PROCEEDINGS

of

1962 TURF CONFERENCE

Sponsored by the

and

PURDUE UNIVERSITY

LAFAYETTE, INDIANA

March 5-7, 1962

PROCEEDINGS OF THE

1962

MIDWEST REGIONAL TURF CONFERENCE

The 42 articles included in these Proceedings are condensations of talks by speakers before sections and divisions of the 1962 M.R.T.F. Conference. We appreciated the willingness of the speakers to participate and prepare material for your reading. See Table of Contents next page. Proceedings of each annual Conference since 1948 have been prepared. A limited number of 1959 and 1960 Proceedings are available at price below. Copies of 1961 are exhausted.

A copy of these Proceedings were mailed to:

1. The 590 attending the 1962 Midwest Regional Turf Conference.
2. One person of each Member Organization within the Midwest Regional Turf Foundation not represented at the Conference.
3. List of those in education activities.

Additional copies are available at $ 1.00 each from:

W. H. Daniel, Executive-Secretary
Midwest Regional Turf Foundation
Department of Agronomy, Purdue University
Lafayette, Indiana

Attendance divided by interest as judged by registration card	
Golf Courses	305
Turf Materials & Supplies	130
Sod Nurseries & Landscape	56
Parks (most have golf courses)	12
Industrial Grounds	18
School Grounds	17
Cemeteries	7
Non-Profit & Educational	45
Total	590

Distribution by States	
Illinois	189
Ohio	135
Indiana	106
Michigan	44
Wisconsin	27
Missouri	22
Kentucky	18
Outside Midwest	26
Purdue	23
Total	590

Check below for special articles suggested for first reference based on your major interest.

For Lawns first see

Pages 4 - 10 - 28 - 36 - 46 - 50 - 55 - 57 - 60 - 62 - 63 - 66 - 69 - 71 - 74 - 75 - 76 - 78 - 83 - 90 - 91

For Sod Production first see

Pages 5 - 28 - 46 - 48 - 50 - 52 - 59 - 60 - 61 - 63 - 66 - 69 - 71 - 74 - 75 - 78 - 81

For Golf Courses - 29 out of 42 are of definite interest, but first see

Pages 8 - 10 - 12 - 15 - 19 - 20 - 24 - 25 - 27 - 28 - 32 - 33 - 35 - 37 - 42 - 46 - 48 - 55 - 56 - 59 - 60 - 62 - 63 - 66 - 69 - 74 - 75 - 78 - 91

For Turf Disease see first

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THE PRESIDENT'S REPORT

Ernie Schneider, Supt., Big Spring Country Club
Louisville, Kentucky

You who are present here today are taking part in an important milestone of the Midwest Regional Turf Foundation - the 25th Anniversary. From a group of less than forty persons attending the first meeting, we have grown to our present attendance of 600.

Our 1961 Foundation membership of 384 is highly encouraging. Of these 253 are golf courses, and about 131 are industrial, cemeteries, landscapers, etc. We want to welcome our 53 new members most heartily.

This organization has grown through the resources of Purdue University, the great work of Dr. Daniel, his staff, and the graduate students. Those who attend the Spring Conference and the Fall Field Days, see this work and some of the experimentations, such as soil mixtures for putting greens, pre-emerge and selective grass controls, new grasses,etc. All their efforts take much time and money. Membership in Midwest Turf supplies just a portion of their financial needs. Much support is in the form of grants, plus the materials received free from industry. You can read about this in detail in Midwest Turf leaflet No. 25, an annual report which has been mailed to members. We want to keep this a growing organization - it is up to everyone here to help us accomplish this.

It has been a real privilege and honor to serve as President of the Midwest Regional Turf Foundation. I want to thank our Executive Secretary, Dr. Daniel, his staff and the directors.

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NOTES FROM THE EXECUTIVE SECRETARY'S REPORT

W. H. Daniel, Dept. of Agronomy,
Purdue University

Each year the demand for ideas and facts concerning turf expand beyond that before. Also, it changes. Just a few years ago most questions were from turf managers, the consumer group. During the last five years the increase has been in industry representatives' questions - on research, development and sales - wanting facts and ideas for their proper presentation to consumers. Accompanying this, has been a real effort on the part of industry to better label and advise on product use. It has been our aim to assist through close coordination and achieve fast idea exchange. Therefore, items such as crabgrass preventers, strongly reflect our work, as well as the efforts of many others.

The training of regular and graduate students continues to demand increased time. The end result as trained personnel has been gratifying. In the future even more time will be necessary for student work.

Purdue has a well-defined policy which encourages individual staff members to do limited consulting with industry. This has provided opportunity for me to work closely with the problems and practices in development and sales. Consulting efforts, outside and extra to regular work, are quite demanding, but to date have been a real privilege.

A word concerning the regional program. Generally group matters may be handled at a local, state, regional, national, or international level. In golf course superintendent work many of you have a local association (some are almost state-wide), and the National. When Midwest Regional Turf Foundation started in 1945 it was truly regional, serving the same seven state area in 1937 as in 1962. A natural outgrowth in turf interest is the individual state organizations now in this area. The Ohio Turf Council, the Michigan Turfgrass Foundation, the Illinois Turf Foundation, the St. Louis Turf Research program, plus increased turf efforts in Wisconsin and Kentucky. May I suggest you always push your local organization, but remember the regional group will continue to be of value. Both need your interest, attendance and enthusiasm.

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A RESEARCH APPROACH TO THE TURF MARKET

Richard C. Lindsteadt, Mgr., Market Research Dept.,
Elanco Products Co. - Div. of Eli Lilly & Co.
Indianapolis, Indiana

This year the Elanco Products Company, a division of Eli Lilly & Company, that has been prominent in the human medicinal field for 86 years, is marketing a line of ten lawn and garden products under the GREENFIELD trade name. These products are designed to help the American homeowner kill crabgrass, fertilize turfgrasses properly, and eliminate diseases and insects in his flowers and ornamentals. Now, it is a long way from the physician's office, where Lilly products are used, to the crabgrass infested lawn. As many people have asked us, "What on earth is a pharmaceutical house doing in the lawn and garden business?" There are several reasons - but the one prime factor that links the human pharmaceutical activities of Eli Lilly and Company and the Elanco lawn and garden line of 1962 can be summed up in one word - and that word is research.

More specifically, the research on which the introduction of the GREENFIELD line is based has been of two types. The first of these is plant science research aimed at the development of new and unique products for use on, under and inside of plants wherever they may be. This work is done in a 600 acre Lilly Research Center at Greenfield, Indiana. The second type of research is market research aimed at the determination of timely and effective marketing practices so that the products of plant science research can be made available to the consumer.

For you to better understand the turf business - the theme of this year's Conference - I'd like to give you some of the highlights from our "case history" to show how these two types of research have figured in the development of the GREENFIELD program. Along the way we'll discuss some

of the market survey and measurement activity that was a part of the planning. As soon as the plant science research on crabgrass preventers began to show promise, we began studying the market for such products. Some questions that obviously needed to be answered were:

How big is the market?
What proportion is preventers?
Where geographically?
What outlets sell it?
What kinds of people buy it?
Relative importance of market areas?

To start with, we looked at the total lawn and garden market, and here is how we sized it up at that time:

The Lawn and Garden Market, 1960 Estimates

Fertilizer (non-farm)	$ 200 million
Herbicides and other chemicals	150 million
Total market	$ 350 million

As most of you know, no really accurate data are available on a subject like this, so the estimate of $ 350 million is simply a summation of information from the Census Department, the National Agricultural Chemicals Association, trade publications, and other sources. And, although it may not be exactly accurate, it was certainly large enough to be interesting and accurate enough to serve the purpose of gross market evaluation. As you know, this market has grown tremendously since these estimates were made some time ago.

Where is it sold? - 1960 Estimates

	% of buyers*
Garden specialty	53%
Hardware and department stores	31%
Food markets	5%
Mail order	8%
Other	3%
Total	100%

*Specifying outlet as major purchase point

The next question was what retail outlets handle the business in this market. The basis for this division of volume by type of outlet came from surveys conducted by a number of publications in which consumers indicated which type of outlet was the primary source of various products they buy for lawn and garden care. You can see that the garden specialty shops and hardware stores probably account for most of the business.

Lawn and Garden Market Basic Index

Factor	Assigned weight
Owner occupied dwelling	60%
Disposable income of consumer buying units	20%
Number of consumer buying units having income over $7,000 per year	20%
	100%

The next question was: "Where is the market geographically?" The answer was that "it is where people have lawns and gardens to care for." Here we applied some statistical analysis to Census Bureau data, weighed it by two measures of financial capability, and thus devised a weighed index of the relative importance of each state and each major metropolitan area.

Market for Crabgrass Chemicals

$25 million @ retail (1959-60)
... about 75% pre-emergence items
25% post-emergence

Here is the way we sized up the market for crabgrass chemicals at that time. The basis for this estimate was a survey conducted by a major business publication which was cross-checked with data from other sources. This market, too, has grown since the estimate was made. Only back in 1956 the market was 99% post-emergence. It will likely become almost 99% pre-emergence.

At this point in the investigation, plant science research indicated our product worked extremely well, and based on that labels were prepared. We began distribution of our product in February, 1961. A number of wholesalers were selected in five midwestern markets, and they in turn distributed to stores. Our own sales force supplemented the wholesaler efforts by contacting retail dealers and assisting them in the promotion of the product. However, all sales were channeled through franchised wholesalers. Advertising coverage included Life magazine and local newspapers and radio.

In order to measure our progress in these five markets, we engaged a private market research agency to measure the retail sales level of our product against competitive products in over 100 stores in the test area. This was accomplished by a series of interviews with cooperating retailers in which invoices for crabgrass killers were tabulated, compared to an opening and closing inventory, and the product movement thus calculated. Here are the results of that survey:

1961 Test Area Average Share of Market

GREENFIELD	40%
Brand A	49
Brand B	4
Brand C	2
Brand D	2
All other brands	3
	100%

When the results were in we were well pleased, as you might imagine. You will note that the two leading brands accounted for 89% of all sales of crabgrass preventers. The share of the other brands drops rather drastically from the third-place product down. We hoped this meant that the market would respond to a well-researched product.

One question that this information led to was: "To what extent did GREENFIELD convert sales from other brands?" Fortunately, a second series of data was available.

GREENFIELD Purchasers by History
of Previous Practice

Never used before	53%
Used Brand A last year	28
Used Brand B last year	13
Used other products last year	6
	100%

Although a number of purchasers were converted from other brands to GREENFIELD in 1961, more than half were newcomers. This particular market is growing quite rapidly and our product showed a definite place in it. That was the record of our test market experience in 1961, and, as most of you know, it led to expanded marketing activities with a line of 10 products this year. Three of the 1962 products are especially interesting in that they reflect some of the things we've learned to date.

First, we think we've learned that people like products that do several jobs if they do each job well. GREENFIELD Triple-Action Crabgrass Killer this year contains a new and even more effective pre-emergent chemical ingredient formulated on a base of 10-5-5 fertilizer. It also incorporates a soil insecticide to control grubs and other pests. Thus, one trip across the lawn solves three problems. The pre-emergent chemical will also be available as a liquid for those who want to spray for crabgrass prevention.

The second product, GREENFIELD Measured-Release Lawn Food, a 20-10-5 light-weight lawn food, represents a real advance in controlled fertilization. Part of the nitrogen is available for quick, green growth, while the remainder is protected by a unique "pharmaceutical-type" coating to control nitrogen release as the lawn needs it over an extended period of time. It is also available with a broadleaf weed killer component.

The third product, and one of the most interesting, is a systemic action Rose and Ornamental Spray. It reflects our conviction that people want to improve traditional methods of coping with gardening problems. This spray contains an insecticide which is absorbed into the plant and translocated throughout its system in much the same way the human vascular system distributed medication to various parts of the body. It reaches into plant tissue and is deadly to sucking pests attacking plants up to two weeks after application -- and it won't wash off! It's inside the plant, out of the rain!

These are some of the things that we have experienced in several years of study, and in the initial phases of the resulting marketing program. We are, of course, still learning -- we expect to be doing that for a long, long time. Plant science research activities are continuing, and again this year we are also conducting a number of market research investigations in the market place. Once again, the objective is to measure "what happens" so that groundwork for the future can be laid.

One thing we're learning in this area is something that all of you know only too well: There is a lot of difference between the needs of the homeowner who is caring for a lawn of a few thousand square feet, inhabited by three kids, a dog and a "light-footed" cat, and the needs of the superintendent who maintains 150 acres or more, trampled by several hundred

"heavy-footed" golfers. In recognition of these needs, research and development work is now being completed on several GREENFIELD products that will be especially suited to commercial uses.

One final observation I'd like to share with you. We have learned from our association with people who are interested in turf maintenance that this industry has a large number of highly professional people like yourselves who practice the fundamentals of research as a routine approach to the solution of problems. It is probably because of this that our initial efforts in introducing a well-researched product line have met with such enthusiasm in the market place. It has certainly been a pleasant experience for us to become associated with others who understand the need for research and who appreciate the value the results can hold.

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THE TREND IN GOLF TODAY

Rex McMorris, National Golf Foundation,
804 Merchandist Mart, Chicago 54,Illinois

Golf is the nation's greatest competitive outdoor participant sport and it is growing at an increasingly rapid rate each year. The number of golf courses increases each year also, but let me hasten to add the rate of growth in new playing facilities falls far short of meeting the demand for places to play golf. The growth pattern in golf is an interesting one, and I believe since it affects each of you either directly or indirectly, that you will be interested in some of the trends we are able to report to you.

Last year more new golf courses were opened for play in the United States than in any previous year in the history of the National Golf Foundation. This same statement has been made for each of the last ten years and I am hopeful that we can continue to make the statement until such time as the rate of building new courses and putting them into play catches up with the demand. Here's the score for 1961:

Classification of Courses Opened for Play in 1961

	Regulation Courses			
Courses	9-hole	18-hole & over	Total	Total holes
Municipal	14	10	24	306
Semi-private	72	23	95	1062
Private	60	50	110	1440
Other	14	4	13	198
			247	3006
	Additions			
Municipal	13		13	117
Semi-private	19		19	160
Private	34	2	36	342
Other	8		8	72
			76	691

Par-3 Courses

Courses	9-hole	18-hole & over	Total	Total holes
Municipal	6	1	7	72
Semi-private	52	17	69	771
Private	5		5	45
Other	5		5	45
			86	933
			TOTAL HOLES	4630

All of this adds up to more than 400 new playing facilities, open to play for the nation's golfers during the year. This required a minimum investment of more than 35 million dollars, not including clubhouse costs, and provided space for over 250,000 more golfers to enjoy at least 3,500,000 rounds of golf.

Here's the score in the actual number of courses (standard courses, par-3 courses and additions) for each of the years since 1956:

	1955	1956	1957	1958	1959	1960	1961
Standard courses	108	124	133	148	173	190	247
Additions	19	31	27	30	29	35	76
	127	155	160	178	202	225	323
Par-3 courses	8	19	23	33	38	51	86
Total facilities	135	174	183	216	240	276	409

Without going down the list of all the states, here are the states that top the list with the most courses put into play last year:

Courses opened		Under construction	Prospects
State	No.	No.	No.
California	31	36	134
Florida	22	30	63
Ohio	18	20	86
Pennsylvania	17	29	78
Texas	15	21	53
New York	14	34	95
North Carolina	12	19	30
Massachusetts	10	15	40

All of this adds up to the fact that there are now better than 6600 golf courses (standard and par-3's) in play in the United States. This surpassed the previous high total in 1931. Actually, at the end of World War II there were at least 1000 fewer courses than had been in play in the early thirties.

Here, again, the figures fail to tell the whole story. The total of 4448 private clubs in 1931 gradually dropped down to 2801 in 1956 and has been steadily increasing since to where there are now 3261. Percentage-wise, there are still 25% fewer private clubs in the United States than there were 30 years ago.

On the other hand, there has been almost a 250% increase in the total

number of semi-private courses, that is, privately-owned, public used courses. This number has grown from 700 in 1931 to 2062, and there has been a 65% increase in municipal courses.

Our golf courses today are used by between five and six million golfers. It is estimated that close to 90 million rounds of golf were played last year. Conservative estimates place the current value of all golf facilities in existence today at better than 1-1/2 billion dollars. At least 650,000 acres are used for golfing facilities in the United States today. It is estimated that at least 310 million dollars is spent annually on maintenance materials, labor, new construction, remodeling, professional services and player merchandise directly traceable to golf. Currently 138 million dollars is spent annually to maintain the nation's golf courses and grounds.

What part does the Foundation play in the development of new playing facilities? Just this!

The NATIONAL GOLF FOUNDATION was founded as a non-profit organization in 1936 by the major manufacturers of golf playing equipment. Its purpose: ". . . to broaden opportunities for all Americans to enjoy golf, 'The Game Of A Lifetime,' by assisting in the development of more golf facilities and the promotion of golf activities of all types, wherever needed." Its function: ". . . to gather and evaluate information in all areas of golf, from every possible source, and to make this information available to anyone needing it." Thus, the Foundation operates as the national clearing-house for golf information in America.

While much of the information gathered by the Foundation is passed on directly in answer to questions posed by individuals and groups faced with some particular problem, a great deal of the information available from the Foundation is distributed in printed form. The golf course development phase of the N.G.F. operation is so important that Foundation sponsors voted, in 1953, to establish a Field Service to more directly assist in this work. Today the N.G.F. has four representatives, or "general practitioners," - one on the East Coast, on the West Coast, in the South, and in the Mid-western areas of the country. The services of Foundation field representatives are available to any individual or group seriously considering a new golf course. Finally, the NGF stands ready to assist any superintendent, or anyone for that matter, in the planning of a new golf course, golf club, or golf playing facility. Ask for a Golf Aids order form and call on us any time.

TURF WITHIN A STATE

Dr. H. W. Indyk, Extension Turf Specialist,
Dept. of Farm Crops, Rutgers University,
New Brunswick, N. J.

What is the value of turf within a specific area? If this question were asked of a heterogeneous group of individuals, undoubtedly varied types of replies would be received. The nature of the replies, most likely, would be closely associated with each individual's specific interest in turf.

These interests or sense of value can be grouped into three major categories: (1) Aesthetic, (2) Uses, and (3) Monetary. The monetary value of turf will constitute the major portion of this discussion.

According to statistics of the recent census, New Jersey is the most urban of the 50 states. Eighty-nine percent of the state's population falls into the urban category. This means approximately 9 out of 10 residents are living in urban areas. Slightly more than 6 million people reside in an area of approximately 4-3/4 million acres. In comparison, Indiana has a population of slightly more than 4-1/2 million people inhabiting an area of about 22 million acres. In spite of the high degree of urbanization in New Jersey, approximately 43% of the land area still remains in woodland.

These statistics are cited because they are of direct consequence to the business of turf. The intensification of residential, industrial, highway, and recreational development, together with a greater appreciation and desire for satisfactory turf, has been a stimulant to the turf industry. Establishment and maintenance of turf rates as one of the most important agricultural enterprises in New Jersey. When we stop to consider that in 1958 the bill for maintenance of the turf areas in the state amounted to more than 95 million dollars, there is no question that turf occupies an important position in the agricultural economy of New Jersey. The status of turf becomes even more significant if one considers that it would cost over 340 million dollars to replace all of the state's turf acreage.

These figures seem astounding and perhaps unrealistic until one begins to analyze the different usages of turf, the various costs involved in its establishment and those in its maintenance. Statistics of this nature are not readily available. Perhaps one of the reasons is the difficulty involved in obtaining such data. In cooperation with the New Jersey turf advisory council, the turf staff at Rutgers in 1958 conducted a survey to determine the monetary value of the turf in New Jersey. The best known and available sources of information were used in compiling these statistics.

The turf within the state was classified in a number of categories, depending upon its specific use. The following table summarizes the acreage, maintenance cost and replacement cost within each of the categories.

Table I. Turf Survey Estimates for New Jersey.

Category	Acreage	Annual Maintenance Cost	Current Replacement cost
	1,000	$1,000	$1,000,000
Home lawns	114	81,668	253
Airports	23	581	12
Roadsides	19	500	20
Cemeteries	15	3,000	15
Golf courses	10	5,658	17
Parks	9	1,070	9
Schools & Athletic Fields	7	1,460	7
Industrial lawns	6.1	1,217	6
Public properties	1	200	1
Churches	.4	105	.4
Total *	207.5	95,459	340.4

*Military installations, race-tracks, sod farms not included

In accordance with these statistics, the introductory statement on your printed program "keeping grass green requires green dollars" seems very appropriate.

The supporting pillars of this flourishing and rapidly expanding turf enterprise in New Jersey is the turf research and extension program at the Agricultural Experiment Station, assisted by encouragement and financial support from golf associations and industry. Presently, turf is big business within the states, and according to present indications, it will become even bigger in the future. As New Jersey continues to develop residentially and industrially, the turf enterprise will also continue to grow and develop as one of the most important agricultural activities with an increased demand upon our research, extension and educational facilities.

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SAVING MONEY

W. E. Lyons, Supt., Firestone C. C.,
Akron, Ohio.

The subject "Saving Money" in the turf business will have as many varied aspects as there are people growing turf. Whether you are a golf course owner, operator, or a superintendent, you have a basic philosophy, or "sense of value" about money. Worth reading is a book entitled, "Have Fun With Your Money." The author used the theory that money is only usable for the things and ideas that will satisfy the human emotion, "I Wanta." He would have one believe that money of itself is worthless after one has satisfied all of his "I Wantas."

Webster's definition of a golf course refers only to land traveled. As you think of a golf course, think of a MODIFIED NATURAL AREA, MAINTAINED OF GRASSES, TREES, WATER, SAND AND FLOWERS IN SUCH A MANNER THAT IT BECOMES IRRESISTIBLE (UNRESISTIBLE) TO PEOPLE. To create these conditions in all their ramifications, let us look on money as a tool to use wisely to produce the:

"X" factor of satisfaction - for the
"Y" type of golfer - for the
"Z" type of management.

As a golf course owner, operator, or superintendent, it is your job to use the five (5) facets of nature to produce the "X" factor of satisfaction: first, for the customer - be he a novice on a fee course, or a bank president on a private club; and second, for pride in yourself and your profession. No matter whether yours is a public fee course, or a tournament quality country club, in each there has to be standards of maintenance established and agreed upon by management and the superintendent. It simply boils down to a set of figures called a budget.

There are all kinds of golf courses being built, and older ones being revamped. Some of the new ones are already bankrupt. Why? Did someone try to save money by building on cheap, rough land? Was there a golf

market? Was the layout a 1910 model with present day labor costs? Others may fail because the promoter did not inform the investor of the tremendous amount of water needed for greens and tees, to say nothing of fairways. This is one area where short-sighted savings may prove most expensive.

Many of you are operating older courses that were built using pipe sizes that are too small. "Scotty" Stewart has told us that we are paying for the right sized pipe whether we install it or not due to the increased power costs and lack of enough water when we need it. Much midnight oil has been burned and a lot of cheese eaten at these annual meetings, discussing soil structures in building or rebuilding greens and tees. Money spent wisely in these areas is the first step in saving money for the private club, or in making a "built in profit" for the fee course.

Mr. P. K. Wrigley coined the slogan, "Fast nickles are better than slow dimes." Many courses need a practical golf designer to study the lay-out for possible improvements to speed up play. Thus, speed up the number of rounds possible on the course, and thereby increase the "cash flow" thru the till. Perhaps design can't be altered to achieve the desired results. What about maintenance? Are the golfers in our way, or are we in the way of the golfers? It is a matter of attitude. What's yours? We must give the golfer his rights. He is struggling with 14 different clubs. That's enough trouble without having mowers, verti-cutters, aerifiers, topdressers, sprayers, fertilizing machines, trucks, etc., distracting his attention and slowing down play on the whole course.

If this is a problem on your course, THINK ABOUT IT! Could it be that you are one who should think about putting a night maintenance program into effect? Will it please our customer,the golfer? Will it produce better turf? Will it save money to get more work per man hour? Will more rounds of golf get played? More cash flow?

Save money on labor. This thought has been kicked around ever since golf wages went from 25¢ per hour to 30¢. The 12 to 18 year olds are finding it rough to get summertime work. More than that, and especially the ever growing number of "drop-outs" from school, need to learn the responsibility that goes with a job. That is all true -- BUT -- well-wishing legislators in our state (Ohio) have done much to deny the teenager job opportunity on golf courses. Thus, they are unknowingly aiding juvenile delinquency. Our (Ohio) law specifically states that noone under 18 years of age be permitted to operate any powered equipment, not even a greensmower. Check your state laws before hiring

Much thought and some action has been taken at private clubs to close in little used sand traps. Want to save money on equipment? Look at the good and not-so-good equipment dealers are offering. These are often priced at 1/5 to 1/7 the cost of new units. To the fee course owner these low prices for tax reasons can be attractive. Repairs put into same can be expensed not taxable.

Joe and Claude Clingan, Pulaski, Pennsylvania, completed their own 9-hole course in November 1961. Claude looked over a 7-gang, push-type, hydro-lift fairway mowing unit, complete with lights about $ 6,500.00. After a short chat with the operator, Claude made this remark, "I can't afford not to buy it. By mowing the fairways at night myself I'll save the wages of one man, plus the other advantages of night mowing will pay for the unit in two years."

Is the slow fire of rust destroying your maintenance machinery? At most golf courses a separate fertilizer storage building is needed. Pole type buildings are still the lowest cost buildings. They are good units for fertilizer storage; machine storage; shops for repairing both summer and winter. With five poles one can make a very attractive shelter house. Anyone who can drive a nail and use a saw can put up a pole-type structure.

Maintaining Poor Design

Pros argue that sand is one of the basic five facets of a golf course. Sure, it can be decorative - it can be a mental hazard to a duffer. As one architect says, "It makes for strong pin positions." To a playing pro sand is easier than 2" grass.

