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Massachusetts Turf and Lawn Grass Council
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BETTER TURF THROUGH RESEARCH AND EDUCATION

Turf Bulletin

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Shade Tree Laboratories

M. A. McKenzie, Experiment Station, UMass.

The Shade Tree Laboratories at the University of Massachusetts occupy a building which was completed in 1948 to provide facilities especially designed for the particular needs of basic and applied research in shade tree problems. At that time the current tree program had already been in operation for 13 years in the Experiment Station with a major interest in the Dutch elm disease. Research now in progress on this important project centers about the genetics of the casual fungus and the variable resistance to the disease within elm trees. Refinement of practical measures to restrict the spread of the disease is also under progressive investigation in cooperation with tree departments in the cities and towns.

Pioneer research in shade tree management was started late in the nineteenth century at the Massachusetts Agricultural College, as the University of Massachusetts was first known, and Bulletin No. 170 entitled "Shade Trees" was published as a comprehensive report by the Massachusetts Agricultural Experiment Station in 1916. This historic publication, long since out of print, incorporated results of studies conducted over almost a quarter of a century. The years intervening between then and now have brought challenging new diseases and insect pests of trees. Also, now shade tree survival in competition with the civilization complex and the population explosion is more complicated, even aside from considerations of disease problems. The wide-open spaces have become popular recreation areas, golf greens, and parks, wherein soil about tree roots often becomes compact and relatively impervious to air and water. At the same time, almost universally, American cities and countryside alike have become mazes of "black top" and this relatively new enemy of trees apparently respects no limits.

Faced with these and other twentieth century achievements, like increased extension of overhead wires and highway construction, and reconstruction of every conceivable type, shade tree management faces new and accelerated demands. Fortunately, the variety and adaptability of trees offer ample opportunities to discover proper balance and benefit from shade trees in almost all situations. *(Continued on Page 6)*

Why Irrigate?

E. S. Pira, Assistant Prof.
Agricultural Engineering Dept.
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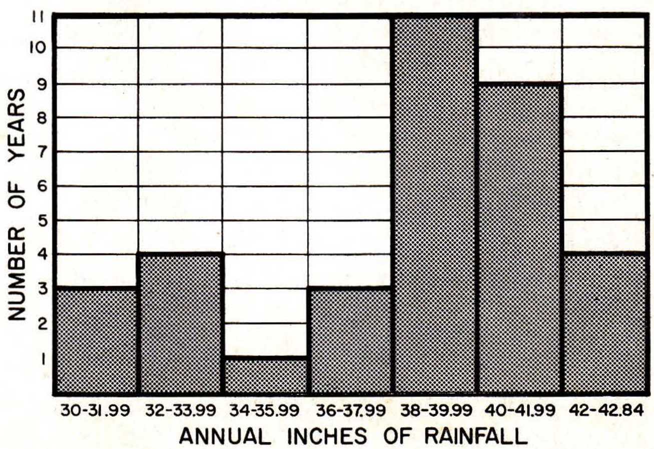
The question of whether supplemental irrigation is needed in Massachusetts seems to plague us especially after a period of drought ocurring during the growing season. For example, the year 1957; interest in supplemental irrigation reached a peak. It was a banner year in irrigation system sales. The Extension Service at the University of Massachusetts was flooded with requests for information and programs on this subject. However, during the 1958-1960 period, there was little need for supplemental irrigation and, consequently, interest diminished only to be somewhat revived in 1961 and 1962.

The primary purpose of this article is to present some data derived from a study of the "Meteorological Observations" records at the University of Massachusetts in Amherst.

First, checking the annual precipitation rate over the past 65 years (1898-1962), it was found that in 1938 a high of *59* inches of water fell as compared to a low of *30.68* inches in 1910. The mean or average for this period was 42.84 inches. Now considering only those years having an annual rainfall less than the annual mean, it was found that of the total 65 years' period 35 years or 53% fell in this category. Breaking this down still further, out of the 35 years, the number of years and inches of rainfall are shown in the following graph.



(Continued on Page 4)

Secretary-Treasurer: 51 Fenwood Road, Longmeadow 6, Mass.

