

JANUARY 1966

USGA GREEN SECTION RECORD



A Publication on Turf Management
by the United States Golf Association



"BULL'S EYE" SODDING

Spot sodding or contour planting at River Oaks
Country Club, Houston, Texas. Story on page 3.

USGA GREEN SECTION RECORD



Published by the United States Golf Association

© 1966 by United States Golf Association. Permission to reproduce articles or material in the USGA GREEN SECTION RECORD is granted to publishers of newspapers and periodicals (unless specifically noted otherwise), provided credit is given the USGA and copyright protection is afforded. To reprint material in other media, written permission must be obtained from the USGA. In any case, neither articles nor other material may be copied or used for any advertising, promotion or commercial purposes.

VOL. 3, No. 5

January 1966

Recipe For Good Greens	By Holman M. Griffin	1
Spot and Strip Sodding Techniques		3
Native Materials Can Be Used	By D. L. Fontenot, Jr.	4
The Case For Temporary Greens		11
Turf Twisters	Back Cover	

Published six times a year in January, March, May, July, September and November by the UNITED STATES GOLF ASSOCIATION, 40 East 38th ST., NEW YORK, N. Y. 10016. Subscription: \$2 a year. Single copies: 30¢. Subscriptions and address changes should be sent to the above address. Articles, photographs, and correspondence relevant to published material should be addressed to: United States Golf Association Green Section, Texas A&M University, College Station, Texas. Second class postage paid at Rutherford, N. J. Office of Publication: 315 Railroad Avenue, East Rutherford, N. J.

Editor: Dr. Marvin H. Ferguson

Managing Editor: Robert Sommers

THE GREEN SECTION OF THE UNITED STATES GOLF ASSOCIATION

Green Section Committee

CHAIRMAN: Henry H. Russell, P.O. Box 57-697, Miami 57, Fla.

DISTRICT CHAIRMEN: **Northeastern:** John P. English, Williamstown, Mass.; **Mid-Atlantic:** Martin F. McCarthy, Chevy Chase, Md.; **Southeastern:** Elbert S. Jemison, Jr., Birmingham, Ala.; **Mid-**

Western: Charles N. Eckstein, Chicago, Ill.; **Southwestern:** L. A. Stemmons, Jr., Dallas, Texas; **Pacific Northwest:** Edward A. Dunn, Seattle, Wash.; **California:** Lynn A. Smith, Pasadena, Calif.; **Rocky Mountain:** J. W. Richardson, Magna, Utah.

Green Section Agronomists and Offices

EASTERN REGION

Northeastern Office: P. O. Box 1237, Highland Park, N. J.

Alexander M. Radko, Director, Eastern Region
Holman M. Griffin, Northeastern Agronomist
Raymond E. Harman, Northeastern Agronomist
Lee Record, Northeastern Agronomist

Southeastern Office: P. O. Box 4213, Campus Station, Athens, Ga.

James B. Moncrief, Southeastern Agronomist

MID-CONTINENT REGION

Southwestern Office: Texas A&M University, College Station, Texas

Dr. Marvin H. Ferguson, Director, Mid-Continent Region and National Research Coordinator

Mid-Western Office: Room 221, LaSalle Hotel, Chicago 2, Ill.

James L. Holmes, Mid-Western Agronomist

WESTERN REGION

Western Office: P. O. Box 567, Garden Grove, Calif.

William H. Benguefield, Director, Western Region

USGA OFFICERS AND EXECUTIVE COMMITTEE

PRESIDENT: Clarence W. Benedict, White Plains, N. Y.

VICE-PRESIDENTS: Wm. Ward Foshay, New York, N. Y. Hord W. Hardin, St. Louis, Mo.

SECRETARY: Philip H. Strubing, Philadelphia.

TREASURER: Robert K. Howse, Wichita, Kan.

EXECUTIVE COMMITTEE: The above officers and: Fred Brand, Jr., Pittsburgh, Pa.; Robert F. Dwyer, Portland, Ore.; Edward L. Emerson, Bos-

ton, Mass.; C. McD. England, Huntington, W. Va.; Edwin R. Foley, San Francisco; Eugene S. Pulliam, Indianapolis, Ind.; Henry H. Russell, Miami, Fla.; Charles P. Stevenson, Buffalo, N. Y.; Morrison Waud, Chicago, Ill.

GENERAL COUNSEL: Lynford Lardner, Jr., Milwaukee, Wis.

EXECUTIVE DIRECTOR: Joseph C. Dey, Jr.

ASSISTANT DIRECTORS: P. J. Boatwright, Jr., Frank P. Hannigan

USGA HEADQUARTERS: "Golf House", 40 East 38th Street, New York, N. Y. 10016

Recipe For Good Greens

By HOLMAN M. GRIFFIN, Eastern Agronomist, USGA Green Section

The recipe for good greens first published in the September, 1960, issue of the USGA Journal, was put together under the direction of experts who used sound research techniques and experimentation over a period of 14 years. In 1960 what was considered to be an almost foolproof method of constructing a green was presented by the USGA, but even Betty Crocker cake mixes can't give you a good product if you don't follow the directions.

