

1970

Fall 1970

Walter H. Gardner

Fred Cheney

Marlin Ball

James E. Newman

A. S. Carter

See next page for additional authors

Follow this and additional works at: https://scholarworks.umass.edu/turf_bulletin

Gardner, Walter H.; Cheney, Fred; Ball, Marlin; Newman, James E.; Carter, A. S.; Brown, Dwight M.; Mustafa, M. A.; and Letey, J., "Fall 1970" (1970). *Turf Bulletin*. 45.

Retrieved from https://scholarworks.umass.edu/turf_bulletin/45

This Article is brought to you for free and open access by the Turf Program at ScholarWorks@UMass Amherst. It has been accepted for inclusion in Turf Bulletin by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact scholarworks@library.umass.edu.

Authors

Walter H. Gardner, Fred Cheney, Marlin Ball, James E. Newman, A. S. Carter, Dwight M. Brown, M. A. Mustafa, and J. Letey

TURF BULLETIN

MASSACHUSETTS TURF
AND LAWN GRASS COUNCIL
I N C O R P O R A T E D



FALL 1970

BETTER TURF THROUGH RESEARCH AND EDUCATION

Editor
Fred Cheney
36 Hale Dr.
Windsor, Conn.

Secretary-Treasurer & Advisor
Dr. Joseph Troll
RFD No. 2 Hadley, Mass.

Vol. 7, No. 1

Fall 1970

**Massachusetts Turf & Lawn Grass Council
Officers and Directors**

President — James Rintoul

Vice President — Paul Serra

Secretary-Treasurer — Frank Downey

Directors

Charles Mruk	John Moodie
Garfield Leard	Ken Minasian
Joel McKoan	Richard Lussier
Julian Kieliszak	Dale Sandin
Lou Duval	Dr. Joseph Troll
Richard Langevin	George Moore

The Massachusetts Turf and Lawn Grass Council Incorporated is chartered under the laws of the Commonwealth of Massachusetts as a non-profit corporation. The turf council seeks to foster "Better turf through research and education".

More detailed information on the subjects discussed here can be found in bulletins and circulars or may be had through correspondence with the editor.

Permission to reproduce material appearing in this publication is hereby granted, providing full acknowledgment is made of the source and that no change of headings or text is made without approval by the author.

Table of Contents

	Page
How Water Moves in the Soil by Walter H. Gardner	3
Editorial	9
Turf Bulletin's Photo Quiz Fred Cheney	9
Public Relations by Marlin Ball	10
Turf Bulletin's Photo Quiz Answer	11
Climate in the '70's James E. Newman	12
Know Your Seed — Ideas About Seed Quality — A. S. Carter	15
Seed Prices and Handling — Dwight M. Brown	16
Factors Influencing Effectiveness of Two Surfactants on Water-Repellent Soils by M. A. Mustafa and J. Letey	21

—Reprint from *Crops and Soils Magazine*

How water moves in the soil

Five pages of photographs reveal the great diversity in one of the most commonplace phenomena in agriculture

BY WALTER H. GARDNER

WATER—as a liquid or vapor—is nearly always moving in the soil. It moves downward following rain or irrigation. It moves upward to evaporate from the soil surface, or into plant roots and eventually into the atmosphere through transpiration. Horizontal movement also is important as for example when water moves out from an irrigation furrow. Water movement can be in any direction depending on conditions.

Water flows through the open pores between soil particles. In an ordinary silt loam, for example, half the soil volume is pore space. Water and air share this pore space. For most plants it must be possible for air from the root zone to exchange with air from the surface. Air from the root zone is laden with carbon dioxide as a result of metabolism in the roots.

Pores in different soils vary in size and number. Silty and clayey soils generally have smaller pores but many more pores than sandy soils. Because of the number of pores, when silty and clayey soils are filled with water these soils contain more total water than sandy soil with all its pores filled.

Some of the water in soils with fine pores is held so tightly that it is unavailable. Even so, the amount that is available in these soils

Walter H. Gardner is a soil scientist at Washington State University. This article is adapted from a two-part series that appeared in the October and November 1962 issues. Because of a steady demand from teachers and others, the issues have become virtual collectors' items. The editors feel that these dramatically illustrated basic concepts are worth repeating.

(Continued on Page 4)

(Continued from Page 3)

is greater than the amount available to plants in soils with large pores.

Two major forces move liquid water through the soil pores: gravity and adhesion. Gravity is most important in saturated soils. It causes a downward force on water. When a soil is near saturation, the large pores are filled and water moves rapidly through them.

When a soil is not saturated, the larger pores are empty and contribute little to flow. In the unsaturated soils in which most crops grow, the major force moving water is adhesion. Adhesion—together with cohesion, which causes water molecules to hang together—makes water move on particle surfaces and through the finer pores. These are the same forces that make water rise in capillary tubes and that account for the absorptive properties of blotting paper.

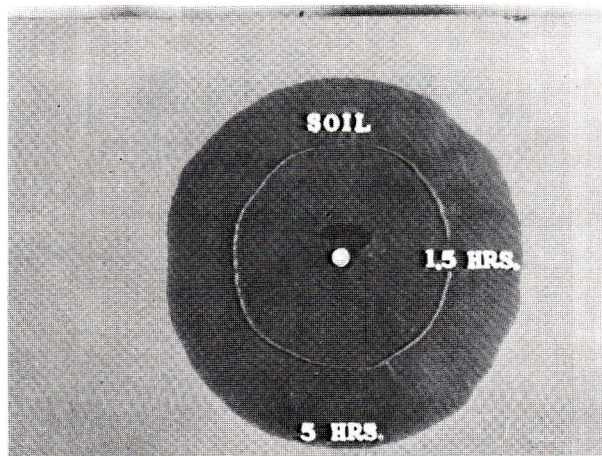
Water moves until the forces balance, at which point water films on soil particles are uniform in thickness throughout any homogeneous soil except for some vertical differences that exist because of gravity. If the soil is not uniform or homogeneous, the portions of the soil that have the smallest pores retain water most strongly.

In stratified soil—soil with various “layers”—the size of the pores in the strata affect water flow. If an advancing wetting front encounters fine materials, the resistance in the extremely fine pores may slow the movement. But the water nevertheless, continues to move. If the wetting front encounters coarse materials, water movement stops until the soil becomes nearly saturated.

Stratified soils also tend to hold more water for plant use than uniform soils. Since

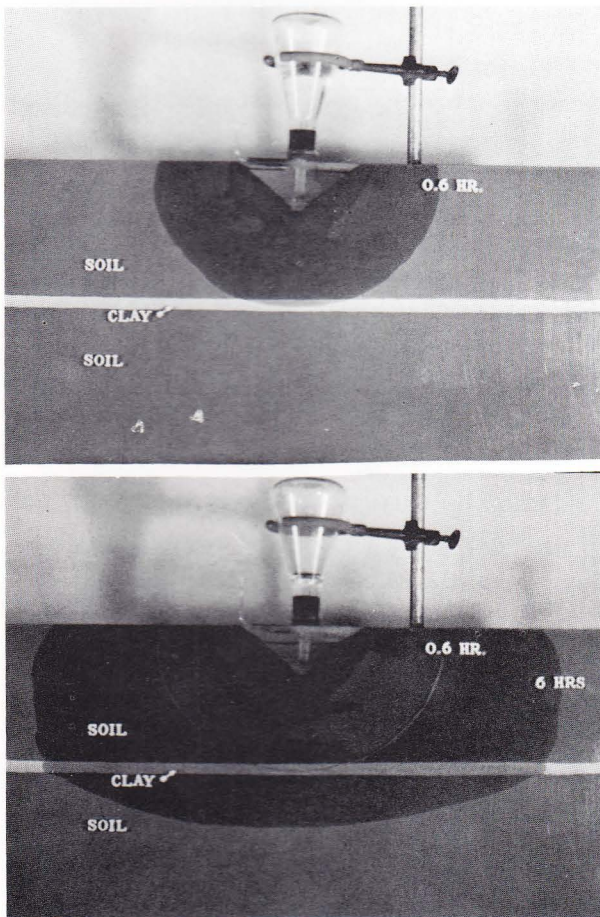
the different layers slow the movement of water, more remains in the root zone.

