NOVEMBER 1967

USGA GREEN SECTION RECORD

A Publication on Turf Management
by the United States Golf Association

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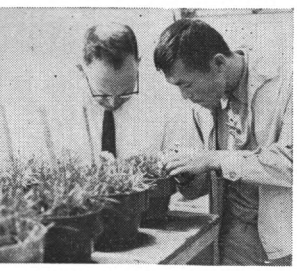
VOL. 5, No. 4 **NOVEMBER 1967**



Cover Photo: Dr. C. Reed Funk and Sang-Joo Han, Rutgers turf breeding specialists, examine selected varieties of new bluegrasses which are to have their chromosome numbers determined.

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Holman M. Griffin, Northeastern Agronomist, USGA Green Section; Dr. C. Reed Funk, Rutgers University turf breeding specialist and Sang-Joo Han, graduate student in turf breeding at Rutgers; examine new bluegrass variety under test.

Turf Management Through Genetics

by HOLMAN M. GRIFFIN, Agronomist, USGA Green Section

Why not develop an all-purpose turfgrass which would grow well in wet or dry soils, hot or cold weather, sun or shade, and be wear-, disease-, and insect-resistant as well?

You might say, "Just what the doctor ordered." And why not? For years the doctors (geneticists) have been improving field crops by means of breeding programs, and have developed many strains which are highly superior to the parent materials.

While the development of such a turfgrass with all the attributes listed above is most unlikely, it is not impossible. We could certainly improve our present turf varieties a great deal.

Most of the turf varieties now available are the result of the selection of superior types of grasses from old turf areas where nature was the principal geneticist. Until recently, interested individuals selected, collected and tested these plants with little thought of any improvement by means of a breeding program. These gifts of nature, were sought as a finished product rather than as a source of superior characteristics which could be combined genetically to produce turf adapted to specialized requirements.

Merion Kentucky bluegrass is an excellent example of a **natural** hybrid which was selected, tested and accepted by the turf world as a superior variety. For years now Merion has been the standard by which bluegrasses are measured, but at the same time the inherent weaknesses of this grass have been realized.

Other superior plants might also be "found," as Merion was found growing in a natural state, but the possibility of such plants occurring in nature is quite low, and the probability of these plants being noticed and selected for testing further reduces the odds. Progress dependent upon such happenstance is extremely slow and unpredictable.

Surveys conducted in several states during the last four or five years indicate that the production and maintenance of turf is a multi-million dollar business ($4 billion according to the first edition of "Turf-Grass Times" in 1965). Nevertheless, the money being spent on turfgrass

Individual bluegrass plants being grown in greenhouse from seed in preparation for field trails.

research is insignificant when compared to the total expenditure on this crop. It amounts to something less than one per cent.

Although turf research programs are gaining in popularity and support faster now than ever before, we have a long way to go before the expenditures for turf research approach anything near the three to six per cent of gross income reportedly spent by progressive industries on product research.

Breeding Programs Neglected

The foregoing paragraph is a general picture of the meager allotments for general research on turf. You might well imagine that the portion allotted specifically for research on turf breeding is small, indeed. Until approximately five years ago, turfgrass breeding programs were either nonexistent or largely neglected in the general turf program. Fortunately, a number of universities, seed and sod growers and governmental agencies have begun to realize the value of turfgrass in our society and the possibilities of substantial improvement in turf through breeding programs.

Yes, interest in turfgrass breeding is increasing in the United States but we are still lagging behind Europe. Holland and Sweden in particular have developed and released a number of named varieties of bluegrass, fescue, ryegrass and bentgrass. Some of these grasses show promise for use in this country, but varieties better adapted to our own climate and needs could no doubt have been developed if we had had similar programs here.

Studies in genetics, botany, physiology, pathology, entomology, taxonomy, ecology, chemistry, turf management, and plant breeding are all essential to the development of a well-rounded and progressive turf breeding program. These programs must culminate in the development of breeding and evaluation procedures specifically adapted to the plant species involved and the particular requirements of the turfgrass industry. After the development of the appropriate breeding method, the greatest need is the development of faster and more efficient methods of evaluation and screening of new and potentially better turf varieties.