Too often greens have been built simply to conform to the profile shown in the USGA bulletin, but without following the detailed specifications recommended. Some of these greens hold up well, and others don't. It would be nice to take credit for those that work and claim those that don't were improperly constructed.

The USGA method stands on its own merit. When it is followed in detail, it will result in a good green. True, a properly constructed green may not live up to the owner's expectations, but then there probably never will be a green that, besides holding a shot that screams in on a low trajectory and without backspin, also allows not more than 18 putts in one round.

Please note also that the title of the USGA bulletin is "Specifications for A Method of Putting Green Construction." We emphasize that there are many other satisfactory methods, but this is the only type that deals in known quantities.

For years, people talked about 3-2-1

mix or 1-1-1 mix or some other such figure that indicates how the components of sand, soil and organic matter were mixed. I doubt that this information has any value unless it is coupled with the classification and analysis of the sand, soil and organic material used. Then, in order to get the same type of green as the other fellow, you have to use exactly the same materials in exactly the same way.

Because different soils possess different properties and seldom act in the same manner when mixed for green construction, it is important to know something about the soil as well as the other materials. By measuring the physical properties of a soil mixture and subjecting it to certain controlled tests, it is possible to "manufacture" the best possible medium on which to play golf and in which to grow turf with the natural materials available.

This does not say that all soil mixtures produced by this method are equal and one is as good as another, but rather that all soil mixtures must possess approximately the same physical properties within certain allowable tolerances. To have the best end product, use the best materials available.

Now let me dispel the all too common belief that the soil mixtures advocated for the USGA method are too high in sand content. I have seen acceptable golf turf grown on what appeared to be 100% sand, and one very well-known course grows turf on a

mixture of pure sand and organic matter (peat). Although the greens in both cases are quite troublesome and we would never encourage such extremes, it proves that it can be done.

Because too much sand causes problems in setting cups and may not hold sufficient moisture or nutrients without frequent applications, a soil mixture should contain only enough sand to achieve the necessary porosity after compaction. Under the USGA system of testing, almost no two samples will require the same percentage of sand since the sand content of the soil sample and the particle size of pure sand will vary. Therefore, any mixture may contain a high percentage of sand but the percentage is never too high.

Only if you plan to sacrifice good drainage, good aeration, deep rooting, protection against diseases, protection against overwatering, protection against salt problems, a putting surface which holds a shot without being overly wet and one that resists pitting by golf balls — only if you sacrifice those properties in the interest of easy cup setting because the soil holds together, and an insignificant saving on fertilizer can you say that the sand content is too high.

Another misconception about this type of green is that there are some short cuts which can be taken to save money. First, the \$100 fee for the necessary analysis seems high since most people are accustomed to having soil tested free or for a nominal charge of \$1. or \$2. per sample. Joe Doe comes by the course and says he can give you all the testing you need for \$10., or you bypass the testing altogether and mix up what appears

to be a good soil mixture and go from there.

Well, please don't call the end product a USGA green, good or bad. You may be fortunate enough to get a green that works well and actually save about \$100, but your chances are just about as good as they are for coming home rich from Las Vegas.

The USGA Green Section can provide the testing service for you through a contractual arrangement. Considering the time required for the analysis and the equipment necessary, the cost is reasonable and it may well be one of the cheapest investments your club will ever make.

If you have tried to locate good topsoil or good sharp sand lately, you know that these are scarce and bring premium prices. After getting bids on the desirable materials in the area, budget-minded club officials may recall that the greens they have played on for the last 40 years were just scraped up out of the fairways and were constructed for a fraction of the proposed cost of the new greens. What they don't recall is how little traffic the greens could withstand, what a headache the greens have been to the superintendent, and how difficult it is to make a putt through a puddle of water three inches deep after a light rain.

There is just no alternative. Good construction costs money and the short cuts are risky. Good construction may cost a little more initially but it pays big dividends in the long run. Buy the best material your club can afford, and if your members are not gamblers at heart use the USGA recipe for good greens and pay attention to details in the specifications. When playing the game as well as constructing greens, "follow through."



Large areas of well adapted bermudagrass have been plugged and the sod plugs moved to adjacent fairway areas. Albuquerque Country Club, Albuquerque, New Mexico, 1965.

Spot and Strip Sodding Techniques

Sod plugs or strips for establishing turf areas are very useful when the grass used is a creeping type such as bermudagrass, zoysia, or bentgrass. The accompanying photo and the one on the cover illustrate the method.

