PROCEEDINGS OF

SIXTH ANNUAL PACIFIC NORTHWEST TURF CONFERENCE

OCTOBER 13 AND 14, 1952

PULLMAN, WASHINGTON

SPONSORED BY

PACIFIC NORTHWEST TURF ASSOCIATION

AND

THE STATE COLLEGE OF WASHINGTON

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NORTHWEST TURF ASSOCIATION - OCTOBER 1952

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Ivan W. Lee Turf Association's four year representative on the Agronomy Advisory Board.

1952 PACIFIC NORTHWEST TURF CONFERENCE

Monday and Tuesday, October 13 and 14, 1952

9:00 A.M. Registration - A.G. Law and Wallace Wade

Morning Program - B.R. Bertramson, Chairman

10:00 Welcome - Dr. C. Clement French, President of The Washington State College

10:20 The Value of Turf Nurseries - Charles G. Wilson, Regional Director, United States Golf Association

10:50 Activities of the Mid-west Turf Conference - Dr. Wm. Daniels, Turf Research and Extension, Purdue University

11:25 A Quarter Century of Trouble Shooting Specialized Turf - O. J. Noer, Milwaukee Sewerage Commission

12:00 Lunch

Afternoon Program, October 13

1:30 Section Meetings - Sections rotated at 3:15

Cemetery
Chairman, Ivan Lee

Greenskeepers
Chairman, J.K. Patterson

Fertilization of Turf
Dr. C.B. Harston, Extension Soils Specialist

Turf Diseases
Jack Meiners, Plant Pathology Department

Weeds and Weed Control
Dr. L.R. Rasmussen,
H. Wolfe, Extension Weeds Specialist

Turf Insects
Dr. H.S. Telford
L. Schmidt
Clif Everhart

Repair and Maintenance of Equipment

Surveying Techniques
Agr. Engineering

7:00 Banquet

Morning Program, October 14

Chairman, A. G. Law

9:30	Development of a Turf Research Program - Dr. B. R. Bertramson, Chairman of Department of Agronomy
9:45	Soil Conditioners - Dr. Walter Gardner
10:15	Fundamentals of an Effective Turf Maintenance Program.- O. J. Noer
11:00	Clover Control in Turf - Wm. Daniels
12:00	Lunch

Afternoon Program

1:30	Observation of Turf Plots at the S.C.S. and roadside plantings.
3:00	Travel to Hayden Lake for evening banquet.

THE MIDWEST REGIONAL TURF FOUNDATION PROGRAM

W. H. Daniel
Purdue University

Such an activity as the one I'm to review for you can start very inconspicuously. If it serves a need, has a program of development and is backed by those served then it can surely and safely grow far beyond the initial dream of the originators.

Last year the 15th annual turf conference was held on the Purdue Campus. During one of those conferences, back in 1944 and 1945, about one dozen men planned a foundation through which club membership could support research on turf problems. Many men, including Joe Graffis, Carl Bretzlaff, G. O. Mott, Fred Grau and O. J. Noer, helped in developing the program.

Initially (from 1946-1950) the foundation had two major functions: conducting the annual turf conference and doing graduate student studies on specific problems. Dr. R. R. Davis, now at Ohio Experiment Station tested soil mixtures. Mr. Don Likes, now superintendent at Hyde Park Country Club in Cincinnati, tested fairway grasses. Mr. Ethan Holt did his thesis on bentgrass breeding for 2,4-D resistance. In 1950 this program was enlarged as I joined the Agronomy Department staff at Purdue as Turf Specialist. It should be pointed out that the Experiment Station staff is very active in the program. The Departments of Entomology, Plant Pathology, Botany and Horticulture cooperated in the various turf programs and assist in turf conferences. The Experiment Station has consistantly increased its support of the turf program so that it now carries at least one-half of the entire turf program in its budget.

There are three main points concerning our Midwest Regional Turf Foundation organization. First, it has an Articles of Corporation as a Foundation and a charter from the state. Second, it has a Statement of Agreement between the Foundation and Purdue University which specifies that the Department of Agronomy will receive funds and utilize them. Third, it has Bylaws which give it effective organization. One section of the Bylaws sets up an advisory council to advise and assist in planning the various activities. The success of the turf extension program is largely due to this advisory council. In each golf course superintendent organization, such as in the Chicago or Cleveland area there is one member who acts as a county agent in turf. They know the local situation, they provide

transportation to various golf courses, and they arrange group meetings and programs. They advise on our research problems.

How wide has our membership become? There has been consistant growth and now we have over 200 member club and turf interests participating. An 18-hole golf course pays $40 per year dues. Cemeteries, parks, dealers and 9-hole golf courses pay $20 per year dues. We are very happy with the support and close contact we are having with the industry serving turf management. They provide materials for testing and funds for research. But more important is the fact that they are of great assistance in promoting ideas and, materials which we in extension and research find beneficial for "Better Turf".

What can such a program do for those who supervise turf areas? It can assemble and promote information on turf. We have a good library and a quarterly publication. It can assist on specific problems by doing research and encouraging various superintendents to test the material on a limited area. We are working on clover and Poa annua controls. It can bring educational programs to the local turf superintendent's meetings. Kodachrome slides are used for this to a great extent in our work.

On the Purdue campus we have a 10,000 sq. ft. experimental putting green under playing conditions. There we conduct our nitrogen-fungicide tests, our 20 selections of creeping bentgrass and bermuda tests. There are approximately three acres of various grasses for lawn and fairway tests on the new Agronomy Farm. Some 2,000 individual plots are maintained here. These areas give us a testing round for any new material or grass as Z-73 Zoysia or Merion bluegrass.

Let's not kid ourselves into any false sense of security because we have a very specialized turf program going. Look at the progress being made in breeding disease resitance in wheat or oats. A new soybean variety can easily be developed, increased and actually lead in commercial production volume in five years. In contrast, Merion bluegrass is still an infant after sixteen years. New grasses and new materials are becoming available to the turf superintendent thick and fast. He must know, if he is to be efficient, what each can and cannot do. Therefore, our Midwest Regional Turf Foundation, the U.S. Golf Association Green, Section and other cooperative agencies have today a very real challenge before them. A challenge of good turf - ready for use.

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THE USE OF 2,4,5-T FOR CLOVER CONTROL IN TURF

W. H. Daniel
Purdue University

Many of the current turf management practices of today tend to encourage the growth of clover in turf. The close cutting, excess watering, weed removal, low nitrogen feeding, disease attacks, turf cultivation, crabgrass control and compaction all may indirectly favor clover infestations. Under lawn conditions, particularly with bluegrass, it is hardly possible to fertilize heavily enough with nitrogen to prevent clover infestation.

Considerable success in clover control has been obtained by using one to three pounds per acre of sodium arsenite as a weekly spray to repeatedly defoliate and weaken the clover, particularly as winter approaches. By the same treatment chickweed and Poa annua may be greatly reduced. Research by Nutter and Cornman of Cornell University showed good results with Endothal, a product now on the market. Both Endothal and the sodium arsenite give temporary leaf burning to the turf.

In 1951 several turf superintendents in the Chicago area began using a mixture of 2,4,5-T (2,4,5 Trichlorophenyacetic acid) and 2,4-D (2,4Dichlorophenyacetic acid) for clover control. This report is a summary of various tests conducted at Purdue University using 2,4,5-T for clover control. Fairway plots, located on the Purdue Golf Course, sprayed with2,4,5-T in June, 1951, at the same time as various rates of Endothal were used, have shown definitely lesser clover percentages than those treated with Endothal during the following year. Where one pound of 2,4,5-T acid equivalent was used,there was less than 2% clover one year after treatment compared to 25% for untreated areas.

We have tried fall and summer clover control on a practice putting green through cooperation with the Elks Country Club of West Lafayette, Indiana. The presentation of these results is not to be considered a general recommendation for its use but to suggest it as a possibility when management has allowed clover infestations. One quart of 2,4,5-T solution, or one pound of acid equivalent, applied on October 10, 1951, gave an estimated 95% control of existing clover within one month while a mixture of one quart 2,4,5-T and one pint 2,4-D one-half pound acid equivalent, gave 98% control. On April 23, 1952, or later that year no clover could be found on either treated area. Lesser

rates were only partially effective.

On June 16,1952, applications of .75 pound, .5 pound, and .25 pound per acre of 2,4,5-T and .5 pound 2,4,5-T plus .25 pound 2,4-D were used on the north half of the Elks Country Club practice green. Temperatures for the following two weeks were high, up to 100° F., with very high humidity. There was considerable reduction in the vigor of the bentgrass but no extended injury, and it responded to nitrogen applications gave only 90% control of the clover and regrowth began before fall.

On June 18, 1952, three grasses,Merion bluegrass, F-74 fescue and Astoria bentgrass,maintained as lawn areas, were treated with 2,4,5-T alone and in combination with 2,4-D. Table I shows that clover in bentgrass was reduced from 18% of the turf to 2% by a summer treatment. This table shows also that the vigorous Merion bluegrass was restricting the invasion of clover. Considerable regrowth has taken place on these plots during the fall of 1952.

Table I. Percent of clover in turf on July 18, 1952, which was sprayed June 18.