Obtaining Improved Varieties

Essentially improved varieties of turf are obtained through three methods. They are:

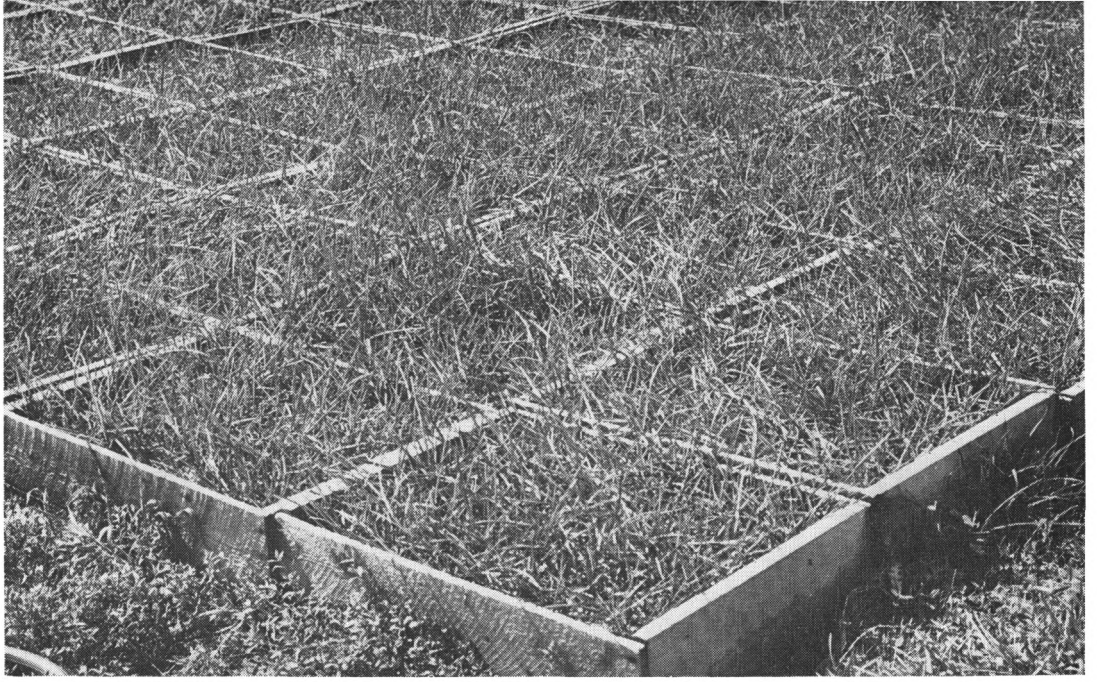
(1) Selection of superior plants occurring in nature.

(2) The use of radiation and other mutagenic agents to produce variants.

(3) Hybridization of promising selections.

Regardless of the method employed, it usually takes at least 10 to 15 years to develop properly a new turf variety to the point that it becomes commercially available. Much of this time is required for evaluation and testing: thus the need for more efficient methods of screening to separate the good from the bad.

We have already discussed the natural selec-



Flats of bluegrass seedlings ready for the field. This will constitute a portion of next year's nursery plants to be evaluated in the breeding program.

tion method by which most of our present turf varieties were obtained, and its obvious limitations. Next we should consider the use of radiation and mutagenic agents to create genetic variations. This method offers the plant breeder a chance to work with the most outstanding varieties, and alter their genetic composition in hopes of producing an even better plant, or of endowing the variant with a superior, transmittible characteristic. Also, it allows the breeder to produce his own source material rather inexpensively in the laboratory without depending on extensive travel or donations to obtain plants for evaluation.

Although this method of altering plant material has some distinct advantages, the breeder is still unable to control the genetic changes he brings about in the plants, and the probability of producing superior plants is again extremely low.

The third method for obtaining improved turf varieties is hybridization. Without doubt this is the most promising. The first two methods of deriving superior plants are normally used simply as a starting point for plant breeding.

Reproduction is Complex

On the surface it would seem simple to collect different plants (source material), screen this material for the desired characteristics, and then cross the plants having these individual characteristics until a superior plant containing all the desirable features present in the source material is obtained.

However, it is much more complex than this. For one thing, the specific method of reproduction of different varieties of turfgrasses and the techniques of hybridization must be clearly understood for each variety. As an example, Kentucky bluegrass **(Poa pratensis)** reproduces both sexually and by apomixis. Apomixis is a process whereby seed is formed vegetatively without the union of the germ cells (egg and pollen). Seed produced apomictically is genetically identical to the parent plant and for this reason a high degree of apomixis is sought in new varieties.

Merion Kentucky bluegrass is extremely apomictic, producing only about 4% of its seed sexually, and can therefore be propagated from seed as a pure strain. A grass of this type in which each plant is genetically identical to the others leaves much to be desired, however, because every plant in the planting is subject to the adversities of disease and environment to the same degree as all the others. Figuratively speaking, we have all our eggs in one basket with a grass such as Merion, and some turf breeders now feel that the best bluegrass turf of the future will come from a mixture of highly apomictic and compatible strains.

