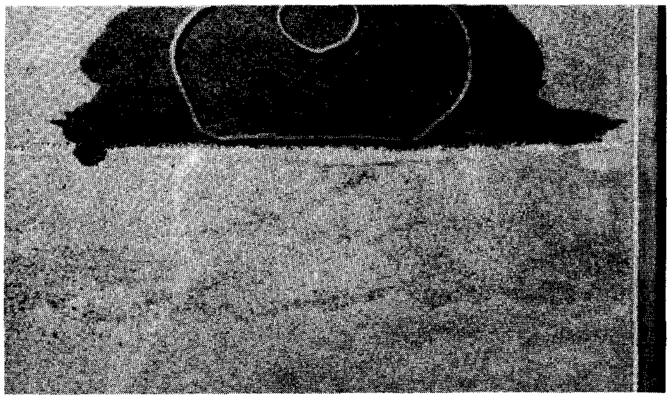

FIGURE 1
Water movement in a soil is impeded by a thin layer of coarse sand. The point on the left where water has moved below the sand layer occurred where the sand layer was not continuous.

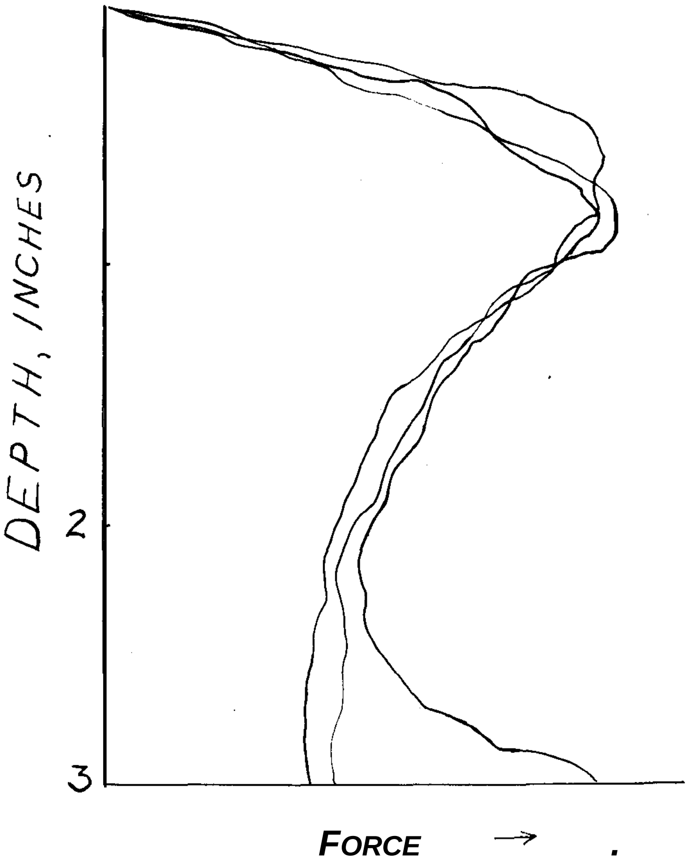

FIGURE 2
Variations in the force required to move a steel probe into o putting green soil to o depth of three inches. The shape of the force curve indicates the greatest compaction at about 3/4 inch below theground surface. The different curves represent different measurements mode on the same green.

* *Appreciation is expressed to Dr. S. J. Richards who assisted on these and the aeration measurements.*

compaction developes due to foot traffic (1, 2, 4), attempts to correlate bulk densities with compaction have been difficult because of the large and variable amount of organic matter present.

It would be expected that putting greens in poor physical state would have suffered a loss in the volume of large diameter pores. In this regard the data of Davis (1) is particularly interesting. He found the porosity due to large pore spaces to be strikingly smaller in the top 3-1/2 inches than lower in the profile. The destruction of large size pores is precisely the effect one would expect in soils when traffic occurs when the soil is extremely wet. Soil moisture measurements made on a number of greens in Southern California have frequently been well above the estimated field capacity.** Soil moisture contents were such that the effect of foot traffic is characterized by destruction of structure as much as by compaction. Figure 3 shows the relation between the compactability of a soil and the moisture content at which the compaction is effected. Compaction treatments occurring at moisture contents higher than that required for maximum compactability tend to destroy structure to a marked degree.

The net affect resulting from the loss of the large diameter pores is that the soil tends to remain wetter and contain less air.