The photographs on these pages show some basic principles of water movement using artificial soil profiles.



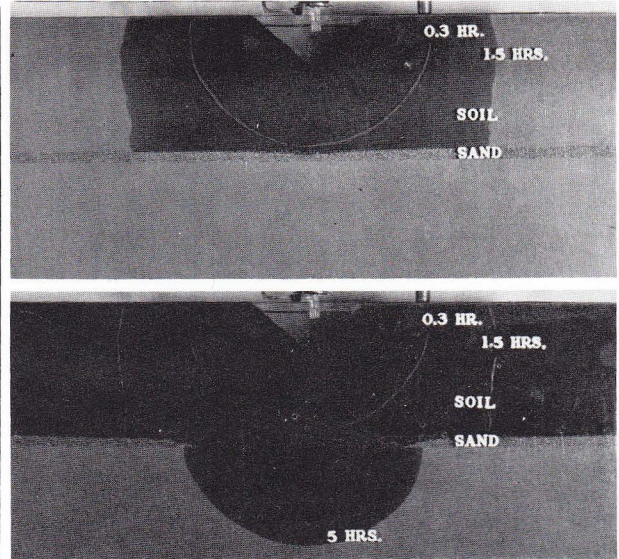
Uniform or homogeneous soils

Water was added to the center of this dry homogeneous soil. Under this unsaturated condition the water moves out almost equally in all directions. Gravity has only a small effect as indicated by the slightly greater downward wetting. Under saturated conditions, or as saturation is approached, gravity begins to play a much greater role in water movement.



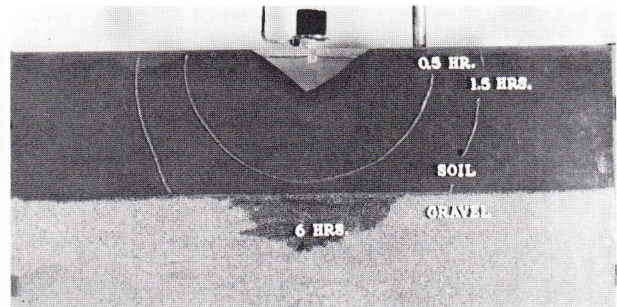
Clay layer

When water reaches the clay, the very fine pores of this layer resist water flow. Although water does pass through the clay, its penetration is so slow that water tables often build up above the clay. Some plow pans act similarly.



Sand layer

When water passes through fine soil and reaches a layer of coarse sand it stops until enough water accumulates to nearly saturate the fine soil. When the fine soil is almost saturated the water readily moves from it into the large pores of the sand. This is much the same as adding water to blotting paper. Only when the blotting paper is near saturation does it begin to drip.

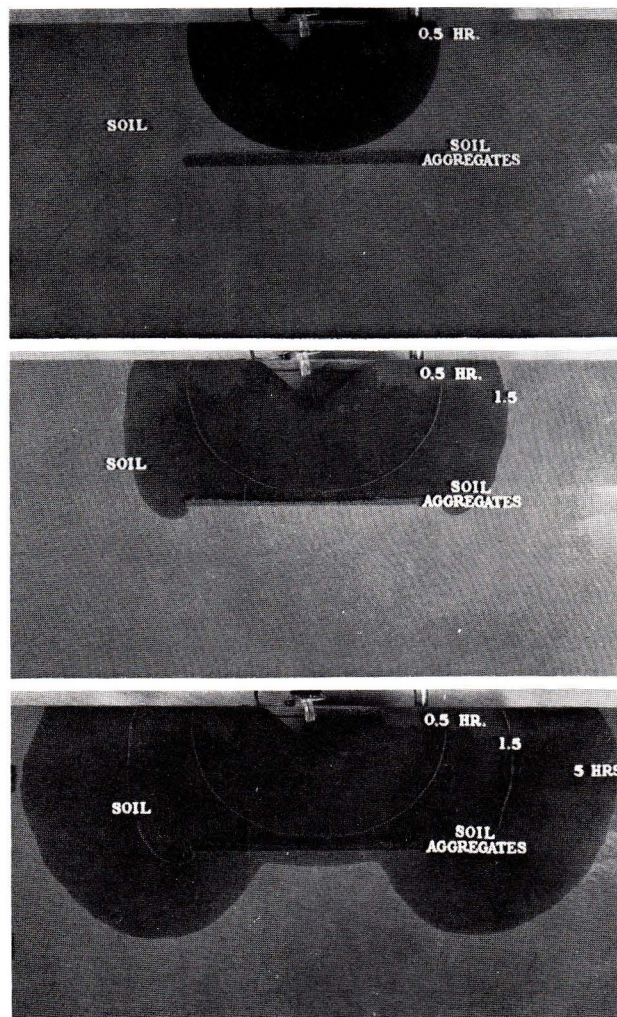


Coarse sand or gravel subsoil

Fine soil overlying a coarse sand or gravel subsoil must become very wet before water will move down through the large pores of the subsoil. Under these conditions the overlying soil holds up to two or three times as much as it would if the coarse subsoil were not present.

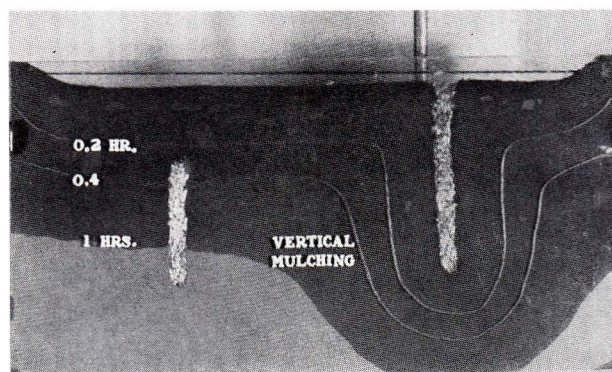
(Continued on Page 6)

(Continued from Page 5)



Layer of coarse aggregates in fine soil

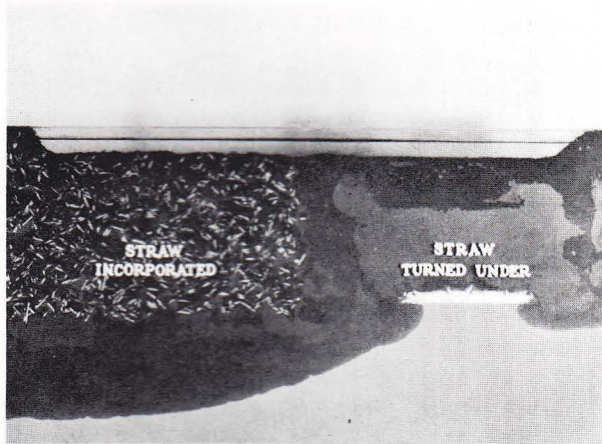
Any change in soil porosity encountered by a wetting front affects water movement. In these three photographs, a layer of coarse soil aggregates acts much like a layer of sand, with one important difference: water can move through the interior of the aggregates themselves. But the relatively small number of contacts between the aggregates limits the amount of water that actually moves through this layer. Only when the soil is nearly saturated does the water move rapidly through the soil aggregate layer. Saturation was not reached in this test.



Vertical mulching

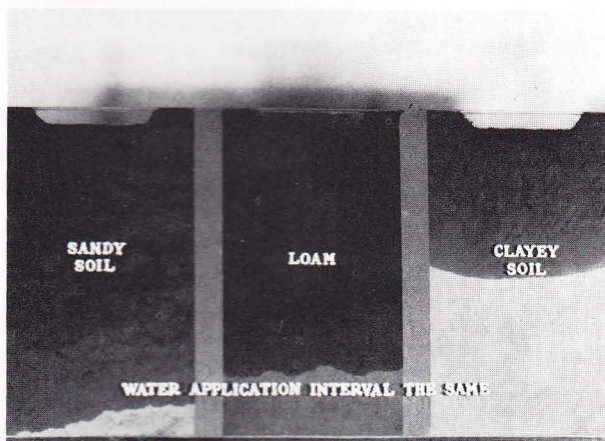
Here, deep vertical channels are cut in the soil and filled with chopped organic matter. If the channels remain open to the surface, the large pores in the organic matter take free water from rain or irrigation and transmit it deep into the soil. Then it is absorbed by the soil. If the channels are not open to the soil surface, vertical mulching does little good.