Now that we have discussed some advantages of apomixis, we must also acknowledge that this process is a great handicap to the turf breeder. The reproductive process of apomixis is neither

Dr. C. Reed Funk checks new seed, placed under ice pack to break dormancy prior to planting in flats such as seedlings behind him.

clearly understood nor presently of use to the geneticists except as a means of maintaining the purity of a strain once the proper result has been achieved. All progress with cross breeding is totally dependent upon sexual reproduction.

The techniques and possible combinations for crossing plants are too complex and too numerous to cover in this article, except to say that the goal of such a program is a plant with superior qualities for turf which may be maintained true to type by its seed or by the less desirable means of vegetative propagation if the plant is not apomictic.

A Tedious Process

Dr. C. Reed Funk, associate research specialist in turfgrass breeding at Rutgers University, annually screens and evaluates some 50,000 individual plants of bluegrass, fescue, ryegrass and bent. Each year a large portion of these plants is discarded and replaced with new plants. Those with some superior characteristic will be retained for further evaluation.

Such large numbers of plants are necessary because of the difficulty of obtaining all desired characteristics in one plant. This is illustrated by the fact that if three independent, desirable characteristics were present in some of his cross-breedings in a frequency of one per 1,000 plants, the plant which he would be looking for, and which possessed all three characteristics would exist at a frequency of one in 1,000,000,000

To further illustrate the problems of genetics with an extremely simplified example, a cross between two plants which differ in only one gene (the unit of inheritance which controls the development of character in all life forms) would produce the desired plant which possessed both of the desired genes in a frequency of one in each four plants in the second, or F2 generation.

When you consider that bluegrasses may have from 38 to 150 chromosomes, each of which contains numerous genes independently assorted and capable of independent combination, the chance of the ideal plant being produced with only 20 different gene pairs concerned would be one in 1,099,511,627,776 plants.

To overcome such odds, the turf geneticist must be highly skilled in breeding techniques,

Ryegrass plants being evaluated both to determine characteristics of individual plants, and for seed production.

and must have a keen eye so that he can select and evaluate plants which show promise. In addition, he must be persistent, dedicated, and it would help if he were just plain lucky.

Generally, a progressive bluegrass breeding program might be outlined as follows:

First and Second Years

Collect source material and evaluate it. Produce seed from which vegetative or clonal nurseries are established of the more promising strains.

At this point I would like to make a particular point in the interest of better understanding between the researcher and the man in the

field. The field men or turf managers are extremely valuable to the researcher when they provide source material which they have found to be outstanding. However, once the material has been donated, these individuals, being normally anxious about their discovery, quite often express concern that progress reports on their selection were either vague or nonexistent. The explanation for this seeming disinterest on the part of the researcher is that preliminary screening and evaluation takes anywhere from one to five years. Under these circumstances, when a geneticist is cornered at a conference or turf meeting he can hardly be expected to remember and recite a detailed evaluation of a particular plant which is only one of thousands.

If your selection has merit, I am sure you will be informed as soon as possible. However, this may take years rather than months, depending upon how your material is evaluated and how it is used in the program.

Third and Fourth Years

The promising selections must be screened for disease and superior characteristics. This may be done in a green house, growth chamber or in the field.

Fifth and Sixth Years

Determine the degree of apomixis and establish vegetative nurseries of individual plant selections.

Seventh Year

Cross superior plants in the greenhouse and replant their seed in the nursery.

Different types of plants produced by the same parent growing in nursery row for evaluation.

Progeny test. Bluegrass seedlings developed and evaluated as individual plants in spaced nursery.

Eighth Year

Screen superior progeny and establish mass seeded plots for evaluation.

Ninth and Tenth Years

Evaluate the solid seeded plots and vegetative nursery.

Continuation

After the 10th year the program would progress into the second and third cycle in which the superior plants from the 10-year program are further improved by repeating the procedures carried out in the seventh through the 10th years.

The program outlined above could most certainly produce some highly superior plants; however, it requires a considerable amount of time. In addition to the time required for the breeding program, commercial fields must be planted and brought into production. This process increases the time required for seed to become available to the consumer.

This article has dealt largely with bluegrass because this is one of the more complicated species. There is gross oversimplification of many genetic principals and breeding techniques, but this material is presented solely as a basic introduction into the field of turfgrass breeding, to provoke thought in this direction, to create a better understanding of the problems confronting the turf breeder, and to generate support for his efforts.

Footnote: The cooperation and assistance of Dr. Reed Funk, Associate Research Specialist in Turfgrass Breeding, was an invaluable aid in the preparation of this article and is hereby gratefully acknowledged.