Sand layers in greens, compaction, and destruction of large pores coupled with frequent irrigations combine to produce soils that are nearly saturated with water and devoid of air in many greens. Perhaps the best direct evidence on poor aeration in putting greens comes from air diffusion measurements made in situ. This soil property was measured in a number of greens of both good and poor quality using equipment devised by Dr. S. J. Richards. Figure 4 shows schematically the technique used. A hole was cut in the soil about 3 inches deep into which was fitted a rigid plastic tube which extended into the soil 2-1/2 inches. A small amount of water was applied to the soil surface around the edge of the tube to seal this possible avenue of gas movement. The system was then flushed out with nitrogen gas with

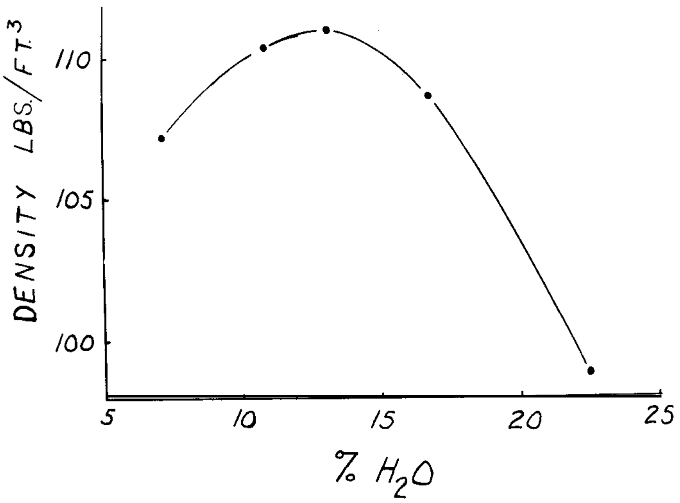

FIGURE 3
The density to which a soil can be compacted with a standardized treatment is a function of the moisture content of the soil.

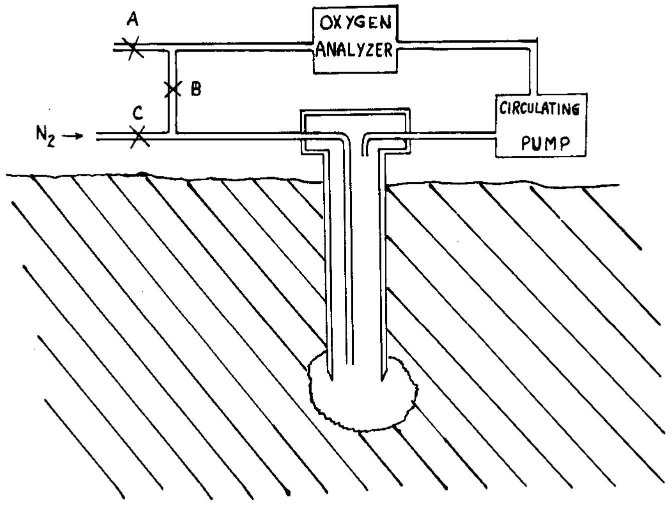

FIGURE 4
Schematic diagram of apparatus used to measure the diffusion rates of gases in soils.

valves A and C open and B closed. Valves A and C were then closed and B opened and the circulation pump operated. A plot was then made of the oxygen concentrations observed as a function of time. The shape of this curve gives an indication of the rate at which air will diffuse into the opening from the soil. In a number of putting greens tested of both good and poor quality, there was at best barely detectable and in most cases no measurable air movement at a depth of two and *one* half inches. Air diffusion rates were invariably rapid when similar measurements were made just off the greens These measurements emphasize the reason for the shallow rooting so common in putting greens. It is remarkable and a tribute to greenskeepers that satisfactory turf can be produced under the conditions usually prevailing in putting greens.

Improving Aeration in Putting Greens

Frequently it is possible to maintain satisfactory turf under relatively poor soil conditions by a regular program of cultivation. The holes made in turf with these instruments provide localized spots where aeration is adequate and where grass roots may thrive.

In building new greens or in renovating and rebuilding greens which have become unsatisfactory consideration should be given to using a soil which is resistant to compaction and which will drain well. All recent studies are in general agreement regarding the requirements of a soil mix with these properties. Work done by Gorman (3), Kunzet and work at UCLA all point to the fact that satisfactory infiltration and drainage will occur in putting greens notwithstanding compaction from foot traffic if the soil mix is sufficiently high in sand. In some parts of the country turf grass service companies have successfully used the high sand mixes for a number of years. Specifications for the soil mix will be given below.

***Field capacity is the moisture content of a well drained soil about 3 days after a thorough irrigation. When field capacity is reached, further drainage practically ceases.*

† *Personal communication.*

In laboratory tests using soil columns it was shown that soil mixes containing as much as 80 percent sand could be compacted so that percolation rates became low. When the sand content of a mix was as high as 90 percent compaction treatments did not reduce percolation rates to low values. In all probability 85 percent sand in putting greens will maintain high infiltration rates provided particle size distribution is right. Other practical considerations are: A. How thick need a sand layer be? B. What size of sand is desirable? C. What should the other constituents in the soil mix be? D. What special fertilizer or irrigation practices should be developed?

