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Bermuda turf resists adversity better when the soil is no more than slightly acid. It stays green longer at the onset of drought. The greener grass along lime lines on some football fields attest to that fact. The use of lime on Bermuda grass turf is justified when soil reaction is below pH 6.0. Degree of acidity determines the amount to use.

The golf ball does not run true over a stemmy sparse-leaved Bermuda grass green. The golfer wants a dense, leafy turf. The tendency toward stemminess is most marked at the time of normal seed head formation. It is aggravated then and at other times by the generous use of phosphate and or potash with little or no nitrogen. The way to produce and keep Bermuda grass turf vegetative and leafy is to use little or no phosphate and potash and apply nitrogen generously. This type program is imperative on greens. It applies to fairways also. The best fairways receive just enough phosphate and potash to provide minimum requirements for growth and an ample amount of nitrogen to keep the turf dense and leafy.

Bermuda grass needs less phosphoric acid than bluegrass or rye grass. It resembles the bent grasses in that respect.

Clippings are not removed from fairways and seldom from tees. As they undergo decay, their phosphorus, potash, and other mineral elements are released in forms grass can utilize. The oppsite is true on greens. The crop of clippings is removed. That accentuates the need for phosphate and potash on greens to replenish loss by removal of clippings.

There is no published data on the yield of clippings from Bermuda grass greens, or its plant food content. Such information is desirable.

Green Clippings Analysed

In 1955 J. E. Hammer of Memphis (Tenn.) CC, weighed the clippings from the 14th green of common Bermuda grass. He collected samples for chemical analysis. This was done in the laboratory of the Milwaukee Sewerage Commission. They separated foreign matter from the samples, determined dry weights, and analyzed the grass for nitrogen, phosphoric acid, potash, and sulphur.

When the 1948 National Amateur championship was played at Memphis Aug. 30 - Sept. 4 the contestants praised the putting quality of the greens. Many club officials from other Southern clubs asked Hammer to reveal his secret. Mowing on the 14th green started on May 9 and stopped September 11, making a total of exactly 18 weeks. The dry weight of clippings produced during that time was 120.19 lbs. These and all other figures are on the basis of 1,000 sq. ft. The average amount of plant food 'elements removed per month and for the 18 week period were as follows:

	Per Month	fotal for Season	
Nitrogen	1.34 lbs.	5.62 lbs.	
Phosphoric Acid	0.35 lbs.	1.48 lbs.	
Potash	0.80 Ibs.	3.36 lbs.	
Sulphur	0.29 Ibs.	1.22 lbs.	

The first column of figures, pounds of plant food removed per month, are represented by the following amounts of fertilizer. For nitrogen 27 lbs. of 6 per cent grade fertilizer, or 6.7 lbs. of 20 per cent grade; for phosphoric acid 1.75 lbs. 20 per cent superphosphate or 8.75 lbs. of 4 per cent grade; for potash 1.29 lbs. of 60 per cent grade muriate of potash; for sulphur 1.45 lbs. 20 per cent grade ammonium sulphate or 18 lbs. of 2.5 per cent grade sulphur containing fertilizer. A 100 lb. bag of 6-2-4 fertilizer would restore all the plant food removed from 1000 sq. ft. during the season at Memphis.

The data does not include the amount of plant food contained in the turf on the green, and ignores the requirements for root development.

Year-Round Bermuda Program

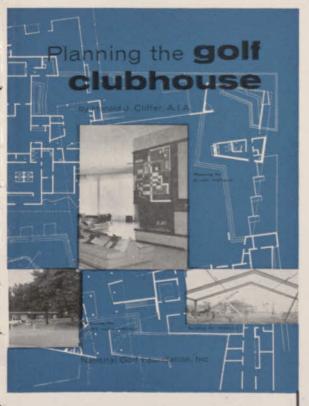
The fertilizer program for Bermuda grass greens which are overseeded for winter play must be devised for the entire year. That is the only way to have good playing turf summer and winter and lessen damping-off troubles at seeding time in the fall.

A plentiful supply of phosphate and potash with little or no nitrogen is best before seeding. They make the young seedlings more robust. The rate of superphosphate need not exceed 10 lbs., and a rate of 10 to 15 lbs. muriate of potash per 1,000 sq. ft. is ample. The above rates will take care of Bermuda also.

Nitrogen fertilization should begin after the young winter grass has gotten off to a good start. Rates should be moderate in the range of $\frac{3}{4}$ to $\frac{1}{2}$ lbs. actual nitrogen per 1,000 sq. ft. per month.