Grasses	1.5Pts.* 2,4,5-T/A	1pt. 2,4,5-T* .5 pt. 2,4-D/A	None
MERION BLUEGRASS	0.5	1.5	10
F-74 FESCUE	2	4	17
ASTORIA BENTGRASS	2	2.5	18
UNSEEDED	3	3	36

* 1 qt. of both materials is equal to 1 pound of acid.

In the fall of 1952 a series of three applications 10 days apart were made on a lawn area containing approximately 25% clover in the turf. Clover control of applications made at all three times,as shown in Table 2, were satisfactory for the higher rates while no rates of less than one-half pound of 2,4,5-T acid equivalent per acre gave complete control.

Table 2. Percent of clover in lawn turf at Purdue University. Average of 3 dates of application August 29, September 10 and September 19.

Treatment, lbs. Acid Equivalent	Time after Spraying 1 month	2months
None	28	23
---------- 1# 2,4-D	4r	5r
1# 2,4,5-T --------	0.3	0.3
1# 2,4,5-T & ½# 2,4-D	0.3	0.1
½# 2,4,5-T -------	2	1.5r
½# 2,4,5-T & ¼2,4-D	2	2r

r New leaves on old stolons.

Observations on golf courses where these materials have been used lead to one precaution. If applied on dense matted areas of creeping bent which have dry soil below, these can be injured by 2,4,5-T.

Based on these observations the current recommendation for clover control in fairways and lawns is a fall application of one pound of the amine form of 2,4,5-T acid equivalent. In most formulations this is equal to one quart of2,4,5-T solution. If broadleaf weeds, need to be controlled, then add one-half pound of 2,4-D acid equivalent, one pint solution to the 2,4,5-T solution. Late fall applications, October in the Midwest, have given the cleanest turf areas as treatments made at that time will also kill the fall growth of new weeds, including some Poa annua and chickweed. Clover control is only one step in turf improvement. Adequate nitrogen fertilization and soil cultivation should be included in the program.

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SYNTHETIC SOIL CONDITIONERS AND THEIR APPLICATIONS

Walter H. Gardner
Department of Agronomy
State College of Washington

Introduction

"Soil Conditioner" is the general name that is being applied to the new synthetic materials intended to improve soil tilth. Fine textured soils tend to pack and become compact and dense with the result that they are poorly aerated and take water slowly from rains, waterings or irrigation. A marked improvement in the structural condition(tilth)of such soils brought about by small additions of soil conditioners often is accompanied by phenomenal increases in plant growth. Such effects, however, will be important only under conditioners where tilth is extremely poor naturally or where surface crusting is so severe that seedling emergence or water entry is virtually prevented. Otherwise the effects of soil conditioners on plant growth will be slight or absent. Even where direct benefits on plant growth are slight the use of soil conditioners may still have value from the standpoint of culture since the more stable structure induced by them will permit working the soil without damage over a wider range of moisture conditions.

The tremendous public interest in soil conditioners stimulated by the announcement of Krilium by the Monsanto Chemical Company (Philadelphia Meetings of the American Association for the advancement of Science December 29, 1951) resulted in the appearance in 1952 of dozens of products claiming soil conditioning properties. Currently there are more than fifty trade names for soil conditioning materials on the market.The exploitation of this interest in soil conditioners has been rapid and irresponsible; there has been little opportunity to evaluate the virtues and limitations of the various soil conditioners. Krilium was not intended for release on the general market before 1953 in order to obtain more experience with its use, but its release was forced in 1952 due to the appearance of competing products which have had even less testing.

At present prices the useof these materials is limited to small-scale applications or to applications where high cash returns justify the expense of the soil conditioner. Competition and mass production are expected to bring about very material decreases in prices in which event extensive agricultural use might result. Wide-spread agricultural use of soil condit-

ioners could conceivably have a most profound effect upon our agricultural economy.

Soil conditioners are not equally effective in all soils and the rate and method application seems to be somewhat critical in many soils. In soils where they have had the greatest effect, yield increases up to 45 per cent have been reported for a few crops. The size and quality of such crops as carrots and potatoes have also been reported to have been greatly improved. Soil conditioners may have a place in seed bed preparation on soils which form hard crusts deleterious to proper germination and emergence of seedlings. However, soil conditioners must not be regarded as a cure-all for ailing soils. The conditioners, themselves, contain, no plant nutrients and sound soil management practices including the use of organic matter and fertilizers, are still of major importance.

Chemical nature and effect on soil structure

Basically most of the legitimate conditioning materials have as the conditioning agent some form of hydrolyzed polyacrylonitrile. One of the most effective, conditioning materials is a modified vinyl acetate-maleic acid compound which is available through only one manufacturer at the present time. These materials are thought to be synthetic replacements for the natural polysaccharide or polyuronide resins formed in the soil during the decomposition of organic residues and green manures by microorganisms. The mechanism by which soil structure is improved is not yet completely understood. The result, however, is a binding together of small soil particles such as clay into stable aggregates. The materials form a very tight bond with clay particles and unless present in very high concentrations will not move in the soil. Hence, they are non-leachable and must be mixed mechanically with the soil. The conditioners do not by themselves create a desirable soil tilth; they do, however, tend to stabilize soil aggregates that are formed by mechanical mixing or possibly by natural soils aggregating processes.

A number of other soil conditioning materials are on the market, not all of which are effective. In Italy and Holland substances are avilable which purport to be chemical conditioners carried on a peat moss base. Similar materials may soon be available on the American market and, according to reports, at prices considerably below those of the presently available soil

conditioners. Several natural materials which are "mined" in the earth are being pushed as soil conditioners and a number of "biological" soil conditioners are being offered. Industrial by-products from paper mills, fish canneries, and other industrial plants are being investigated as to their effects on the physical properties of soil. Some of these may also carry plant nutrients and hence have value as fertilizer.

The advertising claims concerning the value of conditioning materials are often grossly exaggerated, and completely misleading, effective soil conditioning materials may be purchased under a number of different trade names but not all of the materials on the market are legitimate soil conditioners. Extravagant claims should be viewed with suspicion.

Soil Conditioner Formulations

Aside from the actual differences in soil conditioning materials themselves, a large part of the variation in commercial offerings as in the formulation. Several of the large chemical manufacturers sell the basic soil conditioning materials to a number of different, chemical distributors for formulation into their own products. In some instances identical products may be sold under several different trade names. A few of the soil conditioning materials are sold only in powder form and many may be had in both liquid and, powder form. Some are sold as a powder or in flake form to be put in water solution by the ultimate user.

The actual amount of soil conditioner material in the product purchased on the retail market will vary considerably. At the present time none of the materials are available through retail sources in pure form for the reason that effective use requires, application to the soil in dilute solution or in mixture with some inert carrying material. If and when the pure form becomes available, package recommendations will likely call for pre-mixing of the material with some substance such as pulverized dry soil before application is made to the soil itself.

Several of the soil conditioning materials on the market are formulations containing added fertilizers. Although this type of formulation may be desirable for use in gardens or in other small-scale applications, its suitability for large scale applications is questionable upon economic grounds. Fertilizers requirements of different soils are widely different and a single formulation could not fit all requirements.

Formulation of soil conditioners with fertilizers by the user for combined application may, however, be an economical procedure.

Rate of Application

The rate of application depends upon the kind of conditioner, the type of soil and the aggregating effect which is desired. Work on soil conditioners has not progressed sufficiently to permit making rate recommendations on the basis of soil types. For this reason any general recommendations must be regarded as suggestive and some testing should be done before large scale applications are made.

In general, the cost of small scale applications around the home is not so great but what small differences in rate can be disregarded. However, when the application becomes greater than a few square feet such difference become important. For example, one company recommends application of soil conditioner at the equivalent rate of from 0.05 to 0.10 per cent of the dry soil weight. At the lower rate of application it would cost about $300 to treat the surface three inches of an ordinary city lot. At the higher rate this cost would be doubled. At present prices, the cost of treating a square foot of soil to a depth of three inches would be between five and ten cents depending upon the rate of application. The cost of treating thesoil in an ordinary flower pot containing about two pounds of soil would be from one-half to one cent.

Because of the many different materials and formulation on the market it is impossible now to make general rate recommendations. Until such time as the formulation of soil conditioning materials is indicated on the package the user must rely on package directions. Some experimenting is desirable to determine the best rate for a particular soil. Depending upon the soil this could be greater or less than the rate indicated on the package.

Method of Application

It would be impossible to discuss field application of soil conditioners adequately without first giving a great deal of technical information. Some of the principles of application can be illustrated in description of a method for preparing potting soil. Garden and flower bed application could not be carried out in the same manner but the requirements for producing a favorable soil structure are the same. A measured amount of dry soil is placed upon a table

and the proper amount of powder soil conditioner is added and mixed thoroughly with the soil. After a thorough mix is obtained water is added in small, amounts and the soil mixed with a trowel or by hand. As much water should be added as the soil will hold and still have a desirable tilth as it is mixed and stirred with the hands. Aggregates must be formed by physical mixing since the function of soil conditioners is not to make structure but is to stabilize structure that is formed. After the soil is mixed it must be left at least 24 hours before using to allow the conditioner material time to form the bonds between soil particles which are necessary for stabilization.