The first question can be answered rather accurately. Equations used in soil mechanics studies as well as laboratory measurements indicate that a 4 inch layer of sand on top of a soil susceptible to compaction will distribute the load occurring from foot traffic sufficiently to effectively protect the soil underneath from compaction. Figures 5, 6 and 7 show how this occurs. The white lines in the soil were originally approximately parallel. The moist soil which was loosely packed into the boxes was then compacted with a pressure of about 35 pounds per square inch of soil. Both the fact that the greatest compaction occurs very close to the surface and that four inches of sand protects the soil underneath is clearly shown in the pictures. Actual measurements on the amount of compression resulting from compaction treatments on sand layers of various thicknesses over clay loam are as follows:

DEPTH IN INCHES OF LAYERS BEFORE COMPACTION		COMPRESSION IN INCHES AFTER COMPACTION	
SAND	CLAY LOAM	SAND	CLAY LOAM
1.2	8.7	.51	.94
2.4	7.5	.35	.63
3.5	6.3	.47	.20

These data indicate that a 4 inch layer of sandy mix on top of a soil susceptible to compaction will protect the soil. The underlying soil should be so prepared, of course, by cultivation or other means so that it is in good physical condition and drains well. It is advisable to treat the top two inches of the soil with Krilium at the rate of 7.5 pounds per 1000 square feet before applying the sand layer. This may be done by going over the soil while moist with a rototiller - the Krilium having previously been dusted on. No particular attempt should be made to mix the sand with the soil.

While the importance of a sand layer at least 4 inches thick on the surface has been emphasized here, somewhat deeper layers are desirable if available materials and and construction costs permit. Some fine greens have been built on sandy soils whose composition is approximately that being proposed. The courses at Palm Springs, California are an example.

What size of sand is satisfactory? The experimental sand surface green at UCLA has the following particle size distribution.

SAND DIAMETER IN MILLIMETERS	%
Larger than .5	25.1
.5 - .42	5.2
.42 - .30	16.8
.30 - .21	17.7
.21 - .l0	22.2
Smaller Than .l0	13.0

Although this green has not been subjected to heavy traffic, infiltration rates remain very high. The quality of the turf is quite satisfactory.

The most desirable sand size fraction is the range from 0.4 to 0.2 mm and an ideal source would have about 75% of the sand in this range, and not more than about 6 to 10% in the range smaller than 0.10 mm and not more than a percent or two of silt and clay. Fine sands - 0.25 to 0.10mm- may be satisfactory provided they are relatively free of silt and clay. Very fine sands - 0.10 to 0.05 mm - should be very carefully evaluated since, small amounts of unaggregated silt and clay in sandy soils are subject to migration and the soil may very well seal up. Very fine sands are particularly susceptible to this hazard. If 85 to 90% of the soil mix is composed of sand as described above, the remaining 10 to 15% of the mix should be composed of fiberous peat and well aggregated clay. A desirable amount of clay appears to be about 7.5% or less. In laboratory tests soil columns composed of 85% sand principally in the range of 0.42 - 0.21 mm, 7.5% Krilium treated clay, and 7.5% peat by volume have maintained infiltration rates in excess of 1 inch per hour after having received a compaction treatment. The suggestion of Kunzet of blending in a small amount of Krilium treated clay into sand mixes increases slightly the capacity of the mix to retain fertilizers and water. The 85 - 90% sand, 5 - 7.5% Krilium treated clay, and 5-7.5%