Coordinator: Prof. Joseph Troll, UMass

Editor: Joseph A. Keohane, UMass

Those Who Serve:

All too frequently, in most organizations, the person who receives the fewest accolades for the most time-consuming of elected posts is the secretary. Here, in the Council, we have a man who not only serves as secretary but also as the treasurer. In his dual role, Leon St. Pierre deserves whatever praise we can bestow upon him. Leon was born in Woonsocket, Rhode Island, some 39 years ago. Since that time he has worked diligently to attain his present position as a leading golf course superintendent and as Secretary-Treasurer of the MT&LGC.

Leon was a graduate of the Worcester school system, attended the Worcester State Teachers College, and the Westfield State Teachers College. However, World War II came along and Leon answered the call. As a member of the U. S. Army he served with distinction in a unique branch of the Army, the 10th Mountain Division, an outfit that served our country well during its tortuous cliff-to-cliff campaign in Italy.

After his return to civilian life, Leon had aspirations of being a mortician, but he changed his mind and decided to grow turf from the topside instead. Fortune and good luck are made, not given, and in Leon's case this was true. He decided eventually that working on a golf course is what would best suit him. His first job was at Tatnuck C.C., Worcester, and from there he moved on to become the superintendent of the Oxford C.C., Chicopee. With a wealth of know-how tucked away and a keen perception of good maintenance practices, it was not long before he became recognized as the man who could get a job done — a real good job. That is why today we find Leon as superintendent of one of the classiest courses in the state — the Longmeadow C.C., Longmeadow.

Not only is Leon an active member and officer of the MT&LGC, but he is an active member of the National Association and also the 1st V. President of the New England Association. As if this was not enough, Leon has been appointed Chairman of the Conservation Commission of Longmeadow — a most active organization devoted to keeping Longmeadow and Massachusetts beautiful. Many, many times Leon is called upon to be the guest lecturer for organizations that show an interest in planning and keeping for our children the most beautiful country in the world — America. After all, Leon has a direct interest here. He has three children of his own, two girls aged 11 and 3, and one boy aged 7.

UMass can be proud of Leon as another fine product of our Winter Turf School. So for once, Mr. Secretary-Treasurer, here is an organization that is not afraid to extend bouquets for a fine job. —Editor.

Notice To All Members

The *Turf Bulletin,* which is paid for, and published by the Massachusetts Turf and Lawn Grass Council, is devoted to the dissemination of research and educational articles in the field of fine turf. In addition, as prescribed by the Council's constitution, the *Turf Bulletin* is devoted to stimulating further research in turf. Furthermore, the *Turf Bulletin,* with help from the members and officers of the Council, intends to carry out the purposes for which the Massachusetts Turf and Lawn Grass Council was founded, and that is the fostering and aiding of fine turf research in Massachusetts. The results obtained from our endeavors will not only aid the Council members, but will also aid every citizen of Massachusetts and any others interested in fine turf. The *Turf Bulletin* is your news media in fine turf — with your continued cooperation our publication will become one of the finest in the nation.

The contributors of articles to the *Turf Bulletin* are not paid for their time and energies but give freely in order that you as members of the Council might be benefited and become more aware of what is new in turf, which in turn benefits you. Help further turf research by keeping an active *Turf Bulletin* available.

The editorial staff is always open to suggestions by the membership; perhaps there is some phase of the fine turf you would like to have us discuss in future *Bulletins.* Send suggestions to the editor, Joseph A. Keohane, c/o The Agronomy Department, Stockbridge Hall, University of Massachusetts, Amherst. Keep Massachusetts first in turf, help us to help you — we at the University will do our part — will you?

EXCERPTS of letter received from Prof. R. E. Blaser, Turf Division V.P.I. "We started in a small way with a 9-hole course which will soon be enlarged to an 18-hole course. We were very fortunate in having people interested in developing fine turf help us. Our public relations department saw the need for student and faculty enjoyment, and we knew a need existed for research purposes . . . . ."

U. S. SPENDING ON LAWNS IS NEAR 2 BILLION A YEAR — To make the grass greener on their side of the fence, Americans are spending nearly $2,000,000,000 a year. According to industry figures, this outlay goes into growing grass, killing weeds, controlling insects and that intangible called the status symbol. In 1961, the breakdown was as follows: Tools and equipment, $950,000,000; fertilizer, $150,000,000; pesticides, $100,000,000; seed and other horticultural items, $450,000,000. These are expected to double by 1970.

