September/October 1989

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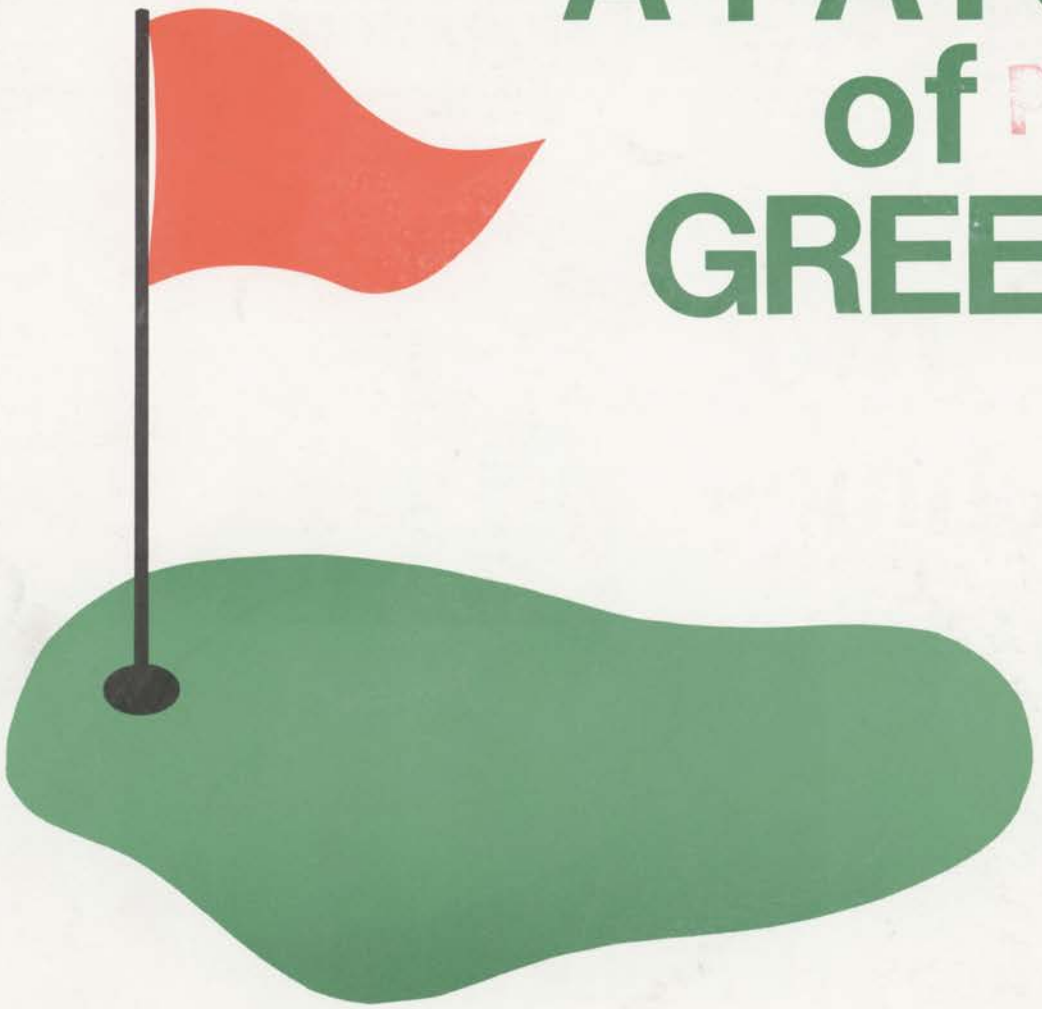

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LOCALIZED DRY SPOTS

by
Jeff Lefton, Executive Director
Midwest Regional Turf Foundation

Several turf situations have suddenly developed large brown areas intermixed with apparently healthy green turf. In analyzing the problem, always check the soil first. If the soil in the top 1 to 2 inches is extremely dry compared to the greener turf areas then pesticides will not solve the problem. This condition is called localized dry spots. Technically, it is known as hydrophobic (water repelling) soils.