Where possible ponds on the property may be natural and have a low maintenance cost. This is another of the five facets of nature that can enhance a property. Water is a more equal hazard to both pro and duffer. As an asset, extra water can come in mighty handy to fight a fire, or to combat drouth.

Well-placed trees make American golf courses interesting and beautiful. Many of you should be cutting tree roots around greens and tee areas annually. However, trees can create problems. They become old familiar treasures. Even though they are expensive to maintain, are robbing greens, tees and fairways - still to cut unneeded ones down takes a lot of selling. Sometimes superintendents prefer to hire your area's best tree authority. Tell him what you want,and then let him shoulder the decisions. A superintendent was heard to remark that one-third of his labor cost is chargeable to trees. The big leaf blowers are reducing leaf removal expense, and extending the golf season. These along with the portable leaf burners are definite aids to the "Z" type of profitable management.

Many courses have lost, or are losing their elms to blights and diseases. From studies made at Firestone C.C. we learned we can replant with 2" to 7" trees of more suitable varieties for the price of one year's treatment to try to save the 495 elms standing in the playing area.

Sense of Values

In turf maintenance one must develop a "sense of values." For example, one man walks to work; another rides a bicycle; a third may drive his own automobile. They all get where they are going "At a price." Today's golf market caters to people of all classes. On some of the fee courses the 50¢ fee is over-paid because of the cow pasture facilities offered. On another well-kept course a $ 5.00 fee is a bargain.

New Grasses on Old Courses

Many of the old grasses on the old courses are expensive to maintain. Even on a new course Poa annua can be most expensive. All kinds of excuses are heard when the Poa suddenly wilts and fades away as it did on Saturday afternoon, August 5, 1961. Here is what one bold course owner decided to do after expensing Poa greens for 15 years. He desodded a green, smoothed the soil and sodded with a clean bent from his nursery. The green was out of play not more than four days. After two years there is no Poa showing. Did he save money? Less fungicide, less syringing,

etc. Truly this illustrates the

"X" factor of satisfaction -- for the
"Y" type of (fee) golfer -- for the
"Z" type of (profitable) Management for Himself.

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STANDARDS WORTH KEEPING

Bob C. Dunning, P. O. Box 4236
Tulsa, Oklahoma

My interpretation of "Standards Worth Keeping" would be to attain and sustain the highest standards possible through understanding, ability, and the tools available.

In general there has been a decline in maintenance standards in the past few years. Herb Graffis said that adjustments must be made to fit into the golf business of the future. Harry J. Fawcett, veteran club manager, says that automation has made great gains, and that automatic food machines will serve a variety of menus superior to those now provided, at a profit to clubs. Harold Moffett, former president of the PGA was reluctant to say that unless adjustments are made clubs may undertake to operate their own golf shops. Bob Williams said that courses may run on a consultant basis, with a foreman in charge. It is also my belief that superintendent, professional, and manager should cooperate to the fullest extent for the ultimate in management of the club's affairs in harmonious surroundings.

To define the problem and to find a solution, let us consider the following: With rising labor and material costs, more unproductive time, increased play, and player-labor interference, it is necessary for all courses, on a national basis, to scrutinize operations closely if golf is to continue to prosper as the favorite participant sport of the Americans. Labor is 70% of the national average budget, and watering is sometimes 25%. This, and inadequately constructed greens, have complicated problems to the extent that many courses are finding it increasingly difficult to operate, and even to maintain turf on greens.

My number one turf tip would be to urge a wider acceptance of new and proven ideas by club officials and superintendents. New introductions and labor saving devices that have been introduced by research workers, superintendents, manufacturers, distributors and others, will allow the refinements that all golfers desire. New construction methods, mechanization and automation will go much further in solving the problem than would trying to reduce costs by rigorous economy, which often leads to disaster. Also, such will enhance the superintendent's position when backed up by advance planning, a system of cost analysis and budgeting. A budget is no more than a plan of operation.

We have said that nearly every golf course could reduce its overall maintainance cost 30% to 40%, and be operated more economically and effi-

ciently than at present if currently available agronomic information, proven methods and equipment are fully utilized. This saving will allow purchases of other labor saving devices and have the refinements that make courses a pleasure to play.

We also realize that course maintenance cost is not the greater part of the members total expenditure at clubs. Many courses have consideration for long range planning and capital improvements. The statement 30% to 40% was augmented by:

1. The authoritative acceptance of the sandy mixture for putting greens, combined with proven construction methods, architectural design and the elimination of built-in trouble.

2. That semi and fully automatic sprinkling systems have moved from a dream to a proven reality. This combination will reduce cost and labor, resulting in better playing conditions, more disease resistant and wear-free greens, all of which will result in more revenue at decreased cost.

Elmer & Elmer, father and son team of superintendents, make this statement: "Some of the advantages of sandy greens over the old construction are: 1. Air circulation, interexchange of soil, air and atmospheric gases. 2. Drainage; surface, internal and lateral. These are important items, especially in hot weather. There is no scald on the new greens, but the old greens have considerable scald, especially when heavy rains are encountered, over which we have no control. The new greens do not have to be syringed nearly as much as the old greens. They are mowed much sooner after rains, and can be played without damage to soil, or grasses, much quicker. Naturally all of these advantages have considerable bearing on cost of maintenance in favor of the sandy greens, and when our construction is finished this will have a direct bearing on the availability of course for play.

This was further emphasized in the summer of 1961, the worst year in Kansas City history. Rainfall nearly 70 inches, temperatures over 90°, and 100% relative humidity. Many old greens were severely damaged and almost a complete loss was experienced on some. Without exception the properly constructed sandy greens came through in excellent condition, and have never had to be closed because they were too wet.

G. C. Reed, Superintendent of Parks and Golf Courses, Tucson, Arizona stated that they had a saving of 43% on water with 20% increased usage. On 370 acres watered there is a saving of $ 43,000.00 on water and $ 100,000.00 saving on labor, for a total yearly savings of $ 143,000.00. On two 18 hole golf courses, one manually watered and the other automatically, the appearance is as different as that of night and day. Further, with a regular fertilizing program, turf withstood traffic, crabgrass was eliminated, which indicates healthier and more vigorous turfgrass, and areas were never too wet to use. Labor costs are drastically reduced.

He stressed the elevation of the superintendent's position by having full responsibility of watering. This will do much to solve the golf cart problem. Earl Yesberger of Cleveland area was one of the first to utilize fully automatic sprinkling for greens. This is understandable for Earl pays his own bills and his decisions are final. Any adequately designed manual sprinkling system can be converted to an automatic system at very low cost.

It is said that the club membership, through its green committee and chairman, is responsible for the overall program for operational standards. But we say - how can they program what they do not know! Club officials need additional information by attending meetings like this, when possible, and closer liaison with their superintendents. Quality of turf does not stand still. It usually improves, or deteriorates.

Now, to discuss 13 labor and time saving devices that are not being generally practiced, but are as sure to be achieved as was John Glenn's orbiting the earth:

1. Application of fertilizers, insecticides, herbicides and fungicides in conjunction with automatic sprinkling systems. I believe that plant pathologists agree that frequent even daily applications even of fungicides at minute rates would be more effective than the customary method of application.

2. Chemical mowing - the use of Maleic hydrazide will develop a place and has been proven for certain areas,although not generally accepted, for around trees, along fence rows and inaccessible areas. Companies have many chemicals that can be used for very specific purposes.

3. Chemicals , such as Boron and Novon, can be used for edging and elimination of undesirable vegetation in traps where tree roots do not exist without danger from spreading or being washed down to lower areas.

4. There are also mechanical edgers that will save labor and time. These same tools will reduce the encroachment of Bermuda grass into bentgrass greens. Chet Mendenhall has reduced labor cost by establishing Meyer Zoysia to produce sharp edges on his traps. Choice of grasses are important for other areas also.

5. There are tractor-drawn kurbdressers.

6. Mallinckrodt, Cleary, DuPont, Upjohn and others have improved fungicides that are time and labor saving because they prevent the loss of turf.

7. Phygon XL, sodiumarsenite and other chemicals have their place in eliminating aquatic growth, including algae in lakes.

8. Pre-emergent chemicals are just coming into their own. Chlordane has completely eliminated the silver crabgrass, or goosegrass (Eleusine indica) problem in widely separated regions in bentgrass putting greens.

9. Many more need to eliminate tree roots from greens, tees and edges of fairways. Trenchers and the Haines Root Cutter will do much to eliminate this problem.

10. Many golf courses still have shrubbery in line of play and some are even planting it.

11. Golf courses are still being built without approved specifications, advance technique in design, and without taking advantage of agronomic facts.

12. The Workmaster Utility Cart equipped with a three point hydraulic lift, or otherwise, and Terra tires can perform many green maintenance functions which have not been suggested by the manufacturer, including aerification,

verti-cutting, disc spiking, dew removal, applying topdressing and working it in, much of which could be a one man operation. Topdressing and whirlwind type fertilizer distributors are also available for this purpose. Golf courses could use several of these carts, including a one man operated high capacity g.p.m. power sprayer equipped with boom for spraying greens. You, no doubt, can think of more operations. A little inspiration is all that is needed.

13. Tractors equipped with 7-gang hydraulic frame, such as Parkmaster, which can mow through narrow areas and then fan out to a full 15 feet swath, have been reported to cut mowing time up to 50%, or be capable of mowing 50 to 60 acres or more a day, or the entire fairways of an 18-hole golf course. This same tractor equipped with the Roadmaster hydraulic frame can easily handle both rough and fairways by changing to Roughmaster mowers. It may also be equipped with power take-off for handling the 80" Whirlwind mower for rough mowing and leaf lumching. Excessive speed is not the Parkmaster's answer to high acreage mowing. Rather it is its maneuverability, the power to accelerate out of low places up steep grades without changing gears, or slowing down. Only a few golf courses are utilizing this labor and time-saving device. One man and one tractor can mow fairways two or three times a week. Also take care of the rough and tees if you so desire with a tractor primarily designed for mowing, and will handle snow brushes for winter use.

For the young man just getting started in the business some hard and fast rules and standards in the art and science of greenskeeping are necessary. In these we stress the importance of knowing the degree of soil moisture of greens in relation to the condition of grass at the time of mowing, turgid or turgidity, the state of plasmolysis,and the effect that mowing will have on the grass in varying degrees from an optimum condition, or a state of rigidity of plant parts.

Recently after a national tournament a member, a lawyer, said to the green chairman, "Wouldn't it be wonderful if the course could be in this condition all of the time." The chairman started to explain why it could not, then stopped and said, "You would not understand - anyway you are a lawyer." I do not think the chairman was right. It is possible by taking advantage of agronomic findings, time and labor saving devices. The superintendent, salesmanship, management, routing and advance planning, all must play their part. Quality begets quality.

There is one more thing which is not primarily the problem of the golf course superintendent, but is the problem of everyone connected with golf, and that is to <u>speed up play</u>. This would help solve many of the headaches that face golf today and should be the by-word of everyone connected with golf in any way. Slow play is driving golfers away and cutting down on revenue.

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THE NECESSITY FOR BUDGET AND COST ANALYSIS

Everett L. Queen, Supt., Wichita C.C.,
Wichita, Kansas

A budget is the way to the successful operation of all going concerns. A home, farmer, small one-man business, large corporation, and even our governing bodies are compelled to operate from a budget for continued success. A golf course is big business, therefore needs good budget procedures.

By using accurate records of the cost of past operations, I set up a budget, projecting the cost of each operation that could normally happen on the golf course. By using my projected costs, I can tell what type of course can be provided with the money allocated to my budget.

You are probably wondering how I got these records of past operations, so I will show you one easy method of doing this. This small black note book in my hand is used while out on the course to keep a record of needed repairs, or if any suggestions are made by my committee, I jot them down to be sure I won't forget them. After listing the needed repairs, I pick out the ones most urgent and assign a man to do them.

Each man in my employ keeps a time card, hand-written, to show how long it took to perform each job each day. Thus, it is relatively easy to find the cost of each operation over a very short, or long time. I also keep a time book for my help to use in making payroll and for a permanent record.

I have found that the best way to preserve my records are in a three-ring, loose-leaf notebook with index tabs. I keep an accurate record of all purchases of supplies and equipment, and the cost of each item is charged to the proper department, or category of work.

I might also add that a diary is very helpful in projecting a budget because it should have all the work done for any given year in it. It takes only a short periodic review to ascertain all the necessary, or unnecessary work that will have to be done in the future.

Now, I would like to illustrate some records. We have a yearly plan chart .... a proposed budget .... list of equipment showing the number, year purchased, cost, and present value .... and a monthly balance sheet. This is received each month from the club accounting office and is used to check my records against the actual. The balance sheet also helps to set up the next year's budget. Capital improvements, or equipment, are in a separate budget for accounting purposes.

It may seem amazing, but after this system is set up it takes only about one-half hour per day to keep it going. It takes good records, good planning, and good judgment to prepare an annual budget, but I am sure that it will in the end make a turf superintendent a golf course manager. In closing I hope you received a few ideas that you can use. No set formula has yet been devised for all golf courses, but it is my hope that some day we will have a uniform basic system.

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UNIFORM PARTS OF THE GOLF COURSE BUDGET

Marvin H. Ferguson, Mid-Continent Director,
National Research Cordinator, USGA Green Section

The most obvious reason for a golf course superintendent to keep records is that of enabling him to account to the members of his club for their money which he has expended in the process of maintaining their golf course. This alone is reason enough for adequate records. The members have a right to know how their money was spent and what was accomplished through its expenditure.

There are many additional dividends to be gained from the keeping of adequate records. Good records help the superintendent to gauge the effectiveness of his operations, to accurately estimate costs of future work, to prepare a sound budget, to be able to predict machinery and equipment replacement needs, to evaluate the performance of men and equipment, and to compare maintenance costs with others (on a valid basis).

Measuring the Effectiveness of Work Done

The turf around trees, near tees and alongside fairways has been nicely trimmed and provides a pleasing appearance. Most club members like it that way and usually no questions are asked. But, suppose an economy-minded member inquires about the cost of this trimming. What is your factual answer? Can you give him the answer about costs on grub control, clipping removal, or Poa annua controls? Memories alone are often sufficiently faulty as to be unreliable to recall. Only a written record, which can be referred to during a less busy season, makes an adequate basis for an analysis of the effectiveness of operations.

To Estimate Costs of Future Work

Records of labor and material requirements for routine operations permit precise estimates of costs of performing this, or similar work in the future. Suppose, for instance, that a club wishes to establish a different grass on fairways. It may be possible to maintain bluegrass satisfactorily with two mowingsper week; whereas, bermudagrass, which requires closer cutting and which grows during the summer months, may require four mowings per week. How much more time will be required? Will presently owned mowing equipment be sufficient to take care of the problem? Will a new tractor be needed?

It may be decided that fairways should be aerified more frequently, that flagstick positions be changed twice daily, that sand traps be raked more frequently, that divots in tees be repaired and topdressed daily, or that new towels on ball washers be replaced more frequently. Conversely, it may be proposed that only the putting green should be sprayed with fungicide, and that fringe areas be skipped in order to save money. The superintendent with adequate facts can answer such proposals intelligently. When the committee members consider the increased costs, or savings, they may wish to alter their aims and funds.

Budget Planning

It is virtually impossible to intelligently and accurately plan a budget for a future year's operations unless records of former operations are available. Former labor requirements by hours, multiplied by current,

or foreseeable labor costs will provide an accurate prediction for budget purposes. Adjustments to include proposed standards and equipment efficiency changes can be predicted.

The depreciation rates of equipment and items for equipment replacement should be inserted annually so that major items of capital expense are spread over a number of years rather than being shown on a single year's budget. It is distressing to find that some clubs not only fail to provide for depreciation, but do not have an up-to-date inventory which shows the remaining useful life and estimated value of equipment used.

The total costs of supplies can be estimated with fair accuracy by studying the invoices of purchase orders from past years. In the case of fungicides and insecticides it is well to maintain an adequate supply of materials. More accurate estimates of material needs may be made by referring to records of weather conditions, disease incidence, severity of insect attacks, etc.

Comparing Costs

It has been said frequently that comparisons between golf courses cannot be made. Regardless of the validity of the statement, comparisons will continue to be made. Several comparisons are possible and may be helpful if the unit basis is standard.

Because of a need for better cost accounting methods, a USGA Green Section subcommittee under the chairmanship of Mr. Allen Brown was established for the purpose of studying "Uniform Terminology and Accounting." The committee first undertook to define the various areas of a golf course with respect to their maintenance requirements. A list of these definitions follows:

1. Golf Courses. The whole area on which the game of golf is played, including practice area and all club property, except the grounds immediately around the club house and that used for private residences, or for other recreational purposes.

2. Tee. The tee is the starting place for the hole, consisting of either an elevated, or level flat area, maintained at a short heighth of cut. The exact position of a golfer teeing area should be indicated by two movable markers for which the following color code is recommended:

Distance	Course
Back	Blue
Middle	White
Front	Red
Women's	Yellow

3. Tee Slopes. If the tee is elevated, the banks around the tee shall be known as the tee slopes and shall be considered a separate part of the course.

4. Fairway. - That part of a golf hole between the tee and green on which the turf is groomed to provide an improved lie.

5. Rough that part of a golf hole generally maintained by cutting or mowing at heights in excess of the height of the fairway.

6. Woodland - Any area occupied by trees, saplings, bushes, etc., which requires hand-labor and cannot be maintained by gang-mowers.

7. Swampland or Bog - Any low area containing an excessive amount of water which cannot be maintained by the customary golf course quipment.

8. Nursery area - Any area which has been set aside specifically for nursery purposes, such as cultivation of sod, trees, flowers, bushes, etc.

9. Putting Green all the ground of the golf hole which is especially prepared for putting, not including collars or aprons.

10. Collars - The area immediately adjacent to the putting surface that is maintained at an intermediate height of cut between the putting green and the fairway.

11. Apron - The approach or area immediately in front of and around the putting surface, between the collar and the fairway, or rough, which is usually maintained at an intermediate height of cut between the collar and the fairway.

12. Hazards -

    Water - A water hazard is any lake, pond, river, ditch, surface, drainage ditch, or other open water course (regardless of whether or not it contains water), and anything of a similar nature. All ground, or water within the margin of a water hazard, whether or not it be covered with any growing substance, is part of the water hazard.

    Bunker (Sand) - A bunker is an area of bare ground, often a depression which is covered with sand, but not including the turfed banks, or slopes immediately surrounding the Bunker. These should be considered part of the fairway, or rough.

    Bunker (Grass) - Same as sand Bunker, except the area is covered with grass instead of sand.

In order for maintenance costs to be meaningful, they must be based upon some standard unit of measurement. Only by determination of "unit costs" may we evaluate efficiency and economy in maintenance. The following units of measurement are recommended:

1. Man Hours - To provide a common denominator, it is suggested that "man hours" of labor be used to determine the amount of work required on any part of the course. This can then be related to dollars, according to the hourly rate prevailing in any given area, or on any course.

2. One Acre to be used for measuring the unit cost of maintaining fairways, rough, and larger areas.

3. 1,000 Square Feet to be used for measuring the unit cost to maintain putting greens, collars, aprons, tees, traps or bunkers, nursery and smaller areas. (Some courses keep records of road, tree and other special maintenance accounts).

Kinds of Records

Records systems may be simple, or complicated, and they may consume little or much time. The distaste for keeping a complicated, time-consuming system has deterred many from keeping anything like complete records. The simplest and most desirable record is a daily diary. If routine operations, as well as special jobs, are recorded and weather conditions noted, this diary, together with payroll records and invoices for materials purchased, will provide the basic information needed for budget development.

Some of the types of information that will provide a complete and detailed history of the year's operations on any golf course are as follows:

Form 1 - INDIVIDUAL WORKMAN'S DAILY TIME CARD. Each workman should record daily the time spent on each area of the golf course, or explain under other heading.

Form 2 - A SUMMARY SHEET - either daily or weekly - to develop a progressive record of the total hours spent on each maintenance area.

Form 2a - A WEEKLY PAYROLL FORM, either individual or group, on which each workman's time for each working day is recorded. This provides a record of the total hours of labor for each man, his rate of pay, his total earnings, net pay and the totals of these items for the entire crew.

Form 3 - A BASIC DATA SHEET which will serve as a description of the course with respect to the areas subject to various categories of maintenance. Units of maintenance will be derived from this information. We have found that enlarged aerial photos made to scale (obtainable from prints at nearly all local Soil Conservation Service Offices) are extremely useful for determining areas. A planimeter can be used to obtain fast and accurate measurements of area from these photos.

Form 4 - A SUMMARY SHEET SHOWING SUPPLIES PURCHASED. This information should be drawn from invoices, or purchase orders. These data, together with year end inventories, will provide figures on supplies used and their value.

Form 5 - A SUMMARY SHEET OF EQUIPMENT MAINTENANCE COSTS. If the club maintains a "repair parts" inventory, this must be considered in determining the cost of repair parts used.

Form 6 - AN INVENTORY OF EQUIPMENT. This should show each item of equipment owned by the club, an identifying number, its estimated value, its estimated useful remaining life, and the annual rate of depreciation.

Small items, such as hand tools, should be placed on a separate inventory. A budget item usually takes care of replacement needs of such "expendable" items.

Form 7 - AN EQUIPMENT OPERATION RECORD. This should show the item of equipment. an identifying number, and a record of its operation. It will be helpful in establishing "expected useful life" of equipment.

Complete records do require a considerable amount of time. Those who have kept such records feel that they are well worth the trouble. They

subject operations to a constant, critical analysis; weaknesses; and predict next year's costs. With these the superintendent can defend important maintenance tasks; the elimination of costly but important course features; and finally demonstrate his responsibility to the club by showing his membership exactly what he has done for them with their money.

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GETTING NEW COURSES STARTED

A. A. Linkogel, Link's Nursery, Inc.,
11500 Conway Road, St. Louis, Missouri.

In my 26 years as a golf course superintendent, I often wondered why there were so few golf courses in Missouri and Southern Illinois, and those that were around having only sand greens. During the last few years through checking with several officials from some of the smaller towns, I found that their information on golf course construction and maintenance costs were not accurate. The prices quoted for the cost of construction were far beyond their ability to pay, and the salary required to employ a capable superintendent much too high for them to pay. After carefully studying, I came upon the plan to help the people in these towns to promote a golf course. This is how I came to go into the building business for myself.

My method to get a new course started is to locate someone in the area who is very interested in promoting a golf course. The first thing I try to find is how much money they can raise to build a course, or in the case of sand greens, to convert to the bentgrass greens. If there is no course, then it is necessary for the local contact to select several pieces of property that could be purchased, or leased, for a reasonable price. Then, based on how much money they can raise, I will sketch a golf course plan, showing them what they can do with those properties and that amount of money. Such planning will create a lot of argument pro and con, but also a lot of interest. Several meetings are held to permit questions, and discussion before the final decision to go ahead.

As an example, I have a certain course in mind in Southern Missouri. This town had a private nine hole sand green course with a closed membership. Now,a certain small group of businessmen in this town wanted a course, so they called me in to find how to go about it, and how much it would cost. I suggested they line out as many pieces of property as they could. When I went down I wasinformed that they had only $ 11,000 to spend. One of the many pieces of property was a dairy farm which they could lease if they could promise the owner a yearly job on the course. Now, this was not the best piece of property for a golf course. It was a dairy farm, all in pasture with a pretty good turf. I made a sketch of the proposed course layout, including a lake for water supply.

I might mention that these members had the idea they could not have bentgrass greens that far south. The nine hole, private club sand green course already there had tried out a grass green several years before, and not knowing how to maintain it, lost it the first year. I assured them they could have bentgrass greens. They asked for local volunteers to work evenings and week-

ends to try and build the course under my supervision. On my next trip down they had about 100 men offering to help. I staked out the greens and tees, a local contractor permitted them to use his equipment to dig the lake. The greens were planted in September, and the golf course opened in May of the following year.

I laid out their maintenance program and made visits to help as problems developed. I have been advising and supplying material to this group for seven years, helping them prevent, or solve problems, and have seen only one bad green in that period. The group is tickled pink with their new course, and they built it for only $ 11,000.00. Through the information passed on to others in the area by members of this course, there have been four other courses built within a forty mile radius.

In laying out these courses, I am very careful of six things:

1. To spot the greens in areas where there is good air movement.
2. To be sure of good surface drainage.
3. To use a good soil mixture
4. To fan out the collars around greens for ease of cutting with fairway mowers.
5. To have a large enough water system so as to cover the complete green with one setting of sprinklers
6. To use the proper pressure plastic pipe which almost anyone can install. (I might add that this pipe has worked out wonderfully for us).

I also inform them to try and hire some local young man interested in learning this type of work and have him on the job during construction. I might say some of these men have gone on to better jobs and are doing an outstanding job.

Some of the courses I design are not all holes offering the best golf shots, but they do give the people what they want - an acceptable golf course. This is what they have been waiting for and they are happy. In the past seven years, 1956-61, I have promoted twenty-one 9-hole courses, and one 18-hole course within 100 miles of St. Louis. At present I am working on plans for three more in 1962. Giving the people a golf course for the dollars they have to spend so they can have the enjoyment of playing golf is my aim. It's like wanting a Cadillac and settling for a Compact.

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INSURANCE AND BENEFITS FOR WORKMEN

Al Johnson, Supt., Park Ridge C. C.,
Park Ridge, Illinois

Many of you have read employment ads of companies and industry in different papers where they have listed benefits for prospective employees, such as: forty hour week, insurance program, sick leave, hospitalization, paid vacation, and pension plan. If you were to read a similar ad for employment at a golf course it would list benefits such as: clean environment, 7 day week, minimum insurance program, below average wage scale, possible paid

vacation, no pension plan, etc.

Seriously, a program of benefits as some incentive for workmen is desired. A large percentage of country club and semi-private clubs have little or no program of benefits for employees, other than workmen's compensation, or liability insurance. A small percentage of country clubs have a group life, sickness and accident policy usually written in individual clubs by a member of that club that is in the insurance business with the premium paid by the individual employee. Others have one thousand dollar life insurance policy, and in a few clubs staff employees are covered by a five thousand dollar life insurance policy, and other regular employees are covered by a one thousand dollar life insurance policy - in a few cases paid by the country club of which they are employed.