Little or no phosphate or potash need be used on Bermuda grass during the summer. That is the way to keep it leafy and vegetative. Nitrogen fertilizer should be

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March, 1956

used generously to furnish 2 to 3 pounds actual nitrogen per month. The highest rate should be approached during warm weather when Bermuda makes its best growth.

The new fine textured Bermuda grasses should be handled much like the bent grasses. Topdressing should be at light rates to avoid smothering. Nitrogen should be used at moderate rates but continuously. Phosphate and potash should be applied at the time the grass is vegetative and not when it throws seed heads.

The Bermuda grass on tees should be fertilized generously with nitrogen throughout the growing season. The amount should be in the range of 2 to 3 lbs. actual nitrogen per 1,000 sq. ft. per month. One application of phosphate and potash usually suffices. Early spring — just before or when growth starts — is a good time to apply them. Where a mixed fertilizer is used, the nitrogen content should be high with from one-third to one-half as much phosphoric acid and potash.

The best fairway turf on golf courses in the warm season belt is Bermuda grass. Fertilization and water management are the two most important items in their maintenance, and in that order. Many reverse it and try to grow grass with water only. To their dismay, the ground cover soon becomes crabgrass, clover, fennel, chickweed, and every other type of creeping weed. Then fairway renovation becomes necessary.

The way to produce good fairway turf is to use ample fertilizer and reasonable amounts of water. Workers in Missouri found it necessary to use five times more water to produce a bushel of corn than was needed on an well fertilized plot. plot.

Testing of representative soil samples is the first step in formulating the fairway fertilizer program, providing sampling is done correctly and reliable methods are used. Such tests will disclose need for lime and provide an inventory of the soil stock of available phosphorus, potash, and other mineral elements. In semi-arid regions it is well to learn something about saline conditions.

An application of lime should be made on Bermuda grass fairways if the soil is more than slightly acid. A dolomite should be used if the soil supply of magnesium is low. Then deficiencies in phosphorus and/or potash should be corrected by the

Top Brass at Party



At the Nadco-Scoggins cocktail party and fashion show which began the round of festivities of PGA Senior week top officials of PGA and of Scoggins Golf Supply Co. and Nadco Sporting Goods Co. viewed in pleased amazement as record was set in consumption of wet and dry hors d'oeuvre.

L to R are Vic East, Nadco club designer; Carlton Waller, Scoggins pres.; Marty Cromb, 1955 PGA Seniors' pres.; Leo French, Nadco sales executive; Jack Russell, Scoggins vp; Harry Moffitt, PGA pres., and Herbert Johnson, Nadco pres.

application of phosphate and/or potash. After doing these things, nitrogen fertilizer becomes the key to a dense turf. Very few clubs use enough.

As much as 100 to 150 lbs. actual nitrogen per acre are used on many watered bent grass fairways in the North. Some Bermuda grass fairways need 50 to 100 per cent more than that, especially where the growing season is nine months or more.

Split Fertilizer Applications

At one time it was customary to apply all or most of the nitrogen at the start of the growing season. The trend has been toward split applications throughout the growing season. Clubs in South Florida have applied nitrogen fertilizer always in November and December. This has been done to hold color in cool weather and to insure a renewal of growth after a cool snap.

Bermuda grass fairways badly infested with clover, crabgrass, etc., are not hopeless. Good turf can be developed without interrupting play seriously. The best way is to fertilize generously and then spray with sodium arsenite three to four times. The sodium arsenite will hold the weeds in check or kill them while the fertilizer encourages the Bermuda grass to spread.



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Grau Answers **Turfgrass Questions**

From many courses Dr. Fred V. Grau gets and answers the problems handled in this monthly department of GOLFDOM. Superintendents and club officials can avail themselves of this service without charge or obligation. Address your question to Grau Queries, GOLFDOM, 407 S. Dearborn, Chicago 5, III.

ONE of the most important decisions the golf course supt. has to make is the selection of the right grass for the right place, particularly on the mountainmount

putting green. In the good old days" of greens seeded to fescue and Colonial bent the choice was small and failures were merely reseeded. Today, improved ammanummunum with several

Selecting The Right Grass

creeping bentgrasses to choose from, all of them vegetative and all of them better than Seaside (seeded) under most conditions the choice becomes a problem requiring the greatest consideration because mistakes are far more costly. The right choice can mean great economy in the long run.

Today we have a great deal of scientific and performance evidence on what these various grasses will do. This department of GOLFDOM is receiving an increasing number of queries: "What grass should I plant on our new greens?"