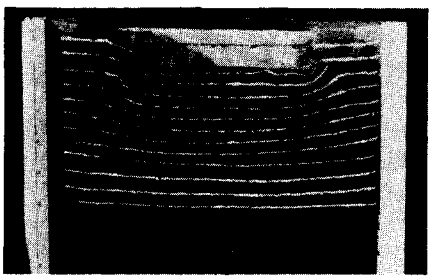

FIGURE 5

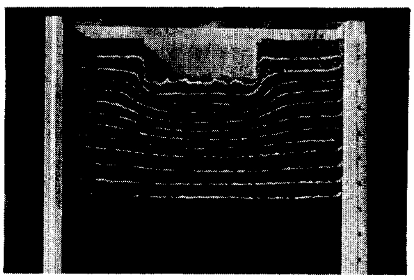

FIGURE 6

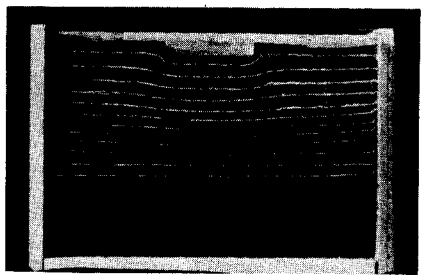

FIGURE 7

† In these figures the white lines were approximately parallel before the compaction treatment. A force of 35 pounds per square inch was applied six times for each square inch of soil. The subsidence and the distortion of the lines in the soil become progressively less as the sand layer increased in thickness. There was no sand layer in Figure 5. The depth of the sand layer in Figures 6 and 7 was 1.25 and 3.50 inches respectively.

peat mix may be obtained by mixing 10 parts of sand, 2 parts of sandy clay loam and 3 parts of loose peat. This mixture, when it settles, yields about 13 volume units rather than the 15 which went into it.

The Bob Dunning-Jones Company of Oklahoma has had good success constructing greens according to the following specifications:

60% coarse sharp approved sand, coarser than concrete sand

25% approved soil (loam or sandy loam)

15% fiberous peat

The volume proportions in this mix when prepared would be approximately:

Sand - - - - - - - - - - about 80%
Silt and Clay - - - - about 10%
Peat - - - - - - - - - - about 10%

A layer of this mix 10 inches deep is recommended by Dunning-Jones. Figure 8, supplied through the courtesy of Mr. Al Houchin of Dunning-Jones, shows the type of root action that is obtained in a well drained mix.

The specifications of the Dunning-Jones Company are a close approximation of those arrived at above principally on the basis of laboratory studies.

Dr. Jesse Skoss who recently returned from Australia, reports sand greens are being employed with good success in that country.

In building greens in areas where the base subsoil is especially dense the use of tile drains may be advisable. in such cases consultation with a person experienced in drainage problems is advisable.

It should be noted that any future top dressing should be done with material of the same composition that the green surface was constructed of.

A disadvantage of the high sand content greens is the care required to establish the grass, and the attention that needs to be given to the fertilization program, which should generally include all six of the major elements supplied by the soil. Fertilization may involve frequent feedings or the use of fertilizer materials of low solubility which do not leach rapidly. Fortunately all fertilizer materials are now available in slightly soluble forms. The fertility management of the experimental green at UCLA has not been difficult.

In view of the greater depth of rooting which can be expected in sand greens, the frequency of irrigation should be less than that of the typical green in which rooting is limited to about 2 inches. Two irrigations per week during hot weather have been ample for the experimental sand green at UCLA,

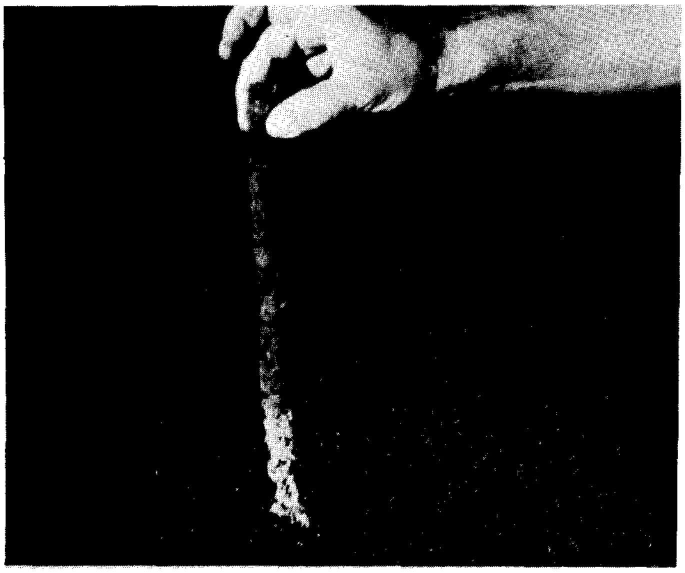

FIGURE 8
Excellent root development may be expected in sand greens.

(1) DAVIS, R. R. - The Physical Condition of Putting Green Soils and Other Environmental Factors Affecting the Quality of Greens, Ph. D. Thesis Purdue University, 1950.

(2) FERGUSON, M.-Compaction, Drainage and Aeration, United States Golf Association Journal 3(2):32-33, 1950.

(3) GORMAN, W. L. - Permeability of Various Grades of Sand and Peat and Mixtures of These With Soil and Vermiculite,United States Golf Association Journal and Turf Management 5:Number 1, 27-28, 1952.