Ice Sheet Damage

We must distinguish between Ice Damage and Ice Sheet Damage at this time. Ice Damage refers to actual ice crystals being formed inside plant tissue. This destroys the plant tissue and it dies.

Ice Sheet Damage refers to a sheet of ice covering or incasing a plant so there is no air movement in or out.

In brief, then, we feel that the following maintenance practices had little or no effect on the condition of the turf after the ice melted:

1. Fertilization
2. Watering practices
3. Snow Mold treatment
4. Mowing practices
5. The use of arsenicals; as was suspected during the winter of 1959 when we had our last ice sheet damage.

Only two factors seem to be responsible for the damage:

1. Compaction of heavy soils. The sandy greens had lateral air movement under the ice as well as more air storage available due to particle size.
2. Strain of grass. Some definitely are more tolerant than others.

What can be done once it is determined that the grass is dead or almost dead?

We can overseed with Seaside or Penncross seed. Some prefer to mix these with Redtop for quicker germination. I doubt very much whether Redtop will germinate faster than Seaside or Penncross; after all, it is also a bent. Redtop is not a permanent grass and will probably die during the heat of July and August.

After overseeding, an attempt should be made to topdress the seed for a good seedbed. This can be done by aerification and breaking up the plugs for your supply of topsoil, or you may use the Aero Thatch machine to accomplish the same thing. Actual topdressing, unless it is very pure, will only add to the weed population.

Next we must keep the seed bed damp at all times. This often requires hand-watering several times a day if it is a little windy and dry. Some Supts. have used plastic coverings with very good results. If your damage is not severe enough to overseed you probably will only need to plug out the bad spot. If they look like they might make it by themselves you should guard against a disease attack by using your normal fungicides at half strength. An occasional light fertilization with liquid fertilizers will also be beneficial.

RECOMMENDATION:

Do your damndest to grow grass.

Information for this article was obtained from Dr. Mike Britton, Jim Holmes and a text book entitled "Introduction To Plant Physiology" by Curtis and Clark.

(Reprinted Editorial, Mid-West Turf Bulletin, May 1962)

THE WOODPECKER owes his success to the fact that he uses his head ond keeps pecking away until he finishes the job he starts.

Low Soil Oxygen

Most Damaging to Plants During Hot Weather

DAMAGE TO PLANTS from holding water on the soil surface for relatively long periods of time during hot summer weather has been observed to cause cotton bolls to drop and alfalfa to become "scalded." Roots require an adequate supply of oxygen to make good growth and support a vigorous plant. High moisture content and/or soil compaction reduce the amount of oxygen in the soil. The detrimental effects of prolonged watering during hot temperatures may also be related to a reduction in soil oxygen.

Experiments were conducted by the departments of soils and plant nutrition at Riverside, and irrigation and soil science at Los Angeles to analyze temperature influences on the degree of damage to plants under different soil-oxygen conditions.

Sunflowers were grown in specially constructed containers and various air-oxygen concentrations were passed over the soil surface — allowing different amounts of oxygen to be established in the soil root zne. The soil temperature was controlled by placing the watertight containers in water which was circulated and kept at a constant temperature. The circulating "water bath" with plant containers was then placed in a growth chamber where air temperature could be controlled. This arrangement allowed full control of soil oxygen content, soil temperature, and air temperature. Experiments were conducted at soil temperatures of 55 and 75°F and air temperatures of 55, 75, and 92°F.

Graphing will show the reduction in growth of the plants under the lowest oxygen treatment in comparison with the plants used as checks for each temperature conditions. The check plants grew differently depending upon temperature, so a graph can indicate a relative growth rather than an actual growth.

Plants grown under the lowest oxygen treatment failed to survive at air temperatures of 92°F, but they did survive and make some growth at 55 and 75°F. Plants were stunted in growth by the low oxygen treatment. The greatest reduction in growth occurred under higher aid and soil temperatures.

These data indicate that reduction of soil oxygen by such practices as prolonged water application in hot weather, could be causing plant damage. Results of previous experiments have indicated that low soil moisture is more detrimental during high temperatures than under lower temperatures. The grower is therefore faced with the problem of maintaining both adequate water and soil oxygen for plants during high temperatures. Flooded conditions create poor soil oxygen conditions, however. High water intake rates allow the water to get into the root zone in a short time, thus avoiding the need for prolonged flooding and a possibility for excessively low oxygen conditions to develop. Adding excessive water for the purpose of leaching should be avoided during hot weather except to keep damaging salt levels from accumulating in the root zone.