There are several important considerations in choosing the right grass. Resistance to diseases ranks at the top in Musser's scale of values - and rightly so. From this standpoint Congressional bent would be the right choice in areas where snowmold is serious. Old Orchard also ranks high in this respect. Brownpatch is serious in areas where excessive moisture and high summer temperatures occur. It was in these areas that nature developed Washington, Arlington, Cohansey, and Pennlu bentgrasses, which are resistant to brownpatch. Dollarspot is a minor disease, easily controlled with nitrogen fertilizer and selected chemicals. It is rarely considered in evaluating a grass. So far as we know there is no grass that can withstand pythium.

As demand for bent greens increases, we

find the bents moving deeper and deeper into the regions of extremely high summer temperatures. This puts a premium on heat resistance. In this class Cohansey, Seaside and Penncross are battling it out. Seaside is easiest to use because seed is available. There is no Penncross now, and only limited supplies are in sight for this fall. Cohansey stolons are not easily available. Many clubs in the desert areas do not care to go to the extra trouble of handling the vegetative material.

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Toronto Requires Knowhow

Toronto bent has its champions in Chicago and in Canada where it is doing a remarkably good job. Those who have been most successful with it say that it takes more knowhow than some of the other strains. There are other grasses of local distinction that someday may outshine some of the present leaders. When this does happen, the course supt. should get credit for spotting and caring for these superior strains. Test plots, nurseries and the small trials that are being established on courses across the country are the proving grounds. No matter how accurate the data from research stations, a new grass can not be said to be wholly acceptable until it has undergone the acid test on the golf courses under many different types of conditions and management.

Regardless of who has responsibility for choosing grasses for a new course, it is wise to consult with the local supt. before making a final decision. Local experience . may dictate a choice that won't appear in the text books until the next editon. The supt. is blamed for failure of inferior grasses which he never would have chosen in the first place. He can do only the best he can with what he is handed.

This department welcomes supts' com-

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PAR AIDE

The *Par Aide* ball washer club rest, the handy accessory club rest made of cast aluminum, enameled to match the main unit, serves as a holder for golf balls and a rest for golf clubs while using the PAR AIDE ball washer.





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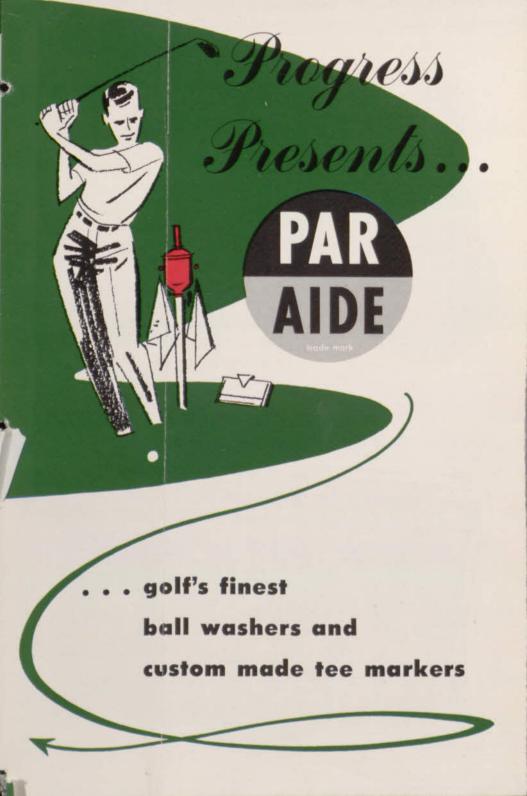
Par Aide is designed and constructed to eliminate need for replacement of brushes and other parts each year. The main units of the washer are cast of non-corrosive aluminum further protected inside and out by a coat of colorful vinyl plastic.

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insert into a 2-inch pipe, and tighten the tamper-proof set screw furnished. Disassembly for cleaning can be accomplished in a matter of minutes. The answer to the ball washing problem-for the player and the superintendent.

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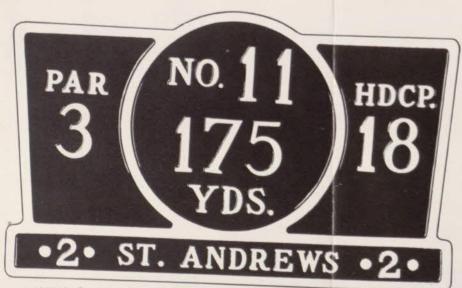
Visualize your golf course tee equipped with attractive, custommade tee markers. Designed to set on the turf at a 30° angle they enable the golfer to determine hole number, yardage, par and handicap at a glance. The markers are approximately $10\frac{1}{2} \times 6\frac{1}{4}$ inches and are available in a choice of 5 styles and 5 colors as shown. Construction is of high grade cast aluminum, reinforced with heavy ribs to prevent bending or breaking. Steel anchor pins are cast integrally into the tee marker. These tee markers furnish an attractive permanent addition to any course.