At River Oaks Country Club in Houston, Superintendent Tom Leonard had some newly graded areas to be planted. Such areas are always unsightly when they are first spot-sodded or strip-sodded. Mr. Leonard decided that such an area might be a bit more attractive if some sort of definite pattern were used in placing the sod. The cover photo shows the result of his plan.

The Albuquerque Country Club golf course is in a low-lying area where either bermudagrass or bluegrass can be grown, though some difficulties attend the efforts to grow

either. The fairways are composed of a mixture of grasses.

In 1965 it was decided that bluegrass and other cool-season grasses would be eliminated and that sod plugs would be taken from several large spots of excellent bermudagrass turf and planted in the adjacent fairway areas. These bermudagrass clones have existed for a great many years and some have spread sufficiently to cover several hundred square feet.

Julian Serna, Golf Course Superintendent at Albuquerque, used a mechanical plugger to remove the bermudagrass plugs and to remove spots of soil from the fairway areas where vegetation had been eliminated. The plugs were set by hand and the area was then topdressed. Accompanying photo shows the fairway areas just after planting was completed.

Native Materials Can Be Used

By D. L. FONTENOT, JR., Soil Scientist

The object of this paper is to provide you with data you may not now have, and to stimulate your interest in the potential adaptation of some native or local material, or by-products, to your needs—both *physical* and *financial*. To you who have just completed or perhaps started new green or tee construction, the question may be — why use anything but soil, sand, and peat moss? Why further complicate a difficult job with other less known materials?

If there were no problems or questions of costs, availability of suitable soil and sand on or near your golf course, plant nutrient needs and balance, proper ratios of soil, sand, and peat, we could dismiss these further considerations. Unfortunately, the above, and many more, are questions that must be answered. Perhaps the most difficult final problem in construction is total cost. Has anyone here done golf course construction, the way he desired it be done, that did not cost more than expected?

The potential uses of native materials or by-products is by no means intended to result in a short-cut or second-rate job of construction. However, there are many “buts” along with additional knowledge and local adaptation if the practical goals are to be achieved.

Let's not forget that construction and maintenance on a golf course is not limited to new or reconstruction of greens and tees. Some others are: landscaping, nursery sites, fairway improvement, topsoil for erosion control

and the like. All involve soil or soil mixtures for a specific purpose.

Of the many available materials in Louisiana, I will discuss only five. They are poultry house manure, sawdusts, lightweight aggregate (calcined clay), sugar mill compost (filter press), and washed sand.

To those of you who keep up with authoritative sources of golf green construction material recommendations, it is realized the above materials are not normally included. There are several good practical and scientific reasons for this fact. Some of the reasons are:

1. The large number of native or by-product material in any regional area or state.
2. Lack of detailed knowledge or research on these materials.
3. Materials with the same name may be extremely variable depending on production methods, storage conditions and age.
4. Users may not have knowledge or experience to use the materials properly and effectively.
5. It is easier to make specific mixture recommendations and have them followed by using soil, sand, and peat mosses.
6. Some of the materials may not be available in sufficient amounts for completing all present or future construction. Uniformity of materials or mixtures is very important and desirable.
7. Sometimes these materials require special equipment, know-how, or technique of mixing, and fertilization.

Presented at the Louisiana Turfgrass Conference, December 8-9, 1965, University of Southwestern Louisiana, Lafayette, Louisiana.

8. Some recommendations involving mixtures do not fully consider the costs vs. benefits in terms of alternate substitution of less expensive materials or mixtures.

Each of the five materials listed above will be considered in outline form.

POULTRY HOUSE MANURE

Source

Commercial chicken broiler houses.

Location

Largely in north, central, and east sections of Louisiana.

Availability

In 1964 the State produced over 29 million broilers with estimated 147,000 tons of manure and litter.

Cost

Variable, often free for cleaning houses.

Potential

As a source of plant nutrients, organic matter (peat moss substitute) minor elements.

Uses and Conditions

Dressing for tees, nurseries, and weak turf areas in fairways and around clubhouse.

The writer used this product with good results during June 1965 in reconstruction of one green and several tees using one-third by volume of manure, mason sand, and silt loam topsoil. These materials were dry and put on in layers. Excellent mixing was

achieved with an offset chopper disk. Two hundred pounds of 20% superphosphate and 100 pounds of 60% K_2O was added prior to sprigging to 328 bermuda.

The soil contained no grass or weed seed and neither did the manure or sand, but the green was treated with methyl bromide to destroy original common bermudagrass cover, nematodes, and to reduce turf diseases. A fungicide program was discussed in the event it was needed. As of October 15, 1965, none was needed. It is well to point out that a new bermudagrass green responds to high nitrogen levels between late April and October. No additional nitrogen was planned for fall overseeding.

Remarks

Has real value in renovation of tees in the spring by mixing two inches of manure with the top 5-6 inches of tee. Smooth and seed if needed.