A quart of dry soil weighs about 2 1/4 pounds. This would require about 0.002 pounds of soil conditioner at an average rate of application (0.1%). If the conditioning material contains only 1/4 actual soil conditioner then the required amount of the materials would be 4 x 0.008 pounds. The exact weight of the soil conditioner material depends upon the formulation but as a rough figure one level teaspoon of material would weigh from 0.005 to 0.007 pounds. This would mean that for pure materials 1/3 of a teaspoon would be required for a quart of soil. Some experimentation is required to determine the best rate of application.

When liquid soil conditioners are used the dry mixing step, of course, is ignored. The liquid soil conditioner should be diluted with water and then mixed into the soil as before. The rate of application with the liquid conditioners is not easily specified and the only recourse is to follow package directions as closelyas possible.

The important steps in soil preparation with soil conditioners are: (1) thorough mixing of conditioner material with the soil, (2) formation of desired soils tilth through mechanical mixing and, where necessary---with the addition of water and (3) allowing the soil to stand at least 24 hours before using it in any way that will tend to destroy the desirable tilth that has been formed.. With several of the powdered forms of soil conditioning materials a special precaution may be necessary in some soils. Some of the soil conditioner materials take up water from damp soil at a very rapid rate and form a gummy mass on the surface of the soil if not mixed in immediately after application. It is to prevent this and to insure uniform application that some of the materials are sold in a clay carrier. Pre-mixing with dry soil will also helpto prevent such gum-ball formation.

Seed bed applications may differ somewhat from other applications in that one is concerned only with obtaining surface structure which is stable, friable, and permeable to water. Experimental work is in progress at various places on the application of soil conditioners to the surface of the soil without mixing. Such methods have proved effective under a few special conditions but general conclusions are not yet warranted. The big problem in seed bed preparation is to secure the proper mixing and at the same time to have sufficient moisture present to permit the soil conditioner to form the necessary bonds between caly particles. Under some soil conditions the soil conditioner powder can be applied, raked in to the desired depth and then the area sprinkled lightly with the necessary water. In the Palouse area such techniques have produced crusting which has hindered emergence of seedlings. It appears necessary to actually stir or mix the soil after water has been added to assure formation and preservation of a desired soil tilth. The exact amount of water necessary for aggregate formation is not known but, as a general rule, sufficient water should be present to form small aggregates, yet not so much as will puddle and form overly large aggregates.

Soil conditioners may have a tremendous potential for improving and in stabilizing soil structure under field conditions where structure is difficult to maintain. This is particularly true with turf where heavy foot traffic keeps soils in a perpetually poor physical condition. The great problem, here, however, is in use of soil conditioning materials on established turf where mechanical mixing is prohibited. Further research in this field of application is badly needed. There do, however, appear to be possibilities for adding soil conditioners in solution tend taking advantage of natural soil structure building processes such as freezing and thawing, wetting and drying, and root penetration to produce the desired soil tilth. Until further research is done, application of soil conditioning materials to established turf should be done on a small experimental scale.

General

The effects of poor soil structure on crop growth is more important than we are often willing to recognize. Practically, however, there has been little that could be done about structure except in small-scale operations where large-scale use of the natural soil conditioners --manures and composts --was economically feasible. The potential of synthetic soil conditioners

for stabilizing soil structure is tremendous. However these materials have been available for such a short time that this potential has been only partially explored. Research workers are studying the use of soil conditioners as rapidly as possible but it will be several years before any valid appraisal can be made. In the meantime,users of such soil conditioning materials should recognize that there is much to be learned and therefore should keep an open mind on the subject. In intended applications where economic considerations are of major importance some small-scale trials might prove of considerable value.

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THE USE AND CARE OF SURVEYING EQUIPMENT

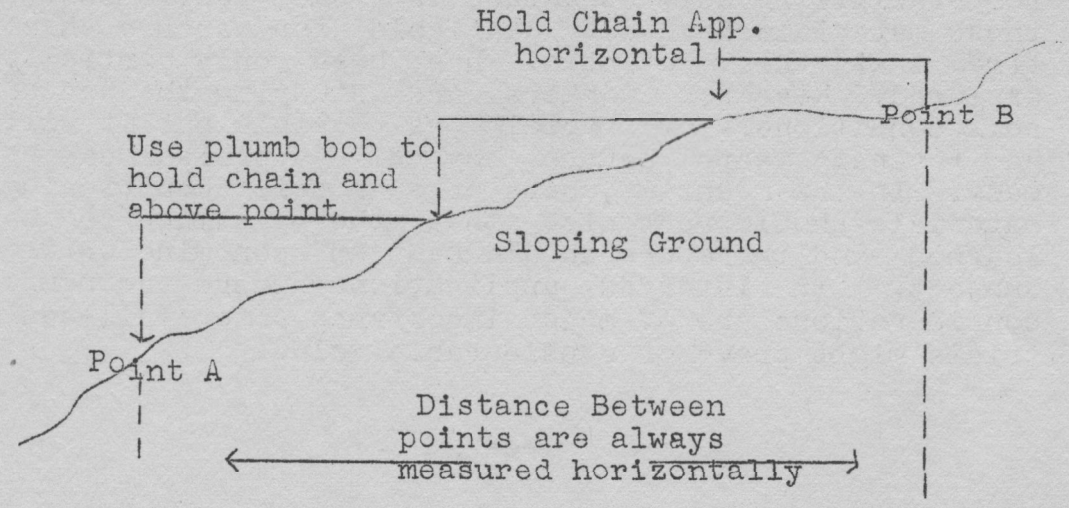
Max C. Jensen

Although the original survey is a job for an engineer, it is often practical for a non-engineer to measure distances and to find differences in elevation between points. It does require careful thinking and the knowledge of a few basic principles. For example, one must know that distances are always measured in the horizontal plane. Further vertical distances are measured by comparing the instrument reading taken when the rod is at one location with the reading taken when the rod is at another location. It is also necessary to keep in mind that surveying equipment requires careful usage and good care to maintain its accuracy.

Distances are Always Measured Horizontally:

The instrument for measuring distances is called a "chain" or "tape".It is simply a special steel ribbon marked off in feet and tenths of feet, or inches. The "chain" can be bought in lengths of 25, 50, 66, 75,100 200, 300, and 500 foot lenghts.

Distances between points are always measured horizontally. On level ground, this distance is obtained by measuring along the ground surface between the point. On sloping ground the procedure is more difficult.



On sloping ground, it is necessary to hold the chain approximately level to measure the distance. When the chain is held so that it appears level, it is ordinarily near enough to level to give an adequate measurement. The chain end can be located directly above the down-slope point by using a plumb bob. If the course is downhill, the "Head chainman" must plumb from the desired mark on the top to the ground. If uphill, the "rear chainman" must plumb from the point on the ground to the point on the chain. When the ground is uneven, each chainman may have to use the plumb bobs.

Distances in some of the older surveys are recorded in "engineer's chains" or "Gunter's chains". An "engineer's chain" is 100 feet in length. It is made up by 100 links, each 1 foot long. Measurements made with the engineer's chain are easily reproduced with our present chains or tapes.

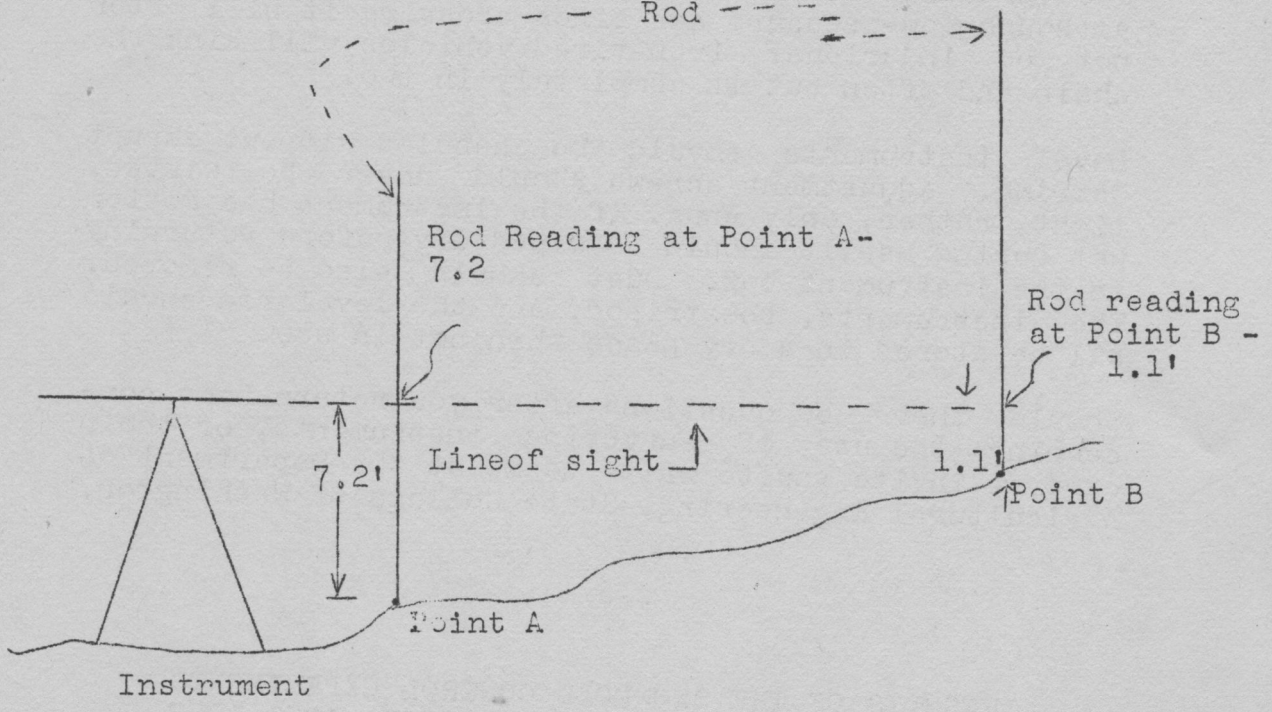
The "Gunter's chain" is 66 feet long and composed of 100 links, each 7.92 inches long. The Gunter's chain is 4 rods in length and 80 of them make a mile. Further, 10 square Gunter's chains are 1 acre. When distances are recorded in gunter's chains it is necessary to be careful to convert the number of correct distances in feet.