(4) WATSON, J. R., JR., MUSSER, H. B., and JEFFRIES C. D. - Soil Compaction Determinations With a Soil Penetrometer As Compared With The Geiger Counter X-ray Spectrometer, Agron. Journal 43:255-258, 1951.

INJURIOUS HERBICIDES REGULATIONS AMENDED

A recent amendment was made to the Injurious Herbicides regulations for the State of California which is of interest to growers of turfgrass. Effective last February 19 no permit is required when deliveries in a 24-hour period do not exceed 25 pounds of granular materials (fertilizer, agricultural minerals, etc.) containing less than 10% of the active ingredient, prepared for use as a dry material without further dilution. The active ingredients covered are:

1) 2,4-D
2) 2,4,5-T
3) MCP
4) 2,4-DP
5) Silvex

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THE USE OF PLUGGING FOR CHANGING GRASSES IN TURF

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Many of the improved strains of bermudagrass, zoysias, and bentgrasses can be propagated only by vegetative methods. When the soil is free of weeds and other grasses, these strains can be planted with assurance of establishment within a reasonable period of time. However, vegetative planting of this type requires that the area be out of use for a certain interval and frequently the amount of planting stock required is considerable. Often the only practicable method of clearing the area of existing vegetation is by fumigation, which is cumbersome and expensive. A simpler method of changing the composition of turf to the desired grass is by plugging it into existing turf. However, the rate of increase has often been exceedingly disappointing, and rapid spreading has been. noticed mainly in areas having thin turf due to disease or wear.

The following experiments were conducted in order to compare the rates of spread on bare soil with that in sod of various species of grasses and also to develop methods of overcoming the strong competition of the established grasses. These studies were made on the experimental turf plots of the University of California at Los Angeles. The type of the soil was a Yolo loam and the reaction was about 6.6 pH. Several different heights of cut were used.

An electric drill was used to make the four-inch holes in the turf. This drill was operated by two persons and saved much time. The two plug cutters are shown in Fig. 1. The four-inch cutter was pushed into the turf by pressing the foot on the bottom of the cup, then by turning the cutter to the left about 180°, the plug was completely separated from the turf. The two-inch magazine type operated in the same way, except it had a hollow tube in the center where about 15 to 20 plugs could be collected. The thickness of the plugs was about one and one-half inches and in all cases they were taken from well established turf.

A preliminary study was conducted on an experimental putting green area consisting of a mixture of Congressional and Old Orchard bents, which are both improved clonal strains of creeping bentgrass. This area was fertilized at bimonthly intervals with ammonium sulphate at a rate to supply 15 lbs. nitrogen per 1000 sq. ft. per year.

In July, 1951, two series of two blocks of five plots each were laid out on this area. One block was laid out on the turf described above, while the other block was laid *out* on a bare soil adjacent to the edge of the turf. Each series of plots was divided into two sections. One of these was plugged with several different strains of bermudagrass at six inches distance from the centers of the plugs, the second section was plugged with the same strains at eighteen inches distance from the centers of the plugs. In both cases four-inch plugs *were* used.

There was practically no spread of the plugs in the established lawn but growth was exceedingly rapid in the bare soil. After about six to eight weeks, the whole area was completely covered with the spread of the different strains. There was faster coverage with the plugs spaced on six-inch centers than with eighteen-inch centers, but the difference of time of coverage was only about 7-10 days, which does not justify the greater expense and labor involved in the narrower spacing.

There was also a very distinct difference between the different strains, in regard to their relative vigor and aggressiveness. The most aggressive of the strains tested was Everglades No. 3, followed in order by Maples, Everglades No. 2, Everglades No. 1 and U-3 bermudagrass. Observations during the seasons of 1951, 1952, and 1953 indicated that U-3 bermudagrass had less vigor than the Everglades strains in Southern California. It was invaded by the Everglades strains from both sides, contained a higher percentage of weeds in the fall and winter and lost its color faster when the temperature became low in winter. However, it started growth earlier than the other strains.