Many of the private country club have a Christmas bonus which is given to the employees, usually based on the amount of money donated by the membership to such a fund, and alloted to the employee on the basis of his position with the club, the number of years of service, etc. In some private clubs the Christmas bonus is based, if money is available, on 5% of base salary; others have a system of so much per year for each year's employment; still others have no bonus system at all. After all, a Christmas bonus is a gift, no matter how small or large, and should be considered so unless it is considered part of your salary. In many cases a Superintendent may take it upon himself to do small things as an incentive for better workmanship.

Other benefits as far as the Superintendent is concerned, may come from expenses paid to National Turf Conferences, Local Turf Conferences, of which there is usually three or more, and monthly educational meetings. In a few cases all expenses are paid, but it appears that Superintendents pay about 75% of the expense for the year. Vacation benefits are based on the individual private, or semi-private golf club, and range from no vacation to a paid vacation of two weeks after a year's service, three weeks after five years service, one month after ten years service.

Two of the more desirable programs of benefits for employees that I was able to get information on are: a semi-private club with a new program of life, hospitalization, sickness and disability policy paid by the employee at present, but with the possibility of the club paying up to 50% of the premium in the future. It has a five thousand dollar life insurance for staff employees, two thousand dollars for regular employees, a twenty-five dollar deductible on hospital and operations, of which full payment is made up to five hundred dollars, and then 80% by the company and 20% by the individual. A sick benefit of so much per week over and above workmen's compensation, or any other insurance carried by the individual. It can be taken by the individual at the same premium if he leaves the employment of the club. The same semi-private club has a 10¢ per hour Christmas bonus fund if the employee stays the complete year. Notice this is a real step towards a definite program.

The other more desirable and definite program is one of Illinois Municipal Employees of which most city and park golf clubs of the state of Illinois are members. They have a good insurance plan, a 30 day sick leave, if necessary, a pension plan that is based on the high five years of employment. The hourly rate of pay for workmen is usually above most private country clubs, or semi-private.

Most of the information I was able to receive from private, semi-

private, and public courses was taken in the Chicago and surrounding area, and does not necessarily hold true of other areas in the Midwest. In the large percentage of contacts made, there was no definite program of benefits, or incentives for workmen to have the desire to do a job in his work.

It is my hope that our National G.C.S.A., as well as our local Associations, will spend a greater part of our dues towards securing a decent pension, or annuity program for those Superintendents and employees of all golf courses in the future.

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INSURANCE AND FRINGE BENEFITS FOR WORKMEN

Vertus Mitchell, Supt., Forest Park Golf Course,
St. Louis, Missouri

As already discussed by the previous speakers, the necessity of work standards, budgets, record-keeping, and cost analysis plays a large part in the modern-day operation of golf courses. The City of St. Louis requires a budget that lines out the various items of expenditures based on the program of maintenance, improvements, and purchase of new equipment in each department for the coming year. There are certain differences between private operation and the St. Louis Municipal in that certain administration and maintenance functions are performed within a framework of a large Department of Parks, Recreation and Forestry.

The City of St. Louis has a standard Civil Service setup which provides for the recruitment of new employees for all departments. This is outside the personal attention of the Golf Course Superintendent,and the broad Classifications as applied to employees doing like work sometimes are not too good for they may not have previous experience on a golf course. If the employee shows interest and willingness in his work, we then train them for the different jobs required on a golf course. This requires a more intensive training program for all employees.

The City of St. Louis has benefits, such as Social Security coverage, and pension rights for all employees. Civil Service procedures provide a fixed program for increasing wages annually for the first five years, and allows for promotions. Increases in wages after the five year period must come from a general increase for the entire city, or as a result of promotion to a higher job classification.

While the pay scale is competitive with other industries throughout the metropolitan area, it is not generally possible to start a well-qualified laborer at an advanced salary over the general pay scale. He must start at the general pay scale and work up. After a man is on the job for a year or so, he may be reclassified and promoted to a different job. The Civil Service system allows for prescribed sick leaves, 3 weeks vacation, time off (up to 6 days per year) for sickness, or death in the immediate family, and 13 paid holidays per year.

On April 1, 1960 a retirement system was established for employees of the City of St. Louis; this is in addition to his Social Security. The normal retirement date of an employee is the first day of the month following his 65th birthday. All employees shall be retired as of the first day of the month following his 70th birthday. The amount of pension an employee receives is his number of years of service multiplied by the sum of a percentage of his annual compensation. The retirement system provides for the following: Early Service Retirement, Disability Retirement, and Death Benefits.

Considered by the employees as a real benefit is our compensatory time arrangement, pay for a 40 hour work week, regardless of the number of hours over 40 he has put in. These hours, or days, accumulate,and he gets time off at a later date, with his pay check continuing at the 40 hour rate. The big advantage lies in the fact that it is possible for a man to have a couple of months off, including his vacation, for a more extended vacation. There are some disadvantages to this program, but all things considered, the advantages far outweigh the bad points, proven by the fact that seldom does anyone, after working with the City for any length of time, leave.

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HOW MUCH DID YOU PUT ON?

Marvin H. Ferguson, Mid-Continent Director,
National Research Coordinator, USGA Green Section

The Green Section agronomist visiting with a golf course superintendent asked, "How much fungicide did you put on this green?" The answer came immediately, "Two ounces per 1,000 sq.ft." The agronomist expressed surprise, but then asked, "How much area is in this putting green?" The answer was, "I don't know." Obviously, careful measurement and careful application can be wasted. If one is to know "how much was put on", he must measure the material to be applied, measure the area to be treated, and then treat the "Measured area" with the "measured material."

Measure Material to be Applied

The sellers of golf course supplies are doing a good job of packaging materials in convenient sizes for use without the necessity of measuring. However, some materials must be measured. The first rule is to use standard measurements. For solids, such as powdered or crystalline materials, use ounces and pounds. For liquids, use liquid ounces, pints, quarts and gallons. The cost of graduates and scales are not prohibitive. When one uses coke bottles, bar glasses, beer cans, or other such containers, he is permitting a chance for error that is not necessary.

We put a little more on the larger ones and a little less on the small ones. It is a fortunate thing that grasses tolerate some error, and that manufacturers of turf chemicals usually allow for some deviation from their printed instructions. It is small wonder that hit or miss methods do not cause more trouble than they do. We know the competent turf managers are very conscientious about proper measurements, and they carefully control the amount of material applied.

One of the problems of measurement of pesticides, or fertilizer, arises from the fact that we must deal with varying concentrations. How much 40% liquid sodium arsenite must be used if the recommendation calls for 3 lbs. of sodium arsenite per acre? Because 1 gallon of 40% liquid sodium arsenite weighs approximately 10 lbs., we can determine easily that there are 4 lbs. of active material per gallon, or 1 lb. of active material per quart. Therefore, 3 quarts of solution per acre will provide the desired amount. This is a relatively simple example, however, and some problems become considerably more complicated. Usually liquid formulations are prescribed in terms of liquid measure. When this is not the case, then one must determine the weight of the liquid, the percentage of active ingredient calculated in terms of weight per gallon, and the measurement made accordingly. In the example above, 1 gallon weighs 10 lbs., and the concentration is 40%. Therefore, .40 x 10 = 4 lbs. active ingredient. Another helpful bit of information furnished by some manufacturers shows the weight of the active ingredient per gallon. The container will carry a label saying, "Contains 2 lbs. per gallon of Product A."

Fertilizer rates also require some calculation. Such calculations, however, are not difficult if one will remember a brief formula. It is:

Desired rate of nutrient x 100 ÷ % concentration =
Rate of application.

The formula may be written:

$$\frac{R \times 100}{\%\ \text{nutrient}} = \text{Rate of Application}$$

If we assume we wish to apply 60 lbs. of nitrogen per acre, and we are using a 12-12-12 fertilizer, we can substitute figures in the formula as follows:

Desired rate (60 lbs.) x 100 ÷ percent N (12) =
Rate of Application

$$\frac{5 \times 100}{1} = 500 \text{ lbs. of } 12\text{-}12\text{-}12 \text{ per acre}$$

This formula may be applied to any particular nutrient. In the above example, it may be readily seen that equivalent amounts of phosphorus and potash were applied.

Measure the Area to be Treated

Measurements of area on a golf course are usually expressed in terms of acres (43,560 sq.ft.), or in 1,000 sq.ft. units. These are convenient units, and we can convert acres to 1,000 sq.ft. by multiplying by the factor 43.56. There are several acceptable methods of measuring areas. Aerial photos, made to a known scale, are one of the very convenient tools. Any well-equipped civil engineer's office can quickly measure any given area with a planimeter. Very accurate approximations may be obtained by overlaying a clear plastic grid on the area to be measured, provided the area covered by each square in the grid is known. Another method used with a map, or photo, is to divide irregular areas into more or less regular shaped parts, measure the parts with a scale ruler, and add them all up to provide a total for the area.

On the ground measurements may be made with a tape, or a measuring wheel. If irregularly shaped areas are to be measured, it may be necessary

to divide the area into more regularly shaped parts. If you have an inclination to estimate the size of areas, it may be wise to check yourself frequently. Estimates can sometimes miss the mark by virtue of faulty reasoning. The following is one example:

Superintendent A has a greenthat is oval shaped, 110 ft. long, and 75 ft. wide. He multiplies 110 x 75 and finds that this is 8,250 sq.ft. He estimates that the rounded-off corners probably amount to about 500 sq. ft., and he considers the green to be 7,750 sq.ft. (see Fig. 1).

Fig. 1

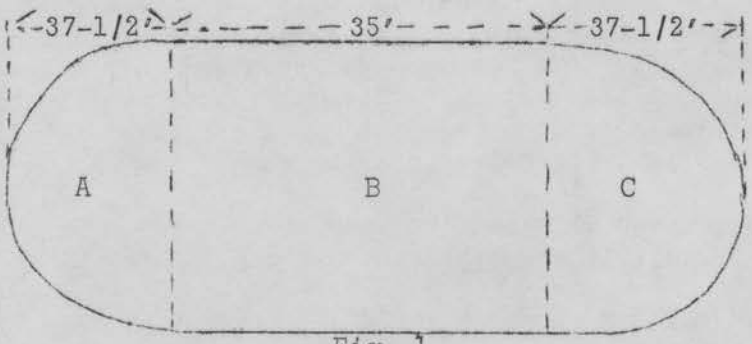

Fig. 1

When the green is measured, it is divided so that part B is a rectangle with the dimensions 35' x 75'. Its area then is 2,625 sq.ft. Parts A and C, if placed together, would form a circle with a diameter of 75'. The formula for finding the area of a circle is pi (3.1416) times 1/2 the diameter, squared. It is written

$$3.1416 \times (37.5)^2 = 4,417+ \text{ square feet}$$

Adding these values, we find that 4,417 + 2,625 = 7,042 sq.ft. Thus, the estimate is off by more than 700 sq.ft., or 10%.

One of the most common occurrences of faulty estimates comes from the treating of fringes of greens. The green may be circular and 80 ft. in diameter. The superintendent wishes to apply 3 ounces of fungicide per 1,000 sq.ft. We may calculate the area by the formula pi (3.1416) x 1/2 diameter squared.

$$3.1416 \times 40 \times 40 = 5,026 \text{ sq. feet}$$

Therefore, 15 ounces of fungicide will be required. But, because the superintendent wishes to spray a strip about 10' wide around the collar of the green he decides to put in a little additional fungicide, so he allows enough for another 1,000 sq.ft. (3 ounces more). Now, how much fungicide is he applying? The radius of the area to be treated is now 50' instead of 40'.

$$3.1416 \times 50 \times 50 = 7,854 \text{ square feet}$$

Now, we have applied 18 ounces to 7,854 sq.ft. This amounts to a little more than 2-1/4 ounces per 1,000 sq.ft. Thus, the estimate was seriously in error.

Treat the "Measured Area" with the "Measured Material"

Calibration of spreaders, or sprayers, is one of the most important steps in the application of any material. In the case of sprayers, the rate

of output will remain constant so long as pressures and orifice sizes are constant. Therefore, the procedure is to measure the rate of discharge, and from this information, together with the known width of the swath covered by the sprayer, calculate the distance to be traveled in order to apply the given amount of material.

Let's consider one example. We wish to apply 50 gallons of a spray material per acre. We have determined that the sprayer discharges 2 gallons of solution per minute. Thus, 1/25th of the required amount is discharged in one minute. Another way of saying this is that 1/25th of an acre must be covered in one minute. One twenty-fifth of an acre is 1,742 square feet (43,560 ÷ 25). Then if we know that the sprayer covers a strip 12 feet wide, we may calculate that the rig must travel 145 ft. (1,742 ÷ 12) in order to cover this area. By converting feet per minute to miles per hour, we can determine correct tractor speed. (A speed indicator on the tractor is a very useful "extra" in turf maintenance work). A rate of 145 ft. per minute is equivalent to 8,700 ft. per hour, or 1.65 miles per hour (8,700 ÷ 5,280).

A fertilizer distributor must be handled differently. The conventional distributor will vary in its discharge rate with variations in speed, fullness of the hopper, and roughness of the terrain. Usually the best way to measure rate of discharge is to fasten a pan to the underside of the distributor, operate the machine over a measured area, and weigh the fertilizer discharged into the pan. Openings in the spreader may be adjusted to provide the desired rate of output.

One pitfall in the application of spray materials that are suspended in water rather than dissolved is the danger of settling out. Unless thorough and constant agitation accompanies the spraying operation, the concentration of the solution may vary. There have been cases in which excellent fungicides failed to provide disease control. Subsequent examination of the sprayer disclosed a "paste" of fungicide material in the bottom of the tank.

Use Good Clean Equipment

The last step in any operation involving sprayers or spreaders is to thoroughly clean the equipment, service it, andstore it in such condition that it is ready for use. However, it is always a good idea to check over equipment again just prior to use. These precautions are not only a part of good housekeeping and a way to forestall rust and corrosion of metal parts, but they may also save one from disaster. There is one case on record where a club killed nine bluegrass fairways by failure to use clean equipment. The club borrowed a large sprayer, placed 2,4-D solution in it and sprayed the fairways. The workman failed to check the tank prior to filling. Had he done so, he would have found that it was partially filled with a solution of a powerful soil sterilant. The previous user had failed to empty the tank.

The chemical materials that have become an important part of turfgrass management have had a revolutionary effect upon the profession. One would be hard pressed to maintain turf without them. Because of their effectiveness, and because of their costs, they must be used in accordance with thoroughly tested procedures and rates. The superintendent who uses them is obliged to be ever alert to make certain that he is using the correct material and the correct amount on the known area to be treated. Accorded this attention, turfgrass chemicals can be a tremendously effective maintenance tool.

TRAINING TURF MANAGERS

Mal McLaren, Supt., Oakwood Club
Cleveland, Ohio

To become a good superintendent today you must be an agronomist, engineer, chemist, electrician, mechanic and bookkeeper all rolled into one. Go to school and learn everything about these subjects you can. You'll need every bit of it. Regardless of all this schooling you will find that experience on the job is what will eventually make you a good turf manager. You will be dealing with Mother Nature at all times, and she can pull some pretty slick tricks on you; no two seasons are the same; you cannot use the rule book in this business. Our good friend, Carl Bretzlaff (a confirmed bachelor), jokingly said he's been "married to the golf course." You have to learn to live with it night and day to be successful.

Every superintendent has different ideas on how to train men for this profession. When we find a man who is sincere about wanting to learn, we like to start him in by learning to operate machinery on all types of jobs. If you know how to perform these operations, you are better qualified to tell your men how to do the job right.

Next in importance is keeping records. Fertilizer and fungicide applications are very important. Explain the rates, time of application, and reason for applying; assign him to do these jobs and follow by checking results with him. Along with this have him apply new materials on an experimental basis, encourage him to try some ideas of his own. Machinery inventory and repair records are also good things for him to learn. An inventory on machinery of when it was purchased, cost, estimated life, and cost of repairs is a must on all courses because it helps you when you ask your club to replace worn out equipment. When purchasing equipment have him in on the deal, explaining why you think the type of equipment is more adaptable to your course.

Labor Supervision

An assistant manager's most important training comes after he has gained experience in handling all types of work. Start out by having him supervise jobs with one, two or three men, such as fungicide spraying, fertilizer applications, small construction projects, etc., gradually working him up to where he is able to submit all work orders for the entire crew. At the end of the day review the results of the work done and discuss the program for the next day. It is very important that all your employees are informed of his authority, and that he is in complete charge in your absence. We like to have him sit in on certain green committee meetings, taking notes of reports and business transacted, such as budgets, progress reports, and improvement programs for the course, after which he is requested to submit his report for the chairman and myself.

Encourage him to attend educational programs, such as this Turf Conference, as well as those put on by local chapters of the G.C.S.A. Here again, have him submit a report of his findings. During the summer have him visit other courses to see how they are maintaining their course, look over their equipment and maintenance barns, and discuss things with other superintendents. Permit him to play golf, and if possible, have the club assist him

with payment of dues in the G.C.S.A.

When you outline this program on paper it sounds like an awful lot of duties to load on one person. Remember this -- you cannot expect him to be driving a tractor all day and still perform these extra duties. You are to be the judge of how much he can take, so plan this program the same as you plan your other work. Keep your program interesting. He will have to work extra hours to keep up at times. After all, he is going steady with a golf course now, and if he is to be any good, he will want to become married to a course, the same as Carl Bretzlaff.

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TRAINING TURF MANAGERS

Warren Bidwell, Supt., Olympia Fields C.C.,
Olympia Fields, Illinois

The Challenge

My cooperation with various Land Grant Colleges in training turf managers during the past fifteen years has certainly been both interesting and challenging. The progressive steps in the evolution of the student from the classroom to a full-time golf course manager are important ones for the student, the college and to the superintendent. Mistakes that could embarrass anyone of the threesome are to be avoided if a continuing program to train young men for positions in the turf field is to be a success story.

Usually a student, who is engaged in a Turf Management course, is there because he has found the turf field to be a challenge to him prior to being enrolled in the course. In most cases he has not come into the course "blind". He has found his challenge and expects to pursue it. He is looking for helping hands both in the classroom and during an apprenticeship under the guidance of a leading superintendent.

The Orientation Program

I do not attempt to lay before a Turf Management student a rigid type of classroom-like proceedure during his orientation program. He has had enough of that in classes and labs. He is now ready to experience the unfolding of an entire operational program where player satisfaction, along with growth requirements for living plant life, are the prime considerations.

One of the early lessons which the future Turf Manager should observe is that you are seldom, if ever, "all set" in your dealings with Nature. There should be an allowance for a reasonable amount of flexibility in job planning. The forces that are at work in our natural environment are changeable, and one must adapt his program to meet the conditions which are at hand.

Leadership

It is my belief that the future Turf Manager must develop Leadership by first knowing how to do the job. This is best done by having personal

experience. Thus, it is my procedure that the trainee be given as many varieties of work as may be practical for him to cover. Once he has first-hand knowledge, then he can teach or supervise others and have self-confidence, which is so important to him at this stage in his training. Without self-confidence he can flounder and make embarrassing mistakes, sometimes costly to the club. It is here that he begins to associate classroom fundamentals with practical, personal experience that will eventually qualify him as leader of men.

I have noticed that the age differential is sometimes a problem when the young trainee Turf Manager has under him men who have been on the job for some time and are older. The worst thing he can possibly do is to try to impress these men with the amount of schooling he has under his belt. Once he has assumed limited leadership of a crew, he should make mental notes in a day-to-day study of the good, as well as the bad points of each member of his crew. An application of "horse sense" psychology will keep the mental outlook of those inclined to be sensitive about the age difference well in his favor. In recognizing this problem, Dr. F. Snider, Dean of Short Courses at Pennsylvania State University, has introduced Personnel Management into the Winter Turf program for future Turf Managers. While it is not expected to cover all situations, the course will be highly beneficial in many ways.

Accountability

Very early in his new career the trainee Turf Manager must learn that we are accountable for many things. Turf production and the growing of ornamental plant material calls for special skills. Turf is a specialized crop, grown for specific purposes and must be managed if the bill of specifications are to be fulfilled for both Nature and mankind. Nature is a good teacher if we will but take time to read the lessons. When we overdo things the resulting lesson is there for qualified people to interpret. It may be too much fertilizer, or water. Once it has been applied, over-stimulation, or weakness may result.

Budgeting is another area where we are responsible and accountable for the spending of vast sums of money belonging to others. We must spend it wisely to achieve the results desired. Before we spend there must be a plan that will substantiate the wisdom of our proposed spending.

The Relationship Medium

The training of a Turf Manager cannot be considered thorough unless some time has been spent on his relationships with his fellowman; mostly his fellow department heads and those to whom he is responsible. In this field where the best is expected from everyone, mistakes can be kept to a minimum when simple, applied psychology and consideration for the other fellow is practiced. While some of these principles are to be found in the textbooks, we will concede that a greater number of the lessons are to be experienced in day-to-day living. Many occasions warrant our practicing the principle that cooperation is a two-way street. If we wish the spirit of give and take from others, then we, too, must practice it.

Professional Status

The attainment of a position as Turf Manager carries its own built-in responsibility. It requires that we conduct ourselves and our business relations with others on the highest plane, that the standards and ethics of our profession be promoted at all times.

THE ROLE OF THE DISTRICT G.C.S.A.

Harold W. Glissmann, 930 South 48th Street,
Omaha, Nebraska

What does the local G.C.S.A. groups do for you and me? They provide information, fellowship, leadership, and a means to get together and discuss your local problems. There are many things that the local groups can do to help you and your community:

1. Be a source of reliable information about local turf problems.
2. Be a community leader in any way that you can serve - and there are many and the rewards are big.
3. As individuals attend your local meeting and work in any capacity you can. By helping your local group you will be helping yourself.
4. The local G.C.S.A. should try to have a project, or goal to work towards.

Sponsor a young man to further his education. You and I are the source of future supply of capable superintendents and future members of G.C.S.A. I could think of no better way to help a young man to become interested in turf than to have the privilege of attending this Conference. Your local G.C.S.A. can do this by encouraging, and even sponsoring him. It would cost only a few dollars. And, who know what may become of it? What better roll could your local G.C.S.A. play than to have that satisfaction?

We must do our part along this line. You don't see many that already helped us in years past. They have served their time, and now others must fill their places. If you are a part of your local G.C.S.A. you can feel the satisfaction of belonging, and that is what everybody wants and needs in day-to-day living. We must all pull ourselves up by our own boot straps. You will get as much out of your local as you put in it, and your local will be as big as it has its sights set.

It is not always the largest membership of any organization that gets the most done, or the most satisfaction from what has been done. So, the basic role of the local G.C.S.A. is to help provide a better way of life for people through helping to provide means for pleasure, profit and satisfaction, through grass care, service and application. Support your local group; your local group should not only support our National Association, but Conferences of this type and anything at all that will help to do a better job.

It is not my intention to try and tell you all there is to the subject that has been assigned to me, nor do I care too much if you don't agree with me. If I can make you think a little bit more about the subject than you did before coming into this meeting I will be satisfied and will be well repaid for my efforts.

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THE MIDWEST GROUNDS MANAGEMENT ASSOCIATION

Frank Smith, George A. Davis Co.,
Chicago, Illinois

What do you suppose Dr. Daniel's reason was for wanting someone to talk about the Midwest Grounds Management Association this morning? That's what I wondered two months ago. The realization finally came to me that the men attending this particular session could represent a dozen or more embryonic turf associations that could be formed with the incentive of a common interest. You are the ones who have to worry about keeping football fields in shape, God and your grounds budget permitting, but this is only part of the story. You are responsible for all turf around the school. No one can find much fault in the way the inside of the school is kept up, but they can sure make a fuss over a few dandelions, or a little crabgrass.

How about your trees and shrubs? Somehow more often than not you men are expected to do an expert job in caring for them too. Our good friend, the average taxpayer, can certainly be critical at times. Where school grounds are concerned, an increase in your budget is not necessarily the sole answer to the improvements you want to make. With or without an increase in funds, you must know how to get full value for every dollar you spend. We learn a lot from personal experience on a job, and when we have the opportunity, it is a good thing to take advantage of someone else's experience. Perhaps that is the main reason for an Association. It gives us an opportunity to know other fellows with the same interests and share experiences with them.

Here is one way to get an Association of your own started. It is the way the Midwest Grounds Management Association was formed five years ago -

Each one of you can think of someone who gets around to the various schools in your areaand knows other men with jobs like yours. He might be the salesman who sells floor wax, boiler compound, fertilizer, grass seed, or mowers. Ask him if there aren't six or more men in the area who would make up an organizational committee to form a new association. Consider expanding the field by including other people interested in grounds, such as men from industrial plants, landscapers, nurserymen, suppliers and perhaps local cemetery and park superintendents.

At the organizational meeting start by discussing what could be gained by forming an Association. As soon as possible choose a chairman of your organizational committee. The chairman will choose men for the essential committees such as: (1) membership; (2) publicity; (3) nominating; (4) constitution; (5) program. Also, their definite job should be understood.

Set a date for your first regular meeting. Decide on the place, time, and program. Do everything possible to attract a good turnout at the first meeting. Let Dr. Daniel know what you are doing and arrange for him to speak. Chances are you'll draw a good crowd and they'll go home with the intention to attend future meetings. Help the men get acquainted with one another by providing them with lapel cards showing their name and where they are from.

Here is an outline of a typical meeting of the Midwest Grounds Management Association:

We meet at 11:00 A.M. at a school in our area, and our host, a fellow

member, conducts us on a tour of the building and grounds. Lunch at noon at a nearby restaurant. We usually have a separate room reserved for us. After lunch a brief business meeting, and then we turn our meeting over to the program chairman who introduces our speaker. We have always made it a point to have a guest speaker who could talk on his subject with authority. Since we have only six meetings a year, we must have six good meetings.