If tried as part of a mixture for topdressing greens, the mixture should be composted with soil and sand for two to three months, or the manure run through a grinder.

If air dry, nitrogen may reach over 2%. Value as fertilizer is from \$5. to \$10. per ton. From this standpoint only it is not usually economically competitive with commercial mineral fertilizers. As a source of organic matter it is excellent.

Chemical Analysis

Kind	Moisture	Nitrogen	P ₂ O ₅	K ₂ O	Per Ton Equivalent
Broiler manure- litter*	24.6%	1.7%	1.8%	1.5%	400 lbs. 8-8-8
Hen manure- litter*	36.9%	1.3%	2.7%	1.4%	450 lbs. 6-12-6

*From an *Evaluation of Poultry Manure As a Fertilizer* by M. B. Parker of Georgia Mountain Experiment Station, Blairsville, Georgia.

SAWDUSTS

Source

Very extensive in all parts of the State having a lumber industry. Old piles can be found even if sawmill has long been moved.

Availability

Usually in unlimited amounts.

Cost

Usually available without cost.

Potential

As a substitute for peat moss.

Uses and Conditions

In new green and tee construction. Also, as a mulch for ornamental plants and as composting material. Its major advantage is availability and low cost. On the other hand, it is low in potential plant nutrients and *must be properly supplemented with additional nitrogen* (24 pounds of nitrogen per ton of fresh, dry sawdust), and sometimes phosphate. It decomposes under the same conditions faster than peat mosses. The release of added and natural nitrogen is, therefore, more rapid than in peat moss soil mixtures.

Sawdusts available in this State are not toxic to plants and grasses even when occupying one-third of the volume of the mix. Soil reaction or pH is little affected by additions of sawdust. Cypress sawdust has the lowest pH of any encountered in Louisiana.

Weight and Other Comparisons

The weight of a unit volume of sawdust or peat depends mainly on the amount of compaction and moisture content. A cubic yard of uncompressed dry sawdust weighs about 200-300 pounds. Saturated with water, the weight is from 1,000 to 1,500 pounds. This means it is capable of absorbing up to 500% of its dry

weight of water. This is slightly below the percent for good peat mosses.

What about "peat"? Although not a product listed for discussion, it well could be. One parish, Terrebonne, according to its soil survey, has over 533,000 acres of peat and muck of sedimentary origin. Depths are from a minimum of one foot to more than ten feet. Organic matter is 35 to 70%; pH between 6.0 to 7.3, and the percent nitrogen up to 2.5. If you think this organic material is variable, look at some published data in the table following. Commercial peats are sometimes classed as (1) moss peats (2) raw peats (3) cultivated peats (4) sedimentary peats.

The point I am trying to make is that by just ordering so many bales of "peat" you could expect about the same variation as ordering 50 pounds of unspecified meat.

A casual study of the peats available in the Alexandria, La., area revealed that there are 12 brand or trade names available, of which five were imported. A standard bale was 6 cu. ft. and weighed from 51 to 75 pounds.

Recommendations for use were on a volume basis only. No analysis or moisture was shown on the label. Commercial classification was sometimes omitted or was not specific. Labels were strictly for sales appeal. Prices varied for 6 cu. ft. bale from \$3.40 to \$4.75. Moist peats, sacked in 100-pound plastic bags (about two bushels), sold for \$1.89 to \$2.50.

Cost Comparisons

I have data and experience in construction of only one green where sawdust was substituted for peat moss. Two greens were constructed at the same time, one using 14% sawdust, the other 10% peat moss by volume; in amounts—24 cu. yds. of sawdust and 17 cu. yds. (76 bales).

COMPARISON OF PEAT TO SAWDUST

Lignin or Lignin-like Materials	N %	P ₂ O ₅ %	K ₂ O %	Ash %	pH	Water % Holding	Cellulose %
18 to 28% (fine sawdust)	0.2	0.1	0.2	0.4 to 0.9	4.5 to 5.0	545	47 to 58
Coarse sawdust	0.2	0.1	0.2	0.9	5.0	240	47 to 58
18 to 19% (sphagnum peat (p. moss)	0.5 to 1	Less 0.1	Less 0.1	4 to 5	3.0 to 4.5	700 to 1500*	13 to 17
35 to 49% (lowmoor peat)	1.5 to 3.5	Less 0.1	Less 0.1	5 to 40	3.5 to 7.0	300* to 800	3 to 5

*Influenced by degree of drying.

On estimated dry weight basis, 6,000 pounds for sawdust and 5,950 for peat. Cost delivered at greens — sawdust \$24. — peat moss at \$4. per bale, \$306. Approximately \$10 was spent on *additional fertilizer* for the green containing sawdust.

Observations during and after two full years did not reveal any difference between the two greens.