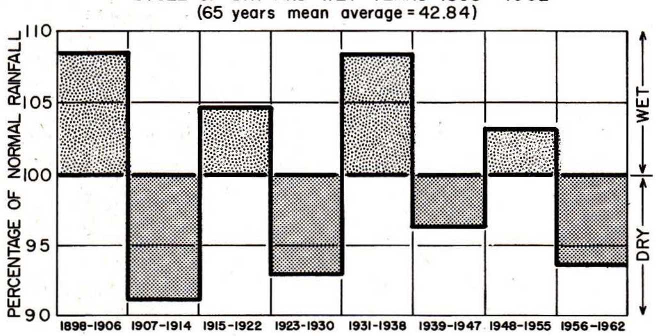
(Above work by J. Letey, L. H. Stolzy, N. Valoras, T. E. Szuskiewicz, University of California. Reprinted by Sprinkler Irrigation Association, California, 1963)

(Continued from Page 1)

The significance of the previous graph is that we are inclined to think in terms of the mean or average and the fact of the matter is that about 11% of the time the annual rainfall was 34 inches or less.

We are all aware of the fact that the total amount of precipitation changes from year to year. However, upon closer inspection the 65-year period revealed that the weather pattern appears to follow an 8-year cycle of wet and dry years as shown on the following graph. It can safely be assumed that we will continue to have wet and dry years in the future.

CYCLE OF DRY AND WET YEARS 1898—1962
(65 years mean average = 42.84)



Cyclical pattern for Amherst, Mass. The total rainfall for each group of years given within this diagram is shown in percent of normal. The pattern for each wet and dry period is approximately 8 years.

Next, consider the need for supplemental irrigation based on the deficit or less than the mean monthly average rainfall occurring during the vital growing season months (May-September).

Here a 60-year period was used (1902-1962) primarily for convenience in calculations.

The table presented on Page 5 again emphasizes the danger of speaking in terms of averages. This can be readily seen by following through on any one of the months. For example, the mean precipitation rate for May is given as 3.88 inches; however, out of the total 60-year period, 6 years or 10% of the time 1.00 to 1.50 inches fell, which would certainly be inadequate for sustaining most crops.

Obviously, annual and even monthly rainfall averages can give a distorted picture as to the actual need for supplemental irrigation.

As noted on the previous table, 16.10 inches of rainfall occurring in August of 1955 would have a significant effect on the annual and overall mean for the month of August. Further, an abundance of precipitation in December will be of little value when averaged out with a deficit during the vital growing season months. Also, a concentrated rainfall in a period of a day or two during a month may indicate a sufficient average yet at the same time a serious drought can occur. Therefore, it is essential to examine the daily precipitation rate as the timeliness of rainfall is perhaps as important as the amount.

Let us briefly review a few terms and basic factors concerning soil-water plant relationships.

Saturation

Often a volume of soil is compared to an ordinary sponge. Water applied to an ordinary sponge will be absorbed until all the pore spaces are filled (saturated). Adding water beyond this point will only result in surface run-off or will be lost by percolation.

Field Capacity

For a period of about 24 hours after a soil has been saturated, water will continue to be lost from the pore spaces by the pull of gravity and is replaced by air. The amount of water held by the soil against the pull of gravity is expressed as the "FIELD CAPACITY" of the soil, commonly expressed as inches of water per foot of depth.

The water holding capacity varies for each soil type.

"Field Capacity" and "Available Water" for Various Textured Soils

Soil Type	*Field Capacity (in./foot) Depth*	*Max. Available Water (in. per ft. depth)*
Sands	1.0	.50- .75
Sandy loams	2.0	.75-1.00
Fine sandy loams	2.9	1.25-1.50
Sandy silt loams	3.7	1.50-1.75
Silt loams	4.4	1.75-2.00
Silty clay loams	5.0	2.00-2.25
Clay loams	5.5	1.75-2.00

Available Water

a. Of the total water held by a soil, only a certain amount is available for plant use. As the available water is depleted, the soil particles hold onto the remaining water with greater and greater tension until the plants can no longer compete. At this point, the plants permanently wilt and die.

b. The available water naturally varies with the depth of the crop root zone. For example, a crop having a root zone of 6 inches will have approximately ½ of the A.W. shown in the above table.