Holes left in the soil by angleworms, rodents, or decaying crop residue act like vertical mulch channels. If they remain open to the surface and exposed to free water, they carry water readily. These open channels or holes also help soils with poor aeration by permitting the exchange of gases between the soil atmosphere and the air above.



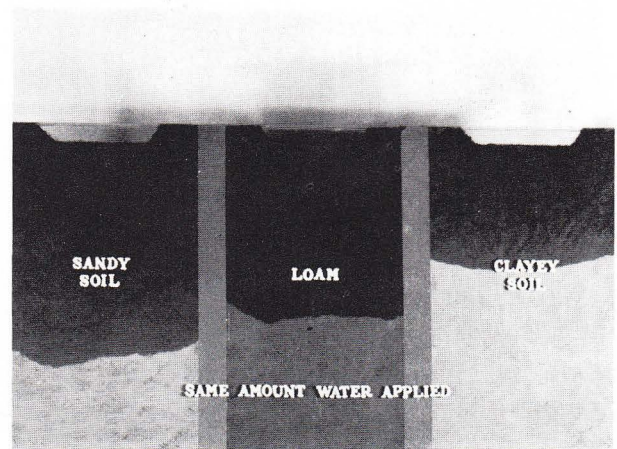
Straw or organic matter layer

Straw plowed under and left in a layer forms a barrier to the downward movement of water much like a layer of sand or coarse soil aggregates. If the straw is mixed with the soil, its decomposition releases substances which help to maintain the open porous structure created by plowing. Where the porous structure extends to the soil surface the large pores speed downward movement of water.



Soil texture and infiltration

Water was applied to three soils at the same time and rate. Infiltration and the advance of wetting front is more rapid in sandy soil than in either loam or a clay soil.

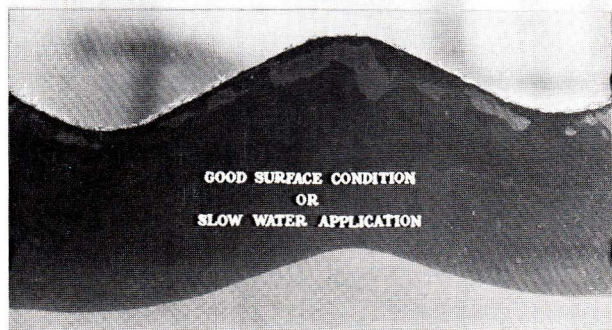


Soil texture and water-holding capacity

The same amount of water was applied to each of three soils. The clayey soil holds the water in a smaller proportion of its volume than either the loam or the sandy soil. This indicates that clay soils can hold more total water than either loams or sands. Because they hold more water, fine silt loams and clay loams are likely to be better soils for dryland farming than coarse sandy soils. But under irrigation the poor water-transmitting properties of such soils make them less desirable than sandy soils.

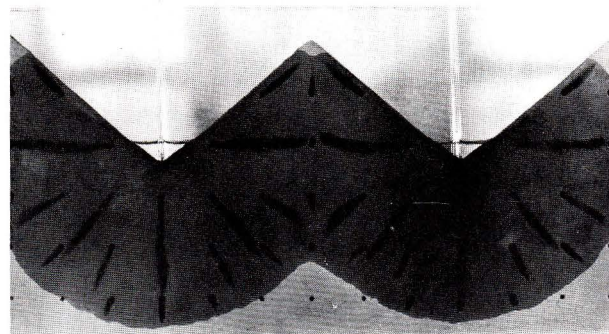
(Continued on Page 8)

(Continued from Page 7)



Uneven surface

If water is applied to rolling or hilly terrain more rapidly than it can infiltrate, it runs off the high spots and accumulates in the low spots where it penetrates to greater depths. If the water application rate equals the infiltration rate, the soil wets uniformly. Surface conditions favorable to high infiltration rates permit higher application rates with uniform wetting.



Soluble fertilizers move with water

Dye tracers indicate the direction of water movement in irrigation furrows. Water and soluble fertilizers move almost radially away from the point where water was applied in the furrows. After the wetting fronts join, the direction of flow changes slightly. Above the water level of the furrows, the movement is upward toward drier soil. Below the free water level, soluble materials move downward. In addition, evaporation from the soil surface causes an upward movement of soluble materials in the soil solution.

Reprints of this article are available at 25 cents each (prepaid) or \$20.00 for 100 copies from CROPS & SOILS MAGAZINE, 677 South Segoe Road, Madison, Wis. 53711. Write for prices on larger quantities.

A 27 minute, 16 millimeter color, time-lapse **motion picture film** with sound and 35 millimeter color slides illustrating the principles shown are available from the Agronomy Club, Department of Agronomy, Washington State University, Pullman, Wash. 99163.

Editorial

DDT . . . WHO NEEDS IT!

DDT is an almighty force in the destruction of the world's water and shore creatures. Studies into the effects of the insecticide have been under way for some time resulting in world-wide moves to stop its use because of its long-lived ability to poison whatever it touches. Why fool around with something so dangerous. I say if proper controls can't be provided, ban it 100%.

Following are a couple of examples of its effects on certain animal life. DDT washes from the soil to rivers and to the sea. Tiny animal life absorb the chemical which passes to ever-larger living creatures. When these larger fish are eaten by birds such as the Osprey, thin shelled eggs result. Such upsets in the reproductive system put the future of such species in doubt. In Canada fish were put in water containing just twelve parts per billion of DDT. Almost immediately they showed signs of altered sensitivity to temperatures which may hinder their ability to survive.

It is dismaying news and a firm warning to man how quickly his carelessness can begin to destroy other forms of life on which he, himself, must depend.

The continuing use of DDT is like playing Russian Roulette with the balance of nature. I don't feel it's worth the risk.

— Fred Cheney

Turf Bulletin's Photo Quiz

CAN YOU IDENTIFY THIS PROBLEM?

Date: August

Area: Fairway

Location: Central Connecticut

Description: Browned out grass in wide circular patterns.

ANSWER ON PAGE 11.



Creeping Bent Stolons (C-1 & C-19) **Windy Acre Farm**

1361 Suffield St. Suffield, Conn.

Tel. 203 236-9030

E. J. Pyle, Prop.

**Nursery ideally located for
New England plantings**

**Twenty years growing stolons
Original stock from R.I. Expt. Sta.**

Address: 133 Chester St.
Hartford, Conn. 06114
Tel. 203 249-4059

SOD FOR THE PROFESSIONAL

*Valley Farms
Turf Nursery Inc.*

MERION BLUE GRASS • FYLKING
C-1 : C-19 • PUTTING GREEN SOD
PENNCROSS PUTTING GREEN SOD

SIMSBURY, CONN.

Mail Address:

BOX 81

AVON, CONN.

Phone Area Code 203 658-6886

PUBLIC RELATIONS

by Marlin L. Ball

Pro-Superintendent relationships are for the most part pleasant ones because they have learned to sit down and iron out their problems. They ask unbiased or disinterested parties for guidance and assistance. Many problems much larger than our own little differences have been solved by open and frank discussions. It is imperative, then, that there be a smooth flow of communications between the two professions. Both departments are essential and are closely allied, even though each operates in a different area of activity. Without the superintendent you would not have a playable golf course; without the pro the game of golf would suffer. One provides satisfactory playing conditions and the other promotes the game. Both are needed and must work together as a team.

It is the objective of most superintendents to give their club members the best possible golf course and playing conditions that nature and available monies will provide. The great growth of the game during the last decade has increased the duties of the superintendent many fold; as an example, golf is no longer just a man's pastime, now the whole family enjoys it and superintendents at clubs having a large membership are finding it increasingly difficult to accomplish their daily maintenance chores without interfering with golf play to some extent.