Vertical Measurements are Read With a Level Instrument

The most common instrument for measuring vertical distances is called a level. The level is a telescope equipped with an "eye-piece" and cross-hairs" to control one's line of sight when one looks through it. The telescope has a "spirit level" type leveling

bubble at such that when the bubble is centered the telescope is exactly level.

When one looks through the level to the level rod, the cross-hair bisects the rod at the level line of sight. Since the rod is marked off in feet, beginning with zero at the bottom of the rod, the "rod reading" is simply the distance from the level line of sight down to the point.



In this example Point B is 7.2 - 1.1 equals 6.1 feethigher than Point A.

For example, if one read 7.2 when the rod was held at one point, it would mean that your instrument was 7.2 feet higher than the point. Then if the rod was held at another point and your instrument reading was 1.1, your instrument would be 1.1 feet above the second point. Therefore, if the level instrument is 7.2 feet above one point and only 1.1 feet above the other, the latter point would be 6.1 feet above the former. This is the principle by which verticle distances are measured.

Surveying Instruments are Precision Equipment:

Surveying equipment, including chains, is precision made. They should be cared for accordingly.

The chain should be wiped clean and dry after using. It should be coiled up or wound on a reel and stored in a dry place when not in use. When in use, it is good practice to prevent the chain being run over, although low-pressure car tires crossing it will often not be injurious. Iron-tired vehicles will kink the chain and often cut it completely in two.

Level instruments should be handled without abrupt jarring. Adjustment screws should never be twisted, tight, rather, only snug. If the instrument has gotten wet during use,it should be wiped dry before returning to the instrument box. Dust should also be removed. The instruments, the tripod, and the level rod should all be stored in a dry place when not in use.

Should there be questions after you return home concerning the use of surveying instruments, or their care, I invite you to write to me at the Department of Agricultural Engineering, State College of Washington.

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RESULTS OF THE SNOWMOLD CONTROL EXPERIMENTS AT PULLMAN AND SPOKANE, WASHINGTON, 1951-1952

Conducted by Jack P. Meiners
Washington Agricultural Experiment Station
Department of Plant Pathology and Inland Empire
Greenskeepers Association

The results of the National Turf Fungicide Trails on control of snowmold on turf at the WSC Golf Course in Pullman and at the Indian Canyon Municipal Golf Course in Spokane are given in the attached table.

The treatments were applied in early December just before the first snowfall. The winter was very favorable for development of the snowmold, especially at Pullman, so that the treatments received a very good tests.

At both WSC and Indian Canyon, Puraturf and PMAS were outstanding in controlling the snowmold. Calochlor was nearly as effective in both places.

In addition, at Spokane, Tersan and Spergon gave fair control but these same materials gave little or no control at Pullman where the snowmold infestation was much more severe.

On the other hand Cadminate gave fair control in Pullman but little control in Spokane.

In most cases, the dosages used in these experiments were lighter than recommended for snowmold. It is believed that when snowmold is especially severe greater dosages of some of the materials would have produced nearly perfect control.

An additional experiment to compare wet vs. dry application of treatment was made at Pullman. The method of application used seemed to have no effect on the degree of control obtained except in the case of Cadminate where the dry treatment gave better control than the wet.

The effect of 15 fungicides on the percent of snowmold on golf greens in Pullman and Spokane.

Treatment	Dosage/1000 sq. ft.	Average Percent Snowmold	
		Pullman	Spokane
Check	-------	96	18
Actidione	200 ppm.	97	18
Crag (531)	3.0 oz.	87	22
1025	3.0 oz.	90	19
Calochlor	2.0 oz.	38	5
Calocure	2.0 oz.	74	9
Cadminate	1.6 oz.	57	9
Puraturf	0.2 oz.	24	1
Puraturf 177	1.6 oz.	91	16
Puraturf GG	.05 pts.	83	6
PMAS	0.1 pts.	23	1
Special Semesan	3.0 oz.	90	11
Tersan	3.0 oz.	96	3
Spergon	3.0 oz.	96	4
Tact-C-Lect 4.75	1.5 oz.	76	.6
Orthocide 406	3.0 oz.	92	9

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YOU CAN'T AFFORD TO BE WITHOUT A TURF NURSERY

Charles G. Wilson
U.S.G.A. Green Section

In recent months your Green Section regional office has had many inquiries from the Pacific Northwest concerning the value of Meyer Zoysia and Merion bluegrass. It is a challenge to turf superintendents to give the public information concerning the adaptability of these grasses. The superintendent should be the first to try new materials, because by so doing, he furthers his own position as a turf specialist. The place to try an new grass or chemical is in the turf nursery.

Snowmold disease has been and will continue to be a serious problem in Eastern Washington and Oregon. It severly attacks seaside bent and Poa annua turf. Dr. Boyce in Canada has found that Congressional (C-19) bent is highly resistant to snowmold - yet how many superintendents in these areas have tried Congressional bent in their nursery?

Pearlwort is a serious pest in putting green turf throughout this entire area. It has been proven that aggressive improved bents will keep it in check. Doesn't it make sense to experiment with improved grasses as well as magical chemicals in fighting your weed and disease problems?

The turf nursery is the place to test and try. It is your club or turf installations protection against disaster. Truly, a nursery can be likened to an insurance policy. It is your bet that trouble won't occur, and protection when it does. There always is a need for patching material on any turf installation. The weather elements, mistakes, and in some instances vandalism can wipe out a good stand of turf.

Correction of such damage is rapid and much less painlesswhen you have a turf nursery. New chemicals may be tricky to use. It is far better to ruin some nursery turf while experimenting rather than number-18 green in front of the clubhouse.

The cost of developing and maintaining a turf nursery may be less than you realize. Calcium Cyanamid and Methyl Bromide can be used to sterilize the soil and thus provide weed-free seedbeds. Proper location near the barn assures that materials and maintenance equipment are close at hand. A little increase material of improved grasses can be secured at slight cost.

For instance, Bob Scott, superintendent, Five Farms Country Club, Baltimore, Maryland, increased nine 2-inch plugs of an improved bent into ten 135-feet rows and a 300 square foot putting sod in 2 years. Yet we still hear that it is cheaper to seed than stolonize. Clif Runyan, Superintendent, Spring Grove Cemetery, Cincinnatti, seeds Merion bluegrass at 10 ounces to the acre! Under favorable conditions he has an acre of Merion nursery sod in 1-year at a cost of about $4.00! Eb Steiniger, superintendent, Pine, Valley Golf Club, New Jersey, has about 5 acres of nursery area on his practice driving range. Different grasses, fertility rates, water management, etc. are under test where the members can not only use the area, but also can observe the progress being made.

Conversely, many small homes in the Mid-Atlantic area have established 10' x 10' nursery plots in their back yard for increase of turf grasses adapted to their area. This area is used for plugging material to plant the remainder of their lawn area.

The Mid-Atlantic Association of Golf Course Superintendents has made an exhaustive survey on the value of turf nurseries. The Association's published findings are as follows:

VALUE OF TURF NURSERIES

1. Economic - nursery pays for itself many times over the cost of establishment and maintenance.

2. Nursery grown stolons give much quicker cover than seed in any new construction.

3. Putting Green Nursery provides an ideal source of improved bents for introduction into an existing green. Cup changes taken from the nursery will convert an old green to a better turf, painlessly and at slight cost.

4. A nursery is the ideal testing ground for new fungicides, herbicides, and fertilizers.

5. A nursery makes the superintendent part of the research team. It is a natural proving ground. Recommendations from experiment stations and the Green Section must be finally tested under your growing conditions.

6. A nursery keeps employees busy when they cannot work on the course.

7. A nursery aids in identification and enhances

superintendents position as a turf specialist. It stimulates public interest in better grasses.

8. A nursery is a lever to action. Members can be sold on the value of new strains and practices if they see good performance in the nursery.

9. Improved strains of grasses fight Poa annua and other weeds.

10. The nursery is a source of income for the club.

11. Essential in a National Emergency.

I shall close my talk on a note of caution. The turf nursery is like maintenance records in that it must be managed properly and under constant observation to be of the utmost value. It is far better to have small plots properly maintained, rather than a large area which is neglected. When given the care it deserves there is no question but what you can't afford to be without a turf nursery.