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MODEL No. 3

Enameled cast aluminum balls available in any color are a useful accessory to the Progress custom tee markers. They may be used to mark additional starting

> points on the tee to help prevent excessive wear in any one area or to indicate ladies' or juniors' tees. They are cast of high grade aluminum with an anchor pin cast integrally into the ball.

ments on their successes and failures with various grasses as well as questions on choosing the right grass.

Q-Our bent greens have a poor winter color. What can we do to improve the color? (Va.)

A-Some bents naturally lose their good green color with freezing weather. Washington bent is one of the best examples but even strains with best late fall color become dull in weather that alternately freezes and thaws. About the only thing you can do is spray some green grass dye for quick relief. Grass that is fertilized adequately with nitrogen, balanced with P and K, will hold green color longer than hungry grass.

Q-Last summer we were forced to water our greens frequently to prevent wilting and loss of grass. The turf got quite thin and algae appeared, especially in low spots and where there was heavy traffic. Is the same thing likely to happen again? (Pa.) A-Yes, particularly if you do not do something to improve drainage and aeration. The soil probably is compact and crusted. This excludes air (oxygen) from the roots, Water lies on the surface to cause "scald"

which further complicates the problem. Aeration, or cultivation, is of first importance. Deep placement of fertilizer will encourage heavier rooting. By improving the infiltration of water it will be possible to keep the surface drier. Algae can not grow when the grass is dry.

Q-We have heard that hydrated lime lightly dusted on greens will check algae. What can you tell us about this? (W.Va.) A-Many authorities recommend, and supts. use, hydrated lime at 2 to 5-lbs. to 1,000 sq. ft. when algae appears. The lime tends to dry the surface quickly. The rapid change in pH also is believed to check the growth of algae. To apply the material in water as a spray does not seem to do the same amount of good. Mixing the hydrated lime with screened topdressing helps get it distributed uniformly. It is not necessary to water it in. Footprints may tend to cause slight burning. Late afternoon applications will help to minimize this.

Q-In applying green dye to warm-season grasses, is it best to wait until the grass is dormant and brown? We have heard that it sticks better if it is done while bermuda or zoysia still retains some of its natural

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green color. What is your opinion? (NJ) A-Steiniger at Pine Valley, Farnham at Philadelpha, and others have shown me they get improved results by spraying green dye while the grass still retains a large part of its natural summer-green color. Recently we learned this principle holds in other parts of the country.

Q-We have had our soils tested for years and are pleased with what we have accomplished with the help of recommendations which have accompanied the returns. Tissue testing has been mentioned as another way of helping keep track of what we are doing. How valuable do you think this is? (III.)

A-Experiment stations have been making intensive studies on the value of tissue tests and some simple effective methods have been devised. If the test is carefully conducted on a sample properly taken and handled, and if chemicals (reagents) are fresh and viable, the tissue test will yield valuable information. Do not tae too seriously the results of the first few or the first dozen tests. Each succeeding test will become more informative because you will begin to correlate results with performance of the grass. We like to think of tissue tests as supporting evidence for soil tests. Consult your experiment station for its version of tissue testing. There are good kits on the market.

Q-Our bermudagrass nursery grew quite tall last fall and now it is a tangled mass of grass. It looks hopeless to try to mow. Someone suggested burning it off but we are afraid that this might ruin it. What would you do? (Md.)

A-We would burn it off. In fact, we have been doing this for years. We checked with Dr. Burton of Tifton and he approves the practice. Be sure you can control the fire. Check with the fire company if you are residential. Be sure there is an ample supply of moisture in the soil to prevent damage to roots and rhizomes. Try to burn into the wind to get more complete burn. Try to get it done before there is much green growth.

Q-We have very heavy play on our course and we do a lot of irrigating. The result is that we get extreme compaction. We all know what this does to the grass and what we ought to do about it. Every time we get the equipment out and start to work the howls of complaints are not pleasant to hear. We are discouraged because we're having increasing difficulty in holding turf under these conditions. Other courses can get the work done. Why can't we? (Calif.)

A-Psychological effect on the golfer when he sees an apparently perfect putting surface interfered with in any way is a dilemma. Where necessary work has been accomplished most successfully and with the least complaints, golfers have been "conditioned" or informed. Major operations must be scheduled at a time when there are no major golfing events. It is most important that the green chmn. and pro be fully advised so they can take the pressure off you. A note in the club publication or a notice on the bulletin board will go a long way in keeping the golfers informed. After all, you are only trying to improve conditions for them and give them the best possible playing conditions. Why not tell them just that?