The use of electric cars presents unique problems brought about by careless and improper operation of the vehicles. Vandalism is another headache, so is the new player who has not yet become aware of his responsibilities towards fellow golfers and the proper care of the course. Juniors, ladies, and many men, too, contribute a great deal of unintentional damage by their failure to replace turf, by twisting and dragging their feet on putting greens, improper replacing of flagsticks in the cups, leaving footprints in sand traps, and many other infractions which cause greenskeepers extra work.

The more qualified a golf course superintendent is, the better the condition of the golf course will be. A well groomed layout can mean more members and guests, and this in turn means more business for the pro. The keeper of the greens wants the pro as a personal friend and as an associate in the operation of the golf course. When players register complaints about playing conditions, professionals should inform the superintendent so that he has the opportunity to make the necessary adjustments, if needed.

The rapid growth of new country clubs has

created a shortage of qualified men, and if your man is experienced and practical, do all you can to help him and to keep him. The pro could also invite the superintendent to golf functions, and ask him to discuss course care and maintenance. When all is said and done, it is the members' money and course the superintendent is trying to protect. Such cooperation makes for a better professional-superintendent relationship.

The pro can help his superintendent by encouraging him to play golf frequently, by giving him an occasional lesson and seeing that he is included in press releases. Give him due credit for taking care of the course and help the members to realize that he contributes a great deal to their golf enjoyment. When pros and superintendents recognize the true value of each other, they along with clubs and golfers, reap untold benefits. It would be much appreciated, too, if pros, whenever possible, would introduce the superintendent to the golfers, let them know who he is.

Closing a course because of inclement weather or repairs causes the one in charge a great deal of concern, and always is a difficult decision to be responsible for since it affects the overall operation of the club. Members are made unhappy, the pro shop loses business, and so do other departments of the organization. Therefore, the closing of a course should be a unanimous decision, accepted by all.

A superintendent can also help a pro in other ways; namely, your golf shop may need a new coat of paint, new display racks or shelves built, new lights installed, etc. Pros often have to get this work done at a cost to themselves, but most superintendents would be glad to do the work during the off season, or during slow days.

In order to progress in prestige and pay, the superintendent must make himself known to the golf playing public. A planned public relations policy will do just this. Here are some essentials of just such a policy:

1. By preparing a ten minute photoplay explaining the facts of life as they pertain to golf course maintenance. The photographic effort depicted the various operations necessary to put a golf course in playable condition before the beginning of the season, together with closeup shots of daily maintenance efforts.

2. By forming caddy clubs. These clubs meet once a month with the superintendent who explains to them the whys and wherefores of golf course maintenance. As well as how they can aid the golf

course by keeping a watchful eye on the antics of their player associates. At least one club throws a steak dinner for all caddy-ites once yearly in return for their being members in good standing of the caddy volunteer golf course maintenance movement. The caddy can make suggestions to the player from time to time where the superintendent cannot. These suggestions may and should deal with the importance of treating the turf tenderly rather than abusively.

3. Part of any planned public relations program is the arrangement for frequent newspaper releases issued by the superintendent. The superintendent may list some of the ways the golf player may cooperate in keeping golf course maintenance costs down and minimizing the headaches involved. Some of the topics of interest include a description of golf course maintenance equipment, including the cost, utility and importance of various pieces of maintenance equipment.

4. Bulletin boards are always worthwhile and usually can be found on any golf course. Prominently displayed, they can be of utmost value in keeping the members abreast of what's happening.

5. Work with the teen-age element. Impress upon a terrible teenager the deadly earnestness of keeping a golf course in A-1 playing condition and he will be a positive rather than negative factor in course maintenance for full many a year to come. Visit high school assemblies and converse on your maintenance trials and tribulations. You may also encourage some of the more promising youngsters to consider your profession. Some might work into your summer labor force.

6. Accept the fact philosophically that this is the car age; the golf course car age. Point out gently but firmly in a letter to the players that these cars invariably cause golf course maintenance costs to shoot drastically upwards. That, if they are used wisely and not misused, they can be a convenience to the player and not so much of an inconvenience to the superintendent and his maintenance problems. Point out the way a golf course car should be used and also how they can be abused.

7. Last but not least, work with and not against or separately from, your pro. The pro lives in a wide, wide world of his own with his own peculiar problems which are every whit as important to him as yours are to you. Talk with the pro frequently and outline the problems you face. Tell him how he can help by instructing his players to respect course conditions and maintenance along with playing technique. The superintendent and pro can work as a team, issuing joint statements dealing with maintenance for bulletin board or newspaper consumption.

As stated in the beginning of this article, the superintendent is a V.I.P. How important depends entirely upon the job he does of selling himself to the public in general and to golf course players in particular. What sort of a selling job are you doing on yourself?

The philosophy of public relations is to be realistic at all times and avoid over-idealization on the one hand or a cynical view on the other. The basic purposes of a public relations department are for the establishment and the maintenance of good will.

In this decade of technological developments and changes in new equipment, products and services, the salesman in the field must use every sales tool at his disposal to keep present accounts current in the face of rapid technical modifications and of new products or services becoming available to your industry.

Turf Bulletin's Photo Quiz

ANSWER — Lack of pressure in irrigation system caused sprinklers to operate ineffectively. A two-foot wide band 30 feet from the sprinklers received no water resulting in the peculiar burned out pattern. Switching to sprinklers that require less pressure solved this problem.

Try our FUNGICIDES

HERBICIDES

INSECTICIDES

LIQUID & SOLUBLE FERTILIZERS

WETTING AGENTS

SINCE 1939

ALFCO ROKEBY CO., INC.
FERTILIZERS & CHEMICAL SPECIALTIES FOR HORTICULTURE & TURF

phone 373-1394

P.O. Box 267

MARIETTA, OHIO 45750

—Reprint from *Crops and Soils Magazine*, Jan. 1970



Climate in the 1970's

Photo: Grant Heilman

BY JAMES E. NEWMAN

WILL THE MID-70's produce a series of dry years in continental United States like the 30's and 50's? This question, answered with some reliability, could carry a multibillion dollar value for agribusiness the world over.

Professional weathermen's answers to this question are highly divided, depending upon whether they think in terms of weather events several months or years apart as somewhat interrelated or purely independent and at random. Among meteorologists there is a particular breed that specializes in studying weather events over varying lengths of time. Professionally such weathermen are classed as climatologists.

Changing climate

Down through the ages, climate has changed continuously. The only questions open for debate are how rapidly it has changed and the possible causes.

The repeated return of the great ice ages is perhaps the most strik-

ing evidence of climatic change. But the ice ages were separated by thousands of years with periods of smaller changes in between.

If climatic change has any immediate agricultural implication then such variations must be significant over a decade or two. The evidence for such short period shifts are voluminous too, but their significance and predictability are much more debatable.

Cycle of change

Scores of short-term cycles are reported in the climatological literature of the world. It is a shop-worn joke among climatologists that as many climatic cycles are reported in the literature as there are "cycle-hunters." On the other hand, no one would debate the changes in climate between seasons. Such changes in climate occur because of the regular, predictable, astronomically controlled cycle of energy received from the sun.

Fundamentally, climatologists only consider a climatic cycle real if it can be shown that it is the result of periodic energy change; that is, it is generally accepted that all cyclic phenomena must have a "forcing function." For example, a rapid change occurs in all out-of-doors environments when day turns into

night. This is the result of the huge change in the amount of solar energy that a point on earth receives. Therefore, daily changes in temperature, humidity, etc., are well-defined cycles that are 24 hours long. Similarly, the rotation of earth about the sun affects the amount of energy that various points on earth receive, thus giving rise to seasonal changes in climate. This annual cycle is likewise 365 days long.