During each of the past five years Dr. Daniel has been the speaker at our February meeting. Mr. Wilson of the Milwaukee Sewerage Commission, and Dr. Watson of Toro Manufacturing have also cooperated greatly by speaking at a number of meetings during those years. Other speakers have been local landscapers, nurserymen and arborists. Through membership in our Association, the school men in our area have finally become acquainted with one another. The information gained at meetings has made their work and money more effective, and their school grounds looking better.

In closing, it is interesting to note that many of the members of the Midwest Grounds Management Association have been given increased allowances for their grounds. When a man makes improvements in his grounds with a limited budget, school boards and administrators are encouraged to provide more funds for further improvement.

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THE TURF FUNGICIDE BUSINESS - A REVIEW

Stan Frederiksen, Mallinckrodt Chemical Works,
St. Louis, Missouri

On a certain day in August,1921, about 40 years ago, George Smith, greenskeeper, went out with his greens chairman to look at No. 5 putting green. It had looked fairly good only the day before - but!! In various sized spots, the beautiful green had given way to ugly browns and grays, and the spots were rapidly growing larger. What was it? What was happening? George checked over his maintenance activities - watering, mowing, topdressing, raking, fertilizing - all had been carried out. Yet, George's gorgeous grass was dying.

The spots he saw on his putting green were no novelty - George had seen them before - had lost grass before. In fact, it was not unusual to have greens entirely without grass. George wondered how much disease could really be controlled. He had used lime, on occasion, with some effect. He had tried Bordeaux mixture, and noticed that it did seem to control the "disease" some, but the residual copper component damaged and thinned his good grass.

Now we jump a span of 40 years to August, 1961, and briefly visit with Larry Johnson, golf course manager. Larry maintains an excellent 18-hole layout. It is always one of the best manicured courses in his area. Day after day every putting green is in excellent condition - all of excellent texture, beautiful color, and with not a sign of "turf disease."

Now - what had happened during the intervening 40 years? Many turf products were developed, but, the real answer to disease-free putting greens

lies in the growth and development of excellent turf fungicides by that segment of industry which we are calling today "the turf fungicide business." This business is just another example of our "American way" in which free enterprise industry always finds the answers to problems, whenever those problems become known to industry's leaders.

Let's scan this "turf fungicide business" concerning (I) where we have been, (II) where we are now, and (III) where do we go from here?

I. Background of the Turf Fungicide Business - Where have we been?

Back in George Smith's day, Bordeaux mixture was really the only turf fungicide worthy of the name. Then, in the early 1920's, came the first "breakthrough" on turf disease control. During these years, Dr. John Monteith, then of the USDA and USGA, did considerable work with the inorganic mercury salts, and concluded that combinations of mercuric and mercurous chlorides gave control of some turf diseases. Actual work on fungicidal control dates back over 3,000 years. As early as 1000 B.C., the Greek poet Homer, spoke of "the pest-averting sulfur". In the year 60 A.D., Pliny recommended soaking wheat seed in wine, plus bruised cypress leaves, to control "mildew." Throughout the centuries since then, work has been done with various fungicides. Bordeaux mixture had first been recognized as a fungicide around 1800.

In these early 1920's Mallinckrodt Chemical Works, then already 60 years old, pioneered the commercial aspects of the mercurial turf fungicide, launching the famous Calomel-corrosive sublimate mixture. The original Calo-Clor was heavy - did not stay in suspension, and was used in dry form, with sand, and broadcast over the turf. "SUSPENSION CALO-CLOR" was developed shortly after, containing a special suspension agent. During the late 20's and throughout the 30's, the mercurials were the best known of all turf fungicides.

During the 30's DuPont and other companies worked on the activity of the dithiocarbamate compounds. This work actually marks the beginning of the modern scramble for organic fungicides. Their tetra-methyl-thiram-disulfide, which you know as Tersan, did a good disease control job throughout the war years, and has continued to be a factor in turf disease control ever since. Of course, DuPont also developed its own organic mercurial, hydroxymercurichlorophenol, which you know as Semesan, about the same time.

Around the mid-40's the Cleary Corp. helped pioneer the advance of phenyl mercuric acetate, both as a fungicide and a crabgrass control. Their PMAS has gained in popularity over the years. Then in about 1948, the Upjohn Company helped pioneer the new concept of anti-biotic control with their cyclohexamide, an organic compound which Upjohn offered commercially as "Actidione." The ferrated and "RZ" types were later offered.

About 1950 Rhode Island's Department of Plant Pathology, under Dr. Frank Howard, determined that Cadmium compounds offered excellent control of the then serious disease, dollarspot. So effective have they become, that the standard phrase is "When the cadmium compounds came in, dollarspot went out."

Disease identification is difficult even among the experts. A fungicide was needed that could be sprayed without too much difficulty, and which would readily control several diseases. Thus, the concept of the broad-spectrum turf fungicide was born, Mallinckrodt pioneering in this field with

broad-spectrum Kromad. Shortly thereafter, DuPont marketed Tersan-OM, combining Thiram and organic mercury, and Cleary marketed Thimer, also combining Thiram with the organic mercurial PMAS. Soon Upjohn also was in the field with Acti-Dione Thiram. More recently Vineland, Chemagro, California Chem. Co., and others have entered the turf fungicide business.

All these steps illustrate how the turf fungicide industry has come about and has grown, filling a need, and solving much of the turf disease problem. So far as the fine putting green turf market is concerned, the fungicide industry is not huge. But, you'll agree it occupies a significant place in modern turf maintenance.

II. The Turf Fungicide Industry Today

Now, just a few words about what these turf fungicide companies do. What goes on, and within firms, that eventually results in the marketing of an acceptable, effective turf fungicide? In general, the sequence is something like this:

1. A Turf Disease Problem Must Exist. There isn't a turf fungicide on the market today that didn't result from a disease problem of some kind. It is such problems that stimulate the manufacturer to start work, especially if he can see two end results: (a) a really tangible service to solve a problem; and (b) the reasonable anticipation of a profit for himself.

2. The Problem Must be Recognized by the Proper People - Especially the Turf Fungicide Manufacturer. So long as a turf manager keeps it to himself there will be no solution.

3. The Problem Must Be Significant Enough to Warrant Action by the Manufacturer. The problem must be big enough for him to spend time, money, and other wherewithal, in an effort at solution.

4. The Manufacturer Must Learn Everything Possible About the Disease Problem. By direct contact, attending Conferences, studying environments, etc. The research staff must study the disease organism, its habits, conditions under which it attacks grasses, what kinds or classes of substances are likely candidates for its control, etc.

5. The Manufacturer Must "Screen" Compounds. Sometimes he must check through many thousands of potential compounds. He may reconsider products previously found unsuitable for other purposes.

6. From Among These He Must Select Some Candidates For:
   a. Laboratory testing - the products will have to be actually tested against the fungus organism.
   b. Greenhouse testing. Next it must be tested against the disease organism actually attacking turfgrass.
   c. Field testing - out in the field in the hands of superintendents. You will be asked to help and make observations for this was originally your problem that the manufacturer has spent much time and money on. Meanwhile, the manufacturer has been collecting all data. By this time he has a stack of material perhaps a foot thick.

7. Develop Complete Information and Submit to U.S.D.A. - Having found, perhaps, a single fungicide that will work, and after having calculated reasonable costs, selling prices, etc., the manufacturer must propose what he

thinks is satisfactory labeling, and submit his compiled data to the USDA for its approval. Only if facts have been properly gathered and presented, and a satisfactory product has been developed, will the USDA approve.

8. Manufacturer Must Develop Production Processes -
   1 - PILOT PLANT - usually to make small quantities of the fungicide, this small plant being used to test facilities, provides your test materials and gets the "bugs" out of the production cycle.

   2 - FULL SCALE MANUFACTURING PROCESS - to produce the quantity of the product surveys have indicated will be needed for the market to be covered.

9. Advertising and Marketing Program Plans - These will next have to be developed since the manufacturer's plant full of completed material will do no good unless it is sold.

10. Marketing and Selling - All the mechanics of marketing the product to the ultimate consumer must now be invoked. Only when used by you to get successful disease control is the manufacturer's job complete.

11. Follow-Through - The reputable manufacturer wants to know that you are a satisfied customer. His follow-through includes:
    a. HE MUST BACK UP HIS PRODUCT - He must be constantly on the alert for any problems or questions. He must correct any deficiencies, find the reasons for the potential non-success of a product under any given circumstance, etc. Sometimes this is merely the result of not following the label instructions, knowing the size of his greens, or putting on overdosages, or underdosages, etc.

    b. HE MUST SUPPORT TURF ASSOCIATIONS, NATIONAL AND REGIONAL - Most of you are members of the GCSA, and your own district turf associations. You'll find good firms ready to work with your groups in any way possible.

    c. HE MUST GIVE OUT HONEST INFORMATION - This means, essentially, that he must advertise with honesty and integrity, giving out only those facts about his products which are realistic, and which will be honest and helpful.

    d. HE MUST WORK THROUGH GOOD DISTRIBUTORS - He knows that the middleman, or distributor, can be abolished, but the distributor's function, and the cost of that function, must be performed by someone.

III. What's The Future For Turf Fungicides?

What will be the next big break-through? Many projects are rapidly being pushed, and others will come. Some of the present aims include:

1. Preventive Spraying - Any plant pathologist will tell you "if you see it, it's too late." They will tell you "you cannot really cure a turf disease, you must prevent it." Manufacturers will continue to point out the many advantages of a routine preventive spray program.

2. Fairway Fungicides - Members are demanding the same quality of turf on tees and fairways as on greens. Manufacturers, of course, will cooperate, by seeking better and better fairway fungicides, and at low costs. Some superintendents already are using PMA 10% solution at one quart per acre. Others are using Cadminate at one-half ounce per 1,000 sq.ft. every six weeks. These and other fungicides are giving good fairway control of diseases.

3. Combinations - Kromad, Tersan-OM, Thimer, Acti-Dione Thiram are now available, yet broader combinations are in prospect. Some firms are seeking to combine fungicides with herbicides with soluble fertilizers, or with insecticides.

4. Bu'lt-in Fungicides - Some turf and business interests are seeking a soil ad .tive which is fungicidal, and which, when mixed with soils, used as seedbeds, will prevent fungus attacks for extended periods.

5. Fungicides to Control Previously "Uncontrollable" Diseases - Most major turf diseases may now be controlled by existing good turf fungicides. Of course, some may be more effective, safe, or economical than others. However, some fungi are persistent rascals; others are controlled only at great expense, and with great difficulty. For instance, prior to this year for pythium there has been no sure control, except sudden cold, dry weather. Now several experimental formulations are showing promise. Dr. Homer Wells at Tifton, Georgia, has gotten promising results for pythium control on turf in greenhouse tests with Dexon. Certainly another "uncontrollable" disease thus far has been "Spring Dead Spot" of Bermudagrass fairways.

6. Systemic Turf Fungicides - applied to the soil with root absorption and the active ingredients which would supply long term internal plant protection through the root systems/ is being seriously studied from many angles today. Several soil drenches are already on the market and are successful to a degree.

7. Anti-Organism Control - One of the "way-out" projects being considered are turf organisms antagonistic to fungi perhaps; actually feeding on and eliminating harmful fungi. The future for this idea is highly nebulous.

8. Synthetic Putting Greens - Possibly in the form of all weather "rugs", or "carpets" that can be laid down over a prepared base, and removed, repaired and re-laid - or possibly in some other form not yet even visualized. This may be impractical, expensive and only slowly acceptable to golfers. Also, "synthetic greens won't repair themselves;" while grass recovers well from ball marks, mower and spike shoe damage, etc.

This, then, is the turf fungicide business - where it has been, where it is now, and where it might go in the future. You can help move it forward. First, you can make sure the industry knows of your turf disease problems, so that they can set to work to solve them. Secondly, you can purchase the fungicides of the manufacturers who are pushing their research for you. You'll enjoy the outstanding services of your distributor, and provide just a bit for research dedicated to solving your problems.

INTRODUCING A NEW PRODUCT

Woodrow A. Jaffee, Oil-Dri Corporation
Chicago 11, Illinois

The speakers preceding me have presented aspects of turf improvement from the standpoint of the salesman and the distributor. My purpose here is to relate to you some of the problems, experiences, and lessons that my Company met with in marketing a new product, a calcined clay aggregate, in the turf field.

Clays are found and mined in many states from bentonites in Wyoming, which are poured down the shafts of oil wells as drilling mud, to the kaolins of South Carolina used to put a glossy finish on paper materials, to attapulgites of Southern Georgia used for refining of oils, to the firebrick clays of Ohio. Clays vary with regard to their density, color, porosity, placticity, the temperatures at which they glaze or vitrify, absorption rates, and in many other respects.

The word "Clay" is encountered frequently in the field of soil science where the reference is to that important fraction or part of the soil made up of particles which are less than .002 mm in diamter. This clay fraction is often called the "colloidal material." Three of the main clay groups are: the illites, the montmorillonites and the kaolins. We are concerned with, in particular, the montmorillonite group. However, the smallest aggregates in our "calcined clay" is at least 500 times the size of the largest particle in the natural "clay fraction" of the soil.

About six or more years ago, various people began to be interested in the application of calcined clays to golf course putting greens. Purdue University began testing calcined clays in 1954. Within the costly and difficult problems of compaction and drainage of putting greens, and building of golf courses, an excellent potential exists for calcined clay.

The development of this market is involved. First, there was the matter of investment of time by our administrative staff in contacting people in the Department of Agriculture, turf field, universities, and others to determine where we should start. Then came the matter of financial grants and contribution of clay materials to help studies already underway. We joined our good competitors in supporting the turf research directed by Dr. Bill Daniel, and he is to be complimented for his diplomatic talents in getting manufacturers with conflicting personal interests to cooperate communally in such studies. Perhaps we were a bit more conservative, or perhaps we were less far-sighted, but in any case we held off marketing TERRA-GREEN soil conditioner until about two years ago.

Initially we had only hazy ideas of which clay types would be best. Because we had absorbent clays readily available from mills in Tennessee, Mississippi and Georgia, we did submit clays from all of these mills for Purdue test. It turned out that highly calcined, or highly baked clays, performed the best. Some of the clay samples we submitted were not highly calcined, and were found unsuitable. We then selected the Mississippi montmorillonite as evidently best. I do wish to emphasize that TERRA-GREEN soil conditioner is not merely one of our industrial absorbent clays with a new hat. The raw material is identical, but the mesh size and temperature during the drying and calcining procedure, which is most important, is carefully controlled to achieve maximum stability.

Let us share some ideas about mining of clays and calcining of clays. In a typical strip mined clay pit we remove 5 to 15' of overburden, then mine the underlying clay layer which runs from 10 to 30 feet in depth. Inside the mill we crush the big lumps down to 1/2", 1/4" and 1/8" size particles in stages. Meantime, we give the clay an initial drying that removes all but about 1/10 to 1% of water moisture of the original 40% moisture content, as it comes from the pit. The kilns are 60' long, 6' in diameter, and rotate about their longitudinal axis. The high temperatures come from the gas-fired burner at the lower end of the kiln, toward which the clay tumbles as the kiln rotates. The temperature gradient, the maximum temperature, and the size of the clay particles all affect the calcination index of the clay.

We have considered the possibility of producing highly calcined clays at our Georgia mill for the turf field. The Georgia clays are somewhat bulkier and more absorbent. However, we believe, at this time that the Mississippi montmorillonite can be calcined and hardened to a greater degree with greater resulting stability. Stability is the characteristic that we are emphasizing in our production thinking. It appears that the 2 - 1 plate structure of the montmorillonites offer a possibly higher base-ion exchange rate with better fertilizer holding and release characteristics than the fibrous Georgia attapulgite. These are matters yet to be concluded, and, until they are, I can only offer the prayer of the Iowa farmer, "Dear Lord, make my words today sweet because tomorrow I may have to eat them."

Another possibility is a change in the color of the calcined clay. Not through the use of dyes, but rather through control of oxygen supply in the kiln. This again is a delicate matter requiring more time and trials.

Let us look now at sales of the product. Because our Company has always emphasized sales through distributors, we looked around for the best distributors. Our products are bulky and require warehousing, truck delivery, salesmen contacting golf courses, and, if possible, a respectable line of credit. Because we believe in the sales and distributing efficiency of the turf supplier who is already contacting golf courses, we made no effort to bring our very large list of OIL-DRI absorbent distributors into the picture.

It is interesting to consider the initial reaction of the companies that we contacted as prospective distributors. There are many problems in turf management, and many excellent products used, but also some unsatisfactory products which just didn't work. As a result we found the turf equipment distributor to be extremely cautious and conservative in taking on a new product. He is mightily concerned about keeping the goodwill and confidence of his customers. Even as we called on distributor prospects, we also commenced calling on the golf courses. These calls were made by our own sales force of some 25 full-time men. When distributors were established, these men continued their sales calls in the form of missionary field work, along with and supplementary to, the field calls of our distributors' salesmen. Our men have continually received training so that they could be as efficient and well-informed as possible.

In bringing a new product to the turf field, we were hard pressed for performance data. For example, how could we prove that our calcined clays wouldn't "layer" in five years, or lose their stability in twenty years when no one had watched them for such periods. However, we had had many years of experience with calcined absorbent clays and the presentation of absorption rates and hardness of granule was something we could and did show with actual samples and a small demonstration kit. This kit consisted of several test

tubes with wire mesh bottoms with which we could demonstrate the water absorption of our TERRA-GREEN, and a comparison of the way that soil samples would compact without and with calcined clay. We also had analyses of TERRA-GREEN showing absorption rates, chemical composition, density, pH, analysis of particules according to mesh size, etc. As quickly as University and field studies were completed, the usable data and information was passed onto our field force.

Displays and demonstrations at meetings are also helpful. This year at the Turfgrass Conference in Miami Beach we used a lucite box showing a profile section of a golf course putting green with tile line, pea gravel, coarse sand, and top mix depth as recommended by the USGA. We modified the top mix by adding calcined clay as an illustration. This display drew a gratifying and amazing amount of attention. We also used a soil sample compacting unit, designed originally by Leon Howard, with which we showed that more compaction developed in soil samples not containing calcined clay. This, too, was an interesting exhibit.

The selling of a new product in a new field was, of course, very costly. Our men had to find their way to new addresses, take time away from other products, and learn many new things. In making golf course calls, one frequently finds that the Superintendent is at the tenth green supervising work there. As a result, the number of sales calls per day are far fewer than in industrial selling. It is quite different from calling on gasoline stations on Main Street in Middletown. On the other hand, the amount of calcined clay to be sold may differ considerably from even the annual purchases of a filling station.

The reaction of the golf course superintendent has been similar to that of the distributor, conservative, but interested and frequently willing to try. We believe that the calcined clays do offer a good solution to the problem of compaction and drainage. I would like to comment on what, to me, is a rather distinguishing characteristic of the golf course superintendents. It is the regularity and emphasis that they place on attending association meetings, conferences, seminars, and field days with educational programs.

We feel fortunate that in developing our TERRA-GREEN program we were able to have retained a consultant, an experienced Turf Specialist, to advise us on technical questions, possible avenues of further research, accurate labelling of packages, preparation of field manuals, and other areas. Such aid improved the quality of our service in a new field.

It became clear before we had gone very far that there was a need for a technical manual describing calcined clays, performance characteristics, methods of application, and other available information. Although I do have a Master of Science degree from the University of Chicago, it was not in Agronomy, and my background in soil science was very thin. However, I read a good bit, talked with many helpful superintendents, picked some of the best brains available, and with editing by our consultant, we were able to publish a creditable field manual for which we are still receiving requests. This will be revised and upgraded as new studies are completed and new information from the mill, the laboratory and the field become available. Manuals like this are most valuable in making it easier for both distributors and consumers to learn about your product in an organized and convenient fashion.

I might add here that the preparation of the manual was only another

item in the long list of things to be done in bringing a new product to market. Market research, production, changes, laboratory studies, packaging, advertising, establishment of distributors, and consumer calls are vital, and also costly, time-consuming, and demanding of intelligence and organization.

Let us consider now the question of future research. We are considering other ways to evaluate stability besides freeze and thaw tests. We are curious as to whether tiny particles of clay that are eventually detached may not simply pass downward through the soil profile. There is a question as to what is the critical size of particles. The fixation of chemicals, degree of heaving under seasonal change, and the change of pH have been studied and will be studied further. It is my belief that the USGA would be interested in seeing porosity and permeability indices of TERRA-GREEN when mixed with various local sands, soils and peats, and we are engaged in preparing such values, which should give statistically reliable predictions and satisfactory assurances.

An example of cooperation and participation by manufacturers, and several of the local country clubs is the recently installed experimental putting green of the St. Louis Turf Research Association at Westwood Country Club. Based on Leon Howard's testing he suggested a

50 sand
30 calcined clay
10 soil
10 peat mix

During the first watering of the experimental green, water started standing on "soil only" first, and on the "standard mix" next, but not on the USGA mix, or the calcined clay mix.

I would like to close this talk with a few indications of other things that may lie ahead. First, there is the question of developing the use of calcined clays in new construction and rebuilding of putting greens. While an interesting amount of new construction has involved the use of calcined clays, it has not been a widespread occurrence. The major use of calcined clays to date has been for topdressing after aerifying. The determination of further performance indices to the satisfaction of the USGA, golf course architects, and others is vitally needed. To some persons the costs of calclined clays look high in the construction budget, but to others it is mainly a matter of the long range stability and decrease in other maintenance costs.

Second, there is the possibility of applications of calcined clays to athletic fields. Purdue University pioneered this idea when in May, 1961 they installed approximately 50 tons each of TERRA-GREEN and Turface into their then compacted football field. A hopper attached to a sub-soiler filled slits with moisture absorbing clay. The idea is to create fast water removal at all times. Also, aerifying and surface applications are being used together.

Ohio State University is also rebuilding their football field utilizing TERRA-GREEN. Thirdly, there is the possibility of applications of TERRA-GREEN to various commercially grown crops and plants. Growers of mushrooms, poinsettias, orchids, tobacco, and others have shown varying degrees of favorable interest.

Fourthly, there is the possibility of the use of calcined clay in the

installation of shrubs and trees along our many new Interstate Highways. These trees and shrubs are expensive to acquire, costly to install, and frequently the soils are far from good. Oftentimes there is no development of the root system and the tree or shrub is lost. We believe that at comparatively small cost calcined clays can save many of these trees and shrubs by improving the rootzone area.

Fifthly, our Company has just presented to the market a new product called ROOT ZONE soil conditioner which is aimed not at the golf course, but at the homeowner. It incorporates the benefits of calcined clay with the nutrient and soil conditioning properties of a 30% organic component. Finally, we're happy in this new field, but introducing a new product, we assure you, is most demanding - even for a good one.

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WHEN A SALESMAN STOPS BY (PUT HIM TO WORK FOR YOU)

Frank Smith, George A. Davis Co.
Chicago, Illinois

As you've noticed in your program, both Bill Smith and myself are listed for this talk. Bill had been selling to the golf courses for seventeen years when I started out in 1946. So to explain why I'm up here alone, Bill doubted he could confine 35 years of experience to a 25 minute talk. Those who know him would agree. By coincidence, I've known Bill longer than anyone else here today - we happen to be brothers.

Our theme this afternoon is "The Business of Turf Improvement." Salesmen are vitally interested and involved, and I can't think of anyone more helpful to the salesman in furthering these improvements than Dr. Daniel and others like him. Here are five reasons why we lean so heavily on Purdue and other schools doing research in turf:

1. To quote a speaker at the Purdue Conference a few years ago, he said, "Year after year, the questions asked by you men are pretty much the same, but through the years the answers have changed many times." Because the answers keep changing, it would be impossible for the salesman to stay up-to-date without the help and information we get from Purdue, Illinois and other schools.

2. Aside from the education of the salesman himself, the information gained at Conferences and meetings by our customers makes our job easier and more pleasant. For example, consider the extensive work done at Purdue with crabgrass control materials. A salesman wants to sell the best chemical for the job, but he cannot possibly test and evaluate every product on the market himself. Moreover, he can't ask a customer to spend money and try everything either. Knowing results of tests at Purdue, both can choose intelligently the best product for the money and time spent on the specific problem.

3. Usually the one obstacle in the path of an improvement is a lack of money, and that's a high hurdle to get over, but at other times there may be

adequate funds available and only a reluctance to spend them. If the Superintendent can't convince his board members of the merit of those improvements, he might persuade members of his board to outline the problem in a letter to an unbiased authority, such as Dr. Daniel, and they will usually so along with his recommendations, which is what the Superintendent had been wanting all along. An example of this could be a small park district with very poor turf areas. The board allowed a fertilization program to get under way solely on the basis of recommendations made by Purdue after their lawn soils were tested.

4. The extension work done by fellows like Dr. Daniel is of great help, both to the customer and the salesman. They often travel many miles to present a talk to a meeting of one of our Associations.

5. Have you ever noticed that salesmen seem to make a practice of encouraging their customers to attend these and other Conferences? This could be another category with five or more reasons given. Find the newcomer who is attending his first Conference here, and ask him what his impressions are. He'll probably say he never suspected so much time and work, money and talent was devoted to studying grass and improving it. He discovers good turf management is not a haphazard art. It is an art bolstered and made possible by a working knowledge of fundamentals he can learn and practice. With that attitude, he will become more progressive in manging his turf and, therefore, a better user of more and better products.

It is almost essential for a man to have a constructive attitude toward his work in order to do the job properly. If the salesman and other commercial people in this room were to raise their hands now you'd see we make up a good percentage of the attendance. A lot of these fellows have been calling on you for many years and you welcome them as friends with a common interest, an interest in growing good turf. Our attitude towards our work is that it is worthwhile and that we can serve the Superintendent in many ways. We can list these ways briefly:

1. Be honest in representing products.
2. Acquaint customer with good new products.
3. Anticipate his future requirements.
4. Help him justify purchases of new equipment, or added expenses for improvements.
5. Know where to get help and advice from others, if needed.
6. Attend meetings of his Association and work to support it.
7. If equipment needs repair, service it promptly.
8. Be considerate of his time.
9. Make calls profitable to the customer.
10. Provide liaison with manufactuerers.