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WEED CONTROL IN TURF

Lowell W. Rasmussen
Agronomy Department

Research studies on turf weed control are few and scattered. Consequently, many problems cannot be answered definitely. Much of the information presently available has developed from years of field application and observation. Turf managers who have been doing weed control probably have as much information on the subject as anyone. Therefore, in this discussion I will only attempt to give you some suggestions and then allow time for you to discuss or present some of your findings.

One important point or step in weed control is knowing the kind or kinds of weeds to be controlled and also knowing something about the growth habits and characteristics of those weeds. Some weeds may really be identified by yourself, your County Agent, or County Weed Supervisor. Other weeds, however, appear occasionally and present a distinct problem of identification. We in the Agronomy Department are able to

identify some of the more rare weeds. The Hervarium of the Botany Department here at W.S.C., or similar places at other colleges and universities have all the facilities and know-how to identify plants. When sending in plants for identification, get a good-sized specimen if possible and put it in a plastic food bag to keep it fresh. It is very helpful and many times absolutely necessary to have the flowers and seeds. It is also a help to know where the plant is growing. In other words, don't just send in a very small piece of a plant with the question, "What is it, and how do you control it?" Give some information about the plant as an aid in identifying and recommending control measures.

Much time and material may be lost in attempting to control some weed species which you do not know. That particular plant may be highly resistant to the spray you choose to apply. Some plants may be very resistant to some weed control sprays but susceptible to others. Of course, some plants are resistantto nearly all herbicidal chemicals and cannot be controlled selectively; that is, without harm to the turf or other nearby plants.

Now, a few suggestions about weed spraying. A problem that presently demands our major attention is damage to desirable plants. Too often operators of spray equipment assume that weed sprays will kill only weeds. That certainly is not true. Many people use 2,4-D and similar herbicides without a thought that they might damage or kill non-weed plants. A characteristic of such herbicides as 2,4-D is the distinct effect produced on some plants by a very small quantity of spray.

Damage to desirable plants may result from several sources of 2,4-Dor similar materials. It is strongly urged that you and your operators recognize these danger sources and do everything to guard against them. To enumerate, these sources are:

(1) Direct application to desirable plants by improper control of spray boom or hand gun.

(2) Vapor from volatile ester formulations drifting from sprayed area to sensitive plants.

(3) physical drift of spray as very small droplets or dust particles from sprayer to sensitive plants.

(4) Careless storage and handling of herbicides.

(5) Improper disposal of empty containers.

(6) Multiple use of sprayers without thorough cleaning.

It is important not to use volatile ester formulations of 2,4-D 2,4,5-T or M.C.P. There is no such thing as a non-voltile ester. There are now some low-volatile esters, but they may cause some damage unless all precautions are followed. Generally, the amine or salt formulations are safest.

To reduce physical drift, use low pressure -- not over 30 p.s.i. at the nozzles. Do not use orchard type hand guns. It is better tomake or buy hand guns or booms having the same kind of nozzles as those on the boom, and use only 30 p.s.i. pressure. Never spray when the wind exceeds 5 MPH, and never spray on the windward side of sensitive plants.

Make certain all herbicide containers are well labelled and that they do not leak. When empty, a container should be destroyed or returned, if a returnable drum. Never attempt to burn containers or use any as an incinerator --the fumes may be very damaging.

It is desirable to use a sprayer for herbicides only as complete cleaning is difficult and not positive.

Now, the final information of this presentation is about chemicals. What materials are available, and what ones may be useful to you?

(1) Selective herbicides for foliage applications:

2,4-D -- slats, amines, esters.

2,4,5-T -- amines, esters

MCP, alsoknown as methone, - salts, esters

Selective dinitrophenol

Iron sulfate

Sodium arsenite

PMAS -- phenylmercuric acetate

Potassium cyanate

(2) Soil sterilants. Some may be used selectively, but these are generally used as non-selectives.

TCA -- sodium trichloro acetate

CMU -- chlorophenyl dimethylurea

Sodium chlorate

Borax compounds

Ammate

Carbon Bisulfide

Methyl bromide

Detailed information on the characteristics of these chemicals and some information on their uses is available in a new edition of the book, WEED CONTROL, by Robbins, Crafts, and Raynor. Second Edition, 1952, published by McGraw-Hill Book Company.

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PROGRESS REPORT ON THE PEARLWORT CONTROL PROJECT AT THE WESTERN WASHINGTON EXPERIMENT STATION

Maynard Grunder
Western Washington Experiment Station

This study is being conducted cooperatively by the Pacific Northwest Turf Association and the State College of Washington.

The seedbed on which the turf was established was built up of approximately equal parts of the parent soil (an impervious clay) sawdust, coarse sand, and a well decomposed peat soil. These materials are thoroughly mixed. Enough lime was incorporated to bring the soil reaction to approximately pH 5.6. The depth of the seedbed is about one foot. The seedbed was prepared early in September, 1951 and the plot was seeded to a mixture of Colonial bent and creeping Red Fescue on September 19, 1951.

Early in April, 1952, four series of plots, each series including eleven 5' x 10' plots, were laid out. On April 7, 30 plugs of sod were removed from each plot (with cup-cutters), and these were replaced by plugs of pearlwort, which were obtained from golf courses

in the area. A total of 1320 plugs of pearlwort were planted in the 44 plots.

After placing the pearlwort plugs, all the plots were fertilized and watered uniformly until late July when eleven different treatments were initiated. Before any materials were applied, notes were taken (July 25) on each individual plug of pearlwort to determine its condition before treatment. Notes were taken again on Sept. 27 to determine the changes that had taken place. The results shown in the following table are the combined data for the four plots of each treatment (120 plugs).

The most effective treatments to date have been the .4% 2,4-D and the application of nitrogen at 3/4 lb., (actual N) per 1,000 square feet, but these treatments resulted in severe burning of the turf. Sodium arsenite applied dry at the rate of ½ lb. per 1,000 square feet showed some benefit without injury to the turf. Chlorodane, although very effective in preliminary greenhouse trials, showed almost no effect in this tests. In many instances, an abundance of Poa annua appeared where the pearlwort had been killed or weakened.

A number of treatments were made on a pearlwort infested turf at the Tacoma Golf and Country Club during the 1952 season. The following treatments were applied on July 11, 1952.

1. 2,4-D at .2% water solution (Pennco 2,4-D acid 65.8%)

2. 2,4-D at .4% water solution

3. Chlorodane, 50% wettable at 30 lbs. per acre in water solution.

4. 2,4-D at .2% plus chlorodane, 30 lbs. per acre in water solution.

5. Chlorodane, 30 lbs. (acre) mixed with Nitroganic at 80 lbs. per 1,000 sq. ft. applied dry.

6. 2,4-D - 10 oz. (65.8%) acid per 1,000 plus Nitroganic at 80 lbs. per 1,000 applied dry.

7. 2,4-D - 5 oz. per 1,000 plus Nitroganic at 80 lbs. per 1,000. Applied dry.

8. Sodium arsenite at 2 lb. per 1,000 plus Nitroganic at 80 lbs. per 1,000 square applied dry.

Change in Condition of Pearlwort Following Treatment
(120 Plugs per Treatment)

Western Washington Experiment Station

Puyallup, Washington

Plot	Treatment	Date Applied	Number of Weak Plugs	Number of Dead Plugs	New Infestation (number)	
1	No Treatment	----	8	0	5	
2	.2% 2,4-D water solution	7/29	20	3	5	
3	.4% 2,4-D water solution	7/29	48	7	2	Local areas severely burned
4	Chlorodane, 30lbs. 50% water per acre	7/29	11	1	1	
5	Chlorodane 60lbs. 50% water per acre	7/29	9	0	3	
6	.2% 2,4-D + chlorodane 30lbs. water per acre	7/29	23	1	6	
7	1,000 sq. ft. Nitrogen 3/4lb. per	7/29-9/17	23	1	2	
8	Nitrogen 1½lbs. per 1,000 sq. ft.	7/29-9/17	46	3	0	Severe burning
9	*Sodium arsenite ¼ lb. 1,000 sq. ft.	7/29-9/18	22	10	0	
10	*Sodium arsenite ½ lb. 1,000 sq. ft.	7/29-9/18	32	4	0	
11	*Chlorodane 30# 50% per acre	7/29-9/18	10	3	1	

* Applied dry in mixture with 80 lbs. Nitroganic per 1,000 sq. ft.

In these plots, the applications of 2,4-D in water solution and the dry application of sodium arsenite effectively controlled the pearlwort, but also severely injured the turf.

The dry applications of 2,4-D mixed with Nitroganic proved effective against the pearlwort with relatively little injury to the turf. It was by far the most promising of the treatments made in this location.

On the basis of the results obtained to date in this study, 2,4-D appears to be the most promising of the materials used. Further studies are needed to determine the proper form, rate of application, and method of application for various conditions to obtain maximum kill of pearlwort with minimum injury to the turf. Application in the dry form with an organic fertilizer appears to have definite possibilities.

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ITS'S EASY TO BE A TURF EXPERT

Alfred Slinkard
Washington State College

Does your lawn resemble an abandoned lot? Do you have dandelions in your petunias? Is your city park a refuge for cottontails, gophers, and unpruned trees? Is your golf course such an eye-sore that you are ashamed to take your best friend for a game of golf? These and other turf problems are discussed each year in a two-day turf school at W.S.C.