Municipal Golf Course Operations

AREAS OF CONCERN

by GROVER C. KEETON, Superintendent of Special Activities, City of Dallas Park and Recreation Department, Dallas, Texas

In operating a municipal recreation facility, the facility should be designed to meet the recreational needs of the community. A municipal golf course should follow this philosophy if it is to fulfill the requirements of golfers of all age groups. Figures compiled by the National Golf Foundation indicate that municipal golf operations represent only 14 per cent of the nation's golf courses, and yet they serve about 40 per cent of the country's players. Play is increasing, and the greatest increase is from juniors and lady players.

The number of players has grown to the extent that public golf course operators must adapt their thinking and operations toward the design of the course, the construction, the rules and policies regulating play, and the training of operating personnel. Increase in leisure time means an increase in play and traffic.

Some of the major areas of concern which we have experienced in operating a municipal golf course in order to welcome this traffic includes:

Design
Construction
Maintenance
Personnel
Player Educational Programs
Record-keeping

DESIGN

Golf facilities today are being designed and constructed on land which is less desirable for other types of development, and yet many times a golf course will beautify and convert a rugged real estate problem into an attractive open-space area for the community.

Designers of municipal courses should consider the attractiveness of a course to 250 or more players per day. Designers must also consider the time available for playing the course. It must not be too difficult; it should allow the player to have an encouraging score. Concern for the safety of players and for the movement of traffic on the course are also a part of the designer's job.

CONSTRUCTION

It is most desirable to use a golf course architect in planning and designing. If it is necessary to reduce cost, reduce it in areas other than in the construction of the greens and irrigation system. A definite plan should be followed in the construction of greens. These plans should include specifications for size, soil mixture, drainage, seed bed, surface drainage and contours. These are all essential items regardless of who is to operate the course. On a municipal golf course, as well as on all others, the putting green is the principal attraction. It should receive the principal attention during construction.

The tees may be designed, constructed and maintained as a part of the fairway. They should blend with the natural terrain and slope of the fairway. Such a layout will enable placement of tee markers at many locations and will better distribute the traffic.

As in the case of tees, the fairways may also be constructed to be played with a minimum of hazards and a continuous, safe movement of play. As noted previously, it is not practical to reduce drastically construction costs in the fairway irrigation system.

One of the most controversial features of a municipal golf course is the location and number of bunkers. This presents a condition which

Tenison Memorial Park Municipal Golf Course - West Course, showing No. 17 fairway in foreground and approach to green; upper left is adjacent fairway No. 11 with three trees protecting green. This view illustrates a typical layout of adjoining fairway screening with trees, rapid fairway mowing, attractive relaxing view by public links player, and faster movement of traffic on the course.

is, in all probability, unique to each golf course operation.

MAINTENANCE

Maintenance of any golf course will include such items as mowing, aerifying, vertical mowing, tree maintenance, irrigation, fertilizing, equipment care, chemical treatment, etc. However, on a municipal course these responsibilities are increased to include the maintenance of the clubhouse area, parking lot area, curbs and gutters. These areas receive heavy use and must be maintained while the golf course is being played seven days a week with an average daily play of 250 to 300 rounds.

It is difficult in a municipal operation to establish different standards of maintenance for greens, collars, aprons, tees, and bunkers. Therefore, we concentrate on greens, tees, fairways and roughs. The secondary areas such as aprons and collars cannot be treated separately.

Golf cars have become an added service to the golfer, and public golf course maintenance must adjust accordingly. We have made provisions for golf car paths, signs and housing facilities.

Today, public golf operations must also be concerned with course beautification. For example, trees and shrubs may not contribute to lowering scores, but they do affect the attractiveness of the course and add to greater enjoyment of play.

Trees offer an additional safety advantage on public golf courses by providing barriers between fairways.

We emphasize in turf management that soil is the foundation of the golf course. Soil has four functions to perform for the grass plant. It provides support, serves as a source of nutrients, air, and water. While performing these functions, soil must also resist compaction under daily traffic and/or adverse weather conditions.

A good fertilization program is also stressed because it is one of the equalizers to traffic damage on turfgrasses. The use of three R's is an important guide—RIGHT AMOUNT OF THE RIGHT KIND AT THE RIGHT TIME. Depending upon a number of factors, such as the fertility

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Correction

A caption under a picture on Page 13 of the September issue of the Green Section Record incorrectly identified injury to the turf pictured there as "fungicide injury." The caption should have read "herbicide injury."