LIGHT AGGREGATE (Calcined Clay)

This discussion and data presented *are only for* aggregate produced from *Red River* clays near Alexandria, La., and processed there.

Sources

Plants at Alexandria and Erwinville, La.

Availability

Unlimited.

Cost

\$4.75 cubic yard FOB Alexandria, La., in bulk.

Potential

As part of the mix for construction of greens and tees and as part of top-dressing material where more aeration is needed.

Much data is available on calcined clays and in most cases such data would be generally applicable to aggregate.

Experience In Use

Used as replacement for one part of

sand in new green construction. Final 12 inches of surface soil contained 15% by volume. Two-year observations and comparison with greens constructed without aggregate indicate the following facts:

1. Aggregate green is considerably more firm when wet.

2. Water intake rate and movement through the soil equals or exceeds other greens.

3. pH about 0.4 higher than non-aggregate green.

4. Cup changing somewhat more difficult especially when green is very dry on surface. However, soil remains in cup changer the same as other greens.

5. Fertilizer appears to leach more readily as a result of the higher percent of non-capillary pores. Smaller and more frequent fertilizer applications are suggested.

Aggregate was used with cane compost soil (filter press) in pot tests as a soil mix. This phase will be discussed under cane compost soil.

Remarks

Light aggregate is an inexpensive source of calcined clay especially valuable where construction materials need greater non-capillary pore space. Also, note the available plant nutrient and lime content of this aggregate.

Chemical Data of Composite Sample of Dry Light Aggregate 10 Days After Grinding¹

Available phosphorus, ppm ²	60
Available potassium, ppm	172
Available calcium, ppm	6120
Available magnesium, ppm	1525
Reaction pH	10.0 ³
CaCO ₃ (limestone) equivalent	7.1%

¹Analysis done by Louisiana Agricultural Experiment Station.

²Parts per million.

³pH reduced to 8.2 when in contact with moist air. Oxides and hydroxides changed to less alkaline materials. Although data is being requested for the *available* ppm after lowering of pH, it is not ready. It is expected they will be lower for the above reasons.

Selected Physical Data Compared To Mason Sand

	Weight Cu. Ft.	% Water Held By Weight 3 Hrs. After Free Draining
Mason Sand	100	18.1%
Lightweight Aggregate	53	42.8%

SUGAR MILL COMPOST SOIL (Filter Press)

General

This material is actually composted material. Each compost pit is expected to vary, often in extremes. Basically this soil material contains soil washed from the mill cane, bagasse (cane fiber), chemicals used in making sugar, ash, carbon, and organic matter provided by plants growing in the pit.

Other factors influencing such a compost are the amount and kind of materials going in the pit, age of compost, depth of pit, water management, amount and kind of vegetation growing in pit, place of discharge of mill residues in the pit, changes in chemicals and sugar manufacturing processes with time, and others.

Does it appear hopeless, too complicated, too variable? I think not. The evaluation procedure described

below may change your opinion and justify mine.

The pit studied, and from which soil was later used, is located at Meeker, La. (Meeker Sugar Cooperative, Inc.) After receiving approval from mill officials to make the study, and to use the pit contents without cost, the job was started—but not before all information related to or influencing the pit material was obtained from key mill personnel. Then the steps taken were in this general order:

1. Made the equivalent of a detailed soil survey of the 5-acre pit (leveed area).

- a. Recording depths and extent of major layers, vegetation (weeds).
- b. Made simple field chemical tests.
- c. Made a large scale map and recorded pertinent data.

2. Based on conditions found above, took composite soil samples.

3. Took 30-pound samples from the pit for pot or other studies.

4. Sent samples to LSU for analysis.

5. Checked on other analyses and past uses of this compost.

6. Evaluated all data and information and made recommendations.

This involves a lot of words but not too much work. Timing and follow-up are very necessary. The following conclusions were reached:

1. The compost material was, although stratified, very uniform in profile and total depth (3 feet).

2. Removal of the compost should be down to original soil (3 feet).

3. Good mixing was obtained through loading, dumping (disking in

our case) and/or screening or shredding.

4. No serious weeds or grasses were present. Tie-vines, coffee weeds, but no common bermudagrass, crowfoot, or crabgrass.

5. No problem of toxic substances, nematodes, turf insects or diseases.

6. This compost material was *not satisfactory* or *suitable* unless cut or mixed with sand, aggregate, cinders, or other non-plastic material for green or tee construction.

7. The composted material was excellent for construction when properly diluted or cut with the above.

8. No peat or other organic material was needed or desired in green or tee construction.

Chemical Data With Comparisons

	Composted Soil From Cane Mill Pit ppm ¹	Fertile Red or Mississippi River Bottom Sandy Top Soil ppm	Unfertilized Hill Sandy Soil ppm
Available phosphorus	400 +	180	40 or less
Available potassium	453 +	220	80 or less
Available calcium	4534 +	2800	500 or less
Available magnesium	450 +	280	50 or less
Reaction pH ²	5.7 (7.2)	7.0	5.0 to 6.0
Organic matter	12 to 18%	1.8%	0.7 to 1.0%

¹Parts per million.