This school is sponsored jointly by the Agronomy Department of the College of Agriculture and the Northwest Turf Association. It is attended by golf course green superintendents, cemeteryand park supervisors; colleges and high school playground supervisor and others interested in turf. These practical turf specialist meet with scientists from the Agricultural, Colleges of the four Northwestern states, and with equipment, fertilizer,and seed dealers to discuss such diverse turf topics as weed control, use of fertilizers, irrigation and drainage problems, turf disease control, mowing practices, new turf grasses, methods of establishment of turf, landscaping of turf areas, and many other problems.

The first turf conference was held here during May,

1949, at the suggestion of four greens superintendents of golf courses in the Spokane area - Wilfred Brasseau John Harrison, Glenn Procter, and Louis Schmidt.

These men came to the college and told of the need of greenkeepers for information in developing and maintaining better turf. Dean Emeritus E.G. Schafer was instrumental in the organization of this first turf conference, and was very active in the organization until his retirement this past fall. From this modest beginning the conference has expanded to cover the subjects listed above.

The Fifth Annual Turf School was held on the W.S.C. campus November 6 and 7, 1951. One of the most interesting session of this school centered on a discussion by Bob Steiner, member of the University of Washington Athletic Department, on rebuilding of football fields. Three years ago the University football field had lost most of its turf by mid-season and was a muddy orass when the Thanksgiving Day game was played. Steiner, sought advice from State College Agronomists Grunder and Law, and from turf equipment dealers in the Seattle area. Sifting the good advice from the bad, and following the former, Steiner embarked on a rebuilding program that has given the University an outstanding playing field. He corrected soil drainage problems, he moved in top soil rich in humus; he reseeded to a mixture of colonial bent, creeping red fescue, and Alta fescue. He is following a fertilizing, mowing, and irrigation schedule based on the need of the turf. As Steiner put it "A football turf has to be tough to withstand the daily trampling of twenty-two stalwart young men bent on committing mayhem on one another".

Harry Schoth, U.S.D.A. Agronomist from Corvallis, Oregon, discussed new turf grasses. He pointed out that there had been much interest in three new turf plants. These three, U-3 bermuda, Japanese lawn grass and Dichondria have been much in the news. They are all southern plants adapted to southern conditions. "Unless you can bring the southern climate and soil conditions to the Pacific Northwest", Schoth said, "You will not have much success with these plants."

Another newcomer, Merion bluegrass, according to Schoth, has a bright future in this area as a lawn, grass, for fairways and tees and in parks and cemeteries. Merion bluegrass requires less mowing than common Kentucky bluegrass and will form a dense turf with a deeper green color.

If you have a particularly tough site on which you want to establish turf, then you should have heard John Schwendiman discuss this problem.

Schwendiman, manager of the Soil Conservation Nursery Unit at Pullman, described the turf establishment experiment on the big cut on Highway 195 west of Pullman. Results from this experiment, and others like it, should give valuable leads on the grasses to use and methods of establishing these grasses under favorable conditions.

Other high-lights of the conference included a discussion of turf diseases by Jack Meiners, Plant Pathologist at W.S.C., and the use of ornamental trees and shrubs on turf areas by Earl New, Horticulturalist from the University of Idaho.

The next Turf Conference will be held at W.S.C., in November,1952. If gremlins of the green are getting your goat, then you should plan to attend and share your troubles. You will find a most sympathetic audience.

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TURF INSECTS IN THE PACIFIC NORTHWEST

H. S. Telford
State College of Washington

Fortunately, the insects attacking turf are apparently not as troublesome in this area as they are in the eastern part of the United States. They do, on occasion, cause trouble, but with the proper use of modern insecticides, their control is generally successfully achieved. Our problem would be greatly accentuated if we had the Japanese beetle, the Chinch Bug, and higher populations of White Grubs or June Beetles with which to contend. The latter insects are most readily associated with extensive plantings of oak since the adults prefer to feed on the leaves of this tree. This may account for their lack of numbers in our area.

Of the most frequently encountered pests, the sod webworms, cutworms, ants, leaf hoppers, grubs, and earthworms are undoubtedly the most important. From research conducted in the east, particularly in Connecticut, it appears that chlordane is one of the most effective insecticides for the control of most of these turf insects.

In our area we often have large numbers of leaf hoppers building up late in the season, particularly in August and September. Many turf managers are not aware that these active hopping insect are detrimental to the turf, but such numbers as have been observed, certainly cannot contribute to the health and vigor of a lawn. In fact, heavily infested lawns are grayish brown and lack the greenness and vigor of healthy foliage. These insects can be readily controlled with light applications of DDT or chlordane.

Your State College Entomologists are available to help turf men on their insect control problems. It would be helpful however, when inquiries are directed to their entomologists, that the turf manager send in the insect in question in a cardboard box or bottle, or some other container which is not readily broken in the mail. It is only when an insect is received in good condition that a proper identification can be made.

Proper control can be made only when we are certain of the identity of the insect.

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DEVELOPMENT OF A TURF RESEARCH PROGRAM

B.R. Bertramson
Washington State College

These conferences have now been continuing for sufficient time that they provide us with an excellent opportunity to renew old acquaintances. I feel by now that I know nearly all of you and can spot you in the group, but a few of the names still escape me. I will see what can be done about that. It is indeed a pleasure to have you folks with us, and I am happy to have this opportunity to talk to you on a subject that is very close to our hearts. We are all sold on the idea that turf is an indispensable part of modern living. It has a multiplicity of everday uses.

I should like to report to you on some of my activities in support -- I believe of your turf program in the Pacific Northwest. You will recall that last year I discussed with you "Putting the Grasses to Work", in which I suggested that in addition to the golf courses parks and cemeteries, there are also the roadsides to consider. There are some 200,000 acres of right-of-way areas in the state of Washington alone that should be

in grass rather than in noxious weeds, brambles, shrubs brush, etc. Following our meeting here last year, I had an opportunity to carry this message for you to the highway engineers' 1952 Northwest Conference on Road Building at the University of Washington. On this occasion I told the engineers how agronomy could help them with their problems. I pointed out the use of our soil surveys in helping them with their problems of road construction and of anticipating what what these problems might be. Also the soil physics activities in our department were described. I gave particular emphasis to the subject of grassing the raodsides to control noxious weeds and erosion.

Whether I sold this latter part completely or not will have to be left for you to judge. The highway engineers of course are more interested at the moment in the road bed and the parent material of soil formation than they are as yet in the roadsides and their maintenance. As a consequence, they have drawn up a memordandum of agreement with Washington State College for some $9,000 a year for three years. Out of this amount the soil survey program in the Agronomy Department will draw nearly $7,000 a year. The highway people put the project on grassing the highways and studies pertaining to it as a number 2 priority, and we hope that they will not forget about it. If you think it is a good thing, we will do our best to promote this project of applying turf to the roadsides. Perhaps next year we shall have some more research in progress on grassing the roadsides.

The enthusiasm of the highway landscape engineers for grassing the roadsides tempted me to contact your President and Al Law regarding the possibilites of setting up a third sectional meeting for your Turf Conference. In addition to the cemetery and greenskeepers sections, you could have one on highway landscaping and turfing. After all, what is the difference in interest between the maintenance of fairways, cemeteries, parks or roadsides? It seems to be one of scale and degree of intensive management. Therefore, I would like to suggest the possibility of adding a third section for your consideration. If you feel, that you can take on an added section and bring in more of these people, then you might give it a try next year. If you wish to do this, of course, you can instruct your president and other officers. I shall be glad to work with them and with your secretary in developing such a program if you wish and in helping contact those who could be especially interested in this special section of your program.

Here are some of the reasons why it seems to me that a third section on highway landscaping and turfing problems would be a very desirable thing. In the first place, let's not forget the $7,000 a year that the highway people of the State of Washington are providing to help our soil survey so that it can help them. They've got the dollars to help out such a conference as yours in return for the help you can render And you can render a very real assistance. You are organizing and developing an educational program on turf and can scarcely shirk your responsibilities in the application of the program to all problems of the Pacific Northwest. This, of course, will draw, additional presitge, swell your membership, and place you in the enviable position of leadership,which you deserve for the responsibility that is already yours.

I should like to take the opportunity here at this time to thank you and your officers for the excellent support that your organization has given us through your president, Ivan Lee, serving on our Agronomy Advisory Board. This Board ismade up of the president and now one four-year representative from each organization interested in the agronomy program. Your president has been one of our most faithful attendants and has made some very excellent contributions to the thinking and discussions in these meetings. As Dr. French stated yesterday, the agronomy program--like that of any other part of the college--is your program. Where our mutual interests can be developed to help the over-all agriculture and economy of the Pacific Northwest, we should do this. We appreciate the excellent help that has come for your organization and hope that you will appoint a four-year man who will continue to keep close touch with our organization and that your president will also be interested in our agronomy program and how it can help you with your particular problems.

In discussing the development of a turf research program for your organization it seems to me that the excellent information you have received in annual reports in person from the people closely associated with the Midwest Turf Conference at Purdue,namely, Dr. Gerald Mott, Dr. Eric Sharvelle and Dr. Bill Daniel has set an excellent pattern of how a turf research program should be developed. It appears that you have been following along the pattern quite similar to theirs,only some years behind, since you got a later start. I was particularly impressed with some of the points that Bill Daniels brought out yesterday about the growing number of problems with which they are confronted and particularly the importance of the

extension aspects of the program. In other words,once the information is found,it is necessary to develop a way by which this information can get out to all of the supporters of the program and those who can profit by it. I believe that is true in any phase of an agricultural program and that the dollars which you would spend for carrying the information back to your people would be as well rewarded as those that are spent on doing the research itself. This, therfore, requires careful consideration in developing the educational and extension aspects of your program.