Tenison Memorial Park Municipal Golf Course showing clubhouse and one of two parking lots and park drive. Note approximately 150 parked cars which would indicate approximately 450 players on 36-hole course on a week-day at 4:00 p.m.

level of the soil, species grown, clipping management, leaching losses and others, turfgrasses need relatively large amounts of nitrogen, phosphorus and potassium to meet the increased play on public golf courses today.

It has been said that irrigation is so important that the golf course should be constructed where the water is, rather than bring water to the golf course. However, it is noted that you can do as much damage to turfgrasses by watering too much as by watering too little. Too much water in areas of heavy traffic aggravates compaction. Therefore, overwatering, plus heavy traffic is a double dose of compaction to the turf. The soil probe used to check the desired amount of moisture in the root zone is one of the most important instruments on the municipal course.

PERSONNEL

It is impossible to mention special areas of concern on a municipal course without mentioning personnel, employment, training, and supervision. I suppose this is equally important in

any golf operation, but there is a special emphasis in the case of public course work because we are serving many people of all ages, with varied interests and with varied economic backgrounds.

The personnel in the clubhouse and on the course must operate as a team and as a unit with complete and thorough communication with one another through proper channels. Because of these conditions, we have found it desirable to publish a golf course operator's manual outlining rules, regulations, fees, and policies which apply to the golf course. It is made available to all personnel.

PLAYER EDUCATIONAL PROGRAM

An important area of concern today, and this is possibly unique in public golf course operation, is an educational program to encourage public links players to take care of the golf course by replacing divots, observing course etiquette and using the putting greens properly. New golfers should not only learn how to play the game, but also learn how to use the course through this educational program.

Particular emphasis is given to a litter control program. All golf course personnel must learn that this is an area of concern, and yet one that we must live with. A golf course with no litter does not have many players. Our player educational program also disseminates information to the players through brief notices on score cards, signs on the course and in the clubhouse.

I don't know of any golf course which can completely eliminate vandalism—either thoughtless (majority of such acts) or malicious. Our experience shows that most vandalism involves the putting surface, drinking fountains, and restroom facilities. The best approach we have found to vandalism is to recognize that it will occasionally occur, to remove the evidence as quickly as possible, and to have a preventive program in order to minimize these acts.

RECORD-KEEPING

Written records and reports are a necessity! This is not a task to be done annually, semi-annually or monthly, but, in most cases, daily. Record-keeping should encompass items such as labor, materials, equipment, rounds of golf, and receipts. The advantages are many. Of primary importance is determining how maintenance money is spent, and assembling data for annual planning and annual reports. These reports become increasingly important for future comparative studies. Written reports and record forms should be prepared so that they can be easily compiled and used as a reference for operating conditions.

A few years ago we had the pleasant experience of participating with the USGA in standardizing golf course record-keeping. This was a valuable experience. We now use the following standard measurements in preparing and submitting written records:

1. Labor—man hours to determine the amount of work on any part of the course.
2. Fairways and roughs—use "one acre" as a unit of measurement.
3. Putting greens—use a standard measurement of "1,000 square feet ."
4. Liquids—liquid ounces, pints, quarts and gallons.
5. Solids—ounces and pounds.

In conclusion, public golf course operations do not present problems simply because they are public. The problems we have are the result of increased play from all age groups: from 7 to 87. Of course, our concern would be even greater if we did not have this kind of problem. So, let's just say that municipal operations today present a challenge; and we aim to meet it!

ABOUT THE AUTHOR

Grover C. Keeton, Superintendent of Special Activities, has been with the City of Dallas Park and Recreation Department for 22 years. He is a member of the USGA Green Section Committee, a member of the National Parks and Recreation Association and is a former President of the Texas Turfgrass Association.

Turfgrass Conferences: Should Superintendents Attend?

by BEN J. CHLEVIN, Executive Director, Golf Course Superintendents Association of America

The 39th annual International Turfgrass Conference and Show will be held in San Francisco on February 18-23, 1968. The educational program will cover four and a half days and will feature nearly 40 speakers, among them research scientists, agronomists, golf course superintendents, and officials of other golf agencies. Two special "clinics" are planned, one on irrigation, the other on small engines.

Have conferences such as this any value? Should your superintendent attend them?

To the veteran golf club official or green chairman who takes for granted his golf course superintendent's attendance at the Turfgrass Conference and Show as one of the superintendent's responsibilities, the answer is obvious.

Indeed, he might even rephrase the question as a statement:

"Golf Clubs should **insist** that their superintendents attend the International Turfgrass Conference and Show!"