Q-Last year we got rid of our sand greens and planted U-3 bermudagrass. We had a hot, dry season but watered well. The grass grew better than we expected. As a result we did not keep up with it; in fact we didn't know much about managing a grass green and now we have a lot of tall growth. If we mow it close we'll have a lot of rough stubble. Should we topdress heavily? How much water will it need? (Neb.)

A-We suggest burning off a heavy growth of bermuda. We recommend this in your case. Then, as soon as growth gets under way, fertilize generously - 1-lb. of nitrogen to 1,000 sq. ft. every two weeks. Topdress, yes, but not heavily. Just enough to smooth the surface for good putting and smooth mowing. Start moving at 1/4 inch as soon as there is anything to mow. Mow daily. Use a brush or comb on the mower. Water well (deep soaking) not more than once a week. You might stretch this some. You probably will have to turn to vertical mowing as the turf gets thicker and when a mat begins to develop. This is a natural occurence with vigorous spreading grasses. U-3 is not one of the best bermudas for putting greens but it is well adapted for you and will be a vast improvement over sand greens.

Trans-Mississippi Tourneys

Trans-Mississippi Seniors Golf Assn. will hold its third annual tournament at the Thunderbird GC, Palm Springs, Calif., Apr. 2-7. Trans-Mississippi Golf Assn's annual championship will be played at Oklahoma City G & CC, June 18-24.

PAT DEAVY STANDS PAT on HY-GRO Soluble Plant Food!

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"Using HY-GRO Soluble Fertilizer on our greens at ratio of 1 pound to 20 gals. of water to 1000 sq. ft. and applying every 10 days, we've made and maintained the finest turf a golfer could play on. HY-GRO is really fine, and won't burn if applied at the above rate. I've tried most of the brands. Where I used HY-GRO, I got best results." Do you have turf problems? Put HY-GRO to work. Write for samples, prices, literature.

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GCSA Conference

(Continued from page 56)

the underground growth of grasses. Dr. James R. Watson told the supts. of the possibilities and described the management of the various new warm climate grasses. L. W. DuBose reported on the large scale planting of improved Bermuda at the new Houston CC, now under construction. Following the planting of a five-acre nursery, 80 acres of fairway were planted. The first step was to use a special sprigging machine for planting 36-in. rows. Then, said DuBose, the area was covered with an inch of topsoil and watering and aerifying followed. As soon as Bermuda appeared, the sprigging machine was brought back and the area between rows planted.

Tells of Supts' Trials

Carlos Smith, who came from Mexico to attend the GCSA meeting, told of the many trials and tribulations that come with preparing a course for such a big event as the Mexican Open, and the misgivings a man in his profession may have when told that his club has been selected for a tournament of this kind. Smith's conclusion was "if you have something to work with and are willing to pitch in, you'll discover most of your worries are imaginary."

The text of a speech covering fertilizers by Dr. O. J. Noer, who followed Smith on the program, appears on page 98.

If some degree of lethargy tended to creep in after two days of discussing the technical aspects of greenkeeping, it was completely dispelled on Thursday morning when GCSA members gathered and began examining the economic and socioligical phases of their profession. More than ordinary interest was evinced in subjects in this category, and post-session discussions of contracts, wages, training programs and similar topics were particularly lively as well as prolonged.

Contracts Evoke Interest

John Clock, Long Beach atty. and USGA official, led off by talking on the subject of contracts. Comparing oral and written agreements between employer and employee, Clock stressed the many disadvantages of the verbal contract and advised the supts. that, all things considered, a written agreement produces a much more satisfactory relationship between two parties than one not put in writing. Some audience unrest was detected when the Long Beach atty. reminded his listeners that if a supt. quits to take another job before his contract is up, he is liable to pay the difference in wages that may have to be paid to get a qualified replacement.

Besides recommending a written contract, Clock also told the supts. to avoid signing agreements in which generalities or loose wording may lead to misunderstandings. In short, he advised, the supts. to either get what they wanted in writing, or to make sure there was no doubt in their minds as to the terms to which they agree. (See page 66).

In conjunction with Clock's speech, Elmer Border, Olympic CC, San Francisco, Calif. supt. gave a detailed outline of the supt's responsibilities. It touched on maintenance, purchase of supplies and employment.

Border emphasized that undoubtedly the supt's most important task today is setting

Here's a view of the turnaway crowd that attended the GCSA banquet in Wilton hotel. More supts' wives than ever before accompanied their husbands to this year's convention.