²Initial low pH due to organic acids and only temporary.

Physical Data With Mason Sand Mixes

	Dry Weight Cu. Ft.	Relative % Water Held	% Sand ¹
Pure compost	52.3	62.8	28
1/2 sand-1/2 compost	84.5	31.1	
2/3 sand-1/3 compost	89.8	28.2	
Mason sand	100	18.1	

¹Includes fine sand, cinders, carbon, and strongly aggregated soil. Actual sand may be as low as 10%.

As of this date no laboratory evaluations of the movement of water through various mixtures and compaction have been made. This was not done because more reliable information was available locally. All 19 greens at the Rapides Golf and Country Club at Alexandria, La., were constructed using compost from the Meeker Sugar Mill. These greens are not tiled and rest on heavy clay with a ten-inch cinder base.

They were constructed six to seven years ago using 60% cane compost and 40% ground cinders. Top-dressing basically same as above. Maintenance was standard for golf courses of this financial status.

Observations and study during this six-year period, under all climatic and playing conditions, are listed below:

1. Permeability rate was no problem.
2. This mixture grows 328 Bermuda and winter grasses in a highly satisfactory manner.
3. No special or unusual physical maintenance practices are required.
4. Requires a minimum of fertilizer and water.
5. Practically no turf disease noted without use of any turf fungicides.
6. Thatch, mat, and worm problems normal.
7. Transition from cool to warm season grass no problem.
8. Weed invasion not serious.
9. Greens have tendency to be less firm than desirable when saturated with water (suggests more sand or cinders in future topdressing).
10. No problem with pin changing.

In addition to the observations listed above, extensive tests have been conducted using potted compost-sand, cinder, and aggregate mixtures. Tests involved puddling mixtures, compac-

tion both wet and dry, then growing both grasses and vegetable plants.

Conclusion

We recommend the compost from the Meeker Sugarcane Cooperative for part of the *mix* for green and tee construction. The mix for the climatic conditions around Alexandria, La., for construction is by volume—one part of this compost and one part sand and *no peat*.

Topdressing may be a ground mixture as above or under certain conditions the sand can be increased two parts. Available evidence does not indicate an increased disease problem following topdressing during fall seeding.

The Alexandria Golf and Country Club has already stockpiled enough of this compost to construct five new greens in 1966. It is also being used as part of the topdressing mix.

WASHED SAND

In most areas of this State, sand is usually the most expensive single major ingredient in green construction. Mason sand is very expensive but is not essential in the soil mix.

Many operating or abandoned gravel pits have large amounts of "washed sand." This is sand or sandy material from which almost all of the gravel and fines have been removed by water and screening. Some of this material has been washed and screened twice. The clay and silt percent is usually less than 5%. Naturally every pit will not be uniform in the percentage of fines or gravel.

Examination of each gravel pit will almost always result in finding a large amount of excellent sand or granular material suitable for the greens soil mix. I have found that this material very often can be purchased for about one-third of the cost of mason sand. Don't forget that the cost of sand is

often determined by what it is being used for or with.

The Louisiana Geological Survey Office at Baton Rouge (LSU Campus) can provide at a small cost the locations of operative or abandoned pits in Louisiana.

SUMMARY

Economical and technically sound greens and tees may be constructed or improved by the proper use of native materials and by-products.

I have tried to leave the idea with you that the selection, use, and management of such construction will require additional knowledge and effort on your part. It is often possible to get needed technical information and basic data without cost from state,

REFERENCES:

- The Use of Sawdust For Mulches and Soil Improvement* by F. E. Allison and M. S. Anderson, U. S. Department of Agriculture, Circular No. 891.
Sawdust And Other Natural Organics For Turf Establishment And Soil Improvement by M. S. Anderson, USDA-ARS 41-18.
Composts, Peat And Sewage Sludges by H. W. Reuszer - *Soils - 1957 Yearbook of Agriculture*.

The Case For Temporary Greens

AN OPEN LETTER

To Members of
Northeastern Golf Clubs
Gentlemen:

The question of whether to allow play on regular greens in winter is very difficult to answer precisely and finally because so many variables must be considered. The difficult part is that any one of these variables can change daily, or even hourly and play at such time could cause serious injury. At other times play could be allowed without causing injury.

Speaking from the agronomic point of view, we would say without reservation that it is best to keep winter play off regular greens and to use temporary greens for the following reasons:

federal, and other sources, not excluding members of your golf club. It may be necessary in some circumstances to pay for some "know how" or for specific information.