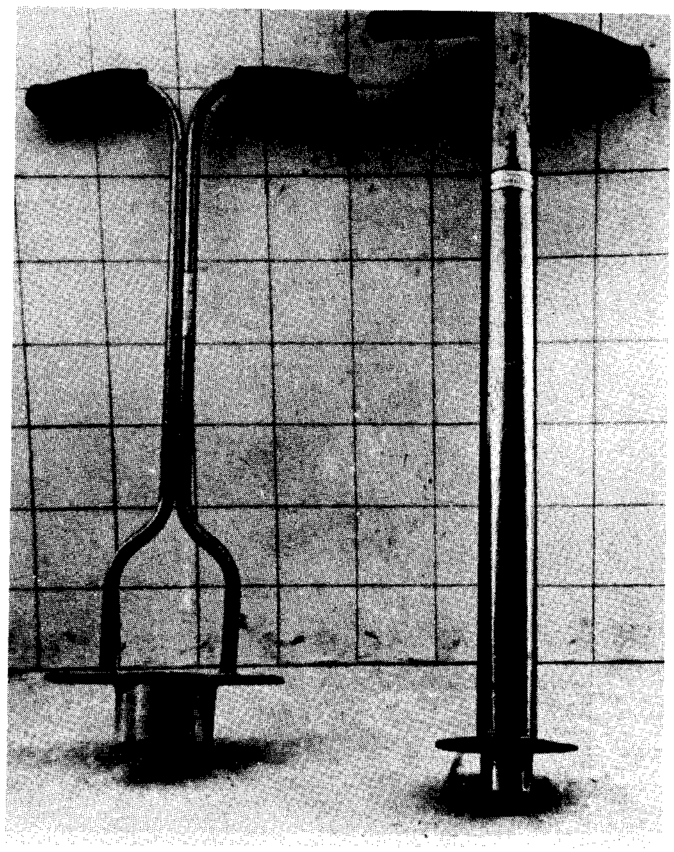

FIGURE 1
Tools for making four-inch and two-inch plugs

t *Formerly Graduate Student*

In the established turf, the results were quite different. After two years from plugging, there was no apparent spread for the plugs and in many cases the competition was so severe that the plugs were completely crowded out.

Another experiment was conducted to determine the effect of the size of plugs and the effect of surface fertilization in overcoming the competition of the old turf, in the operation of introducing the improved strains. In the fall of 1949 the area had been seeded at the rate of two pounds of Seaside bentgrass seed per 1000 sq. ft. The turf was maintained under putting green height of cut and fertilized once every two months with ammonium sulphate at a rate to apply 15 lbs. nitrogen per 1000 sq. ft. per year. In July, 1952, an experiment involving three levels of nitrogen fertilization, and two sizes of plugs, two-inch and four-inch, in a six by six factorial Latin square design was established on this turf. The three levels of nitrogen used were 5, 10 and 15 lbs. of nitrogen per 1000 sq. ft. per year, using ammonium sulphate.

The area of the experiment was 30 feet by 30 feet, divided into 36 plots each five feet by five feet. In every row and in every column, every fertility level was replicated twice while the size of plugs was replicated three times. In every plot, twenty-five holes, one foot apart and one and one-half inches deep were dug. Then U-3 bermudagrass plugs of corresponding size to the holes taken from a well established nursery were dropped in the holes. Precautions were taken to keep the plugs continuously supplied with sufficient water to prevent drying off, especially the first two weeks of planting. The plugs were pressed with the feet to insure a firm contact between the roots of plugs and the soil below.

In December 1952, eighteen months after the beginning of the experiment the rate of the spread of each plug was charted and measured by a planimeter. The contrasting winter color and the different morphological characters of U-3 bermudagrass and Seaside bentgrass made the areas of the two grasses easy to distinguish.

The spread from the plugs as shown in Table 1 shows that higher fertility levels have little effect in increasing spread of the two-inch plugs, but have some influence with four-inch plugs. It was also noticed that increasing the nitrogen level from ten to fifteen pounds of nitrogen per year had more influence than raising the nitrogen level from five to ten pounds per year. The spread from the four-inch plugs was significantly greater than from the two-inch plugs.

The failure to overcome competition by surface fertilization led to another experiment in which the fertilizer was dropped at the bottom of some of the holes before setting the plugs, so that the plug would grow under higher fertility levels than the surrounding turf of common bermudagrass. In August 1952 a common bermudagrass plot was selected as the iste of this experiment. The turf had been established in 1949 and was kept at three-fourths inch height of cut and fertilized at the rate of five pounds of nitrogen per 1000 sq. ft per year. Part of the turf was also sprayed immediately before plugging with maleic hydrazide (MH) using the 40% sodium salt in a 0.25% aqueous solution to provide a temporary inhibition of the old turf until the new plugs had a chance to establish roots. The spray was applied at the rate of 20 liters per 1000 square feet of turf. In some plots, 30 grams of 6-2-0 fertilizer were dropped in the holes before setting the plugs. The design of the experiment was a randomized complete block with nine replicates per treatment.

Three days after the spraying, the grasses that were sprayed showed some discoloration but the injury was temporary and the plants regained their regular color after about four to five weeks.