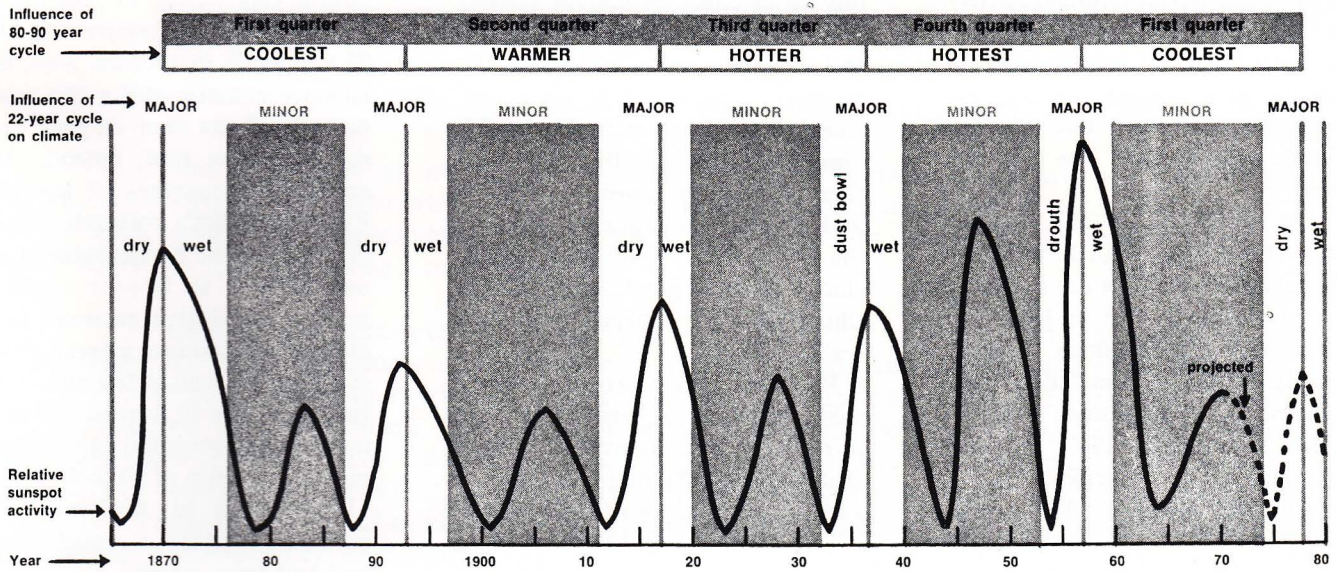
Other than changes in climate resulting from the movement of the earth, the only known forcing functions are the lunar tides, planetary tidal effects, if any, and changes in solar energy.

Moon's influence

Just as the moon's gravitational pull produces tides on oceans and large lakes, it produces tides in the atmosphere. These are very small compared to ocean tides. Nevertheless, some scientists have found that the moon influences precipitation patterns.

Within the continental U. S., precipitation seems to follow the lunar month. Days immediately following "new moon" and "full moon" tend to have higher rainfall than any other days of the lunar month. However, the actual increase in rainfall resulting from this lunar effect is

JAMES E. NEWMAN is an agricultural climatologist at Purdue University.



Simplified chart of sunspot activity and climate in continental U.S. (1865-1980)

so small that I see no agricultural implications in it.

Similarly the gravitational influences of other planets are believed to be extremely minor.

Solar influence

Variations in solar activity have attracted much more attention by investigators. One reason is that scientists have kept track of solar activity for over 200 years. In fact, an observatory in Switzerland has observed the so-called basic 11-year sunspot cycle continuously since about 1750. The current cycle is the 20th one of this continuous record.

Sunspot numbers change spectacularly over a period of 9 to 13 years with an average of about 11 years. Other solar activities closely allied with these observable sunspots cause the commonly experienced radio and TV reception breakdowns. It is tempting to assume that such variations in solar activities give rise to a "forcing function" strong enough to produce climatic cycles of similar length. Actually, many investigators working independently have discovered such cycles.

In North America and corresponding latitudes, sunspot activity and climate change are actually more closely related in a 22-year cycle that consists of two 11-year

cycles. This double cycle of sunspot activity varies between 21 and 24 years in length.

The two 11-year cycles are quite different. First, at the beginning of each 11-year cycle the polarity of the magnetic field associated with sunspots completely reverses between the two solar (sun) hemispheric surfaces. Therefore the charged particles reaching the earth's upper atmosphere from the sun behave differently from one 11-year cycle to the next.

Sunspots and climate

The second difference between the cycles is how sunspot activity correlates with climate change. In one 11-year cycle both maximum and minimum sunspot activity have a less pronounced effect on climate change. In the other, both maximum and minimum activity produce more extreme shifts in climate. During the past 2 or 3 decades climatologists have observed some striking differences occur in the general circulation of the earth's atmosphere from one 11-year period to the next. These differences in circulation affect the climate.

In discussing these effects, I prefer to make the end of each 22-year cycle as the time of maximum sunspot activity during the 11-year cycle that has a major affect on cli-

mate. This period is followed by a minimum sunspot activity period with minor climatic effect. Thus, each 22-year cycle consists of four periods:

period	Effect on climate	Sunspot activity
First 11-year cycle		
1.	minor	minimum
2.	minor	maximum
Second 11-year cycle		
3.	major	minimum
4.	major	maximum

During the major-effect, minimum activity period and just before the major-effect, maximum activity period, there is a strong trend towards a predominance of continental anti-cyclone circulation in the middle latitudes of the earth, centered approximately on a line through Indianapolis and Denver. At higher latitudes (northern U. S. and Canada) a storm track prevails. In lay terms, this means that the interior areas of continental U. S. have warm dry seasons. During major-effect, maximum activity periods, the storm track tends to move south replacing the anti-cyclone circulation. This means increased precipitation and wetter seasons in most middle latitude areas.

(Continued on Page 14)

(Continued from Page 13)

The minor-effect, minimum activity period and the minor-effect, maximum activity period are associated with similar atmospheric circulation patterns, but produce climatic effects that are less extreme.

Looking back over the past 40 years of continental U. S. weather, the unusually dry 30's are a matter of record. From 1932 to 1936 was a major-effect, minimum sunspot activity period. It was followed by a major-effect, maximum activity period in 1937 to 1939. Another minimum activity period occurred during 1942 through 1946. A minor-effect, maximum activity period occurred from 1949 through 1951.

Major-effect, minimum sunspot activity occurred again from 1953 through 1956. A major-effect, maximum activity period in 1957 through 1959 ended the 22-year cycle and began the 22-year cycle we are now in. The minor-effect, minimum activity period of the current cycle occurred during 1964 through 1966.

Forecast for 1970's

Looking forward into the decade of the 1970's, the minor-effect, maximum activity period in the current 22-year cycle is taking place now (1969 through 1971). This should be followed by a major-effect, minimum activity period during the mid-70's, probably 1974 through 1977.

Thus, based on the weather history of the past 40 years, the com-

ing major-effect, minimum activity period means we should expect a series of dry years in the mid-70's centered in the Great Plains of continental North America. It also follows that similar climatic deviations should be expected in other middle latitude continental areas of the world. This would normally include certain parts of U.S.S.R., China, Eastern Europe, and Australia.

But if you look carefully at the past 100 years of weather history in continental U.S., evidence exists that the mid-70's may not produce such a severe series of dry years as did the 1930's and 1950's. In fact, the counterpart of the dry 30's and 50's may not occur until toward the end of second and fourth decades in the next century—that is 2017 to 2020 and 2039 to 2042. The reason is that superimposed on the basic 11-year cycle and the 22-year cycle are evidences of longer cycles. Some investigators have produced evidence of a solar-climatic cycle of 35 to 40 years in length. Others claim that a double cycle of 35 to 40 years or 80 to 90 years relate better to observed climatic trends.

The best recent evidence of these longer solar-climatic cycles has been reported by H. C. Willet, of the Massachusetts Institute of Technology. He has suggested the possibility of an 80-year or 90-year cycle. Willet relates his 80-year to 90-year cycle in terms of four 22-year cycles. These longer cycles end

with a very strong 11-year sunspot maximum such as occurred in 1870-71 and again in 1957-58. Also, hemispheric climatic shifts are related to each of the four 22-year cycles designated as first, second, third, and fourth quarters of the cycle. Further, Willet's research suggests that during the first quarter of each new 80-year to 90-year cycle, the general circulation patterns in the atmosphere produce a trend toward cool, wet seasons in the middle latitudes of 30 to 40 degrees (New Orleans to Indianapolis) but at higher middle latitudes of 40 to 60 degrees (Indianapolis to Anchorage) the patterns produce a trend toward cool and drier seasons.