Irrigation Point

Commonly when about ½ of the available water is depleted, irrigation is started and the soil is filled back to Field Capacity.

Evapo-Transpiration Rate (E.T.)

Water is depleted from a soil in two major ways by evaporation and by transpiration. The E.T. rate is influenced by four principle climatological factors that may change daily: (1) Average temperature; (2) Sunshine duration; (3) Relative humidity; and (4) Wind speed.

The daily E.T. rate also varies with the crop grown.

Actually then, a soil can be considered a reservoir for plant use. Water is added by rainfall and lost by evaporation-transpiration. Therefore, by keeping a *Budget* of water added and water lost, it could serve as a guide or indicator as to if and when supplemental irrigation is required.

Now, to consider the last table based on the daily precipitation rates using the "Budget Method", it must be clearly understood that this table is provided strictly for the purpose of illustration. The calculations shown are based on and apply to the following *assumed* conditions.

(Continued on Page 6)

BUDGET METHOD FOR GROWING SEASON

1961

MAY

	Comment E.T.=.10"	Water Lost	Water Added	Balance 1:00
1		.10	Tr.	.90
2			.75	1:00
3	R & P (1)			1:00
4		.10		.90
5		.10		.80
6		.10		.70
7			.48	1:00
8	R & P		.	1:00
9			.23	1:00
10			.13	1:00
11	R & P			1:00
12			.29	1:00
13	R & P			1:00
14		.10		.90
15		.10		.80
16		.10	.09	.79
17		.10		.69
18		.10		.59
19		.10		.49
20		.10		.39
21		.10		.29
22			.14	.43
23		.10	Tr.	.33
24		.10		.23
25		.10		.13
26	0*		.38	.51
27			.54	1:00
28		.10		.90
29		.10	.24	1:00
30				1:00
31		.10		.90
TOTALS			3.20	

JUNE

	Comment E.T.=.12	Water Lost	Water Added	Balance .90
1	7.9*	.12	.05	.83
2	9.5*	.12	.02	.71
3		.12		.59
4		.12		.47
5		.12		.35
6		.12		.23
7		.12		.11
8	8.0*	.12	.29	.28
9	8.3	.12	.49	.65
10			3.72	1:00
11	R & P			1:00
12		.12		.88
13		.12		.76
14		.12		.64
15		.12		.52
16		.12		.40
17		.12		.28
18		.12		.16
19		.12		.04
20		(Irrigate)		1:00
21		.12		.88
22			1.31	1:00
23	R & P			1:00
24	10.9*	.12	.01	.89
25		.12		.77
26		.12		.65
27		.12		.53
28		.12		.41
29		.12		.29
30	5*	.12	.01	.18
31				
TOTALS			6.05	

JULY

	Comment E.T.=.14	Water Lost	Water Added	Balance .18
1		.14		.04
2	(Irrigate)			1.00
3	9.6*	.14	.02	.88
4		.14		.74
5		.14		.60
6		.14		.46
7		.14		.32
8		.14		.18
9	10.4*	.14	.23	.27
10		.14		.13
11		.14		.00
12	(Irrigate)			1:00
13	9.2*	.14	.30	1:00
14	R & P			1:00
15	8.2*	.14	.20	1:00
16	7*	.14	.50	1:00
17			.42	1:00
18	R & P			1:00
19		.14		.86
20		.14		.72
21	10.3*	.14	.01	.59
22		.14		.45
23		.14		.31
24	2.0*	.07	.20	.44
25	4.0*	.07	.48	.85
26		.14		.71
27		.14		.57
28		.14		.43
29		.14		.29
30		.14		.15
31	7.1*	.14	.45	.46
TOTALS			2.83	

AUGUST

	Comment E.T.=.14	Water Lost	Water Added	Balance .46
1		.14		.32
2	5.0*	.07	.10	.35
3	4.0*	.07	.56	.84
4		.14		.70
5		.14		.56
6		.14		.42
7		.14		.28
8		.14		.14
9		.14		.00
10	(Irrigate)		.02	1:00
11	10.5	.14	.01	.87
12		.14		.73
13		.14		.59
14		.14		.44
15		.14		.30
16		.14		.16
17		.14		.02
18	(Irrigate)			1:00
19		.14		.86
20		.14		.72
21	2.0*	.07	.46	1:00
22	8.0*	.14	.10	.96
23			.30	1:00
24			.28	1:00
25	R & P			1:00
26			.85	1:00
27			.13	1:00
28	R & P			1:00
29	8.5	.14	.05	.91
30		.14		.77
31		.14		.63
TOTALS			2.86	