Another man in this picture who exerts a great influence on the way a salesman handles his job is the salesman's boss - the fellow who sets Company policy and instructs his salesman accordingly. He is the one who determines the character of a company, and it seems the owners of the various supply companies in this field are determined to run their business honestly and require their salesmen to do likewise.

It is an inescapable fact that a Superintendent has to spend money to maintain his golf course, park, cemetery, or school turf areas. The salesman must help provide information that insures full value for every dollar spent, and equally important, call attention to other ways in which the purchase of

a new item could result in more efficient work, or added turf improvement. More often than not he may only be reminding you of something you thought of before and had been waiting for an opportunity to discuss seriously. Since you are in a position to spend money, you are entitled to know what the various salesmen have to offer and with that information you can be more sure of getting full value.

Most turf managers have a characteristic that makes my selling job very satisfying. A good salesman has a talent for getting you involved to the extent you seem to have a casual partnership with him. The price per bag of seed, or ton of fertilizer, is irrelevant. The only important thing is deciding with him what is the best seed, or fertilizer, for the job to be done. He will consider you to be responsible for a working knowledge of your products, and how to get the best performance from them.

Now to look at the salesman from your point of view as Superintendents and customers. Allow the salesman time to talk business, and where differences of opinion exist, discuss them and resolve them. Remember that, through your purchases from his company, you are helping to pay his wages. This makes him partly an employee of yours, and so you are entitled to any help he can give you. Let him feel the time you spend with him is worthwhile.

In closing, we are glad to be salesman in a field where we can take part in the good work of beautifying the landscape, working with and for our customers, and that we can call our customers "friends" and mean it.

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SUPPLYING PRODUCTS TO THE USER

Paul E. & James R. Burdett
Lombard, Illinois

Supplying Products to the User is getting more and more complex. Each year, actually each day, our customers are confronted with new and better products to make their jobs easier and their results better until, like the continued use of gas savers in the Model T, it has become necessary to siphon some of the gas off occasionally. It is hardly possible that every product introduced offers all the advantages, but your supplier cannot fail to examine every product presented as carefully as possible, and to encourage someone to try at least a little to see what happens.

Look over the catalog of a short decade ago; compare it with today's catalog. Almost every product presented in the old book has been refined and improved, and, in most every case, it's relative cost has been lowered. There are many cases in point -- the miracle weed killer 2,4-D is working just as effectively as it did when it was introduced about 1945. Today additional materials with a far greater range of weeds can be destroyed without harm to the turf. For example, there is a new form of the Dalapon grasskiller available with a wax carrier so that you are now able to wipe some of the wax off on the grass around the trees, posts and fences on your grounds, and the grass will die so you will not have to use the trim mower twice a week around the trees to preserve the neatness of the club grounds.

Our suburban areas are getting crowded and the ponds that once were clean and a source of fish and entertainment for the kids and a pleasure to behold, now seem to get overgrown with weeds and scum during the summer. However, finally a material was used that removed the weeds and the scum, and the pond became cleaner than it had been in years. The fish with which it had been stocked were still alive, and when caught, tasted well.

This last decade has brought a whole new vocabulary in the control of diseases in turf. One of the new words is helminthosporium, and some of us believe that in this disease we have the answer to the mysterious disappearance of Poa annua. The controlof this disease and other similar diseases can greatly reduce the pain and failure of Poa annua during the trying summer days.

Sometimes it has happened that a product has become obsolete and then has recovered its former prominence. Aresenate of lead was the only recognized control for white grubs and angle worms for many years, and lost out to a newcomer, Chlordane, which would control not only the grubs and worms, but ants to boot. It was a true boom to the Superintendent until attention was called to the effects of arsenate toxicity on Poa annua and crabgrass, and with this impetus the sales of arsenic reached new heights. And, of course, sometimes arsenic has been used without caution with dire results following, but it is still an excellent tool.

Now, just what has all this got to do with our title, "Supplying Products to the User?" It is an old adage that a salesman must know his product, and it is reasonable to expect that if we propose to sell you something new, that we should be able to advise you exactly how this product is going to benefit you. So that when our fertilizer manufacturer got the story that the new, pelleted fertilizer stayed on top of the grass of the greens and was picked up with the clippings, they rectified this condition by producing a pellet small enough to disappear into the thick, green turf, and hard enough to be applied to the turf with a syphon without danger of burn to the turf even when the grass was wet. We still had to try it and know that what we thought was true was actually true, and for two years we applied fertilizer,supplied by our manufacturer without cost, to selected greens in the area to the end that we could say with the conviction of experience that this fertilizer, applied in this manner, will give a satisfactory growth and will not hurt the turf.

Sometimes it is not possible to spend two years of our time to get to know the true value of a product, but because of the importance of the possible reaction of that product on turf, we have to know what it will do. Under these conditions, we try to have samples made available to men on courses -- men "thru whose eyes we can see" --- men who we know are keen observers of nature and who will report with great accuracy exactly how test product react, and we rely on their experience. We rarely try to sell, or to push a product that has not stood up under our own and our customer's tests. Of course, sometimes our failure to push a product irritates some of our suppliers, and they threaten us with withdrawal of their materials. Our attitude is that if it would do its job well, we wouldn't have to push that product more than enough to introduce it to our customers; that they would buy it.

The physical job of getting products to the user is simple. I know that many of the people who permit us to serve them think often that when we get an order we set it up on the table and watch it for a week or two to see if it will grow into a bigger one, and when we are finally satisfied we have gotten all the growth possible out of it, we finally load the truck and get it to them. We try to get the goods into the hands of the customer as soon as possible.

We feel that you have a right to know from us just what to expect from those things you permit us to supply to you. Frankly, we do not dare to run around with a closed mind - some guy might come in tomorrow with the easy control to the Dutch elm disease - what a bunch of fools we would be to close the door on that guy!

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MERCHANDISING OUR SERVICE AND PRODUCTS

John Z. Duling, Duling Tree Expert Company, Inc.
Muncie, Indiana

I appreciate Dr. Daniel's invitation to share with you some of my ideas of merchandising a service business. I believe that many of our merchandising practices have close parallels to a turf business. Our aims to help in the beautification and maintenance of grounds are very similar. I feel this topic can best be discussed after I have briefly explained the services that we sell and the related products which we handle and distribute.

We operate a tree service business in the northern half of Indiana; our principal office being in Muncie, with branch offices and representatives in Fort Wayne and Lafayette. From these offices we service considerable areas. Tree moving, or the transplanting of specimen trees in a range of sizes and varieties, is one of our services that is widely used. A few years ago I made a 16 mm color movie that tells a story of moving large trees. This covers the job from the selection of the trees, through the steps of preparation and transportation, to the completed planting. This has proven a useful aid in the merchandising of our tree moving service.

In several cases each year we install lightning arresting equipment in trees. These are usually large, valuable, single specimen trees, or groups of large trees near houses.

Our Company holds a franchise for using the Irish Areo-Fertil Process of fertilizing trees and shrubs. This is a process which uses air in a special gun that is inserted into the ground in the root areas. The air pressure is released, and a lifting or fracturing action results into which fertilizer is blown; thus, permitting a better distribution of the fertilizer, which is followed with the blowing of an agregate material to hold the soil apart for better movement of air and water. This method of tree fertilizing has proven very beneficial in the areas where hard, tight soils make it difficult for trees to stay in a healthy condition. We have used this process on industrial grounds where tight, packed soils have been a problem.

In addition to this tree service we are distributors of several grades of turf and plant fertilizers, a full range of grass seeds, and some chemicals. We sell these products to dealers, landscape contractors, nurseries, industrial and institutional buyers, cemeteries, and golf courses. We do not operate a retail store, or outlet, for these materials. Now as to the merchandising of these services, I can truthfully tell you that I have been selling, or merchandising tree services since 1935 which was about one year after I first started working with trees.

Merchandising of a service business requires a more thorough knowledge of what we are selling than where a tangible product can be shown. Our greatest asset is the ability to impart that knowledge to a client in such a manner that we gain their respect and confidence. "Do it right, or not at all" was the slogan by which we were taught to do the tree work assigned to us. Every man is always expected to report in uniform, clean shaven, and ready to do a full days work. Our training included proper conduct on the job, and a high respect for the client's property and wishes.

We have listings of our business in several telephone directory yellow pages, so people can call for service they wish. We have used many forms of advertising, such as newspapers, radio, and TV. We send, or give calendars, pencils, cigarette lighters, and various items to keep our name in front of the public. When the business was started a trade mark was designed to be different and eye-catching. We have used this trade mark on all of our equipment. It appears on all of our printed forms and envelopes. Each month we send out several hundred copies of the "Shade Tree Digest" to regular and prospective customer.

For many years we have sent a letter to customers about our spraying services. In this letter we explain the need of the service, and sometimes send along new or special bulletins about a specific insect, or disease. We follow a policy of giving each customer a copy of the order, outlining the service we are to do and the price, or approximate cost of the service. When the service is completed, the foreman leaves a copy of the daily time report. With our spraying service a copy of the spray report is left with the customer. An invoice outlining the charges for the service is sent as soon as possible after completion. We try to answer any complaints promprly with courtesy and understanding.

As to the products we distribute, we try to carry adequate supplies for prompt delivery to the dealers or users at all times. We do find it very important to keep well-informed about the products we handle, as well as competitive products. Our many contacts with customers of our tree services, and the dealers and buyers of our turf products have provided us many opportunities to help with turf problems. We are often able to advise, or help with the improvement, or maintenance of turf areas by use of information we have learned through attending turf meetings. Since we do not do landscape or lawn service, we try to refer this business to a reliable, well-informed operator, whom we feel will do a satisfactory job.

At one time we considered contracting the maintenance of an industrial site, which included large turf areas. Had we entered into the contract we would have been able to provide a turf school graduate with a good job. In many cases we are expected to know and advise the customer about his turf. I feel that we shall all see improved methods, better products, and equipment as results of the work in turf research that is carried out here at Purdue and other universities. We all benefit from these results when they are presented at meetings such as we have had here this week.

In the "Business of Turf we may all do well to apply these well-known selling rules to the merchandising of our services:

1. We should acquaint people with our qualifications.
2. Estimate how many customers there are that we can serve effectively.
3. Know where they live.

4. Decide how best to communicate with them.
5. Decide how to best serve them and influence them to buy.
6. Offer periodic examinations and preventive maintenance.
7. To deliver the best service and goods for the consumers dollars is necessary to hold the customer.
8. Offer that extra interest and thoughtfulness which will cause the customer to prefer your service.
9. Satisfied customers are your best advertisement.

I sincerely hope that I have presented some new, or reviewed some old ideas in merchandising service and products which you may find helpful.

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SERVICE - HOW MUCH TO LANDSCAPERS?

V. R. Keigley, Red Hen Turf Farm
Berrien Springs, Michigan

May I review our progress in service to the landscaper?

A. First method of service to the landscaper.
   1. Small truck and trailer.
      a. Limited to approximately 300 yard load which was too small for a pay load and requires too many trips.
   2. Loading in field by hand.
      a. Very slow laborious work, especially loading high dump trucks.
      b. Laborious work also reduces the efficiency of men after a few hours.
      c. Too much time wasted by us as well as the landscaper in unloading.
      d. Also, too much time wasted by landscaper in carrying sod to place of installation.

B. First improvement of delivery service to landscaper.
   1. Larger trucks to haul pay load and eliminate delay to landscaper.
      a. Still too much time involved loading & unloading trucks by hand.

C. Second improvement was the field elevator for loading trucks.
   1. Speeded up loading & cut down on landscaper's waiting time at farm.
      a. Men could work at steady pace without becoming exhausted. Reduced costs and rest periods.
      b. The conveyor still wasn't the answer because it took 3 men on truck & 4 or 5 men on ground to load fast and most efficiently.
      c. It didn't help unload, reduce the unloading time, nor carrying the sod.
      d. After close observation of other businesses that handle heavy bulk products, it wasn't difficult to see that palletization of sod was the answer. The cement block, brick, lumber, fertilizer, fruit farmers and many other industries are palletizing their products, and unloading and handling their products for the customer with the aid of the fork lift. Each tailored their pallets and fork lift service to fit their particular needs.

e. Convinced that palletizing sod was the answer, we proceeded to tailor the pallet-forklift service to our business. This, we thought, would be no problem.

After experimenting with several different size pallets, we found that the 47" square pallet was the answer. This pallet

a. Allowed the proper number of yards per pallet without wasting space.
b. Permitted an easy method of loading, and yet keep the pallet of sod in tact while being transported and handled.
c. Would not stick out beyond the 8 foot width limits of the law when loaded on the truck.
d. Also allowed us to place the proper number ofpallets on the limited truck bed area and still haul a pay load.

We learned that the pallet must be made of hard wood to withstand the abuse and carry the weight of the sod.

After inquiring about restrictions of the overall length of a tractor-trailer-trailer combination, it was necessary to utilize every inch of space.

a. In order to conserve truck-bed space, it was necessary to:
    1. Use cab-over tractors.
    2. Tailor-make the stub tag-along trailers.
    3. Use tricycle-type tractor with fork lift to allow close hookup of tag-along trailer, permitting short turns without hitting the front wheels of the tractor-fork-lift.
    4. Make alterations on the fork lift itself to allow tines to be folded back during transit, thus conserving $2\frac{1}{2}$ ft.

By accomplishing all the aforementioned tasks, a pay load of 700 yard, plus the fork lift, can be hauled. This does require bigger truck tractors and more power to do the job.

Now that we have tailor-made the pallet-fork-lift service to our customers' business and to our business, how does it fulfill the requirements presented earlier. -

1. How does it load trucks faster with half as many men?
    a. It took 3 men on the truck and 5 men on the ground to load efficiently with the conveyor.
    b. By having 4 men rolling sod and 4 men loading sod on the pallets, the 2 jobs are done simultaneously.
    c. By having ample pallets on hand at the farm, rolling and loading-labor can work steadily all day and with no limiting factors.

2. How does pallet service reduce the landscapers time and cost of installation, and eliminate the laborious task of unloading and lugging sod to the place of installation?
    a. When the fork lift has dropped the first pallet of sod in the spot desired by the landscaper, the men begin laying sod immediately. This eliminates the men required to carry the sod, eliminates unloading, and saves time and cost of installation.

3. How does palletization permit us to load landscaper's trucks, and our trucks without the trucks being at the farm?

a. The pallets are the truck-bed and can be loaded with or without trucks being around.
b. One of the advantages of this is that sod can be delivered on the job, late in the day, in the absence of the landscaper.
c. It also permits the truck to be loaded late in the day for delivery the following morning, and without keeping the loading-labor around to load the truck. The man driving the truck can load the truck in a matter of minutes and be ready for delivery.
d. The pallet system also permits us to load the landscaper's truck in a matter of minutes and reduces loading time as well as confusion.

Another item of service to the landscaper that rates high on our list of services is promptness with deliveries, as well as promptness at the farm in loading out their trucks. Advertising and selling aids for the landscaper, and instruction sheets for his customers are important services to the landscaper.

The following are a number of services that are very important for the benefit of the landscaper and the sod grower:

a. Making sure there is the proper amount of moisture in the soil before cutting. Irrigate when dry.
b. Mow the grass just before cutting so that the grass has good appeal when it is rolled out on the job.
c. During hot, dry weather, moisten the sod on the truck before it leaves; also canvas the load to keep sod from drying out in transit. We are considering individual pallet cover for field and truck use.

Editor's note:

In the future sod handlers could consider:

1. Vertical thinning and manicuring of sod
   a. To reduce water demand of new sod.
   b. To remove old and dead grass blades
   c. To provide greener turf on new site.
   d. To improve uniform water penetration of newly laid sod.

2. Fungicidal sprays prior to cutting to
   a. Protect from and reduce disease incubation
   b. Improve early vigor on turf site.
   c. Reduce sometime sod failures observed.

3. Wilt reduction coatings on leaves
   a. To reduce sprinkling needs.
   b. To hold fungicide on leaf.
   c. To provide more safety in sod handling.

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AUTOMATIC CONTROL AS IT AFFECTS TURF SPRINKLER SYSTEM DESIGN

H. M. Clark, Product Engineer, Buckner Mfg.Co.
Fresno 8, California

First we must analyze why automation is desirable in connection with turf sprinkling systems, and in fact with any sprinkling system. In this day and age any saving in labor is an important factor, not only for the cost of labor, but when we completely eliminate labor for the operation of the sprinkling system, we definitely eliminate some factors of unreliability and inefficiency. An automatic system is reliable, does not get tired and miss sets, even on a 24 hour day, and no overtime is involved.

So much for labor - we are prone to give this the first consideration in favor of automatic control, but there are other reasons for automation that are even more important. The automatic system has complete control of water usage. When the amount of irrigation desired is computed accurately, the clock can be depended on to shut the system off at exactly the time interval specified so that no sets will be operated longer than necessary. Very definite watering schedules can be set up for any hours, or all of the hours in a 24 hour day, and short sets with recycling can be used to accomplish any degree of slow penetration.

The automatic system uses control valves that may be operated from a remote controller. The valves are hydraulic, either diaphragm or piston-type, and are opened and closed either by hydraulic tubing, usually 5/16" plastic, or with direct burial wire from 18 gauge, or 14 gauge connected to 24 volt actuating solenoid valves which in turn are connected directly to each hydraulic valve. This type of system is as simple to wire as a doorbell circuit.

The automatic sprinkler system controllers handle from 6 to 10,or more circuits, each of which can be adjusted for various time intervals. Several hydraulic valves can be operated on each circuit either with hydraulic tubing from a single rotary solenoid valve where the controller has the hydraulic control system, or from a stepper switch on the controllers that use the 24 volt wiring control system. The number of valves to be connected to each circuit on the controller will depend, of course, on the water supply, volume and the valve locations.

The automation of sprinkler systems has greatly affected the design of sprinkling systems by reducing overall pipe costs when any degree of scheduling desired can be accomplished. The automation also reduces total water requirements to some degree which affects the overall cost of water and the operating cost of the pump when using less water more efficiently for more hours per day, resulting in sufficient and even penetration to allow the maximum interval between irrigations.

In summary, we know from our experience in design of the automatic systems in the last few years that the additional cost of the automatic valves, control lines and controllers can be offset to a considerable degree in the reduction of pipe sizes and water supply costs. Along with this we have to consider the considerable saving accomplished in eliminating labor and all of the problems that go along with this factor. Also, watering of areas quickly during non-use periods should be maximum. Last but not least, is the consideration of the complete control of water application with regards to infiltration rate of soil and turf requirements.

Now, how do we design for all of these efficiencies? First we use long-range Rotary Pop-Up Sprinklers for maximum triangular spacings. When the total sprinkler locations have been computed, we divide the total number of sprinklers into as many small groups as possible, or practical, rather than try to run the full capacity of the required water supply into some one section all at one time. The circuits from the controller, or controllers, are then scheduled to operate several valves at scattered locations at one time. This is gauged by the limits of time allowed for irrigation, or by the water supply capacity. It is then a matter of setting up the proper schedule and cycling arrangement to accomplish the ideal slow and adequate penetration.

Editor's note: (On fairways, or non-putting green turf areas in the humid, rainy Midwest areas, the inclusion of moisture sensing blocks and automatic controls based on them, as well as just time blocks, should be considered also.)

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AUTOMATIC WATERING - WE HAVE IT!

Thomas E. Topp, Supt., Bellevue C. C.,
Syracuse, New York

Your have already heard from Mr. Clark many of the benefits derived from automatic watering. From the personal experience gained from the installation and use of an electronically operated irrigation system for greens, tees, and fairways, I shall endeavor to add my first hand information to what Mr. Clark has already told you.

Yes, Bellevue C. C., Syracuse, N.Y. now has complete automatic watering, and we like it very much. The ground was broken for this project in September 1960. It was completed in June 1961, with the exception of a few small details. The complete installation uses approximately 9 miles of PVC plastic pipe which ranged from 6" down to 1". All pipe and fittings were put together with plastic cement and solvent. We used approximately 16 miles of No. 14 gauge underground electrical cable. This regulates 46 controlled valves, operating a total of 405 "pop-up" sprinklers. Included in the system are 14 gate valves, 6, 4, or 3" which can close off sections of mains in case of trouble.

For draining purposes there are 135 manual drain valves. All control and drain valves are opened in the fall, and during this operation an air compressor is used to force out maximum amount of water. We made up boxes and covers for the control valves and drain valves. This required 1600 board feet of 1-1/4"hemlock, treated with decay preventive. The life expectancy of this material underground is over fifty years.

A 20 horse-power motor with an output of 300 gallons per unit against a discharge head of 120 PSI is used. There are three electrical control stations, built in banks of 16 each, which regulates 46 control valves.

To cover the pipe 2,000 yards of topsoil, 750 lbs. of seed, and 4 tons of

fertilizer was used. The equipment utilized included 3 trenchers, 2 dump trucks, 1 back hoe, 2 front end loaders, 1 cable dolly tractor, and a two-way radio system. During the operation there were from 7 to 46 men working.

Personally I feel that this is a carefully designed system. Using city water, which we are limited to, it will produce a percipitation rate of approximately 1/3" per hour. At the present time we are able to cover 35 acres of fairways, all greens, collars, tees, with 1" of water per week (6 days), operating 8 hours a night, with no interference to play. This is quite a change from the old method we had of hose and portable sprinklers for greens, collars, and tees. Creepers were used for fairways. Water pressure at the time was from 12 PSI to 50 PSI because of the very inadequate piping system to carry our water supply. The Club will celebrate its 50th Anniversary in 1964. You can just imagine the size of pipe that was placed underground at that time, and the number of feet that was added throughout the years.

The unique part of this Automatic System is that you have finger-tip control at the pump house, where the controller stations are located. Each station has 16 toggles, each controlling 46 valves on the golf course. By pushing this forward, it is on automatic. Pulling it all the way back it can be operated manually. Setting it in center position it is omitted completely. Another hand dial at the station regulated the time control 1/2 hour, 1 hour, 2 hours. A unit set within this controller is an electric timeclock for time on and time off, which you set to the desired time to start system and shut system off. There is no need for readjustment unless something unforeseen happens. The versatility of a system like this is very helpful for fine Turf Management, because you have very efficient water control.

Each valve serves a section containing from 7 to 12 Pop Ups. We are limited in operation to a maximum of 30 at one time (and it is specifically stated by the City Fathers that 90% of our watering shall be done between 12 midnight and 6 A.M.) So far we have been going along fine - we have better equalization of water distribution.

Assuming that the timeclocks are set to start the system at 9:00 PM.: Automatically station/valve 1 is opened at 9:00 P.M., followed by pump starter relay starting the pump. Thirty seconds later Station 2, valve 1 is opened, and thirty seconds later Station 3 valve 1 is opened. Now the system has up to 30 Pop-Ups operating. These automatically run for 30 minutes and shut off, followed by opening valve #2 at each Station, then valve 3, until the entire cycle has gone through the control stations, then the pump automatically shuts off. The clock moves on to the next day and repeats the same performance unless changes are made.

Perhaps there is a time when you feel that you need a little more moisture on some high areas which have a tendency to dry up very fast. All you have to do is to move that particular toggle switch which controls that section and start pump by manual switch. Let it run for desired time, 5 minutes to one hour, or as long as desired, and then shut off pump; reset toggle to automatic and you are set for another night's watering. Suppose you would like to syringe a green, tee or fairway when you felt it was needed. To protect golfers, send a man out with a two-way portable radio. You station yourself at the pump house, also with a two-way portable radio. Call out your signal and await an answer from the man sent out. You already know the location of your man. Flip the toggle on manual, start the pump, time yourself for a minute or two, and you have syringed a fairway, green, or tee. You can do as many as three

sections, greens or tees at one time, but this would drastically interfere with the golfers present.

The following are some helpful hints I wish I had known when I was asked and told to assume the responsibility of the installation of this system. To my knowledge it was the first of its kind in the Northeast. Since then I believe there have been a number started.

Layouts always look good on paper, but it is surprising how many of these obstacles you run up against. You need an excellent topographic map badly, with exact measurements and properly marked locations of all existing pipe, drains, trees, shrubs, etc. Also it requires a very competent man out in the field staking it out, with respect to the blueprint.

Trenching can be and sometimes is a great problem, depending also on the experience of the operator and type of machine being used, terrain of land, and condition of area. Make sure to have an iron-clad contract with the contractor. Penalty clauses should be included in contract so that your men aren't left idle because of neglect on their part, as time is of the greatest essence during the project. It is also important to keep in mind elimination of as much turf damage as possible, restricting unnecessary travel with heavy vehicles.

When using P.V.C. pipe, which we have, a good way to speed installation is by pre-fabricating some of your pipe before it is taken out to location. Ask for the necessary information from the Engineering Dept. with regard to the amount of couplers, tees, ells, bushings, etc. needed. Pre-fab work can be done immediately after your golf course or grounds are staked out for trenching. Another important point to remember, if you are using P.V.C. pipe, make sure to use female adapters on your riser detail, with a brass or steel nipple between your pipe and Pop-Up. Male adapters are very weak and easily broken. We found out the hard way and have to live with it now.

Carefully select the proper sprinkler head (Pop-Up). To my surprise, after the particular heads were recommended and in use, we found the cams were wearing out too fast, creating more unnecessary work for us. After some very serious corresponding with the manufacturer, we were sent stainless steel cams to replace the brass, which created extra labor, cost and golf interference. Then to top that, I attended the National G.C.S.A. Turf Conference in Miami this year and spoke to the representative about our problem, only to be informed that they are no longer going to manufacture that particular head.

Splicing electrical joints we used Krimp-on couplers, covering that with scotch fill tape, extending the fill beyond the bare wires to make a tight seal, covering that with #88 scotch electrical plastic tape. This worked out very well, and so far we have had no problem with moisture grounding it out.