Getting back to the subject of the research program itself, it seems that you are organized the interests of a number of specialists who are rendering real help to you. I think this is evidenced very well by those who have participated on your programs here. I see the names of horticulturists, entomologists, agricultural engineers and plant pathologists on the subject matter part of your program. You do have some research work going at western Washington, in which you have participated and actually have done the work and made contributions toward it in other ways. There is some research work going on here in the various departments that is beneficial to you, as evidenced by the participation of the specialists on your program yesterday and today. I can scarcely add more from our departmental viewpoint than to give your program our blessings and urge that the other departments in Agriculture continue to cooperate as they have in the past in providing you with as much assistance and information through research as they can possibly provide on the limited budget available to them. We are presently devoting about all of the dollars to this program that we can under the budget that is provided us. I am sure that Ivan Lee can point out to you the problems and limitations of an Experiment Station Budget.He has learned all about this through attending our Agronomy Advisory Board meetings.

If you feel that additional work needs to be done at the present time and that money can be provided,then I believe that Washington State College is in a position to arrange for accomplishing that work for you. Once dollars are available, or in sight, for a research and extension program,it requires planning to get the full use out of those dollars. If your organization knows what is presently in progress and then considers what it wants done, then emphasis in terms of dollars and manpower can be placed where it will do the most good. We are eager to have your advice on any alterations or changes within the program so far as our own state-supported program is concerned. We should be glad to

work out an expanded program, with you if additional funds are made available through the efforts of your organization.

Recently we have had an opportunity to obtain a turf specialist with a master's degree. He wanted to come out here either on a full time job or a half time assignment to work on turf problems. Had additional funds been available either for an assistantship or for a full time appointment, here was a golden opportunity to launch our turf research program on a grand scale. Unfortunately our assistantships are mostly those which come from commercial grants in which case the assistant is designated to work on a specific problem--just as though your organization might bring in some money here for someone to work on turf. A few assistantships come from the experiment station. There is a very acute shortage of the experiment station assistantships which can be assigned to various problems. There are so many cereal problems, so many forage crop problems, and so many soils problems that need attention, that turf has some pretty severe competition among these. If it is possible in the future to devote one of the assistantships to turf, you may rest assured that our turf enthusiasts here will be in there plugging to get it.

You may wish to know about what it costs to bring an assistant here. A half-time assistant, working for an advanced degree, costs about $1700 to $1900 a year for half-time salary. The materials, equipment, land, etc. that are needed to carry on research will cost in addition for that graduate assistant, anywhere from $500 to $1500, depending upon the nature of the work, amount of equipment needed, the amount of labor that he needs in addition to his own, etc. I do believe that money towards assistantship or experimental aides will provide you with the greatest return for each dollar spent on a project like this, where we have a staff competent to supervise the work.

Again, I should like to reiterate that first we must decide what needs doing most; and then all look at what we have and what we can contribute toward its accomplishment.

I hope you will set up a committee to provide continuity in the development of ourmutual research and educational turf program. I want to thank you again for this opportunity to discuss these matters of mutual interest with you and to thank you for the excellent support of your officers on our Agronomy

Advisory Board. We shall all look forward with pleasure to further close cooperation with you.

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LET'S PUT THE GRASSES TO WORK

B.R. Bertramson
Department of Agronomy

The fine golf courses and the excellent condition some of our city parks and cemeteries are evidence that first class turf specialists are at work. Because, these are associated with our interests of amusement or sentimental regard for those who are departed, they come in for the first attention. As an illustration, when serious erosion resulted in desposition of 2 to 4 inches of mud on the college golf course, one of my conservation minded colleagues said, "You will find some general interest in Soil Conservation -- now that it affects people's recreation.

I wouldn't detract for one moment any of the prestige or importance that has rightly been earned by those who are maintaining our golf courses, our parks, or our cemeteries with a beautiful covering ofturf. More power to them! And I hope that through conferences such as this, these turf specialists will gain information that will permit them to reach even higher levels of perfection in the areas under their supervision.

My contention is that many, more homely and practical needs also demand the attention of you turf specialists. You who are sold on the great utility of grasses and have become acquainted with the intricate details of its management, are the missionaries who should carry out a broad turf educational program on its general usefulness. Through your educational program, you'll draw strength to this organization and bring added prestige to your profession.

These homely and practical needs for turf specialists are: to put the right kind of turf on all our road banks, road cuts, right-of-ways for telephone, telegraph, power lines, railroad construction, landing, strips, on areas between concrete runways at large airports, to make better use of grasses in our city,state, and local parks, and in times of national emergencies to stabilize new construction areas, for use as camouflage, etc. I think it would be quite a morale

booster if you knew the full acreage requiring the attention of turf specialists in the Pacific Northwest. Perhaps some of you have already compiled the data on golf courses, parks, and cemeteries. I have gathered some information for the state of Washington that may serve as a guide for estimating needs for turf in other states. I hope that these data may create sufficient interest so that your organization will attempt a more accurate compilation.

Highway Turf Requirements

Highway engineers are beginning to appreciate the value of turf joining the hard surfaced roads, and for turf on road banks, cuts, and fills. Their interest is demonstrated by their calling in turf specialists for, their highway conferences. Dr. Mott,who was our guest speaker at this conference two years ago, was called, down to the Highway Engineer's Conference concurrently held on this campus, to tell them about the turf research by the Agronomy Department at Purdue in cooperation with the Civil Engineering Department. The best ratio of soil to aggregates for a good road shoulder that would still grow a good crop of grass for a wearing surface was studied. Dr. Patterson of our staff worked closely with Dr. Mott on these problems at Purdue; and, therefore, is well qualified to carry on such work as is needed along this line for the Pacific Northwest.

As you came into Pullman from Colfax, you may have noticed some work that is being done on the huge road cuts near Pullman. Our forage experts, led by John Schwendiman of the Soil Conservation Service Nursery, contacted the state Highway Department and made arrangements whereby they could set up a demonstration and experimental area onsome of these cuts. I hope in the suceeding years as you drive this stripof highway, you will observe how the different grasses and legumes under different cultural practices,have fared so far as stabilizing the bank is concerned. We hope to undertake a certain amount of this kind of research work at W. S. C. The only way to provide new and useful information to you turf specialists is by a vigorous program of research. We will always be interested in your special problems and hope that you will share with us an interest in projects such as this which we initiate. We hope you will carefully formulate problems requiring attention and bring them to us through your Northwest Turf Association.

Through the kindness of Mr. H. C. Rowley of the Depart-

ment of Highways located at Spokane, I have these statistics on our Washington Highways. The state highway system consists of 6,452 miles. The county road system contains approximately 36,000 miles. Approximately 1,431 miles of highways were improved during the last year. Of this, 167 miles involved, grading which required new cuts and fill slopes; 93 miles were state roads, 74 miles were county roads. These 167 miles certainly require turf on the shoulders banks, and fills. It is likely that each year will find a similar amount of construction.

Why is turf of importance in highway construction? Of course the appearance alone could not justify the expense in grassing these areas, although it is an important factor. Here are the real selling points:

(a) The proper mixture of aggregate and soil on the shoulder to join up with hard surface road and then seeded down to a tough turf is the best solution to this problem. It saves on maintenance, and more important it helps save lives. All too often, the cause of accidents can be traced back to a vehicle hitting the soft road shoulder at high speed and going out of control.

(b) A good turf of the right kind of grass stabilized at the time highway construction is completed, denies to weeds on of their most popular and potent abodes. Weeds are good hitch-hikers. The migration of many of our noxious weeds can be traced to railroad rights of way or highways. The seeds are carried on these thoroughfares by man and find a ready seed bed in the disturbed soil of the gradings for these routes of transportation. No weed control program today can be really effective so long as highways and railways transacting the areas are a haven for, and a constant source of, these noxious weeds. It has been learned that certain grasses will control some of the noxious weeds, and few of them will invade a good sod. Therefore, the small additional cost to get these areas grassed, would save the local taxpayer many dollars in his weed control program.

(c) A sign near LaCrosse, standing in a burned wheat field last summer, read, "A flipper did this!" Downy Brome is the common roadside weed along much of our Washington highways. Its early maturity, its fine stem, and fuzzy seed

make it natural tinder and a serious fire hazard adjoining our wheat fields. By contrast if these roadsides were seeded to Crested wheat grass, the hazard of fire would be almost completely eliminated. It would be the best kind of fire insurance we would have for our wheat fields. Under higher rainfall, other grasses would prove better adapted; and although they may be less fire resistant than Crested wheat grass under higher rainfall conditions this would not be such an important factor.