SEPTEMBER

	Comment E.T.=.12	Water Lost	Water Added	Balance .63
1		.12		.51
2	8.0*	.12	.04	.43
3	8.5*	.12	.02	.33
4		.12		.21
5		.12		.09
6	(Irrigate)			1:00
7		.12		.88
8		.12		.76
9		.12		.64
10		.12		.52
11		.12		.40
12		.12		.28
13		.12		.16
14		.12		.04
15	Rain Forecast	.12	.53	.45
16		.10		.35
17		.10		.25
18		.10		.15
19		.10		.05
20	Rain Forecast	.10		-.05
21	0.0*		1.30	1:00
22	R & P			1:00
23		.10		.90
24		.10		.80
25		.10	.10	.80
26		.10	.03	.73
27		.10		.63
28		.10		.53
29		.10		.43
30		.10		.33
TOTALS			2.02	

(1) 24 hours is allowed for the soil above saturation to reach field capacity by runoff and percolation.
* Hours of sunshine

(Continued from Page 4)

1. Soil:
   Available Water = 2″
   Irrigation point = 1″ (1″ of water will fill the soil back up to its holding capacity)
2. Crop:
   Root Zone = 12″ depth
3. Average Daily Evapo-Transpiration Rate:
   May = .10″/day
   June = .12″/day
   July & Aug. = .14″/day
   Sept. 1-15 = .12″/day
   Sept. 16-30 = .10″/day
4. Other Factors:
   a. Allow 24 hrs. for runoff and percolation after a saturating rain
   b. May 1st the soil was at field capacity
   c. The year 1961 was selected as it had a variety of monthly precipitation rates which clearly demonstrates the importance of timeliness of rainfall.

NOTE:

To set up and maintain a budget system correctly, it must be based on the soil and weather conditions for the area to be irrigated.

The "Field Capacity" and the "Available Water" for the soil must be known. The type of crop to be irrigated and the depth of the crop root zone must be considered. Accurate rainfall records must be maintained and finally the climatological factors must be observed in order to establish the daily evapo-transpiration rate.

In the table on page 5 the timeliness of rainfall can be seen by following through for the month of June.

It may also prove interesting to assume you were working with a soil having an irrigation point of only ½ inch of water to check the frequency of supplemental irrigation.

In summary, we can expect that the trend of wet and dry years will continue.

Deficit rainfall occurring during the growing season is of particular concern. Therefore, mean or average rainfall values can provide a distorted picture. As indicated, a high percentage of years had inadequate rainfall which could result in costly crop damage.

Last but not least, evidence indicates the importance of the timeliness of rainfall.

Perhaps these points will help you decide whether or not supplemental irrigation is needed in your operation.

Notice: The *Turf Bulletin* wishes to announce a new policy. Subscriptions are now being accepted for advertising in the *Turf Bulletin*. All agreements will be on a yearly basis. For further information write to:

Joseph A. Keohane
Editor
Turf Bulletin
Stockbridge Hall, UMass.

(Continued from Page1)

In most cases the new look in shade trees requires increased vigilance in the control of fungus and insect pests. Proper treatment of tree pests, given promptly, may avoid costly or serious damage. Therefore, all persons charged with the responsibility for tree care would do well to inform themselves in the fundamentals of pest detection and seek dependable suggestions as needed on appropriate restrictive measures. Almost every highly destructive tree pest has been discovered first in any area by some alert tree officer or tree owner who raised the question of the importance of his own observation with some scientist. The first discovery of the Dutch elm disease in eastern Massachusetts resulted when the curiosity of a tree warden was aroused by the "different" appearance of certain young elm trees, all of a sudden.