In October 1952 - two months after plugging - the spread of U-3 bermudagrass was determined. The most striking increases in spreading were obtained in the treatment where the plots were sprayed before the plugs were set followed by the placement of fertilizer at the bottom of the hole. In Table 2, the mean increases in area of the U-3 bermudagrass plugs are tabulated in descending order, entering alongside each the amount of the difference from previous value. On this basis the first treatment which was sprayed with MH and adding fertilizer at the bottom of the hole was significantly better than any of the other treatments. The fertilizer treatment without MH was significantly better than the MH treatment without fertilizer and also better than the check treatment. When MH was used alone without adding fertilizer the increase was more than the check experiment but the difference was not significant. Typical differences in response are shown in Fig. 2.

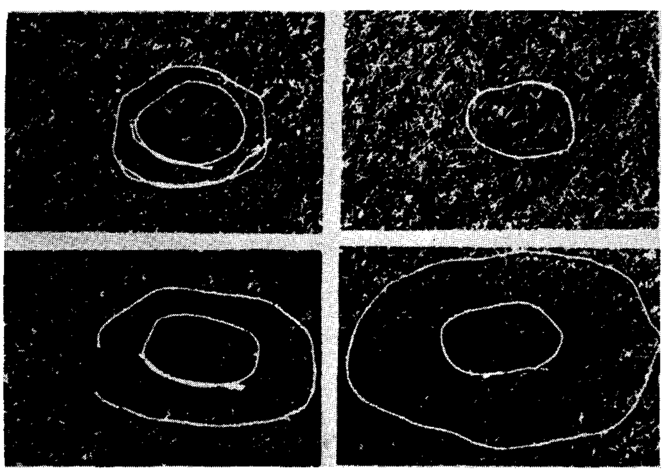

FIGURE 2

Spread from plugs of U-3 bermudagrass in common bermudagrass two months after setting.

Upper right: Control - no spread
Upper left: Moleic hydrazide spray
Lower left: Organic fertilizer placed in holes before setting the plugs
Lower right: Moleic hydrazide spray followed by placing organic fertilizer in holes before setting plugs

The results of these studies show clearly that the growth of any grass introduced by plugging, even of a highly aggressive type, is greatly retarded due to the competition of the existing turf. The experience with

U-3 bermudagrass plugs inserted in Seaside bentgrass illustrated the factor of competition very clearly, although the U-3 is an aggressive grass and is well adapted to the climatic conditions of Southern California. Nevertheless Seaside bentgrass, which is a cool-season grass, was able to retard greatly the growth of the bermudagrass. Uniform surface application of fertilizer gave such a small increase in spread as to be useless. The competition was not checked because both the plugs and the old turf were able to utilize the nutrients. Differential fertilization, in which a good supply of nitrogen was made available to the introduced grasses by placement at the roots of the grasses in the plugs, was highly successful. The use of nitrogen in an organic form has the advantage of availability over a longer period of time than if easily soluble inorganic sources of nitrogen were used.

After the initial competition of the established turf is overcome, the newly introduced grass has a much better chance to compete on an equal basis. The great initial delay in change of composition of turf by plugging has been noted by many observers. In Florida, where lawns of Zoysia matrella are often established in existing turf of bermudagrass, the zoysia may make little apparent progress during the first two seasons and become established rapidly during the third season.

The results of the spray with maleic hydrazide were very promising. This treatment will temporarily check the growth of the existing turf during the critical period while the grass in the plugs is establishing new roots. The combination of differential local fertilization and spraying with maleic hydrazide resulted in such a great spread of the plugs, that the method might well be tried on a practical basis. These results would doubtless be applicable to other species of grasses.

Table 1

Summary of the increase in square inches for two sizes of U-3 bermudagrass plugs in Seaside bentgrass with three fertility levels.

LBS. N PER 1000 SQUARE FEET PER YEAR	MEAN INCREASE IN SQUARE INCHES	
	2-INCH PLUGS	4-INCH PLUGS
Fifteen	8.71	70.19
Ten	7.41	17.44
Five	1.00	8.68
Mean	5.70	22.10

Any difference or cumulative difference greater than 7.89 indicates a significant increase over observations with lower values at 5 per cent probability.

Table 2

Mean increase in area of U-3 bermudagrass plugs, plugged in a stand of common bermudagrass.

TREATMENT	MEAN INCREASE IN AREA (SQ. IN.)	DIFFERENCE FROM PREVIOUS VALUE
MH and fertilizer	35.27	
Fertilizer & no MH	13.28	21.99
MH & no fertilizer	5.12	8.16
No MH & no fertilizer	0.71	4.41

Any difference, or cumulative difference greater than 9.38 indicates a significant increase at 5 per cent probability over observations with lower values.