These comments then, are directed to the new club official or green committee chairman who may be unaware of benefits that accrue to both the golf course superintendent and the Club through the Annual Turfgrass Conference and Show. And they are directed to the superintendents who have never attended the Annual Golf Course Superintendents Association of America Turfgrass Conference and Show.

Without doubt attendance at the International as well as at local conferences and turf clinics adds to the superintendent's knowledge and value to his Club. Today, in the face of rising costs of materials and labor, scarcity of labor, heavier golf traffic sharply reducing the time available for maintenance, the golf superintendent must be skilled in many areas.

He must know what equipment is available and what new equipment is being developed so that he can further automate his present maintenance practices in order to offset the high cost of labor, or the serious lack of labor, efficiently and economically.

He must be aware of the rapid increase in the number of chemicals and other materials available to combat the many new problems developing as a result of an increase in play, less

time for maintenance work, and increasing demand for finer, more closely manicured, and longer-lasting turf.

He must not only know how to use the equipment and plan its use for efficient maintenance, and know chemicals and their application for best results, but he must also know how to explain the need for equipment, materials and other aids. When he asks for money to produce results—he must be able to explain in terms understandable to the businessmen-officials of his Club the very technical reasons why every item on his budget is necessary.

Like all business and professional men, the golf course superintendent has certain specific avenues through which he can keep abreast of rapid developments in his field. They include membership in his local Golf Course Superintendents Chapter, membership in his national association, reading his national association magazine, **The Golf Superintendent,** and attending the annual International Turfgrass Conference and Show. Of these, probably the most direct avenue is the Turfgrass Conference and Show.

It is through the conference that the superintendent meets other superintendents and compares notes on techniques, ideas and problems. For example, a superintendent from an area suffering through an extended period of drought shares his experience with a superintendent who may have yet to face such a problem. By this contact, the second superintendent can anticipate and plan for future contingencies.

Through the equipment show, which features everything that is new and best in turf maintenance equipment and materials, the superintendent can speak directly to the manufacturer, and in many instances the designers and engineers responsible for the equipment.

Fully as important as the actual information presented in the educational program is the inspiration drawn from the speakers, as well as from his fellow superintendents. The golf course superintendent comes away with a better appreciation of his own value to his community and the importance of his work through his contact with the leaders in his profession.

The question becomes not "should Clubs send their superintendents to the International Turfgrass Conference and Show?" but rather "can a Club afford **not** to send its superintendent?"

While the superintendent personally benefits by the acquisition of more knowledge and through a broadening awareness of new information and techniques, it is his Club that is the real beneficiary. It is the cheapest insurance a Club can buy to keep up-to-date on rapidly moving new developments in machinery, chemicals and techniques that keep today's golf courses the finest in the world for the world's most demanding golfers!

COMING EVENTS

TEXAS TURFGRASS CONFERENCE
December 4-6, 1967, Texas A & M University
College Station, Texas
Chairman—Dr. George McBee

MINNESOTA ANNUAL TURF CONFERENCE
December 6-7, 1967
Normandy Hotel, Minneapolis, Minn.
Chairman—Mr. Carl Anderson, Woodhill C.C., 1419 Linner Rd., Wayzata, Minn.

ILLINOIS TURFGRASS CONFERENCE
December 7-8, 1967
University of Illinois, Urbana, Illinois
Chairman—Fred F. Weinard

OHIO TURFGRASS FOUNDATION CONFERENCE AND SHOW
December 11-13, 1967
Sheraton-Cleveland Hotel, Cleveland, Ohio
Chairman—Robert W. Miller, 1827 Neil Ave., Columbus, Ohio