Currently, questions about little known diseases of maple, ash and oak trees are being received from tree wardens and employees of State departments who want answers which are not always obvious or readily available. Nevertheless, early determination of tree diseases is of utmost importance to the over-all basic knowledge of tree pests as well as in the practical application of control of pests, and the Shade Tree Laboratories recognize the importance of the essential reciprocal interests in basic and applied research. Accordingly, observations and questions on tree diseases or related problems are always appreciated whether the communication is from a tree warden, State employee, utility man, property owner, greenskeeper, or professional arborist.

ELMS HIT AGAIN BY NEW VIRUS "X" — According to Drs. Horace V. Western and Edward W. Jylkka, plant pathologists of the U. S. Department of Interior, a new problem in virus form is plaguing the elm trees of the nation. During the last ten years the disease has become serious in the Washington, D. C., area and is widespread in the southeastern United States. The virus causes browning of the foliage, gradual deterioration and finally death. There is no known cure for the disease, nor is it known how the disease is spread.

HINTS ON POND CARE AND CONSTRUCTION — An Eastern *Turfletter*, USGA Green Section, recently supplied the following hints on pond care and construction:

(1) To determine the amount of water in a pond . . . multiply the surface area by .4, and this result by one-half the depth of the deepest part of the pond. Your answer here will give you cubic feet . . . and this you multiply by 7.5 and this will give you the number of gallons of water in the pond.
(2) To clear up muddy ponds apply 1,400 lbs. gypsum per acre of pond surface.
(3) To insure that adequate food is available for fish, spread 100 to 200 pounds of 10-10-5 fertilizer per surface acre per year to ponds.

The information was obtained from a Mid-Atlantic conference speech given by Charles P. Merrick of the University of Maryland.

TEN COMMANDMENTS FOR THE GREENKEEPER

1. Thou Shalt Not Kill
   The grass, by overkindness (over-feeding–over-watering).
2. Thou Shalt Not Steal
   That which belongs to the grass (right of heritage).
3. Thout Shalt Not Covet
   The greens of thy neighboring greenskeeper, but so improve thy greens that they will be the equal of his.
4. Thou Shalt Not Propagate
   Those varieties or strains of grass not adapted to thy own conditions.
5. Thou Shalt Not Bear False Witness
   Against any greenskeeper nor bear false witness regarding materials thou doth use.
6. Thou Shalt Not Bow Down and Serve
   False masters — standing up at all times for what you think is right — Never be afraid to say "No!".
7. Thou Shalt Not Be Unethical
   In thy profession — remembering it is only by uplifting work of all greenskeepers that the profession will reach its highest plane.
8. Thou Shalt Not Fail to Use
   The tools that have been given thee (the thinking tools).
9. Thou Shalt Not Fail to Remember
   The teachings of thy Professors — Forgetting panaceas and depending on old reliable standards, but *trying out* the new.
10. Remember the Seventh Day
    To keep it wholly for thyself. Taking one day in seven whenever that 7th day may come, for rest, study, and self-improvement — at least for rest.

(Presented to the 1942 Class of the Winter School for Greenskeepers at the Recreation Conference, Mass. State College.)

NEW DEVELOPMENTS—There is much work being done by Agricultural Research Institutes in connection with the development of sowing pregerminated seeds. Success has already been achieved in connection with some seeds, the germination of which normally depends upon ideal moisture conditions in the ground. Such are, for example, grass seeds of various types. Pre-germinated seed sowing will no doubt gather momentum as it will be possible to successfully plant broadcast crops in semi-arid areas wherever germination failure was prevalent before. The seedling of pre-germinated seed, being a young, tender plant in that stage, can best be done with a broadcaster delivering such young plants onto the ground without any impact or mechanical agitation within the machine.

SOME PEOPLE THINK opportunity is more money and bemoan the the fact that they do not know enough. These people should remember: "The world does not pay for what a person knows. It pays for what a person does with what he knows."

The Aeration System in Some Grasses Appearing Chiefly on Lowland Meadows[1]

A. Kacperska-Palacz

The anatomic study of the intercellular space volumes in the leaves, roots and rhizomes of grasses show that grass species do adapt themselves to wet or dry sites. Species growing on wet or moist soils have larger intercellular spaces than those growing on dry sites. This may be a means whereby certain species of grasses can tolerate wet areas when the supply of air in moist soil may be restricted for the grass roots.