One problem we had to cope with was to hand backfill our trenches. Any stone larger than 2" in diameter had to be set aside and not placed on top of the plastic pipe, until there was between 6 to 8" of good material covering the pipe. In spite of the numerous problems we have had during the time of installation, we had only one bad joint on a 3" feeder line, and one broken wire.

IDEAS ABOUT SEED QUALITY

A. S. Carter, Director of Seed Control
Purdue University

The problems of seed quality are: 1. to understand what seed quality is, and second to understand how to obtain highest quality at a price that can be afforded. Seed quality involves many factors, but most of these are described on the seed tag, or label.

One of the important things you will find on the label is the name and address of the seedsman. This is very important because some seedsmen have a better record for the correct labeling of seed than others. This is reflected in Indiana in the annual publication entitled, "Inspection of Agricultural and Vegetable Seeds." The latest inspection report is No. 22, and can be obtained without charge by writing the Indiana State Seed Commissioner, Lafayette, Indiana. This circular lists the seed distributors, the number of samples drawn, and the number technically and seriously mislabeled. In a sense, it is a buyer's guide. For example, in the latest inspection circular, one obviously good company had 220 official samples drawn with none seriously mislabeled. In contrast, another company had 55 samples drawn with 18 seriously mislabeled.

Another item that appears on the label that is of extreme importance is the kind and variety of seed. The best assurance of varietal, or genetic purity is the use of certified seed which is increasingly available at reasonable prices.

The seed tag also describes the percent of pure seed in the bag. The average pure seed of all bluegrass samples tested in Indiana during 1961 was 88%; however, this varied from 70% to 98%. Purity makes a big difference when you are attempting to get your money's worth in seed. You might ask yourself whether you bought bluegrass chaff knowingly, or unknowingly. If you bought seed of a low pure seed content, you probably bought some chaff and paid seed prices for it.

The seed tag also carries the guaranteed percentage of germination,and the date the germination test was made to determine this figure. Grass seeds, especially, deteriorate with age, and the date of germination should be carefully considered in making a purchase.

In Indiana less than 3% of all samples of seed are seriously mislabeled. Mislabeling occurs mostly in mixtures. The circular demonstrates rather clearly that if you buy unmixed seeds from a reputable seedsman operating in Indiana, you can rely on the statement on the seed tag. However, if there is any reason to believe that the tag is incorrect, any citizen of Indiana may ask for an inspection of the seed purchased. An official sample will be drawn, tested and reported to all persons involved, and this service is available to citizens of Indiana without charge. No doubt seed control officials in other states will render the same service if you ask them to do so.

Weed seeds are a problem in all seeds distributed. All state laws require a statement of the percentage of all weed seeds and require that the number of noxious weed seeds per unit weight (per pound or per ounce) be stated on the label. Some people working with turf have stated that a separate list of noxious weed seeds should be provided for turf seeds. Poa annua has been suggested as a candidate for such a list. An expression from you on this point

would be of interest to seed control officials.

Aside from considerations of variety, weed seeds and noxious weed seeds, one good way to evaluate turf seeds is to calculate the percentage of pure live seed present. To obtain the percentage of pure live seed, multiply the percent of pure seed by the percent of germination. For bluegrass 2,200,000 seeds per lb. x 88% purity x 85% germination = 1,645,00 pl. seed. We commend this concept of pure live seed to you for your consideration as a basis for the intelligent buying of seed.

A word should be spoken on behalf of the homeowner who probably buys seed only every year or two and is seldom acquainted with varieties, or even certain seed kinds. He is inclined to believe that all labeled seed is good when this is not true. The label is a descriptive instrument and actually constitutes the distributor's guarantee of only the quality claimed. A homeowner may have heard the chewings fescue is a good lawn seed, and then buys seed containing Alta or Ky. 31 tall fescue, with very discouraging results. It is doubtful that a great many homeowners can be expected to know which seed, or mixture will give him satisfaction. The answer to this, of course, is consumer education. However, we might ask ourselves the question, can we ever educate homeowners as to the kind and varieties of seed that will give him a permanent lawn when seed buying is done so seldom, and may be done on impulse?

As a partial answer to the homeowner's problem, several interested agencies, including the American Seed Trade Association and the various seed control agencies in the United States, are giving serious consideration to a system whereby seed may be labeled as to the percentage of fine-textured grasses (which are named) and coarse-textured grasses (which are also named). In this manner educational efforts could be focused on these two items. The homeowner could be told that if he expects a permanent lawn, he should buy seed with a high proportion of five-textured grasses. This approach appears promising, and an expression from those attending this Conference as to whether or not they consider this system workable would be appreciated.

In conclusion, it can be said that high quality seed is the only kind that should be considered by the intelligent seed purchaser. To get high quality seed, he should buy on the basis of the label. If specific varieties are needed, certification will give the purchaser assurance that the seed is of the variety claimed. Straight seeds should be purchased whenever possible in line with recommendations of turf specialists. The person who attempts to buy cheap seed usually gets what he pays for, namely, cheap seed. The goal of the seed buyer should be to get his money's worth, balancing quality as described on the label against the price tag attached to the seed.

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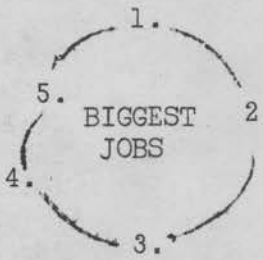
SEED PRICES AND HANDLING

Dwight M. Brown, George W. Hill & Co., Seedsmen
24 W. 7th Street, Covington, Kentucky

Let's stand off and take a long look at what we think the "SEED TRADE" should be doing for the Distributor, the Turf Products Dealer, and the public who use turf seeds and products. By the "SEED TRADE" we mean here the basic

producers, handlers, cleaners and packers of turf seeds. I also include the suppliers of related herbicides, fungicides, insecticides, fertilizers and equipment required for establishment and maintenance of better turf. Therefore, as I see it, we need to list the five "Biggest Jobs" in providing important relations, and I think we'll see they are all links that make a solid chain.



1. QUALITY AT FAIR PRICES

2. PROPER & ADEQUATE TRADE INFORMATION

3. CLOSE WORKING RELATION BETWEEN ALL PHASES OF TRADE-GROWER THROUGH DEALER

4. SELLING THE FACT THAT THE BEST IS CHEAPEST

5. KEEPING REALISTIC & WORKABLE SPECIFICATIONS BEFORE USERS OF SEED

First, his first duty is to offer - QUALITY AT FAIR PRICES. Quality is defined by Webster as "The element, or form of anything which seems to make it distinct from other things." Quality to the plant breeder is constant search for new and better strains and improved methods of growing and handling. To get an improved product all the way to the public is a big job.

The other part "FAIR PRICES" is less easily defined, but equally basic. It means prices that provide the seed trade a reasonable margin on the given product commensurate with being able to properly continue to carry adequate supplies and carry on needed service of advantage to their customers.

Second, the seedsmen must therefore take full RESPONSIBILITY for INFORMING their dealers and other type accounts on AVAILABILITY (or lack of it) on all seeds and products that are in demand. Also, the responsibility of guiding the dealer on the right seeds and merchandise to be handled for their trade. Knowledge of best substitutes, in case of shortage, is just as important. Closely related to this is responsibility for keeping their customers informed on prices and price changes and particularly price trends so that they may establish realistic buying patterns.

Third, there must be the CLOSEST WORKING RELATION BETWEEN SEED DISTRIBUTOR and LOCAL DEALER. Keeping posted on product information is demanding. Cultural product use details are basic. The local dealer must be able to translate this information to his customer, interpreted to fit any given set of local circumstances, such as weather, time of seasonal use, etc. To get the broadest coverage of this information, use brochures, leaflets, or stuffers either furnished by original processor, or manufacturer, plus supplemental local mimeographed material. Well planned, informative point of sale, counter signs, or wall streamers are effective in helping customer to determine their needs.

Fourth, one of the last, but certainly most important services that seedsman and dealer can work together on is SELLING THE FACT THAT THE BEST IS CHEAPEST. This is our weakest link! The average seedsman and dealer (not all, thank goodness) are prone to take the easiest way out and sell the biggest package for the least money. With a little effort even the "uniformed" can be made to see the light. Those of us who live with the problem know that good varieties of seed are always cheap (and at today's market are one of the best buys in years especially too, for many of our new improved strains).

Let's suggest that our dealers put up signs, or distribute leaflets, that prove the "Plain economics of this Price Buying" situation. One that I would suggest would read like this and be large enough and in bold type, to be hung up near the merchandise for every customer to see!

Example

COMPARE!

Mixture #1		Mixture #2	
5 lbs. covers 750 sq.ft.		2 lbs. covers 1,000 sq.ft.	
Total cost ---	$ 1.98	Total cost ---	$ 2.49
Contains mostly undesirable, coarse grasses		Contains desirable fine grasses (Bluegrass, fine fescues)	
Average cost per sq.ft. for a poor lawn	2.6¢	Average cost per sq.ft. for a good lawn	2.5¢

Fifth, the last, but also very important point, calls for utmost co-operation between growers, seedsman, dealers, state agricultural departments seed laboratory technicians, and trade organizations. This is one of my pet peeves and it is the lack of realistic analysis specifications in many states and for even many old and worn out specifications still in use on certain federal jobs. They are too numerous to mention, but you are all familiar with some.

Example: One state requires a germination of 88% on brome grass when 75% has been the best crop produced for several seasons. This should be cooperatively checked annually by agronomists, seed analyst and specification preparers for mutual benefit.

Each works a hardship on many innocent suppliers caught in the maelstrom of supplying a political division or contractor with absurd specifications, with no way to get it corrected before job deadlines.

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LOOKING FOR GOOD SEED

Ben Warren, Warren's Turf Nursery,
Palos Park, Illinois

Because of what to me seems inadequate in seed labeling and certification, I have made trips to the seed producing area the past several years. The first criticism of seed handling relates to the label which is only required to list percentages of crop and weed seed, and does not identify the species in these groups. The other question is whether the sample tested can be relied upon to completely assure freedom from noxious seed, such as Poa annua and bent.

We desire bluegrass seed free of these pests, and until field inspections during the growing seasons for such contaminates is included in the cer-

tification program, we feel that we must rely on our personal inspection.

Seed is produced in two general areas in the State of Washington, and three areas in Oregon. The Jacklin Seed Company dominates the Spokane-Dishman area which is the largest producing area in Washington, including some fields in Idaho. This Company has some 2000 acres in seed production and operates an expensive cleaning plant, processing seed for many other growers beside their own. They also carry on considerable experimental work both concerning seed production and varietal testing.

The other prominent production area in this State is at Pomeroy. The Dye Seed Company has an extensive growing and processing business here. Their output is contracted to one large merchandiser.

The producing areas in Oregon are located in the LaGrande Valley in the Northeast, Madras in the Central part, and the Willamette Valley on the coastal side of the mountains. The most interesting and capable grower in this state seems to be Otto Bohnert in the Medford area. Mr. Bohnert grows a considerable amount of foundation seed and does an excellent job of keeping his fields clean. Two years ago,when visiting in that area, it was impossible to find a Poa annua plant in his fields, while across the road, a neighbor's field averaged one plant every 10 feet.

The State College at Corvallis, Oregon, and the Agriculture School at Pullman, Washington, are active in studying the problems of producing good seed and I believe the tools are available to control the pests that plague us. The incentive to do so is needed and that means we must pay a premium for quality. In paying this premium we must have complete assurance that we are getting quality.

Editor's Note: (About 25% of lawn seed samples tested in either Oregon and in Indiana have some Poa annua seed in them in 1960-61.)

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INTRODUCING A NEW BLUEGRASS INTO THE NORTH AMERICAN MARKET

Richard Crabb, Crabb Associates
20 No. Wacker Drive, Chicago 6, Illinois

The work of our organization, Richard Crabb Associates of Chicago, has been largely the introduction of new products to the yard and garden, or agricultural supply market. As many of you know, since 1959 we have been assisting ALTRA, the American Lawn Turf Research Association, with the introduction of a new bluegrass to the North American market. Rather than attempt to review the steps in the ALTRA program, I should like to be much more specific, and discuss this subject on the basis of our having been asked to assist with introducing the next important bluegrass to the American and Canadian market.

These points would seem especially important, and I am going to state them in definite and positive terms, realizing that whether I am right or wrong, is not as important as my giving you a solid basis for thinking deeply about

the issues involved. It is the conclusions at which you arrive in these matters that are really important.

1. The desire of the American home lawnkeeper and persons who have responsibility for public or institutional turf areas for better turf is tremendous. Our own door-to-door studies and all those of other market development organizations made in the last five years, indicate that right this minute, if you please, four out of five persons would like to have a better lawn, and what is more important, these individuals indicate a willingness to be fairly tolerant about the expenses involved.

2. This next important bluegrass to be introduced into the American and Canadian market will be a new variety of bluegrass. As Dr. M. Britton, Univ. of Ill. turf authority said recently, "The public more and more wants a uniformity and density of turf which can be achieved only by effective use and management of a variety." In keeping with the recommendation of many turf specialists, this new bluegrass might be used in combination with other bluegrass, or fescue varieties, but the standard of measure will be the performance of the new variety used straight with the use of special known combinations to achieve a specific improvement in over-all performance.

3. This next great bluegrass to be introduced onto the North American market will be a privately-owned variety because otherwise there will be no way in which to meet the costs of research, marketing and the higher levels of customer service now required. Public turfgrass breeders may have had an important role in providing some of the original germplasm for this new bluegrass,but the final steps of plant breeding will have been handled by private plant breeders who will have to assume the final responsibility for establishing that there are new and more useful performance characteristics, and proving it to prospective customers. In this role, the organization introducing this new bluegrass will seek all possible aid from turf specialists of our colleges, parks and country clubs.

   Perhaps the most important factor in introducing a new turf variety in the future will be the sod producer. Sod production is just now emerging from its "stone age" and is moving rapidly toward a position of dominance. Sod producers are closely in tune with the desires of their customers.

4. The next bluegrass to attain prominence in the market will have superior performance. Perhaps the first of the bluegrass hybrids which are certain to come in this decade - although many intricate problems in plant breeding remain to be worked out for this largely apomictic plant. Such could open the way for greatly improved performance in bluegrass

   The vast amount of technical work required to open up these new opportunities for more lawn and turf beauty will be done largely through plant breeders in our state Experiment Stations. The cost of developing these techniques will be greater than any one organization in the lawn and turf industry could afford. Too, public turf breeders can have a dominant role in developing outstanding germplasm, or the building blocks from which these superior grasses in the future will come. Add to this the increasing importance of the public turf specialists in development of new lawn and turf management procedures, and it is easy to see that the role of the public turf specialist is going to expand beyond anything we have known until this time.

   How soon we have these new bluegrasses will depend upon the degree of co-

operation that is developed between public turf specialists and private industry. The two groups are not competitive, even though a considerable degree of statesmanship on both sides will be necessary to reveal this fundamental fact. The American public is paying the bill on both sides,and as time passes, this public will expect cooperation all around ... and get it.

5. This new bluegrass will have to have a seed yielding capacity under optimum conditions of 500 or more pounds per acre. Otherwise the cost of the seed will become a major handicap.

6. The marketing costs for this new bluegrass will be higher than in the past because North Americans are not patient people. They want the good things of research, and they want them quickly. Only one in three Americans will be living in his present home ten years from now, and half of these can be certain of only a tenure of two plus years. These Americans on the move want to live in their own home, with an outstanding uniform, dense, weed-free lawn of beautiful color, and they expect to use that lawn before May Day, and a long while after Labor Day - possibly after Thanksgiving in areas that until now have been considered winter-bound before late fall.

   This is to be even a more pronounced trend in places of public entertainment where golfers and players of other outdoor games are all gunning for an extra week, or month of fall, or early winter activities. Playing the "world series of football" in Green Bay, Wisconsin on December 31, 1961 dramatized the public desire for extended outdoor living to a degree never before attained. Turf is, in many respects, the key to this extension of outdoor living, and we will see the introduction of entirely new management practices.

7. This next bluegrass to achieve importance in the American market will be part of a well-worked out and well-publicized system for getting the full performance values for the buyer...quickly. Not only does the suburban family want the benefits of a modern lawn NOW, but it will place a definite limit on how much "do it yourself" time is to be expended upon it. Lawn maintenance has to be fully mechanized and the time required from the lawnkeeper himself to maintain a good lawn must be cut in half...probably even more...in the next five years.

   Here again the public turf specialist is highly important. The work of Dr. W. H. Daniel of Purdue in suggesting and proving the value of an inexpensive type of vertical cutting machine that can be put in a car trunk and operated by one person with limited lawn maintenance experience, has been one of the greatest contributions of recent years, and one that will be increasingly apparent in the period immediately ahead. As Dr. Richard Davis, Turf Specialist in Ohio, recently observed, "Lawn and turf keepers, who want these dense and uniform lawns, are going to have to accept the use of regular thinning as a part of "routine management."

8. Finally, this new bluegrass will be beautiful. The color will remain rich and deep in both heat and cold... so much so that many cities in mild winter areas will shift over to a green lawn the year around.

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OBSERVING BLUEGRASSES

C. W. Lobenstein, Graduate Fellow
Purdue University

The subject of this discussion was stimulated at the 1960 Field Day when Dr. Daniel asked the question, "What do we want in a bluegrass for turf as far as growth characteristics are concerned?" This has since led to extensive observations on the nature of leaf development and rhizome growth of some 25 bluegrass selections.

The manner in which successive leaves develop in bluegrass and several other grasses is the major cause of injury and weakening at low mowing heights. A new leaf develops within the sheath of the preceding leaf, and thus each new leaf is forced to elongate more than the preceding one before the blade can be exposed to light and begin photosynthesis. This means that eventually the new leaves are emerging at, or above, mowing level, and most of the effective photosynthetic blade is removed, leaving only the relatively inefficient sheath portions of the leaves. When this happens the life of the plant depends upon development of new shoots at ground level below the blade of the mower. Perhaps the most common origin of such new shoots is from rhizomes which are horizontal underground stems.

New shoots extending up from the base of the parent plant are called "tillers." Frequently a bud at the base of the sheath of an older leaf will develop entirely enclosed within the old sheath. Such tillers are more accurately called intravaginal tillers. For practical reasons in recording data, rhizomes are considered as any stems producing new shoots which emerge more than 1/2" from the mother plant.

A bud is formed at the base of each leaf on the crown; these buds may form intravaginal tillers, or they may give rise to rhizomes which break through the sheath, elongate some distance from the mother plant, and emerge to form new shoots. A rhizome consists almost entirely of stem tissue, and leaves do not develop unless the rhizome is exposed to light. Both types arise from the same type of bud. We do not know what regulates the type of growth which will result from a given bud. However, the terminal bud of underground rhizomes apparently expresses apical dominance. Certain growth regulating hormones are known to affect growth of stem tissue without affecting leaf growth and vice-versa.

Stolons, which are developed by the bents, bermudas and Zoysias, are also horizontal stems, but since they develop at the soil surface and are exposed to light, leaves and buds develop at each joint, or node, thus providing a constant supply of new shoots close to the soil surface. For this reason, such grasses can be mowed at lower heights than bluegrass and fescues.

It can readily be seen that a grass with very long sheath length will not be as adapted to close mowing as one with a shorter sheath. High fertility, dense turf which shades the new tillers, or heavy thatch are all factors which will cause longer sheath length, and probably more injury from subsequent low mowing.

How much shortening of sheath length can be attained by management practices deserves further close study. The possibility of selecting new types with

this characteristic should be considered in any program of developing new varieties. Last year we attempted to measure whether a shorter sheath would be developed by a constant low cut, begun early as soon as the shoot emerged. We used three bluegrass selections: Merion, "Dwarf"--a slow growing type that is a good rhizome former, and "Shade"--a vigorous type which produces many rhizomes. We planted single unbranched crowns (just one shoot without any tillers or rhizomes) at 1 ft. intervals. They were hand-clipped in the field 2 to 3 times per week at 3/4", 1-1/2", and 3".

The treatment shortened sheath length some, but the results appeared most likely due to general reduction of plant vigor due to excessive clipping. Samples were dug after three months. Results are summarized in Table I.

Table I. Effect of Clipping Height on Bluegrass Growth, Purdue 1961

Height of cut		New Crowns No.	Tillers per crown	Rhizome length inches
3/4"	Merion	17	5.9	35
	Dwarf	23	1.5	45
	Shade	28	5.0	78
1-1/2"	Merion	32	6.1	60
	Dwarf	38	2.1	130
	Shade	57	5.8	252
3"	Merion	37	5.4	71
	Dwarf	44	2.4	136
	Shade	62	5.2	321

Table II. Percent Growth Change at Low Clipping Height -3" cut equal to 100%.

	3/4" cut			1-1/2" cut		
	Merion	Dwarf	Shade	Merion	Dwarf	Shade
New crowns	-54	-48	-55	-14	-14	-8
Total tillers	-50	-67	-57	- 2	-23	+3
Tillers & crowns	+ 9	-38	- 4	+13	-13	+12
Rhizome length	-50	-67	-76	-13	- 5	-22

If the 3" height is taken as optimum and set equal to 100%, the percent reduction by 3/4" and 1-1/2" cut can be summarized as shown in Table II.

These data correspond to what is known from past experience -- bluegrass may be cut at 1-1/2" without serious reduction, but cutting as low as 3/4" seriously retards total growth, rhizome and root development. The new crowns measured here were principally those developing from newly formed rhizomes of varying lengths. This was more severely reduced than the capacity to form a dense turf from new crowns as expressed in tillers per crown. (Tillers develop very slowly on the "Dwarf" type with a single crown frequently remaining without tillers the entire season.)

Going back to the original question, "What do we want in a bluegrass variety?", we surveyed a large group of selections and chose 25 representative

types, propagated them vegetatively, and again planted single unbranched shoots at 1 ft. intervals. Observations and measurements were made during the summer and fall 1961. Principal attention was given to those characteristics considered most likely to be important in healing and recovery during summer stress periods; namely, rhizome development, rate of spread, extent of spread, new crowns formed, and capacity to form a dense turf by tiller development. By the end of three months, some selections had spread over an area more than 1 ft. in diameter,, while Merion averaged about a 4" spread. However, the Merion types had formed a more compact turf as they had about the same total number of tillers emerging as the more vigorous types, but due to the lack of rhizome development, the new crowns were not distributed over as large an area. At the end of 5 months growth, samples were dug, rhizome, crown and tiller development were measured. Representative results are shown in Table III.

Table III. Rhizome Development from a Single Crown.
5 months growth, June - November 1961

Entry	Rhizome Length	Ratio to Merion (rhizomes)	Ratio to Merion (tillers)
	feet	r	r
Merion	8	1.0	1.0
16-H	59	7.8	2.3
A-10	51	6.7	3.1
16-F	47	6.2	2.8
Dwarf	25	3.3	1.5
C-1	8	1.0	1.5
K-5-49	8	1.1	1.5

The surprising thing is that some of the more vigorous types produced an average of 50 ft.of rhizome from an original single shoot in a five month period from mid-June to November, compared with only 8 ft. by Merion and similar types. When Merion is taken as standard and set equal to 1, the ratio to Merion (column 2) shows most selections produced more rhizome growth than Merion - some over 7 times as much. With more new crowns from a more extensive rhizome system, tiller numbers were also 2 to 3 times as great as Merion under exactly the same soil and environmental conditions.

Under conditions of mature sod competition, 8" turf cores were separated and the rhizomes measured.

Table IV. Existing Rhizomes in 8 inch cores of 3 year old Bluegrass Sod, October, 1961.

Entry	Rhizome length	Ratio to Merion	% below 2 in. depth
	feet	ratio	%
Merion	16	1.0	2
16-H	72	4.5	7
16-B	57	3.5	1
Shade	52	3.2	14
16-F	51	3.2	6
Dwarf	32	2.0	4
Common	18	1.1	2

In digging the shade selection, rhizomes were frequently found 10 to 12" deep, with a large number as deep as 6". In fact, 14% of the rhizomes were found deeper than 2" in old sod. Possibly this variety had been able to survive beneath a tree because of greater competitive ability for soil moisture and/or mineral nutrients.

In summary:

1. In spite of the fact that many of the vigorous selections studied are quite susceptible to leafspot and other diseases, they survive and spread. Apparently an extensive rhizome system can provide a means of escape and recovery.

2. While rhizome development by bluegrasses is commonly thought to occur mainly in the spring and fall, the fact that many natural selections already possess capacities for extensive summer rhizome development should be of interest to the plant breeder.

3. Development of more rapid and extensive rhizome systems should be particularly advantageous in sod production and vegetative propagation.

4. The possibility of a relationship between rhizomes and a more extensive root system might provide a means of greater drought and competition tolerance.

5. Consideration should be given to the question of whether varietal evaluation and seed production techniques have tended to select toward the more upright-growing, vigorous types, with long leaf sheath length, which are less adapted to close mowing.

We will continue our observations. The immediate task will be to look at the effect of different growth regulating compounds upon the development of rhizomes and tillers.

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ANTICIPATING NEW BLUEGRASSES

Eric Melkerson, Graduate Student
Purdue University

I'm sure we who work with turf recognize that Kentucky bluegrass is an important turfgrass over much of our country. Most of us are also aware of the fact that bluegrass has some definite and quite serious limitations. While many turf specialists recommend that it be cut at from 1-1/2" to 2" in home lawns for best performance, golfers are demanding that fairways be clipped much shorter than this. Problems with its use also arise from football fields and other public places where it doesn't stand up under the abnormally heavy wear.

Bluegrass also has many disease problems, and closely clipped fairways are often more severely injured than is higher-cut grass. Several types are plaqued by the advanced crown rot stages of leafspot. A severe case of leafspot, or some other disease might result in a loss of the turf, or low quality turf for a season.

Because of the many problems in bluegrass breeding which result from such things as apomixis and the wide differences in chromosome numbers, the main way of developing new bluegrass varieties has been through screening and selection programs. We are undertaking such a program here at Purdue, using some selections Dr. Daniel had made at various places in the Midwest area, and some others received from other workers. Individual plants selected at random from flats of parent material have been observed in the greenhouse this winter. Differences in vegetative character between some of the entries has been noticed. Differences showing within some of the selections were noticed which might mean that some natural crossing had taken place. We believe there is a better chance for crossing under a controlled climate.