Localized dry spots start as small 2 to 4 inch diameter patches that continue to get larger with time. The overall turf appearance mimics a number of disease and insect problems such as grubs, sod webworm, dollarspot, red thread, summer patch, etc. Localized dry spots result from a certain group of fungus (basiomycetes) producing fulvic acid. The white mycelium of the fungus are often evident in the thatch layer. Calcium and magnesium in the soil form complexes with the fulvic acid producing organic coatings on the soil particles that become difficult to wet.

Turf areas prone to localized dry spots include:

* **severe thatch problems**
* **open sunny areas**
* **heavy trafficked turf**
* **heavy clay soils**

To help mask the symptoms from the problem irrigate the turf more frequently. Most sprinklers apply ¼ to ½ inch of water per hour. Irrigate until the water begins to run off. Continue this process until the localized dry spots are moistened to a 2 to 3 inch depth. Use a soil probe, knife, bulb planter, etc. to check the depth of moisture penetration. Irrigate the turf 2 to 3 times per week during hot, dry, windy weather. Allowing the soils to dry in the localized dry spots will make the situation worse. In the fall, the turf area should be core cultivated in 2 or 3 directions. In addition, consider dethatching the localized dry spots to help break up the fungus layer.

The use of an effective turfgrass wetting agent might be tried on some areas subjected to this hydrophobic condition on a regular basis. They should be applied prior to the hydrophobic stress and watered in immediately.

From **Midwest Turf Foundation Fact Sheet**

BORDER CITIES GOLF COURSE SUPT. ASSOCIATION MICHIGAN

"A PATCH OF GREEN"

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TURFGRASS RESEARCH LIBRARY

MICHIGAN STATE UNIVERSITY
East Lansing, Michigan
Dr. Richard C. Chapin
Principal Investigator

In the spring of 1984, after an intitial earlier grant, the USGA and Michigan State University signed an agreement whereby the MSU Library would design and develop a computer-based bibliographic database to provide access to published materials reporting the results of research that affects turfgrass and its maintenance. As of October, 1988, 13,000 records were entered in the bibliographic database. The USGA's Turfgrass Information File (TGIF) is housed in an Alpha Micro multi-user microcomputer, using the STAR database management software. It continues to work well with regular and continuing enhancements to record structure and searching capabilities.

Access and information services from TGIF were offered without charge until August, 1988. Following that date, searches became a billable activity with significant discounts (bordering on subsidy) for subscribers, and an outright subsidy (with a token $2.00 charge) for students. Making the database available for students in any location, under such an arrangement is, perhaps, a national precedent in bibliographic practice. Search requests from 31 states during the past year indicate the increasing level of recognition the file is receiving.

A full color brochure was published in August, 1988 describing TGIF, its charges, and how to access the index on-line, via telephone, or via mail. The brochure is available from USGA Green Section offices, or by contacting Peter O. Cookingham, Project Manager, Michigan State University Libraries East Lansing, Michigan 48824 (517) 353-7209.

To further promote TGIF, an insert post card was included in the July, 1988 Green Section **Record** Magazine. Some 273 cards were returned, including responses from Australia, Brazil, Canada, Japan, Malaysia, The Netherlands and Thailand. Cards continue to arrive. Articles in **The Record**, the GCSAA **Golf Course Management** magazine and **Grounds Maintenance**, as well as numerous superintendent newsletters, assisted awareness activities.

The Turfgrass Information Center (TIC) at Michigan State also distributes the TGIF brochure as a part if its Subscriber Application Package, which includes the details and forms necessary to subscribe to USGA TGIF and open an account with TIC. About 650 packets have been distributed since July, 1988.

VuePort, the PC software needed to dial into the Alpha Micro and STAR, is distributed to subscribers. The USGA Turfgrass Information File **Dial-Up User's Manual** became available for subscriber use in October, 1988. The **Manual** provides an introduction to searching, USGA TGIF, TIC services, and guidance in using USGA TGIF as a tool in research and management. Revision and enhancement of the **Manual** will be a continuing activity of TIC, as we respond to user needs, inquiries, and system/service enhancements.