A study was made on the intercellular spaces in plants and also the number of stomata on the following grasses: red top (Agrostis alba), orchard grass (Dactylis glomerata), timothy (Phleum pratense), tall fescue (Festuca arundinacea), tall fescue (Festuca pratense, Muds), red fescue (Festuca rubra), tall fescue (Poa palustrus), roughstalk bluegrass (Poa trivialis), and Kentucky bluegrass (Poa pratensis).

The largest intercellular spaces in grass leaves were found in the two tall fescues and red top. Orchard grass and timothy have medium size spaces while the Poa species have smaller spaces than the red fescue. Older leaves generally have larger spores than the new leaves. Vegetative shoots have greater space volumes than the new generative shoots.

The volume of intercellular spaces of underground roots and rhizomes differs with the grass species. The tall fescue, Poa palustrus, and red top have the largest space volumes, while red red fescue and Kentucky bluegrass have the smallest. The roots of grasses have greater intercellular space volumes than the rootstock. The deeper rooted grasses (tall fescues) have larger space volumes than the shallow rooted grasses (red top).

With regard to the number of stomata in grass leaves there are differences within the species as well as inter-species differences. Poa grasses have a larger number of stomata than the Festuca species. Red top has the smallest number, while orchard grass has the largest. Leaves appearing in a higher position on a plant have more numerous stomata.

It is supposed that the stomata number in leaves is connected with the volume of its intercellular spaces but it was found that there were more numerous stomata in leaves with a smaller volume of spaces.

[1] Summary of a research paper appearing in *Roczniki Nauk Rolniczych—1962* by Dr. Alina Kacperska-Palacz, who did research work here at the University of Massachusetts during 1962 on this problem, as translated from Polish by Asst. Professor John Zak, UMass.

"PACKETS made from polyethylene film only 2/1,000 of an inch thick still had plenty of fertilizer left in them after two years."

Fortunately, the packet has a "built-in" thermostat. "Our tests show that the packets release four to eight times as much plant food in warm weather as they do at 32° F., says Attoe. "They last because they rest when the tree rests."
—Agr. Chem.

TROLLING

AGRICULTURE DEPARTMENT ANNOUNCES FIRST RECREATION LOANS — Overnight accommodations for vacationers and small community golf courses are among the first enterprises financed with FHA recreation loans according to a recent release from the U. S. Department of Agriculture. Fourteen loans have been made in 13 states.

Another happy way to escape the wear, tear, and long hair on the roads, would be to pull into your local "health bar" for a bottle of wine. Recent research at a Widmer's Wine Cellar in Naples, N. Y., shows all 13 elements considered by some scientists as necessary for maintenance of human and animal life are contained in a bottle of modern wine. Healthy escape, eh?

FOR SALE—316 ft. yacht, formerly owned by Trujuillo; luxurious interior appointments; a real steal at $2,000,000! For additional information contact the National Government, Santa Domingo, Dominican Republic.

MANY PEOPLE THINK that they can't have a good lawn because they have poor soil. This is not true. After all, the main function of soil is to anchor the roots, and almost any soil will do that. Soil also serves as a reservoir for moisture, and can provide a storehouse for nutrients if these are supplied in the right form for storage.

CARE OF ESTABLISHED LAWNS—August is the month to repair your established lawn. Overseeding comes first. Scratch the surface of the lawn with a sharp-tined rake, apply fertilizer and sow seed. Cover lightly by raking again. If weather is hot and dry, water thoroughly. Drought is an August lawn problem; a rainless week can be very damaging. So soak your lawn once a week. Fertilization is also important. Start your fall feeding program in late August when cool nights are bringing the lawn back to active growth. Apply fertilizer again in three weeks; this program will send the grass plants on to a good fall growth. If a grass plant is to remain green and healthy, it must be mowed at regular intervals. Mow high, 1½ to 2 inches is about right.

PERSONNEL TRAINING—"The turfgrass is not getting even its fair share of the limited supply in trained manpower. Experience indicates that this may be due in large part to a lack of understanding of the possibilities in this field and an even greater lack of knowledge as to the training facilities available. It seems obvious that, until more serious efforts are made to publicize and disseminate this information, the shortages will continue and may become even more series." This warning of *H. B. Musser* in 1957 still applies today. All the Council members should publicize UMass Turf Educational facilities. This helps your profession, and your University.

MASSACHUSETTS TURF AND LAWN GRASS COUNCIL
INCORPORATED

BETTER TURF THROUGH RESEARCH AND EDUCATION