We are now in the first quarter (that is, first 22-year double cycle of sunspot activity) of a new 80-year to 90-year solar-climatic cycle as suggested by Willet. If this 80-year to 90-year cycle has any noticeable influence over the current 22-year cycle defined as beginning after the 1957 maximum sunspot activity, then most of continental United States should be generally cooler and wetter during the 1960's and 1970's. This would mean that the anticipated dry years in the mid-70's should be less noticeable than their counterparts in the 1930's and 1950's. Certainly the 1960's have been cooler and wetter in most geographic areas in continental U. S. as Willet suggested that they would be in several research reports about 10 years ago.

SHEPARD SOD CO., INC.

EAST WINDSOR HILL, CONN.

200 SULLIVAN AVENUE

OVER 350 ACRES OF QUALITY TURFGRASS GROWN UNDER CONTROLLED CONDITIONS FOR SUN OR SHADE, GOOD OR POOR SOIL, GOLF COURSES, HOME LAWNS, ATHLETIC FIELDS, HIGHWAY BEAUTIFICATION AND BUSINESS OR INDUSTRIAL USE.

- MERION BLUEGRASS
- MERION MIXTURES
- PENN CROSS BENT
- SHADE MIXTURES
- ATHLETIC MIX
- 0217 FYLKING BLUEGRASS
- PASTURE & FIELD SOD

WE ALSO GROW SOD UNDER CONTRACT ACCORDING TO YOUR SPECIFICATIONS!

IDEAS ABOUT SEED QUALITY

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

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

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

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

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

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

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

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

(Continued on Page 16)

(Continued from Page 15)

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

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

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

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

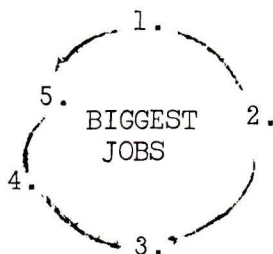
SEED PRICES AND HANDLING

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

Let's stand off and take a long look at what we think the "SEED TRADE" should be doing for the Distributor, the Turf Products Dealer, and the public who use turf seeds and products. By the "SEED TRADE" we mean here the basic producers, handlers, cleaners and packers of turf seeds. I also include the suppliers of related herbicides, fungicides, insecticides, fertilizers and equipment required for establishment and maintenance of better turf. Therefore, as I see it, we need to list the five "Biggest Jobs" in providing important relations, and I think we'll see they are all links that make a solid chain.

KEEPING REALISTIC & WORKABLE
SPECIFICATIONS BEFORE USERS OF
SEED

SELLING THE FACT THAT THE
BEST IS CHEAPEST



QUALITY AT FAIR PRICES

PROPER & ADEQUATE TRADE
INFORMATION

CLOSE WORKING RELATION BE-
TWEEN ALL PHASES OF TRADE-
GROWER THROUGH DEALER

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

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

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

(Continued on Page 19)

SEEDBEDS · SOD TEES · GREENS and FAIRWAYS

need the sustained feeding of NITROFORM® nitrogen — a ureaform turf food that is long-lasting, nonburning, odorless, resists leaching, and builds a residual. Available as granular free-flowing BLUE-CHIP® for mechanical spreaders and as sprayable POWDER BLUE* for liquid application.

When using balanced fertilizers, look for the BLUE CHIP tag on the bag to be sure that at least one-half of the Nitrogen is from Nitroform.



*HERCULES TRADEMARK



AGRICULTURAL CHEMICALS
SYNTHETICS DEPARTMENT
WILMINGTON, DELAWARE 19899

STH67-13

AQUA-GRO
QUALITY BLENDED WETTING AGENT

AQUA-T
LOW COST BLENDED WETTING AGENT

STOMA-SEAL
CHEMICAL CONTROL OF WILT

AQUA-GRO GRANULAR
CONVENIENCE OF APPLICATION

See Your Authorized Distributor

THE Clapper CO.



MAIL ADDRESS
BOX "A"

Phone: 244-7900 (Area Code 617)
WEST NEWTON, MASSACHUSETTS 02165

OFFICES and WAREHOUSE
1121 WASHINGTON STREET

TORO POWER AND GANG MOWERS MILORGANITE FERTILIZER BUCKNER SPRINKLERS JARI POWER SCYTHES
CHEMICALS SPRAYERS SUPPLIES FERTILIZERS TOOLS FUNGICIDES SEEDS BULBS
WHIRLWIND ROTARY MOWERS ROTARY SNOW THROWERS AERATORS HERBICIDES GIANT VAC LEAF BLOWERS

SAWTELLE BROTHERS

E. ROSS SAWTELLE
(1905 - 1964)
CHESTER M. SAWTELLE

JCT. ROUTES 128 & 62
DANVERS, MASSACHUSETTS

Telephone Danvers
Area Code 617
774-4200

— Over 35 Years Experience —

Turf Maintenance Equipment and Supplies for Golf Courses - Park Departments - Estates - Airports - Highways - Cemeteries - Schools and Colleges - Institutions



TURF MAINTENANCE EQUIPMENT AND SUPPLIES



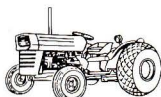
THE MAGOVERN COMPANY, INC.

EST. 1896 - INC. 1928

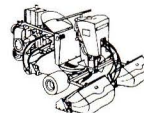
P. O. BOX 270, LAWNACRE ROAD, WINDSOR LOCKS, CONNECTICUT 06096
WINDSOR LOCKS 203-623-2508



41 MEADOW STREET
FAIRFIELD, CONN. 06430
(203) 255-2817



57 ALLEN STREET
SPRINGFIELD, MASS. 01108
(413) 733-6638



279 DALTON AVENUE
PITTSFIELD, MASS. 01201
(413) 443-4450



(Continued from Page 17)

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

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

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

(Continued on Page 20)





The Heavy Duty Line. One year warranty on complete unit because it is built for heavy duty commercial use.

BUNTON LAWN LARK
Power turning, trim with either side, six forward speeds, mows without scalping, mows grades up to 45°, rider attachment optional. 24" to 52" cuts. Ask about new 21", 4 H.P. self-propelled.



BUNTON TRIMMERS
Trim and edge with either side, 8", 10", 12" cuts.



BUNTON "C-TWENTY ONE"
Heavy, reinforced frame and adjustable handles, extra-life engine, up to 5 H.P., machined-steel blade driver and ball bearing steel wheels.

For additional information, write Dept. WT

ALLEN LAWNMOWER CO.
20 River St., West Springfield, Mass.
Phone 733-7837 — Sales & Service

When pros go to seed, they turn to Chanderlin.

Who can blame them?
Chanderlin offers virtually every superior variety of seed. And then some. Included are **0217 Fyking Kentucky Blue Grass, Manhattan Perennial Rye, Exeter Colonial Bentgrass, Highlight Chewings Fescue.**

CROWN VETCH—SEED AND CROWNS
(All Varieties.)

Wild flower seeds and tree seeds also available for roadside planting.

Chanderlin also has sod quality blue grass, Fescue and Merion Blue for certified sod production. Plus many other grasses and special mixtures for institutions, golf courses, contractors and landscapers, mixed to your specifications.

Chanderlin Seed Co.

"Division of LOFTS PEDIGREED SEED, INC."

Chimney Rock Road
Bound Brook, New Jersey 08805
Call Collect (201) 356-8702
Branches in Los Angeles, Calif.; Albany, Ore.

(Continued from Page 19)

Example

COMPARE!