Recognizing that resistance to disease is very important, an inoculation program is being started in hopes of finding some plants with more normal disease resistance. Individual space plantings will be made in the fields this spring to observe such things as rate of spread, sod density, color, and disease susceptibility in natural sunlight, as well as under shade conditions, provided by artificial shade structures.

If some selections are noticed which seem to merit further observations, they will be put out under sod conditions and seed tests in future years. Although past experiences of other workers have shown that developing good new varieties by this method is difficult, we feel that better bluegrass will be developed through the renewed interest in this problem.

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SOD PRODUCTION

Principles and Practices of Sod Production

W. H. Daniel, Turf Specialist, Dept. of Agronomy
Purdue University, Lafayette, Indiana

Growing points are the individual units of sod value. Sod is composed of existing leaves, stems and roots, plus the matrix of soil and plant parts that accompanies them. The green leaves existing - dead and dying - do not count, are often falsely assumed to be all-important. Their values are to:

a. Provide initial green color (important in sales)
b. Reduce mud and dirt at site.
c. Reduce chance of new weeds starting.
d. Provide energy for new root and rhizome development.
e. Provides initial lawn success!
(takes 1 - 2 years to deteriorate under good care)

The rhizomes underground are the key values. Their values are to:

a. Provide nodes for new growth initiation.
b. Provide nodes for new root initiation.
c. Hold sod and soil together
d. Substitute for seed placement on site.

Principles of sod production are:

1. HAVE CLEAN LAND - free from sprigs and seed of undesired perennial grasses - quack, bent, Bermuda.

2. PURCHASE CLEAN SEED - free from other crops - bentgrass, tall fescue, ryegrass, *Poa annua*, *Poa trivialis*, other bluegrasses.

3. PREFER IMPROVED VARIETIES - consider blends - it's more difficult to promote blends, but they may be more disease resistant and wider adapted.

4. PLANT MEDIUM TO LIGHT RATES - overcrowding should be avoided to allow rhizome spread. Seed weight, live seed 85%, an expected survival of 30% is good.

5. GET UNIFORM, WELL-SPACED STAND - seed planters, repeat passes with equipment depth of planting, covering, daily sprinkling, mulches, favorable weather - all aid in getting uniform stand.

6. ESTABLISH BEFORE ADVERSE WEATHER PERIODS - be well ahead of winter freeze and thaw, summer drouth and weeds, competition. Avoid surface dryness periods when possible.

7. FERTILIZE ADEQUATELY - repeatedly - nitrogen needs high. Keep grass coming - suggest at least 2:1:1 in seedbed at seedning. Plan about 6, 2, 4#/1,000 annually.

8. MOW HIGH for variety used until sod is formed. Individual leaf is the production line, entire single plant is assembly line, shipping room, truck line and distributor.

9. KEEP OTHER PLANT COMPETITION DOWN - a growing plant needs room, so release from

competition - get earlier uniformity and earlier harvest. Use 2,4-D,2,4,5-TP and selective chemicals only at preferred times.

10. STORE SOD AT MEDIUM MAINTENANCE until near sales period. Once sod is filled in, reduce to medium fertilization, maintain medium to high mowing, water only to keep leaves from dying.
11. KEEP FIELDS IN PRODUCTION - If soil is smooth enough and free of quackgrass, etc., try light overseeding. Use rotary hoe and water same day to start new crop.
12. REBUILD SOIL as sod is removed. Consider dense corn, sorghum, combined with heavy fertilization, and plow down when necessary. Consider any form of organic material to improve condition. Subsoiling, tiling and leveling fields may further improve management.
13. PLAN MARKET AND SALES PROGRAM before production starts.

Besides these there are additional points which tie to production, but are not a part of it. These are:

A. Plan definite market and sales program before production starts. Is it wholesale, whole farm, or uncutting? Is it to be delivered, or sold only in field? How much equipment do you expect to have? Who will be your users of sod?

B. Sell only good sod - return purchases will be influenced. The unit of costs in production vary widely.

C. Cooperate to Build Market - signs on fields for public; signs on new jobs; newspaper promotion; field day tours, etc. Set aside 2 - 3% of sales for promotion of market.

D. Grade Sod for Quality - have 3 or so grades. Always push premium grades. This is a local, or state cooperative effort.

E. Manicure Sod Before Cutting - match root and leaf system. Reduce watering after installed. Avoid off-color look. Thin out and remove dd clippings and excess leaf surface.

F. Reduce Wilt - consider protecting from desiccation by spraying turf with protectants.

G. Protect from Disease - include fungicides in spray after manicuring.

H. Choose favorable time for sodding. In adverse locations delay or plan to avoid adversity.

Below are items to consider in selecting seed for sod production:

1. SEED CLEANLINESS - complete freedom from Poa annua,bentgrass,off-type bluegrass.
2. SEED WEIGHT - heavy seed germinates better, distributes easier.
3. GERMINATION - fast, uniform.
4. SEEDLING VIGOR - strong, early crown forming.
5. RHIZOME FORMATION - start quickly, continually formed.
6. DISEASE TOLERANCE - to twelve diseases - leafspot is most important.
7. LONG VIGOR PERIODS - from early spring, right up to winter.
8. PUBLIC ACCEPTANCE - a known tested variety has better acceptance.
9. MAXIMUM MANAGEMENT RANGE - high or low fertility and cut.
10. WIDE ADAPTATION - for widespread sales - shade and sun.

Variety _____

Suggested Grading Form for Sod Standards

Date _____ Grade _____

There shall be four grades: AA, A, B, C

Acres _____ Field NO. ___

Grower _____

Address _____

_____

Each field or cutting-management area within fields shall be graded separately if and as marketed separately. Each field shall be graded and reported prior to cutting, and as necessary - at least twice a year thereafter. If for any reason grade question arises, then a grade check shall be anticipated.

	RELATIVE JUDGMENTS	ACTUAL DATA
	Most desired → Least desired AA A B C	
1.	Leaves per unit area 1 2 3 4 5 6 7 8 9	3 counts of 2 sq. in. each _____ leaves/ sq.in.
2.	Rhizomes per unit area 1 2 3 4 5 6 7 8 9	3 counts of 2-1/2" plugs _____ inches/ sq.in.
3.	Sod strength 1 2 3 4 5 6 7 8 9	6 pieces - lift one end. _____ feet
4.	Freedom from thin and bare areas 1 2 3 4 5 6 7 8 9	_____ % bare
5.	Uniformity of sod - tillers/unit 1 2 3 4 5 6 7 8 9	Tillers density _____ /sq.in.
6.	Relative freedom from damaging active disease at inspection time 1 2 3 4 5 6 7 8 9	_____ diseases.
7.	Freedom from excess thatch and old clippings 1 2 3 4 5 6 7 8 9	_____
8.	Freedom from quackgrass, bentgrass, Poa annua (circle ones present) 1 2 3 4 5 6 7 8 9	_____
9.	Freedom from broadleaf weeds 1 2 3 4 5 6 7 8 9	_____
10.	Freedom from crabgrass, foxtail, witchgrass, barnyard grass 1 2 3 4 5 6 7 8 9	_____ % of area occupied

Check those correct:

___ Sod is at peak ready to harvest

___ Sod would further improve

___ Suggestions - comments -

Inspection team: _____ _____ _____

PREVENTING CRABGRASS IN 1962

W. H. Daniel, Turf Specialist, Dept. of Agronomy
Purdue University, Lafayette, Indiana

Nine compounds are available in numerous formulations for seedling grass prevention. These have been tested repeatedly at numerous Experiment Stations, and the data resulting thereform has been quite carefully assayed by the companies producing the basic chemical. Currently the labeling on most formulations is quite adequate. Nevertheless, one of the real problems with crabgrass preventers is their proper use by the consumer in his individual situation. Midwest Turf Leaflet No. 11, Crabgrass Control, gives extensive details!

The table below gives chemical designation and comments. These are based on extensive research and general interpretation. Although the residual time may be questioned, it indicates the relative carry-over.

Chemical designation	Active ingredient rate lbs.	Residual time	Estimated carryover %	Next season apply	Formulators reported	Comments
Zytron	15/A	1 season+	50	.5+	2	Controls knotweed
Dacthal	10/A	2 months	0	full	19	Quite safe
Diphenatrile	30+/A	Almost season	0	full	3	Safe on flowers
Trifluralin	1.5+/A	Almost season	0	full	2	Controls knotweed
Bandane	30+/A	1 season	50?	.5+	5	
Chlordane	80/A	1 season	50	.5+	5+	Standard rate
	1,000 sq.ft.					
Lead arsenate	20 F.	1 season	80	.25	Several	Powdery - caution
Calcium ars.	12-18F.	1 season	75	.25	4+	Granular preferred
Ca. Propyl Ars.	1.5+act. 6.25 F.	1 month	0	full	3	Fast acting

On golf greens some of these products may be used, attempting to control goosegrass. Limited success has been achieved with Chlordane and Dacthal. Zytron, Trifluralin, and Bandane may also serve, but should be used with caution. Calcium propyl arsonate should work well when used at the critical time.

I would strongly suggest that those not having tested the material on golf greens never treat more than one-half of one green. Should one-half be damaged the other half would be usable. Conversely, should one have perfect goosegrass control, it could be used for cup settings during the critical times. With such background experience the turf manager can complete plans for the following year.

Continued research on crabgrass preventers can be expected, and numerous new compounds will be appearing on the market. The continuity of turf protection through arsenics offers the turf manager a real potential. However, the simplicity and safety in using the newer formulations also has advantage for shorter term programs.

In areas where nurseries are being started, or plantings of vegetative grasses such as Bermuda and Zoysia have just been made, the use of any of the several crabgrass preventers before crabgrass germinates and competes is strongly recommended.

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PROGRESS WITH ZOYSIA

W. C. LeCroy, Graduate Student
Purdue University

Zoysias are being used more each year for lawns and athletic areas. Three reasons for this are: resistance to weed invasion (once the sod is established), freedom from disease, and minimum damage from insects. The use of Zoysia has been slow in being accepted as it takes time to form a sod, and it has to be started vegetatively. Zoysias, like other grasses, are subject to weed invasion while spreading, and should be kept as free as possible of weeds in order to obtain cover in a minimum of time. Usually it quires at least two years to form a solid turf.

The program here at Purdue University has been one of selection based on faster-growing, more-open types with a good fall color, along with early spring greenup. The reasoning behind the more open type growth is that the sod would be less spongy compared to the presently used Meyer. Zoysia leaves do not decay as readily as most other turfgrasses, and there is a tendency for a thatch to build up. The open growing turf would tend to reduce this problem.

First year tests consisted of individually spaced plants growing in the field. The second year the individual plants were divided, one part remaining in place in the spaced planting; the other being sprigged into 6 x 8 ft. plots in rows 8" apart within the plots, sprigs being solid in the row. A total of 12 strains selected for the above characteristics were used in this test. 2,4-D and DSMA was applied at the recommended rates to control crabgrass and broadleaf weeds. Under these conditions there was complete cover in four months.

It has been observed in handling these strains of Zoysia that when compared to plugs, either 2 or 4", sprigged plantings give a much quicker cover. The growth rate was measured both in 1960 and 1961 by measuring the amount of growth from five runners during five to seven day periods. This was repeated three times during the growing season and once in late September. At the same time the length of the third internode from the growing point on the runner was measured. The above data, plus fall color and spring greenup, was used to produce the tables to be shown by slides. Strain 0312 is good in fall color and poor on spring greenup. The slower growing of our 12 best strains is still faster growing than Meyer.

The data obtained from the growth rate and internode length in 1961 was used to compute a linear regression problem. From this it was found that during the summer for every 3.6 mm of internode length, the runner increased 1 mm in length, while during the fall this ratio was 1.8 to 1 mm. The leaf width, although not used in this computation, was found to vary as the growth rate

varied. In general we can conclude that the growth rate and leaf width depends on the internode length. The longer the internode, the more rapid the growth and the wider the leaf within the genetic limitations of the strains.

We are also studying the developmental stages during vegetative growth. To attack this problem, seed was obtained and sown in pots in the greenhouse, while another group was placed in a germinator at 85° F. Samples of the group in the germinator were taken every eight hours until the seedlings in the greenhouse reached the two-leaf stage. At this point the germinator group was terminated and samples were taken every other day from the greenhouse. All samples were killed in a solution of formaldehyde, acetic acid, and ethyl alcohol. This solution kills the tissue rapidly with little shrinking. The water was removed from the tissue by a graduated series of alcohols, from 50 to 100% pure alcohol. The plant pieces were then infiltrated with paraffin. After casting in molds, individual plant pieces were cut out and mounted on small wooden blocks. These wooden blocks were placed in a microtome, an instrument for making very thin slices, and cut into sections. Each thin section was then mounted on a glass slide, stained, and examined under a microscope. Such microscopic examinations should give a better insight as to how Zoysia develops vegetatively, and how it responds to various climatic conditions. Certainly such studies add impetus to the potential of wiser Zoysia use.

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STEPS IN NEW LAWN CONSTRUCTION

Robert W. Schery, Director, The Lawn Institute,
Marysville, Ohio.

It is good to have a section devoted to lawns that can't be so intensively maintained as are golf greens. So often there is the tendency to "Overadvise," even when economically not justifiable, and some homeowners would rather endure weeds than undertake a complicated program. So, in covering today's subject, I may sound like a lazy man's friend.

Soil testing, anticipatory pest control, improved varieties, etc., all have their place, but more lawns seem lost from neglect of a few simple fundamentals. Old favorite grasses, such as Kentucky bluegrass and fine fescues, still make a first-rate lawn, economically, most anywhere in the Midwest if their basic (though undemanding) needs are met.

Soil. Time of year, and local characteristics, determine best ways for handling seedbeds. In general, soils of this area are heavy, with ample clay constituents to retain moisture and fertility. Greatest need is often to hold, or improve soil structure while supplying adequate fertility. Plow, or rotary-till the soil only when it is dry enough to be workable; do not destroy structure by pulverization; keep heavy equipment from recompacting the soil. Excellent stands come from pebbled seedbeds that esthetically seem rough.

Fertilizer ample in phosphorus should be mixed into the seedbed, unless soil tests indicate otherwise. Most soil of the area was originally under forest, is podzolized and leached of nutrients so needs ample fertilization.

Seed. This climate is basically suited to Kentucky bluegrass and red fescues for lawns of average care, and to the Highland-type bentgrass for specialty turfs more meticulously tended. The long dormant season causes Zoysias and Bermudas to have limited place this far north.

Of the bluegrasses, natural Kentucky bluegrass offers the most economical source of genetically variable and widely adaptable grass plants. Similar, but selected for quick germination and seedling vigor, is Park; for minimum care durability towards the southern limits of the bluegrass belt, Arboretum. Park is a synthetic variety from sixteen clonal selections made by the University of Minnesota, combined in the growing fields. Arboretum comes from a population reflecting low-growing ecotypes in Missouri. Other varieties, such as Merion and Newport, have a more restricted heredity, and may prove less widely adapted, or demand special attention. In such cases, mixtures afford greater assurance where the precise requirements for pedigreed varieties are seldom completely known.

There are many excellent fine fescues, coming especially from Oregon. Pennlawn and Illahee are two which have performed well in the East, although Chewings, Rainier, and Creeping red make entirely satisfactory components of lawn seed mixtures. The erect-growing bentgrasses, such as Highland or Colonial, are preferred for lawns to the creeping bentgrasses of golf greens, the latter requiring care not possible under homelawn conditions or limited budgets.

Seed mixtures, basically Kentucky bluegrass and red fescue, are generally sowed about 3 lbs. per M, best distributed with one of the excellent modern spreaders. A pebbled seedbed accepts seed well, and if not rolled will continue to absorb water for quite a while without rolling. Seed bought from reliable sources will prove adequate in germination, freedom from weeds, purity, and so on, so that the chief consideration is composition of the mixture - whether it contains sufficient of the permanent quality grasses in reasonable proportion, with a minimum of competing nursegrass.

Mulch. Warmth and humidity are the key to sprouting of seed. A mulch holds the humidity at the same time that it protects the seedbed. Many mulches are available, but straw is still one of the most effective where procurable. Woven netting (Erosionet), pulping by-products (Paygro), even polyethylene tarps find use. Some of the more finely ground mulches have proved excellent in Lawn Institute tests on "scorched earth" replanting of old lawns.

Mowing. With bluegrass-fescue lawns the first mowing should come as the new turf averages somewhere between 2 and 3 inches. Rotary mowers adapt well to tall mowing, sucking up floppy grass blades. Precautions not to run mowers on soft ground, use them when dull, or set them too low are just common-sense.

Water. Both humidity and heat can be provided by moistening seed and holding it in a polyethylene sack indoors. This may give a faster start than sowing outdoors, but timing is critical and the operation laborious. It is generally more convenient to plant the seed in its regular seedbed, then water it, helped by a mulch. The problem is not so great in spring as it is in autumn when dry soils show a water deficit from summer, and must be drenched at least once before the surface can be kept moist to hasten germination. Autumn seeding, however, has many advantages over spring seeding for northern grass species.

Weeding. If the soil had been sterilized at time of seedbed preparation, troubles will be minimal. Most seedbeds are not sterilized, however. Mowing will automatically eliminate some field-type weeds. Others succumb to the excellent herbicides now available.

Most herbicides should not be used until the grass is tall enough to have had at least three mowings. Even 2,4-D can injure very young turf. 2,4-D will control the general run of broadleaf weeds, such as dandelion, plantain, cress, and perhaps chickweed. The related compound Silvex handles clover and oxalis. DSMA will take care of other toughies, including crabgrass, especially in combination with Silvex.

A critical question these days is the use of pre-emergence grass preventers on new lawns which can be harmful to good grass as well as crabgrass. Of the nine available calcium propyl arsonate, with a short residual life, harms new seedings little. It is best to plant a new lawn just as early as possible, and have it up and thriving before pre-emergence crabgrass killer is applied. If a new seeding is made to a seedbed already treated with crabgrass preventer, don't complain should the stand be thin and need bolstering come autumn.

If attractive, permanent grasses devoid of weed-like species and nurse-grass are seeded to a proper seedbed, it should be possible to establish a new lawn in either spring or autumn. Avoid excessive nitrogen in late spring which might lead to soft grass that dies in summer. Better, too, to chance some weeds than to spray herbicides on new grass insufficiently mature. Taking steps in a common-sense fashion should prevent lawn making from becoming expensive or burdensome.

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DISCOUNTING TURF DISEASE PROBLEMS

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"Discounting Turf Disease Problems" -- what an intriguing title! But, what does discount mean exactly? Webster defines the word in these ways:

1. to deduct from an account, debt, or charge
2. to lend money upon
3. to depreciate, as by leaving
4. to make allowance for exaggeration in (a table, etc.) as to discount his story
5. to take in advance at less than the full value of.

Let's take these definitions one by one and see how each could apply to a turf manager reponsible for maintaining turf in a healthy, vigorous condition.

1. To deduct from an account, debt, or charge. In simpler words than Webster can manage, a discount is a saving. It's money in the bank, like buying at a sale. And, the biggest discount you can make with turf disease problems is to prevent them from occurring. Remember that old adage, "An ounce of prevention is worth a pound of cure." For turf diseases make this instead -- An ounce of preventive fungicide is worth 100 lbs. of cure! Think of how long it takes to bring turf back from a severe case of snow mold, dollarspot, or melting-out. How much extra effort and cost would it have taken to apply that missed spray, as balanced against nursing the turf back slowly to health. Think of the cost of

the extra labor, fungicides, seed or sod, fertilizer, water, and loss of goodwill.

Many superintendents have found that it saves money to spray not only the tees, green and aprons, but also the fairways. Here the principal disease is leafspot early in the spring, followed by melting-out. Accurate records kept over a period of years has proved to these superintendents that disease prevention pays off for fairways as well as for tees, greens and aprons. Start early in the spring as the grass is greening up and before the disease gets ahead of you. Remember that the same fungus complex that causes leafspot in cool weather attacks the crowns and roots in hot weather. And, turf without roots in hot weather is in real trouble.

Let's take another example. Let's say you lose three-fourths of the grass on a green due to a disease. Besides the obvious cost of sod, labor, and time spent, what about your public relations and goodwill? These you can't discount. Next to knowing the sound fundamentals of growing turf with all its multiface problems, good public relations (and with it goodwill) ranks at the top. Every successful superintendent must be good in public relations. Know what your golfers want, then go all out to please them if its sound turf management at all.

This brings us to Webster's second definition - 2. To lend money upon. No banker or lending agency will lend you money to finance a new home, automobile, or TV set unless you have a credit rating. You should have kept records and know how much money is coming in and where it all goes.

Your greens committee and most of your members are probably businessmen. They keep records in their businesses. They expect you, as a business man, to keep records too. And, they have a right to expect a good set of books, explaining where their money went and what for. A good set of records though, means much more to you than to your members and greens committee. Good records tell you not only how much you paid for fungicides, but when you used these chemicals, where and how much you applied.

Beside these figures in your record book should go a weather log -- giving both night and day temperatures, and other information (hot, bright, sun, fog, drizzly rain, etc.) The investment of a few dollars in some maximum-minimum thermometers for your golf course is a sound one. Keep these at turf level - not nailed up on the side of your machinery shed. Put thermometers where they will tell you the temperature of the grass.

As you know, each disease-causing fungus which attacks grasses has a temperature at which it grows best, just like the turfgrass it feeds upon. Fungi also have upper and lower limits at which they will grow and infect. These temperatures are given in many research papers on turf diseases. Learn them for these temperatures are critical to your disease control program.

For example, Pythium attacks occur in hot, muggy weather when the temperature is between 90° and 110° F.; Dollarspot between 60° and 85°F. The brownpatch fungus is most damaging to turf when night temperatures are above 70° F., and the daytime temperature is 80° to 90° F. However, there are strains of this fungus which attack at 95° F. and even 105°F., while others grow slowly and cause mild symptoms at 60° F. The powdery mildew fungus is damaging to bluegrass in the spring and fall when nights are cool and days are warm. Snow mold fungi may work under snow before it melts (down to 25° F.), but are probably most damaging in the range of 35° to 45° F. Fusarium patch, or pink snow mold, is active in drizzly weather up to a temperature of about 65° F. The

leafspot and melting-out fungus, Helminthosporium, has a number of species which attack turfgrasses. They "operate" over a temperature range of about 45° to 110°F.

To sum this point up, keep records on every phase of your disease prevention program. Know not only what you're doing each day and week, but what you have done to every green, to every tee, all season long. Write down new and different things in your daily log. How do you recognize and tell others how different diseases look as they are just starting? What telltale signs do you look for? Do you anticipate the coming of certain diseases to certain greens at particular times each year? What do you have planned as a counterattack? Your records, carefully kept, should provide the answers to these questions.

Now, on to Webster's third definition - 3. To depreciate, as by leaving. Do you have your fungicides ordered for 1962 in anticipation for every possible need? Remember that the fungicides stay good if we keep them dry, so why not order early? Don't wait until an "unexpected" disease like Pythium comes to haunt you. Anticipate trouble and order now!

How about your sprayer? Have you taken it all apart and checked the pump, pressure gauge, output per minute, nozzle discs, hoses, etc.? Is there any loose rust in the tank that can plug the nozzles later? Do you have the manufactuere's instructions for lubrication, operation and maintenance tacked up where your employees will see and read them? These points may well mean the difference some day this summer when your greens have to be sprayed and the sprayer suddenly conks out. How about its capacity? Do you need a larger sprayer to get around and finish faster and cut out several refilling jobs that take valuable time? Balance the cost of a larger sprayer not only on more efficient disease control, but the saving of labor and time. Maybe then your greens committee will go along with your recommendations.

How else can we discount? Fungicides aren't the only way to control diseases. A sound cultural disease prevention program was about all that superintendents had 40 years ago. Today we should put more reliance on sound cultural practices to keep turf vigorous and healthy. Fungicides cannot solve your turf problems if the basic cause is some management practice which lets disease "take over."

1. Greens should be kept as dry as your greens committee and membership will allow. Disease-causing fungi thrive under moist conditions. Poling, brushing, or hosing greens shortly after daylight removes the dew and guttated water in which fungi grow and multiply. Avoid as much evening watering as possible.

2. Remake and relocate problem greens, tees, and other turf areas which suffer disease stemming from poor surface or subsoil drainage, or are pocketed by trees which shut out air and light. An educational program may be called for. Does your membership realize how expensive it is to maintain a problem green? Do you have the records to back up your proposal to remake, or relocate a green, or otherwise change your course?

3. What is your feeding program? Are you maintaining a uniform, balanced level of soil nutrients in the rootzone? Disease commonly occurs when the major nutrients, N, P, and K are not in balance with one another. When fertility is high in hot weather, especially N, watch out! Disease is just around the corner.

4. Keep your greens as free of thatch as possible. Most disease-producing fungi thrive in this mat of dead and decomposing turf debris. Use a "vertical mower" at regular intervals and you'll have fewer disease problems, and fewer fungicide applications to make. Another discount to your members.

5. Mow your greens as high as "the law" allows. Grass needs leaves to produce food and deep roots. Too close mowing invites scalping and disease, plus slowing recovery from ball marks, disease, cup traffic, and going-out of Poa annua.

6. Don't stretch out these chemicals beyond their capacity to give you protection. Some chemicals may give you 3-day protection in rainy weather, and 5 to 7 days in normal weather. Learn the weak points and strong points of chemicals.

7. Test new chemicals out in a small way the first year, using part of your nursery. Experiment first and be happy later. Go easy with a new chemical until you get the feel of how it acts. A standard turf fungicide program could be a mixture of mercury and thiram. You may wish to add Zineb to this mixture. This combination protects against all known major turf diseases. And, probably a regular weekly protective program is best for all except hot, rainy weather when the interval should be shortened to 3 to 5 days.