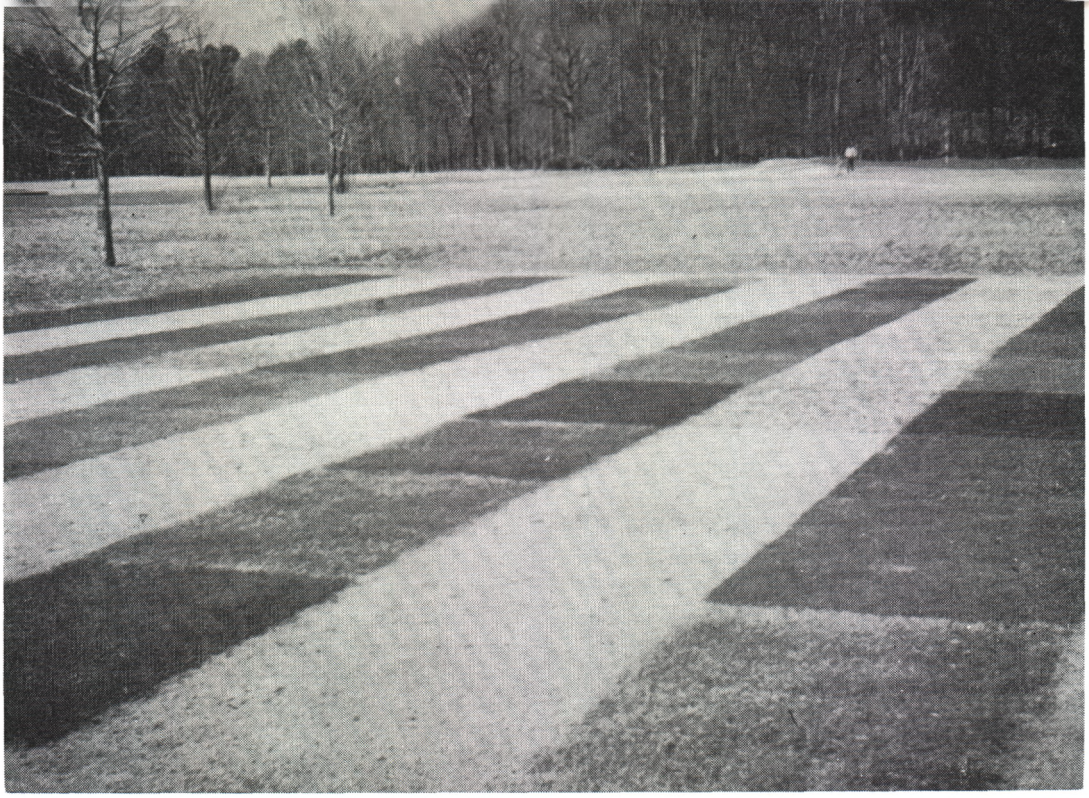
WISCONSIN TURFGRASS SYMPOSIUM
December 13-14, 1967
Pfister Hotel, Milwaukee, Wisconsin
Sponsors—Wisconsin GCSA & Milwaukee Sewerage Commission

NEW JERSEY TURF COURSES—RUTGERS UNIVERSITY
Winter Turf Course—20 weeks January 3-March 8, 1968 & January 6-March 14, 1969
Three-day Turf Course—January 15-17, 1968 (Lawn, Athletic Field and Utility Turf)
Golf and Fine Turf—January 17-19, 1968

VIRGINIA TURFGRASS CONFERENCE
January 23-24, 1968
Golden Triangle Motel, Norfolk, Virginia
Chairman—Dr. R. E. Schmidt

GCSAA INTERNATIONAL TURFGRASS CONFERENCE & SHOW
February 18-23, 1968
San Francisco, California
Host—GCSAA, 3158 Des Plaines Ave., Des Plaines, Illinois

NEW YORK TURFGRASS CONFERENCE
February 26-29, 1968
New York State College of Agriculture, Ithaca, New York
Chairman—Dr. J. F. Cornman



Outfield tests by some experiment stations, such as those Virginia Polytechnic Institute had at James River Country Club, Newport News, Va., were conducted by Richard E. Schmidt.

What's Best for Overseeding Bermuda?

by JAMES B. MONCRIEF, Agronomist, USGA Green Section

Not too many years ago ryegrass was used almost exclusively for overseeding bermuda greens for winter play. It is still used on many courses today.

However, during the past six years, several different types of grass seed have been used, and the result is improved putting surface quality. Single grasses and combinations of grasses have been readily adopted.

Much of this change has been effected by the Milwaukee Sewerage Commission, which established outfield plots on country clubs where bermudagrass is used on greens. Some experiment stations have done research along this line and have even overseeded plots in their experimental areas. But as a whole, they have not carried on extended outfield testing on golf courses.

There are several reasons for interest in the use of finer leaf grasses for overseeding:

1) Finer leaf grasses hold their color better under severe cold weather.

2) Poor transition in the spring is a constant problem in the upper South.

3) Ryegrass is very competitive with bermuda, but if hot weather prevails it will die rather fast.

4) In the past, disease problems with ryegrass overseeding were great, but fungicides and improved management techniques are largely controlling this in most cases today.

The finer grasses also give a more desirable texture and better quality putting surface. Similarly, the transition in the spring has not been as objectionable as with ryegrass. One of the plots at the Athens Country Club, Athens, Ga., included 90 pounds of ryegrass per 1,000 square

feet. This gave quick coverage, but it was still ryegrass. Fortunately this heavy rate coincided with a mild winter and the transition in the spring was good on this plot.