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

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

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

Each works a hardship on many innocent suppliers caught in the maelstrom of supplying a political division or contractor with absurd specifications, with no way to get it corrected before job deadlines. —Reprint from Proceedings of 1962 Turf Conference, Purdue University

CHIPCO

HERBICIDES • INSECTICIDES • FUNGICIDES MICRONUTRIENTS • WETTING AGENTS

Specially Formulated for Turf Experts

A broad line of products for protection and improvement of fairways, greens and other fine turf areas. High quality backed by over fifty years' experience in manufacturing pesticides.

Send for Product Bulletins

RHODIA INC., CHIPMAN DIVISION

P.O. Box 309, Bound Brook, New Jersey 08805

Factors influencing effectiveness of two surfactants on water-repellent soils

M. A. MUSTAFA · J. LETEY

WATER-REPELLENT SOILS are characterized by two undesirable physical properties: low water infiltration rate, and high runoff. Such soils have been reported in many parts of the world under various conditions, however, one of California's real practical problems involves soil-water repellency occurring on burned water-sheds. A high percentage of the many acres (primarily in southern California) burned over by wildfires every year includes soils which repel water. The combination of removing protective vegetation, and inducing water

repellency causes an extreme erosion hazard.

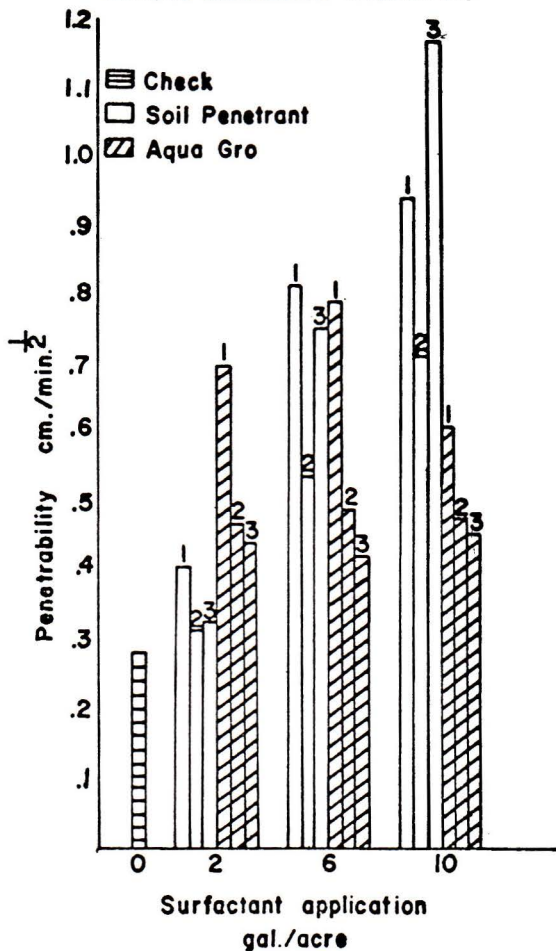
Surfactants (wetting agents) have already been demonstrated to allow water penetration into water-repellent soils. In one study at the San Dimas Experimental Forest, the application of surfactants greatly reduced erosion from the plots. However, in a later trial, the wetting agent treatment was not effective in erosion control. Several factors could influence the effectiveness of surfactant treatments. This report gives results of a study conducted to determine the effect of a few of these factors.

One factor considered was the *quantity* of surfactant applied per unit area—and

whether that quantity of surfactant was applied as a concentrate or whether it was diluted with water and the solution applied to the surface. Also considered were possible differences in results from applying water to the soil immediately after surfactant treatment, as compared with allowing the treatment to dry before water application. The *type* of surfactant was also investigated as a factor in the effectiveness.

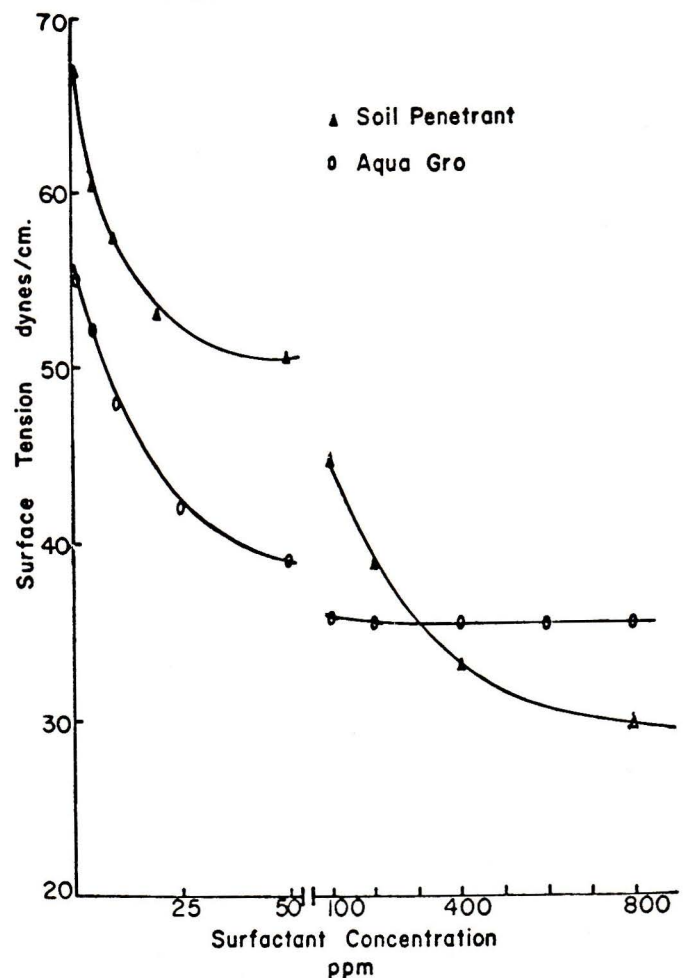
The study was conducted in the laboratory at Riverside on soils packed into glass columns. After a wildfire, soil-water repellency usually occurs in a layer at or just below the soil surface. The layer of water repellency varies in thickness. Be-

GRAPH 1. THE PENETRABILITY OF WATER FOLLOWING VARIOUS SURFACTANT TREATMENTS



Numbers at top of each bar represent: (1) surfactant applied as concentrate with no drying; (2) surfactant applied as concentrate with drying; (3) surfactant applied as solution with drying.

GRAPH 2. RELATIONSHIP BETWEEN CONCENTRATION AND SURFACE TENSION OF TWO SURFACTANT SOLUTIONS



—Reprint from California Agriculture, June, 1970

low the water repellent layer, the soil is wettable. To simulate this condition, the glass column was packed with a wettable soil and then the top 1 inch was packed with a water-repellent soil taken from a site adjacent to the San Dimas Experimental Forest.

Two surfactants

Soil Penetrant and Aqua Gro were the two nonionic surfactants used in the study. Four rates of application (0, 2, 6 and 10 gallons/acre) were used for each surfactant. The following treatments were used for each surfactant and each rate of application: (1) The surfactant was applied as a concentrate by placing a drop of surfactant of sufficient weight to give the required treatment equivalent to gallons per acre in the center of the soil column. The infiltration study was then conducted immediately. (2) The surfactant concentrate was applied to the soil column as indicated before, however, the soil column was oven dried at 53°C overnight and cooled to room temperature before infiltration study. (3) The surfactant was added to 7 ml of water and the solution applied uniformly to the soil column. These soil columns were then dried at 53°C and allowed to cool before infiltration study.

The effectiveness of the treatments for water penetration was evaluated by horizontal infiltration of water into the column. Because the type of water used can also influence infiltration, calcium sulfate was added to the water to a concentration of .01 N in each infiltration study. The advance of the wetting front through the soil column was recorded. The position of the wetting front was plotted as a function of square root of time, producing a linear curve. The slope of the resultant curve was measured and is referred to as penetrability (graph 1). The higher the penetrability, the higher the infiltration rate. All surfactant treatments increased penetrability as compared with no treatment.

Soil Penetrant

Regardless of method of treatment, increasing the application rate of Soil Penetrant increased penetrability. When Soil Penetrant was added as a concentrate, penetrability was reduced by drying the soil prior to water application, as compared with watering immediately after surfactant application. In comparing solution application with concentrate application, it was possible to compare the two treatments only after drying. The experimental procedure did not allow the infil-

tration to be checked immediately after solution was applied to the soil without prior drying.