You have heard considerable reference to organic matter additions in golf course construction. It may be well to remember that regardless of the kind added in the mix, it will not remain un-decomposed very long in our climatic zone. Also, the greatest value of organic material, regardless of the kind, comes after it has been altered through decomposition. I am relating the above to soil structure improvement. This in turn influences infiltration and permeability rates and other attributes of a good green or tee.

(1) So many more golfers play each course now in regular season that injury due to the increased traffic is mounting and off-season play can only add to the total traffic injury problems. This was very evident during the winter-spring season of 1962-63 when many courses suffered severe winter damage. These have been documented in articles written in the USGA Green Section Record for July 1963, September 1963, and November 1964. If you do not have these, we would be pleased to send them to you.

(2) In late fall or early winter when frost enters the ground, turf becomes frozen and the upper fraction of soil becomes moistened with frost. Traffic at these times will break or crack the stiff and frozen blades of

grass, weaken them, and *Poa annua* or other weeds could subsequently encroach, and so the turf is generally weakened. Traffic imposed upon moistened soil results in a cementing of the soil due to the lubricating action of the moisture. This undoubtedly adds to compaction.

(3) In winter when the ground is frozen solid, turf blades would suffer only if play were allowed while the grass, too, was frozen, as under (2) above. The danger here is that during the day while players are on the course, sufficient thawing could occur in the upper fraction of soil to cause footprints and a cementing action of the soil. This occurs when air temper-

atures are higher than normal and, of course, these are the very days when golfers prefer to play.

(4) The most difficult time for turf is in late winter and early spring, from mid-February through March when the top inch of soil (or less) is thawing but the soil beneath is frozen. Traffic on greens at this time will result in severe compaction.

(5) Any time water stands on a green in winter, no play should be allowed. This results in extreme softness of the upper fraction of soil and turf.

One reason why some courses now have little or no *Poa annua* in greens is the fact that they have used tem-

Statement of Ownership

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION (Act of October 23, 1962; Section 4369, Title 39, United States Code). 1. Date of Filing—October 1, 1965. 2. Title of Publication—USGA GREEN SECTION RECORD. 3. Frequency of issue—Six issues a year in January, March, May, July, September and November. 4. Location of known office of publication—315 Railroad Avenue, East Rutherford, N.J. 07073. 5. Location of the headquarters or general business offices of the publishers—40 E. 38th Street, New York. 6. Names and addresses of Publisher, Editor, and Managing Editor: Publisher—United States Golf Association, 40 E. 38th Street, New York, N.Y. 10016. Editor—Dr. Marvin H. Ferguson, 40 E. 38th Street, New York, N.Y. 10016. Managing Editor—Don Weiss, 40 E. 38th Street, New York, N.Y. 10016. 7. Owner (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given.) Names and addresses—United States Golf Association, 40 E. 38th Street, New York, N.Y. 10016; President—Clarence W. Benedict, 40 E. 38th Street, New York, N.Y. 10016; Vice-Presidents—Wm. Ward Foshay and Hord W. Hardin, 40 E. 38th Street, New York, N.Y. 10016; Secretary—Philip H. Strubing, 40 E. 38th Street, New York, N.Y. 10016; Treasurer—Robert K. Howse, 40 E. 38th Street, New York, N.Y. 10016. 8. Known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages or other securities—None. 9. Paragraphs 7 and 8 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner. Names and addresses of individuals who are stockholders of a corporation which itself is a stockholder or holder of bonds, mortgages or other securities of the publishing corporation have been included in paragraphs 7 and 8 when the interests of such individuals are equivalent to 1 percent or more of the total amount of the stock or securities of the publishing corporation. 10. This item must be completed for all publications except those which do not carry advertising other than the publisher's own and which are named in sections 132.231, 132.232, and 132.233 Postal Manual (Sections 4355a, 4355b, and 4356 of Title 39, United States Code)

	Average No. Copies Each Issue During Preceding 12 Months	Single Issue Nearest to Filing Date
A. Total No. Copies Printed (Net Press Run)	5,200	5,200
B. Paid Circulation		
1. Sales Through Dealers and Carriers, Street Vendors and Counter Sales	none	none
2. Mail Subscriptions	4,121	4,232
C. Total Paid Circulation	4,121	4,232
D. Free Distribution (including samples) by Mail, Carrier or Other Means	823	789
E. Total Distribution (Sum of C and D)	4,944	5,021
F. Office Use, Left-Over, Unaccounted, Spoiled After Printing	256	179
G. Total (Sum of E and F)	5,200	5,200

I certify that the statements made by me above are correct and complete.
Don Weiss, Managing Editor

porary greens for several years. When permanent turf (bentgrass) is injured by traffic, ball marks, etc., *Poa annua* quickly fills in. Members don't notice this change, but those versed in agronomy do. Members usually judge cover by green color, and only in summer when *Poa* weakens do they notice several kinds of grasses in one green. The more *Poa annua*, the more potential summer trouble.