Webster's fourth definition was: 4. To make allowance for exaggeration in (a tale, etc.) as to discount his story. The story of a good superintendent is told most eloquently, as you know, by his course. Look at his greens, tees, and fairways. You can't discount good superintendeing! It's a shame, though, that so many greens committees take their superintendents for granted. Here is the place to put your public relations to work. Don't ever let people have an opportunity to think you are anything but a topflight superintendent. Don't be afraid to blow your own horn when it's necessary.

Now, for Webster's fifth and last definition: 5. To take in advance at less than the full value of. Prevention means record keeping; keen observations on how much and how often to water; knowledge of when diseases are most apt to strike and where; knowing your fungicides and what they will do; plus carrying out cultural practices which favor the growth of the grass and not the disease-causing fungi. If you have these points well in mind you really can discount turf disease problems.

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WEED CONTROL PRACTICES IN SOD PRODUCTION

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A weed can be defined simply as a plant growing out-of-place. Weeds in any crop are undesirable. They affect quality as well as growth of the desirable plant. Weeds in sod not only detract from its appearance, but also competes with the desirable grasses for light, moisture and nutrients. One of the most important criteria for determining the quality of a sod is its weed content. A high quality sod demands that it be weed-free. Accoxdingly the sod

producer, as a matter of necessity, must become proficient as a weed control expert among other capabilities.

Weed control is not always chemical control. Thefirst line of defense against weeds is cultural control. Managing the sod and weeds in a manner so as to favor the sod may be referred to as "cultural methods" of controlling undesirable weeds. Cultural control involves using proper techniques which discourage weed growth, not only in establishment of the desirable grass, but also in its management after establishment as well.

Cultural Control Practices -

1. Seed - select the highest quality seed available. One of the most important characteristics of high quality seed is the absence of weed seed. Difficult to control weed problems may be introduced very easily into an area through poor quality seed containing weed seeds. Poa annua and bentgrass are common examples of weed problems being introduced in this manner. Certified seed gives a certain measure of assurance of high quality seed. Under present seed certification standards, the weed problem is not entirely eliminated. A review and revision of present standards for turfgrass seed is needed for improving seed quality.

2. Selection of land area - many uncontrollable, or difficult-to-control weed problems could be avoided on basis of observing weed growth in an area before seeding.

    a. Avoid areas which are known to be infested with difficult-to-control or pernicious perennial weeds, such as quackgrass, or Johnsongrass.
    b. Practice clean cultivation for at least two years or more before seeding sod grasses, particularly areas which have not been under cultivation for a long time.

3. Seedbed preparation - A seedbed prepared well in advance with periodic, shallow tillage before seeding is an opportunity to destroy several crops of weeds.

4. Time of seeding - fall seeding is the best time from the standpoint of minimizing many weed problems as well as favoring the successful establishment of the desirable grass.

5. Proper maintenance program after establishment of sod. Attention should be devoted to adequate liming and fertilizing, high mowing, intelligent watering, and pest control.

The most effective programs employ chemicals as an aid and not a substitute for cultural control, or a "crutch" for a poor management program.

Chemical Control Practices

A. Pre-planting
    1. Soil sterilization for destruction of weed seeds before seeding desirable grasses. Chemicals, such as calcium cyanamid, methyl bromide, or Vapam may be used. Each has its advantages and limitations.
    2. Non-selective chemicals - spot treatment, or over-all treatment in combination with cultural practices for cleaning up areas of hard-to-kill weeds. Such chemicals as amino triazole, dalapon, TCA may be used for quackgrass, bermuda, or Johnsongrass.

B. Post-planting - Herbicide must be selective, only used on well-established sod. Perhaps it would be most appropriate to discuss chemical control from the standpoint of specific weed problems.

1. Dandelion, buckhorn, broad-leaf plantain, knotweed (seedling stage) easily controlled with 2,4-D formulations.
2. Chickweeds, clover, spotted spurge are effectively controlled with Silvex (2,4,5-TP). This material is injurious to bentgrass. Restrict its use to seasons of cool weather - fall or early spring.
3. Veronica sp. (speedwells). Endothal has been recommended by the New York Agricultural Experiment Station for its control.
4. Wild onion, wild garlic - repeat treatments of 2,4-D in early spring, repeated over 2 year period.
5. Henbit, oxalis, yarrow, red sorrel, ox-eye daisy, and ground ivy are among the group of difficult-to-control weeds. Two applications of Silvex about 10 days apart is suggested.
6. Crabgrass -
   a. Post-emergence - application of chemical after crabgrass has made its appearance.
      Methyl arsonates, potassium cyanates, and phenyl mercury acetate have given good control. Generally 2 or 3 repeat treatments at 7 - 10 day intervals required. Phenyl mercury acetate is injurious to Merion Kentucky bluegrass.

   b. Pre-emergence - application of chemical before germination of crabgrass. Under New Jersey conditions, Zytron and Dacthal have proven to be the most effective materials on predominantly Kentucky bluegrass type turf. Calcium arsenate and Chlordane have performed satisfactorily, but somewhat less effectively than Zytron, or Dacthal. Limited testing has shown a number of new materials to be very promising.

7. All other grassy weeds - Muhlenbergia, goosegrass, velvet grass, quackgrass, nutgrass, tall fescue, orchardgrass, etc. No selective means of chemical control presently available.

Specific weed problems, as well as the performance of chemicals in different areas, may not be the same. Before using a chemical to control a specific weed, it would be advisable to check with your state Agricultural Experiment Station. The success of any chemical control program depends upon: (1) proper identification of weed problem; (2) choice of right chemical; (3) correct concentration of chemical; (4) good operator technique, and (5) properly calibrated equipment. Remember a good program for growing grass is the best weed control.

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A CAMPUS MAINTENANCE PROGRAM

Kenneth Girt, Physical Services,
Purdue University

Purdue has approximately 800 acres of turf to maintain. It ranges from grass areas along the run-ways at the Airport, to President Hovde's formal garden.

Our Department is also responsible for streets and sidewalks. Since we are tax-supported, maintenance must be as economical as possible and still get the job completed.

To get a job done, one must use certain technical methods. I will give you some of the methods used in management, labor and tools, both for new lawns and the maintenance of established lawns here at Purdue. Management is the backbone of any organization. The following diagram shows the bread-down of the campus maintenance management:

Campus Supervisor

Turf Manager	Groundskeeper Crew Chief	Grounds Foreman	Landscape Gardener

These jobs overlap, which is both good and bad. We four are responsible to ourself, our fellow-workers, and directly to the campus supervisor. When our jobs do not overlap we work independently, but if they do overlap, we work together. So far, there has been very little trouble with this system.

Our labor is classified into - groundskeeper, nursery worker, grounds laborer, equipment operator and heavy truck driver. We have a permanent staff of around 30 men who work the year round. Then, in the summer months, we hire from 25 to 30 additional. Many of these men who work in the summer are semi-retired men of 65 to 70 years old who want to make their $ 1200.00. We also employ some students. These temporary men come to work with the understanding that they will only work when the weather is suitable. If it rains, they are sent home, and when winter comes they are laid off.

Some of these men quit after a few days or weeks, and others stay until they are laid off. There are a few who come back each spring wanting to work until cool weather, but the largest part of the returns are those who want to make their $ 1200.00. We do try to transfer a good temporary man to a job in another department which can give winter work.

The next step is to have tools for these men to work with. Following is a list of tools and equipment that we use:

1. Lawn mowers

Hand mowers, reel type	15
Power mowers, single reel, walking type 18"	2
Power mower, rotary type, walking (18-21")	24
Large tractor drawn rotary mowers 60-80"	3
Power mowers, multiple reel, riding type	7
Tractor drawn gang mowers 5 reels	2

2. Grading tools.

Rotovator 60"	1
Rotavator 18"	1
Tiller rake	1
Sub-soiler	1
Brillion Seeder 60"	1

3. Maintenance tools for lawns.

Fertilizer spreader, broadcast type	1
Aerifier	2
Self-propelled lawn sprayer	1
Tractors	9
Pull-type sprayers	2

4. Utility vehicles

Pickup trucks	4
Dump trucks	3

When a new building is completed a new lawn follows. The contractor is required in most cases to haul topsoil back in and grade the site off. The first thing that my crew does is to sub-soil the area, and pick up bricks or other foreign matter in the area. The soil is then rotovated. After the soil is rotovated, fertilizer is applied. The area is then gone over with a tiller rake and hand rake where it is needed. A Brillion seeder spreads the seed, going over the area in two directions. If the area is sodded the sod is cut from our own sod field.

As I pointed out earlier, we have many different types of lawn areas which, of course, requires different maintenance methods. I have tried to break down the different types of turf areas into different cases of maintenance care they receive. We have six different levels of turf maintenance. In general, each area is moving up as budget permits.

A. Major Mall areas.
   1. Complete irrigation system.
   2. Fertilized three times a year.
   3. Sprayed for broadleaf weeds 2 times a year.
   4. Crabgrass preventer used annually.
   5. Cut one or more times a week.
   6. Thin-cut in fall to reduce thatch.

B. General Campus around Buildings
   1. Fertilized two times a year.
   2. Sprayed for broadleaf weeds two times a year.
   3. Limited amount of crabgrass control
   4. Cut once a week

C. General campus care.
   1. Fertilized two times a year.
   2. Sprayed for broadleaf weeds two times a year.
   3. Mowed once a week.

D. Residence Halls Areas
   1. Fertilized once a year
   2. Sprayed for broadleaf weeds once a year.
   3. Mowed once a week.

E. Student Apartments Area
   1. Fertilized when it is requested.
   2. Control for broadleaf weeds when requested.
   3. Mowed once a week, or as necessary.

F. Airport
   1. No Fertilizer - No weed control.
   2. Mowed every two or three weeks.

PURDUE STADIUM RENOVATION

W. H. Daniel, Turf Specialist
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The Ross-Ade Stadium is built into a clay hillside. The current soil is a gummy, tight clay, with very slow water infiltration. The grass is principally Merion bluegrass, plus tall fescue, and some Bermuda.

At the request of the Athletic Director, I undertook to utilize the fast moisture transfer action of the calcined clays. Beginning May 7, 1961, the field was sub-soiled to a 16" depth on 18" center going lengthwise. The calcined clay was fed into a hopper built onto the sub-soiler so the clay completely filled the sub-soiler trench, creating a vertical column of absorptive material. Because of the roughness created by the tractor and wagons, it was necessary to till and re-shape the field.

This repeated tilling destroyed the vertical layer so that poor water penetration still predominated in the fall of 1961. Therefore, after the 1961 season closed, we took off the sub-soiler shoe, using only the vertical shaft, and criss-crossed the field on 3 ft. centers, going down 12", utilizing 8 bags of calcined clay for each length-wise strip of the field. This gave a vertical column extending from the surface down into the previously made channels. Following this ten tons of crushed corncobs were spread over the field with a manure spreader. These should favor bacteria decay activity and aid in mechanically separating the clay, and reduce the crusty soil that might be present. Further calcined clay was spread 1/2" thick over the entire field to dilute the soil and cob material.

In the spring of '62 the field was aerified three times over, and an additional 200 bags of clay were spread over the area. Also, the field was dragged with a flexible fence drag to smooth the area prior to rolling. By April 15 the field was again uniform enough for running, had been reseeded with C-1 bluegrass and Traveler fescue, and exhibited ample moisture penetration.

The better of the vigorous, experimental Zoysias are being sprigged in for test purposes. It is felt coarse Zoysia will improve the binding of the aggregate material, and combined with bluegrass, produce a more wear-resistant turf cover. The calcined clay will be used for topdressing to further improve the surface absorption.

To date 140 tons calcined clay have been used on the football field area, approximately half of this placed into vertical slits, attempting to circumvent the very tight clay soil previously existing. A measure of the success achieved would be the complete absence of standing water during play regardless of rain.

Editor's Notes: Comments concerning Ohio Stadium. They have removed the sod which contained some bentgrass, put in a new tile system, rebuilt the crown to 20" above the corner elevation, then mixed 50 tons or more of calcined clay into the surface 4". The soil was a sandy loam, quite different from the clay soils at Purdue. The field was sterilized in late fall 1961, and was seeded in early April 1962.

Notes concerning Kentucky Stadium. At the University of Kentucky in the spring of 1962, they have stripped off the sod, are putting in 6" tiles on 15 ft. centers, and are recrowning the field, hauling in approximately 12" of sandy loam soil.

After the grade is completed they plan to place vertical columns of calcined clay into the field on 3 ft. centers to aid in rapid absorption of water. The field will be planted to U-3 Bermuda stolons, as well as a mixture of bluegrasses. (End of Editor's notes).

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MANAGING ATHLETIC TURFGRASS AREAS

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The condition of athletic field turfgrass always reflects past management practices. Good or bad management shows up to a greater extent in the spring of the year than at any other time.

From a playing standpoint, good athletic field turfgrass should be tough, wear-resistant, and not easily torn by cleats. It should be soft enough to prevent abrasions when players fall; yet firm enough to permit good footing. It should be clipped short enough to prevent hanging of cleats; yet tall enough to insure healthy plant growth and rapid recovery from wear. In addition, from the spectator's standpoint, must always appear green.

Poor athletic field turfgrass is readily recognized under most circumstances. Annual weeds, undesirable grasses and clover often make up the major part of the vegetation. The soil usually is compacted and poorly aerated. Compacted and poorly aerated soil bears shallow-rooted, tender grasses that are easily torn by cleats during play. Injury to players, particularly around the ankle and knee, are more likely to happen on this type of turf. Also, the grass plants cannot develop deep root systems since there is insufficient air (oxygen) within the rootzone, and frequent applications of water will have to be used to keep the plants alive. Such watering will further concentrate the roots near the surface. Most of the water applied will run off the surface and not move into and through the the soil properly.

Quite often weedy turfgrass indicates over-watering and improper fertilization in addition to compaction. No element should be applied in excess of the needs of the plant. This is particularly true of the soluble, or inorganic types of nitrogen, such as ammonium nitrate, ammonium sulfate, etc., which give the plant a quick start, but when supplied in excess, produces tender, succulent growth that increases susceptibility of insects and disease attacks, as well as increased chance for player injury.

Maintenance Program

Good athletic field turfgrass must be cultivated, fertilized, watered, and mowed properly. In addition, programs of disease, insect and weed control should be developed and used as needed. Attention to these fundamentals will insure the establishment, development and maintenance of tough, wear-resistant turfgrass.

Improvement of Physical Condition

Cultivation (Aeration).. Cultivate the field with some type of aerating

equipment at least twice lengthwise and once crosswise. Add sufficient weight to insure penetration to a depth of three to four inches. It may be necessary to sprinkle in order to bring the soil to the proper moisture level for maximum penetration. Soil should be moist, but not soggy. Cultivation alleviates soil compaction and aids the inter-change of gases, particularly oxygen and carbon dioxide between the soil and the atmosphere. Aeration likewise permits placement of phosphorus and potassium in the zone of root growth, thus aiding in the development of deep root systems.

Football fields that are cultivated in early spring do not necessarily require topdressing to fill in aeration holes. Roots and stems of the grass fill in these holes readily, and by mid-summer there is no evidence of pitting. Cultivation of baseball fields will be determined by playing schedules and the rapidity with which the grass is growing.

Topdressing. On fields where topdressing is required, consideration should be given to the type of materials used. A uniform mixture of two parts coarse sand, two parts medium sandy loam, and one part of peat is generally considered an ideal topdressing material. After mixing, the material should be screened through a 1/4" mesh screen. Such a screen can be built from hardware cloth where possible soil sterilization by chemicals or heat is desirable. This topdressing mixture should be used to fill and level depressions at the close of the playing season. If used as a topdressing over the entire field, it may have to be applied in the spring. In this case the field should be topped after cultivation and fertilization.

Fertilization

Fertilizers are applied to supplement the natural nutrient supplies in the soil, rather than to constitute the only source of nutrients. In addition, another major function of fertilizer is to balance the soil nutrient supply with the needs of the plant. Fertilization of athletic field turfgrass, then, begins with a determination of the plant food supplies in the soil. Such is accomplished by obtaining a properly interpreted soil test. The soil test will provide a record of the soil reaction (pH) and the levels of phosphorus, potash, calcium, and magnesium. In addition, most tests will show soluble salts if they are present in toxic levels.

Keep in mind that turfgrasses require several times as much nitrogen as phosphorus and potash on a growing season basis. Soil tests will not give an accurate evaluation of available nitrogen, rather growth, vigor and condition of the grass must be used as a guide for nitrogen fertilization. In general, athletic field turfgrass should receive a total of 6 to 8 lbs. nitrogen and 2 to 4 lbs. of phosphorus and potash annually. Lime, if needed, should be applied in amounts indicated by soil tests.

Timing of fertilizer applications need to be keyed to growth activity and the necessity for obtaining color for special events. Complete fertilizers as suggested in fall or spring. Organic (slow release) forms of nitrogen are suggested for supplemental feedings. Inorganic (quickly available) sources of nitrogen are suggested for use when the turfgrass needs a quick pickup in growth or color.

Watering

Controlled watering is one of the most important considerations in the development of good turfgrass. The prevailing tendency is to overwater rather than underwater. Excessive water, as well as too frequent applications, intensifies soil compaction.

On new seedings,, the field should be sprinkled lightly each day until the seed germinates. The amount of water applied should be increased, and the frequency of application decreased when the seedlings emerge. Water should be applied to mature turf as the plants approach wilting. At this time, the field should be soaked to a depth of 4 to 6". Soils differ in their ability to absorb moisture. When surface runoff is evident, water should be cut off. If that soil is not wetted to the required depth, wait until the moisture has percolated downward and apply additional water.

Consideration should be given to the installation of automatic watering systems on old fields as well as new. The savings in labor and water cost,as well as the control such a system permits, are often sufficient justification to permit installation.

Seeding

Bermuda, where adapted, should be considered the base grass for athletic fields. In the South, Southeast andSouthwest, it is the only grass needed. In most other sections of the country Kentucky bluegrass is considered the base grass. In these regions, the inclusion of creeping red fescue is often desirable. Tall fescue (Alta and Kentucky 31) is sometimes used, but tends to clump after a few years; hence, is not desirable under most conditions.

On new fields where Bermuda is the only grass used, seed about 2 lbs. of high quality hulled Bermudagrass seed per 1,000 sq.ft. Kentucky bluegrass may be seeded alone at a rate of 3 lbs. per 1,000 sq.ft. Tall fescue 100 lbs., plus 25 lbs. bluegrass is sometimes used also. Where it is necessary to reseed established fields, generally one-half the rate of the above is ample.

Mowing

A sharp, well-adjusted mower is essential for the proper cutting of turf. New seedlings should not be cut as soon as needed after reaching 2" in height. Only about one-quarter of the leaf surface should be removed at any one clipping.

Football turf may be maintained at a height of approximately 2" during the summer. About six weeks prior to fall play this may be reduced to a height of 1-1/4", depending on personal preferences of coach and players. Do not make the reduction in one clipping -- reduce the height of cut 1/4" at each successive mowing. Increase frequency of cutting, if necessary. Generally, turf that has been properly managed will require mowing at least twice weekly.

Summary of Recommendations for One Season

1. Overseed very early if needed.
2. Cultivate the field twice lengthwise and once crosswise.
3. Break up soil plugs, fill, level and grade with topdressing mixture.
4. Apply fertilizer and lime in accordance with recommendations based on properly interpreted soil tests. Use nitrogen to control the rate and level of growth.
5. Seed if necessary and not done earlier.
6. Top lightly with topdressing mixture. This is to cover seed if the field has not been aerated or scarified so as to permit seed to be in contact with the soil.
7. Roll lightly and sprinkle lightly, depending on personal preference.
8. Water, mow, and apply additional nitrogen as per discussion.

WHAT IS ADEQUATE LAWN TURF FERTILIZATION

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Few, if any, soils possess sufficient inherent fertility to support satisfactory growth throughout the growing season. Therefore, fertilization to supplement the natural plant food supplies of the soil is necessary to produce uniform, weed-free lawn turf which will recover quickly from damage and wear. Fertilization is not static, and the program must be continually adjusted.

Healthy vigorous turf requires an adequate and balanced supply of plant food available commensurate with the plant's requirements. Such a program involves a great deal more than just the addition of "fertilizer." The rate, ratio and kind of fertilizer applied, as well as the time of application, are equally important in the production and maintenance of weed-free lawn turf.

Although lime is generally considered as a soil amendment rather than a fertilizer, because of its relationship to the availability of other nutrients, it should be mentioned in this discussion. Correction of lime (calcium or magnesium) deficiencies should be the first step in determining adequate fertilization. Soil tests should be employed to determine the reaction (pH) of the soil and if pH is 6.2, or lower, lime in the amounts indicated by the soil test should be applied.

Rate and Amount of Application

Inadequate fertility results in thin, open turf which is easily invaded by weeds. Heavily fertilized turf becomes soft and succulent, particularly during certain seasons of the year. Such grass is readily attacked by disease and insects, and is easily damaged by traffic.

The actual amount of lime and fertilizer to use annually should be based on properly interpreted soil tests and is governed by the kind of grass, the soil reserves, and the intensity of usage expected from the turfed area. In addition, whether clippings are returned or removed from the area, influences fertilization practices. Experimental evidence from widely scattered sections of the country indicates a requirement of 4 to 8 lbs. of nitrogen, and 2 to 4# of phosphorus and potassium per 1,000 sq.ft. during the growing season to produce top quality lawn turf. Such assumes that the lawn is irrigated and the ranges are given to cover both return and removal of clippings. In general, the most uniform growth rates are obtained when a complete fertilizer is applied in the fall and spring, with supplemental feedings of nitrogen during the growing season.

Types of Nitrogen

The weed population may be materially reduced, even controlled, by the judicious choice and application of nitrogen materials. The basic difference between the two types of nitrogen carriers (organic and inorganic) is the rapidity with which the materials can supply nitrate to the plant. When soluble nitrogen is added to the soil, it is readily available, and is either used by higher plants or, if excess water is moving through the profile, the nitrate will be leached. Variable amounts of soluble nitrogen may be temporarily tied up by the microbial population and thus utilization, or leaching delayed.

When natural organics (or synthetics which act similar to natural organics) are added to the soil, they are dependent on microbial activity for their breakdown and subsequent release of nitrates. Applications of organic nitrogen just prior to and, if necessary, during periods of semi-dormancy, will provide a more uniform supply of nitrogen.

Timing of Fertilizer Applications

The inherent growth characteristics of the turfgrass, correlated with the seasonal and climatic conditions obtaining, will govern timing and rate of fertilizer applications. Weeds, like grasses, differ in their growth response to temperature. Fertilizer applications timed to favor grass growth, rather than weed growth, are most effective in the cultural control of weeds. For example, cool season grasses fertilized heavily during the summer months are almost surely to be invaded by crabgrass and other summer weeds. Fertilization of Bermuda and other warm season grasses during late fall and winter encourages the growth of winter weeds, such as Poa annua, wild onion, wild garlic, etc. Conversely, the fertilization of either group of grasses just prior to and during periods of active growth will encourage dense, vigorous grass resistant to weed encroachment.

Lawn fertilization is adequate when sufficient nutrients are available to maintain turfgrass in a healthy, vigorous state throughout the growing season.

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TREES AND SHRUBS

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One of the Seven Wonders of the Modern World were the Forests of North America. They are decreasing today, in spite of mans puny efforts to replace this wonderful gift that God has given. Not only has man failed in replacing this gift, but he himself has been responsible for its destruction, through his carelessness, through his lack of understanding, and through his abuse. We are in a position where we may lose this asset, which God has given us. Granted, of course, that we cannot achieve in a few short years what nature accomplished in thousands, we can, through a better understanding of all kinds of plants, and through the cooperative efforts of all of us who are interested in this problem, still use plants to temper the summer heat, to join buildings, earth and sky in harmony, and give peace and add beauty to all of our surroundings.

It may save time and disappointments if you understand your plants. Know their likes and dislikes, soil growing habits, what they will look like at maturity, and whether they are acclimated. In the many years of experience with the St. Louis Park Department, we have found it easier to use plants adapted to your soil and climatic conditions than to change these factors and fit the plant's requirements. Good planting habits are necessary, and proper maintenance, watering, mulching, wrapping, and a seasonal spray program, are mandatory if best results are to be achieved.

If your trees and shrubs are growing well, leave them alone. If they show

poor growth, try to discover why. Symptoms of disease and decline are so specific that the cause can be diagnosed accurately. Early warnings that all is not well are: poor foliage, pale green leaves, dieback of tips of twigs, dying or loosening of the bark, and small terminal buds. Look first to the soil -- its fertility, drainage, aeration. Roots may not develop due to heavy clay commonly found in newly excavated areas. This excavation, also, is responsible for changes of water table.

To make an alkaline, or neutral soil acid, or to increase acidity, chemicals may be added, such as aluminum sulphate, sulphur, or tannic acid. Sulphate is added at the rate of 5 lbs. per 100 sq.ft. spread evenly and watered in. Sulphur is added at a rate of 1 part per 50 gallons of water. If the soil test is on the acid side, lime is usually added at the rate of 100 lbs. of agriculture type per 1,000 sq.ft. This application is recommended in the fall.

Don't under-rate the importance of pruning your ornamental shrubs. It will increase their beauty and lengthen their life, provided it is done properly and and in accord with their growth habits. Shrubs that bloom in mid-summer, or later, may be pruned during late winter without lessening flower production. But, pruning of shrubs that bloom early, Forsythia, or Cydonia Japonica, for example, should be delayed until immediately after the flowering period; otherwise, many potential blooms may be removed. Most evergreens should be pruned just before spring growth begins. The cuts will be hidden quickly by new growth.

Here in the St. Louis Park system we are very interested in replacement of American Elms and Sycamores which have been dying by the hundreds. Of course, everyone knows that the Dutch Elm disease and the Sycamore Canker has done throughout the country. We are, therefore, going into a very extensive program of replanting with Hardwood trees. For this we operate extensive nurseries.

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