At the lowest application rate, there was no significant difference between applications of Soil Penetrant as a concentrate or solution. However, as the application rate increased, there was increased benefit from applying the surfactant as a solution rather than concentrate. It could be assumed that at the highest application concentrations, best effects would have been obtained by applying the surfactant as a solution, and then having water applied before the solution became dry.

Aqua Gro

Results with Aqua Gro showed almost no effect of application rate on penetrability. When the surfactant was applied as a concentrate, drying significantly reduced the penetrability as compared with no drying. There was almost no difference between the application as a concentrate or solution after the material was dried prior to infiltration.

Aqua Gro generally performed better than Soil Penetrant at the low application rates. However, at the highest application rate, Soil Penetrant gave higher penetrability than Aqua Gro for all treatments. Application of Soil Penetrant as a solution (particularly at the high application rate) seemed to give the best results.

In considering treatment of burned over watersheds, there is a conflict between practical application methods and expected results, however. Because of the rough terrain and difficulty of getting machinery on the area, watersheds have been treated by helicopter. It is therefore desirable to have low volume application to reduce helicopter time. This would dictate the use of concentrate rather than a dilute solution. Furthermore, it is not possible to program application rates so that one can be assured that rain will follow shortly after application. Therefore, the surface usually becomes dry before rain.

In every case, drying reduces the effectiveness of the surfactant treatment as compared with non drying. For Aqua Gro and low application rates of Soil Penetrant, there appears to be no significant difference between adding the material as a concentrate or as a solution. However, at high application rates there were definite benefits from applying Soil Penetrant as a solution rather than concentrate. The highest penetrability measured was for a solution application at the highest application rate of Soil Penetrant.

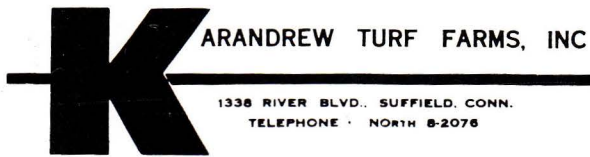
Another potential problem in applying the material as a concentrate to a watershed is that only the surface soil is exposed to the surfactant. Wind can easily blow the material away—again indicating the need for programming the application of surfactant prior to an expected rain.

If surfactants are to be applied to soils other than watersheds, there would be advantages to immediately applying water after treatment rather than allowing the surface to dry out. Soil Penetrant application as a solution rather than a concentrate would be preferred. There appears to be no significant difference, however, between solution, and concentrate applications for Aqua Gro.

Low rates

Of the two products tested, Aqua Gro was better than Soil Penetrant at low application rates. However, at higher application rates, Soil Penetrant was better than Aqua Gro. The difference in behavior between Soil Penetrant and Aqua Gro at different application rates might be associated with the surface tension-surfactant concentration relationships. Graph 2 presents curves representing the surface tension of the two products as a function of the concentration. Aqua Gro reduced the surface tension more than Soil Penetrant at low concentrations. However, at the higher concentrations, Soil Penetrant caused a lower surface tension as compared with Aqua Gro. In fact, Aqua Gro did not further reduce the surface tension even at concentrations greater than 100 ppm. Inasmuch as the surface tension of the solution was not affected by Aqua Gro concentration at higher concentrations, this could explain the effect of similar results for all application rates of Aqua Gro in these experiments. However, increasing the concentration of Soil Penetrant continues to cause a decrease in surface tension until rather high surfactant concentrations are obtained. This could explain the increased effectiveness of Soil Penetrant applications in these experiments. Furthermore, it could explain why Soil Penetrant was better than Aqua Gro at the high application rates, but less effective at the low application rate.

M. A. Mustafa was a graduate student (now at the University of Khartoum, Khartoum, Sudan), and J. Letey is Professor of Soil Physics, Department of Soils and Plant Nutrition, University of California, Riverside.



QUALITY SOD SINCE 1957

- Merion Bluegrass
- Merion/Fescue Mixtures
- Penncross Bentgrass
- 0217 Fylking Bluegrass

All Sod Delivered on Pallets
and Unloaded on Job Site.

Over 300 Producing Acres

BOSTON AREA REPRESENTATIVE
SAMUEL S. MITCHELL
18 Old Randolph St.
Canton, Mass.
828-1065

CLEARY PRODUCTS

FOR
BETTER TURF

"CLEARY'S MCPP" — For selective weed control in Bentgrass Greens, kills knotweed, chickweed, clover.

"PMAS" — Crabgrass & Disease Control.

"SPOTRETE" — 75% Thiuram Fungicide.

"CADDY" — Liquid Cadmium Fungicide.

"PM-2, 4-D" — Weed control including Silver-crab.

"ALL-WET" — For hard to wet areas.

"METHAR" — DSMA in liquid or powder form for crabgrass control.

"SUPER METHAR" — The "AMA" type liquid for crabgrass control.

"THIMER" — A combination of mercury and thiuram for crabgrass and disease control. (Wettable powder)

TOP VITALITY FOR YOUR TURF

A Complete Line of Turf Chemicals

Proved in Use . . .

from

THE GROWING WORLD OF
VELSICOL

DISEASE CONTROL:

VELSICOL® "2-1" has greater wettability, more stability in suspension and less foaming action in control of brown patch, dollar spot and snow mold.

MEMMI .8EC controls brown patch, dollar spot, copper spot, melting out (Helminthosporium), gray leaf spot and cottony blight (Pythium).

PMA 10 can be safely used on greens, tees, fairways and roughs to control or prevent brown patch, snow mold, dollar spot, Helminthosporium curvularia, fusarium patch and other diseases.

THIRAM™ 75 is a new wettable powder formulation containing Thiram, a widely used non-mercurial fungicide for the control and prevention of brown patch, dollar spot and snow mold.

THIRAM™ - PMA Two proven fungicides for more efficient control of dollar spot, copper spot, brown patch, pink patch, Helminthosporium leafspot, bluegrass blight, Curvularia blight and snow mold.

WEED CONTROL:

BANVEL® 4S controls knotweed, common and mouse-ear chickweed, clover, red sorrel, dog fennel, curly dock, English daisy, spurge, purslane, pepperweed, lawn burweed, hawkweed, spurry, carpetweed, stichwort, henbit, chicory and others.

BANVEL® +2, 4D controls weeds listed under Banvel® 4S (above) plus dandelions, plantain and others.

BANDANE® gives effective pre-emergence crabgrass control without injury to turf . . . also kills ants, grubs, and other soil insects.

INSECT CONTROL:

CHLORDANE is available in emulsifiable concentrate, wettable powder, and granular for control of most insect pests in the soil and many on the surface of turf, including grubs, wireworms, cutworms, sod webworms, ticks, chiggers, ants, mosquitoes and many others.

PESTMASTER® SOIL FUMIGANT-1 with methyl bromide will kill insects in all stages, nematodes, weeds, weed seeds and obnoxious grasses in old turf or in soil before planting.

Contact your distributor now for the complete line of Velsicol Turf Pest Control Chemicals or contact Velsicol local representatives:

521 Fifth Avenue, Suite 1801
New York, N.Y. 10017

VELSICOL CHEMICAL CORPORATION
341 East Ohio Street, Chicago, Illinois 60611

FROM



RFD #2, HADLEY, MASS. 01035

Join Your Massachusetts Turf And Lawn Grass Council

For more information write:

Mass. Turf and Lawn Grass Council

attn.: Dr. Joseph Troll

RFD #2, Hadley, Mass., 01035

The Massachusetts Turf and Lawn Grass Council is a non-profit corporation. Its officers derive no benefits except the satisfaction of keeping Massachusetts and its neighbors first in turf. It was founded on the principle of "Better Turf Through Research and Education." We must support our University to accomplish this, and we can with a large and strong Turf Council.

Membership is not restricted to Massachusetts residents or turf professionals alone, all are welcome to take part. Write today.

Our advertisers' contributions help make it possible for us to give you interesting issues of TURF BULLETIN. We shall appreciate your mentioning to them that you saw their advertising in our columns.