Where there was a loss of bermuda this year, ryegrass gave a poor transition; a more satisfactory transition was given by **Poa trivialis**, Pennlawn fescue and bent. In fact, small amounts of bent, fescue, or **Poa trivialis** were still present in some greens as late as August 1, 1967. This year bermuda in these areas will make a complete cover in time for a month or six weeks of play, and then overseeding starts again.

Cost definitely influences the type of seed used for overseeding. This has caused some clubs not to use the finer grass seeds. Ryegrass is a large seed and more pounds per 1,000 square feet are required. For instance, the cost of seed per 1,000 square feet can be deceptive, as shown in the table below.

MERITS OF GRASS MIXTURES

Some merits of these mixtures and reasons for overseeding are:

1. They will withstand close cutting, and in most cases withstand very cold weather without losing color. Ryegrass at zero degrees Fahrenheit or below appears to suffer most, but this may vary with the selection.

2. Even before the desired putting surface is obtained from the fine-textured grasses, the ball rolls true and the putting surface progressively improves.

3. Ryegrass appears to withstand more wear in areas of excessive traffic, but this depends a great deal on management.

It is doubtful that ryegrass will be completely eliminated from overseeding. However, for a good quality putting surface and to withstand excessively low temperatures, it would be more satisfactory to include **Poa trivialis** (weed free) or Pennlawn fescue when ryegrass is used for overseeding bermuda greens. Ryegrass develops fast, but the finer grass seed should be included to fill in the voids of the ryegrass.

If a fast growth is desired, it is suggested that ryegrass at 20-30 pounds per 1,000 square feet be used. **Poa trivialis**, Pennlawn, and bent develop slowly and in most cases are seeded together. It takes longer for a mature putting surface to develop, but the transition in the spring is not as abrupt as with ryegrass alone. Finer grasses tend to linger longer in early summer and yet offer less competition to the bermuda than ryegrass.

Progress has been made in the overseeding of bermudagrass greens. Try grasses other than rye.

Type of Seed	Cost per pound	Amount needed per 1,000 square feet	Cost per 1,000 square feet
Ryegrass	8¢	40 pounds	$ 3.20
Colonial bent	60¢	5 pounds	$ 3.00
Poa trivialis	60¢	10 pounds	$ 6.00
Seaside bent	$2	5 pounds	$10.00

SUGGESTED MIXTURES

The grass seed alone or in mixtures being used most in the South now are:

Poa trivialis	4-6	pounds per 1,000 square feet
Pennlawn fescue	15-20	
Bent	3-5	
Poa trivialis	6	pounds per 1,000 square feet
Pennlawn	20-24	
Poa trivialis	4-6	pounds per 1,000 square feet
Ryegrass	30	
Ryegrass	25	pounds per 1,000 square feet
Pennlawn fescue	15	
Bent (Penncross)	3	
Poa trivialis	10	pounds per 1,000 square feet
Ryegrass	40	pounds per 1,000 square feet

USGA GREEN SECTION RECORD
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TURF TWISTERS

SALTY SOIL?

Question: Our club has been advised to use calcium chloride on fairways to counteract high pH and an accumulation of sodium in the soil. Do you agree? (Colorado)

Answer: You may expect that the use of calcium chloride will bring about some exchange of calcium for sodium in the soil. It appears that beneficial results, however, will depend upon an ability to flush out the sodium which is displaced by calcium. The success of such treatments requires good drainage. If good drainage is not possible, the result may be simply an increase in the salinity of the soil.

COLOR ME GREEN?

Question: I have been told that I should apply Epsom salts to my greens. Is someone pulling my leg? If not, how is this done and at what rates? (Maryland)

Answer: Epsom salts (Magnesium sulphate) acts very much like iron sulphate to give the turf a green color quickly. This is usually mixed with a fungicide or other spray material at the rate of one ounce per 1,000 square feet. The magnesium in Epsom salts and dolomitic limestone acts directly on the chlorophyll molecule of the plant to improve color. Although the material is relatively safe in every respect at this rate, it should be used sparingly as you would use any other secondary or trace element.

GREEN VELVET?

Question: Is Velvet bentgrass adaptable in the Midwest? We have numerous spots on our greens and we think it's great. (Minnesota)

Answer: We have observed, especially in the more northern parts of the Midwest where greens were originally seeded to South German bentgrass, that large patches of Velvet bentgrass have persisted. Indeed, they are beautiful and present a desirable putting surface. Nonetheless, farther south and away from the immediate shores of the Great Lakes, this type of bentgrass is severely damaged as a result of disease activity. Velvet bentgrass is extremely slow to recover from such damage and has not proven suitable as a turf cover.