All told, any amount of play in winter generally means more rigid management during the growing season, especially more aeration and more topdressing to true and level greens. If play is allowed on regular greens, we cannot stress too vigorously that the days must be very carefully chosen; that someone must make these day-to-day decisions; and that your course must be treated as an individual problem. It should not be kept open or closed simply because a near-by course is open or closed.

The only way to insure against possible trouble is to have temporary greens. It has often been suggested that the word "alternate" be used in place of temporary, because the latter bears a negative connotation.

Finally, Dr. Fred Grau, prominent turf authority and former Green Section Director, proposes that this sign be displayed at the club:

"In the interests of all the members, and in an attempt to preserve the high quality of our greens, the course is closed to play until conditions warrant resumption of traffic.

"Foot and wheel traffic on frozen grass causes the grass to turn brown and die. Ice crystals within the grass blades are distorted and rupture living cells, causing death.

"When the frost is thawed by the sun, the greens remain overly wet for a short time. In this condition foot

traffic can cause severe damage by breaking roots, creating compaction, and footprinting so badly that pleasurable putting is not possible.

"Every effort is made to keep the course continuously playable, but when Nature fails to cooperate and brings frost or floods we have no choice but to limit play. The understanding and consideration of the members are greatly appreciated."

We don't know if we've answered the problem but we hope we have provided some useful information upon which to base your decision. If any questions arise, please write.

Sincerely,

THE GREEN SECTION STAFF
NORTHEASTERN DISTRICT
OFFICE

COMING EVENTS

- | | | |
|------------|----------|--|
| Jan. 4- | March 11 | ..Winter Turf Course
Rutgers University
New Brunswick, N. J. |
| Jan. 25-26 | | Virginia Turfgrass Conference
John Marshall Hotel
Richmond, Va. |
| Jan. 26-27 | | Rocky Mountain Regional Turf
Conference
Colorado State University
Ft. Collins, Colorado |
| Jan. 28 | | USGA Green Section Conference
Biltmore Hotel
New York, N. Y. |
| Jan. 31- | March 11 | ..Illinois Turf & Park Management
Short Course
University of Illinois
Urbana, Illinois |
| Feb. 8-11 | | Weed Society of America
Weed Control in Turf Program
Sheraton-Jefferson Hotel
St. Louis, Missouri |
| Feb. 13-18 | | International Turfgrass
Conference and Show
Hotel Muehlebach
Kansas City, Missouri |
| Feb. 21-24 | | Cornell Turfgrass Conference
Cornell University
Ithaca, New York |
| Feb. 21-24 | | Penn State Turfgrass Conference
Pennsylvania State University
University Park, Pa. |
| Feb. 28- | March 1 |Southern Turfgrass Conference
Hotel Peabody
Memphis, Tenn. |
| March 3-4 | | Massachusetts Turf Conference
University of Massachusetts
Amherst, Massachusetts |
| March 7-9 | | Midwest Turf Conference
Purdue University
Lafayette, Indiana |

Chas. Hebblethwaite

COUNTRY CLUB OF ROCHESTER

PM

2935 EAST AV.

ROCHESTER 10

N. Y.

3

~~ATT GREEN COMMITTEE CHAIRMAN~~

TURF TWISTERS

NITROGEN LEVELS

Question: Recently we had soil samples from our putting greens tested. We have been fertilizing regularly with an inorganic fertilizer and the grass has been growing well, but tests indicated that the nitrogen content is low. Should we use larger quantities of nitrogen? (NEW MEXICO)

Answer: Soil tests are almost worthless with respect to nitrogen levels in the soil. Nitrogen from organic matter or from forms other than nitrate becomes "nitrified" by bacterial action. Nitrate is quickly taken up by the plant or leached out. Therefore the amount measured is in a rather transient state. A soil may have a relatively high nitrogen supplying ability but give a low test.

The quantity of grass clippings taken from greens and the color of the turf are better indications of nitrogen supply than are soil tests.

This is not true with respect to tests for other elements. Some of them are excellent indicators of the nutrient status of your soil.

GREENS BURNED

Question: We sprayed our Tifgreen greens with a mixture of chlor-dane (wetable powder), disodium methyl arsonate, and a fungicide (Kromad). All these were used at recommended rates. We have used all the materials before at these rates and experienced no trouble. No response was evident for approximately 10 days after the spray was applied, but weather was damp and cool during this period. Then we had two warm November days and the greens burned badly. Some spots appear dead. What went wrong? (LOUISIANA)

Answer: We don't know. However, we suspect that the materials (or their carriers) were incompatible and that a toxic product was formed. While many insecticides, and fungicides may be used in mixtures, most manufacturers urge that their products be used alone.