Air Field Turf Requirements in Washington

Mr. Trevor A. Steele, Airport Agronomist for the Civil Aeronautics Administration located in Seattle, kindly supplied me with the available information on the needs for airport turf. Where the soil has adequate load bearing capacity and a good stand of grass can be established, this turf is usually considered as a satisfactory wearing surface for personal and secondary airports. There are presently 46 personal and secondary airports in the state of Washington, according to the 1951 National Airport Plan, and 49more are proposed for future development. It is estimated that the area of each landing strip amounts to 12 or 15 acres. There are about 1300 registered small aircraft at the present time in Washington. It is likely that the demand for local air strips will increase with the growth of aviation.

Home bases from which Washington Flying Farmers operate also require the attention of turf specialists for establishing suitable landing strips. There are approximately 210 Flying Farmers in Washington. They need a home landing strip of approximately 5 acres.

Park Requirements in the State of Washington

Mr. Charles A. DeTurk, park planner for State Parks and Recreation, Commission, located at Seattle, informed me that the State of Washington has 83 parks and recreation areas totalling over 57,000 acres. He estimates that about 10 percent of the total area is in some kind of turf. The city of Seattle has 2,941 acres of park property. The majority of the city park areas, with the exception of about half of the 13 major parks, are "man-made" and generally covered with turf for the protection of the land, sake of appearance, or to provide playing surfaces of some kind.

Every town with any civic pride usually has some park areas where the advice and help of a turf specialist is needed. I don't mean by this that every town can employ a full time turf specialist, but there are responsibilities which need covering either by a roving turf specialist or by the turf specialist from the nearest county extension office, golf courses, or city park that employs one. All of us should help local groups in improvement of park and roadside areas as a part of our educational turf program.

Right-of-way Requirements for Public Utilities

I was informed by a herbicide specialist last spring that in an area near Seattle it cost a utility company as much as $500 per mile to cut out brush that grows up and interferes with the wires and maintenance of the lines. A year later, the brush was well on the way to recovery. They have found that a more permanent procedure would have been to treat the cutover area with 2,4-D plus 2,4,5-T at a cost of approximately $35 per mile and have almost complete eradication of subsequent brush growth. At least this would be accomplished after a few years of herbicide treatment. What are they accomplishing? Indirectly they are going into a kind of turf management through eradication of brush by the use of herbicides. No doubt, the establishment of a heavy stand of grass when the utilities were first installed would have been a more direct, approach and then with subsequent herbicide treatments the costly cutting out of brush regrowth could have been avoided.

On the rights-of-way for railroads, telephones, telegraph, and power lines, the ideal vegetation is grass. It creates no obstacle in maintenance of the utilities, and at the same time is the best insurance for erosion control.

In conclusion, let us review in terms of acres, the areas inthe state of Washington needing turf and the specialists to install and maintain it:

Highways at 4 acres per mile (a strip 16 feet by each side)	168,000 acres
Railways at 4 acres per mile	15,000 acre
Telephone, Telegraph and power lines (in forested areas 4 acres per mile)	15,000 acres
Airstrips and grassing adjacent to runways	3,000 acres

Village and city parks		20,000 acres
Golf Courses		20,000 acres
Cemeteries		15,000 acres
	TOTAL	256,000 acres

Of course, many of these acres require less intensive treatment than our golf courses. But all of them can best be handled through the advice and supervision of a turf specialist. These estimates on needs from a single state give some idea of the great demand that exists for turf specialists. Some of these needs are already in the hands of capable turf specialists;but the bulk of the needs are not yet realized by the public. The big educational task challenges your profession and your Northwest Turf Assocation.

Here are some suggestions on how to do it. As you visualize the broad and specialized interests of these various groups, you might divide your annual meeting with a general meeting for one day on general principles. For the second day, set up special sections for instance, one on highway turf problems (call in the highway engineer) and time it to concide with their meetings, one on parks, and one on golf courses. If these are set up to fit the needs and sold to the people concerned, your educational program will be launched. Through special program committees, your organization can formulate the problems and topics which you wish brought to the attention of the entire group and handled by specialists at the annual conference. Your membership can take the initiative in organizing local groups by special problem areas, for example, Western Washington and Oregon, the Inland Empire, Yakima Valley, etc., to take up their special problems with qualified specialists in that area or brought in from the State College. In this way the proceedings at the Regional Conference can serve as a handbook or manual for turf specialists. And last but by no means least your organization can examine the turf research programs of the State College, you can advise on research to be undertaken, and you can go to the legislature through your organization to urge that funds to do the research are provided. This is a Constructive progressive program to serve the interests of turf improvement and management in the Pacific Northwest. More power to you!

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1952 TURF CONFERENCE REGISTERED ATTENDANCE

Barnes, L. D.	Cedar Hill Golf Course Victoria, B.C.
Bauman, Milt	Kellogg Golf Club Pinehurst, Idaho
Bishop, Forrie	Kenniwick Golf and Country Club Kenniwick, Washington
Boyd, Mavor S.	Highland Golf Course Billings, Montana
Brasseau, W. C.	Downriver Golf Course Spokane, Washington
Buckley, W. K.	Elks Golf Course Colville, Washington
Burkette, A. R.	Balbraith and Co. Seattle, Washington
Copley, R.	Power Mower Sales, 712 Humbolt St. Victoria, B. C.
Craner, Ernie	Supt. of Parks and Recreation Twin Falls, Idaho
Crim, R. W.	Wellington Hills Golf Course Woodinville, Washington
Daniel, William H.	Department of Agronomy, Purdue Lafayette, Indiana
Edmunds, Earl Jr.	Peninsula Golf Course Long Beach, Washington
Everhart, Cliff	Manito Golf and Country Club Spokane, Washington
Federspill, Fred	Waverley Country Club Portland, Oregon
Finaly, R.	Seattle Golf Club Seattle, Washington
Fluter, Edward	923 N. E. 155th Portland 16, Oregon
Forsgren, Dick	Rocky Point Golf N.A.S. Whidbey Island, Washington

Gill, R. H.	Willard Egt. Ltd. Vancouver, B. C.
Gordon, R. S.	Uplands Golf Club Victoria, B. C,
Greco, Joe, Green Supt.	Brookdale Golf Course Parkland, Washington
Grunder, Maynard S.	Western Washington Puyallup, Washington
Hammar, Geo.	Parks and Cemetery Caldwell, Idaho
Hamon, Peter J.	King Brown Gardens Caldwell, Idaho
Harrison, John	Hayden Golf Club Hayden Lake, Idaho
Harvey, George	Astoria Golf and Country Astoria, Oregon
Hedlin, William A.	American Cyanamid Co. Box 307 La Conner, Washington
Howie, John	Multonamah Stadium Portland, Oregon
Johnsen, J. G.	Golf Club House Pullman, Washington
Johnson, Frank B. Dale	Evergreen and Washelli Cemetery Seattle, Washington
Kalita, John	Lincoln Memorial Park Portland, Oregon
Lee, Ivan W.	705 - 4th Avenue Seattle, Washington
Little, William W.	Corvallis Public Schools Corvallis, Oregon
Macarr, A. Vernon	202 Central Building Victoria, B. C.
Main, H.	Broadmoor Golf Club Seattle, Washington
Mascaro, Tom	West Point Products West Point, Pennsylvania

McCracken, Lester	Union Farm and Garden Supply Boise, Idaho
McLerran, James H.	Rm. 105 Eng. Lab., Washington State College Pullman, Washington
Merrick, Jay	Calvary Cemetery, Tacoma, Washington
Mills, Claude	Chas. H. Lilly Co. Portland, Oregon
Munro, G. W.	Rt. 2, Box 38 Bothell, Washington
Noer, O, J.	Milwaukee Sewerage Commission Milwaukee, Wisconsin
O'Brien, J.	Capilano Golf and Country Club Vancouver, B. C.
Pearce, James F.	Route 6 Wenatchee, Washington
Proctor, Glen	Rainier Golf Course Seattle, Washington
Quast, Tom	Cedarcrest Golf Course Marysville, Washington
Rasmussen, Chas. M.	Western Washington Exp. Station Puyallup, Washington
Reynolds, H. W.	Rut. 2 Mt. Vernon, Washington
Robey, Glen, Gren.Supt.	Municiple Golf Course Rt. 3 Twin Falls, Idaho
Rogers, C. T.	3135 Western Avenue Seattle, Washington
Schrader, W. H.	Longview Golf Club Longview, Washington
Smith, A. C.	Victoria Golf Club Victoria, B. C.
Steddom, Mike	U. of O. Athletic Fields Eugene, Oregon
Storlie, Loyd R.	Sutp. of Grounds E.W.C.E. Cheney, Washington

Strahl, W. H.	Bentley Milorganite Seattle, Washington
Strang, Archibald A.	V.A. Hospital Spokane, Washington
Toppins, Thos. W.	Tacoma Cemetery Tacoma, Washington
Tucker, W. H.	Plantation Golf Course Boise, Idaho
Tucker, M. B.	Plantation Golf Course Boise, Idaho
Vandiver, J. E.	New Tacoma Cemetery Tacoma, Washington
Wade, Rolland S.	507 West Chestnut Walla Walla, Washington
Weisenberger, L. W.	Supt. of Parks, Engineering Wenatchee, Washington
Wieting, Carol	13501-21st N. E. Seattle, Washington
Wilson, Charles G.	U.S.G.A. Green Section Davis, California
Wright, Neal, Agronomist	H. L. Wagner and Sons Imbler, Oregon
Wuest, C. W.	Skagit Golf Club Mt. Vernon, Washington

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