TURFGRASS FIELD DAY IN OCTOBER

Southern California Turfgrass Council has laid plans for a field day on Monday, October 15, 1956. The theme for the day will be Weed Control and Weed Identification in all phases of turfgrass operations.

The day will start, according to Bill Johnson, who is chairman of the Arrangements Committee, at 9:00 to 9:30 a.m., probably in Griffith Park, with displays of weeds and discussions of weed identification. There will be demonstrations of weed control equipment, methods of calibration for volume delivery, use of various weed control techniques and materials.

Lunch will be served by a caterer in the picnic grounds.

In the afternoon there will be a short field trip to weed control plots which are being established at the present time by John Stark, Los Angeles County Farm Advisor in cooperation with the Department of Floriculture and Ornamental Horticulture at UCLA, Griffith Park managers, and others. The group also will visit turfgrass plots established by Stark in the San Fernando Valley.

The committee on arrangements consists of Bill Johnson and John Coogan of Los Angeles City Department of Recreation and Parks; John Stark, Los Angeles Farm Advisor, M. H. Kimball, Agricultural Extension Service; Victor Youngner, Department of Floriculture and Horticulture, UCLA. Fred Roewekamp, president of the council, will appoint various committees on arrangements, publicity, registration, etc.

A detailed program giving specific location will be sent out in late September.

STATEWIDE TURFGRASS ORGANIZATION PROGRESSING

Both the Southern California and the Northern California Turfgrass Councils have realized for some time that an overall organization was needed to coordinate the efforts of both groups and formulate a unified, statewide turfgrass program. Informal discussions between the two groups have been in progress for a year or more. A meeting of representatives was held at Long Beach in February, 1956 at the time of the Golf Course Superintendents Association meeting. Delegates from both groups at that time agreed to discuss the proposals with their respective organizations.

The two groups met in Santa Maria on Monday, May 7, 1956. Elmer Border, president of the Northern California Council, and King Ewing came down from the north. The committee from the south was President Fred Roewekamp, C. C. Simpson and Gordon Wyckoff. The University of California was represented by John Madison, Department of Landscape Management, Davis; Victor Youngner, Department of Floriculture and Ornamental Horticulture, Los Angeles, J. J. McElroy and M. H. Kimball of the Agricultural Extension Service.

A permanent organization was effected, subject to the approval of the respective councils, with Elmer Border as president, Fred Roewekamp, vice president, King Ewing, secretary, and Ellis Van Gorder of Palo Alto, treasurer. Federated Turfgrass Councils of California is the proposed name. Suggestions for constitution and by-laws, purposes of the organization, and a program were discussed.

Subsequent to the meeting, a tentative Constitution and By-Laws has been drawn and passed back and forth between the two committees. They have reached the stage of advancement sufficient for the northern council to approve and commend them to the southern council.

This is a major step in advance for turfgrass interests in the State. It will provide a vehicle for establishing a unified program *on* research and education.

1955 YEARBOOK OF AGRICULTURE · WATER

"Water", the 1955 Yearbook of the United States Department of Agriculture, contains many articles of interest to people working with turfgrasses. The book contains chapters on irrigation, erosion control, drainage, and many other subjects. It is for sale by the Superintendent of Documents, Washington 25, D.C., for two dollars.

BILL JOHNSON HONORED

The Southern California branch of the Professional Golfers Association recently presented their annual award of a Gold Life Honorary Membership in the PGA to Bill Johnson. This award is given each year to the individual who has in their opinion done the most for Golf. Bill Johnson is the Superintendent of the Griffith Park Municipal Golf Courses in Los Angeles.

RECENT GIFTS

Aggeler & Musser Seed Company
Los Angeles
20 lbs. grass seed

American Cyanamid Company
New York
$350.00

HOW YOU MAY JOIN THE SOUTHERN CALIFORNIA TURFGRASS COUNCIL

Since the publication of the January 1956 issue of "Southern California Turfgrass Culture" a number of requests have been received for information on membership in the new Southern California Turfgrass Council.

Membership is open to anyone who is actively interested in the purposes of the Council as defined by the constitution and by-laws of the organization. Anyone wishing to become a member can do so by sending his name and address with the annual dues of $2.00 to the treasurer, Mr. E. B. Marzolf, 10962 Ardath Avenue, Inglewood 4, California.

ZOYSIA PLANTINGS IN SOUTHERN CALIFORNIA

People who wish to see larger plantings of the zoysia grasses than the small *test* plots at UCLA, can see them at the Los Angeles State and County Arboretum in Arcadia. The Arboretum has large plots of the Meyer and Flawn strains as well as a number of Zoysia matrella selections of their own. Several of the improved bermuda strains can also be seen. The Arboretum is open to the public every Sunday afternoon.