The initial subscribers to on-line access number 40 thus far, from 23 states and provinces. This group of pioneers roughly breaks out as 51% clubs/courses; 28% research/academic; 12% not-for-profit agencies; and 9% private sector. We are quite pleased with this initial distribution, which we feel gives us a good feel for expectations from several perspectives.

The first public edition of a Turfgrass Thesaurus, to aid in search strategy construction, awaits completion of developmental efforts to strengthen its usefulness and comprehensiveness. This is a primary activity of the Graduate Assistant working on the project, Douglas Lee. We hope that a first public print edition of the Thesaurus will be available in early or mid-1989. The Thesaurus, a necessary element to provide long-term stability to file structure, details inter-relationships between some 12,500 keywords related to turf culture. In time, it may become a standard turf reference work in and of itself, available both on-line alongside USGA TGIF and in print form.

In July, a survey was distributed to all turfgrass affiliated members of the American Society of Agronomy. It included information regarding USGA TGIF and resulted in a significant response, in terms of awareness, interest, and donation of materials. Summary results will be reported during this coming year.

In the meantime, data acquisition and entries continue to be made to the TGIF file. All pertinent information on turfgrass research, theses, dissertations, unpublished manuscripts, monographs, technical and popular journal articles, maintenance literature; any material deemed valuable is added to the file on a systematic basis. Emphasis continues on the completion of the 1980-1988 conference proceedings. In addition, citation tracing of currently published refereed turfgrass material adds to the comprehensiveness of the file. These file building techniques have resulted in TGIF citations originating from more than 1,270 different serial sources.

As file users have become acquainted with database objectives and usefulness, many materials have been contributed for processing and addition. Such contributions are particularly important for annual progress reports, theses and dissertations, and unpublished manuscripts. A systematic effort to encourage even more extensive collection donations will begin in the coming year.

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EXECUTIVE SUMMARY

Paul E. Rieke
Crop and Soil Sciences Department
Michigan State University
Prepared for the Michigan Turfgrass Foundation

SAND TOPDRESSING

Sand topdressing of greens has been quite widely accepted on golf courses in Michigan. In a sand topdressing study began in 1981 at the Hancock Turfgrass Research Center, we have demonstrated the necessity of following the prescribed program carefully to prevent development of layers. This means 2-4 cu ft of sand every 2-4 weeks, depending on growth rate of the grass (consider this every 4 weeks during slow growth periods and every 2 weeks during spring and fall). Once a sand topdressing program has begun it is essential that it be followed regularly. If soil layers are allowed to develop this will create problems with rooting or drainage at some future time. Topdressing programs are building the soil for the future so they must be done correctly the first time. In other studies where organic matter has been added to the sand, greens turf quality has been higher than when sand was applied alone. These studies are continuing to determine the long-term benefits of adding organic matter to the sand.

CULTIVATION

Core cultivation (aerification) studies have been continuing. Results indicate both hollow and solid tines can be used with vertical operating units to loosen the soil for turf. The solid tines have been particularly useful (usually ¼ inch tines) during summer to open the soil to permit water infiltration with little disruption of the playing surface. When there is need to bring soil to the surface hollow tines are required, of course. For relief of deep compaction the use of larger vertical operating aerifiers which penetrate deeper into the soil has proven effective in loosening soil and improving turf response.

FERTILIZER STUDIES

A long term study on potassium fertilization demonstrated the need to apply potash frequently on intensively used turf growing on sands (as greens and tees). Unlike loams and clays, sandy soils have little cation exchange capacity to hold potassium, so it is wise to apply potash at least monthly. Potash has proven very important in maintaining wear, stress and disease tolerance.

Adequate phosphorus should be applied to all turfs. The need for phosphorus can be determined by soil tests, but we have demonstrated on plots and have seen in the field that phosphorus deficiencies have developed on both golf course greens and on home lawns where phosphorus had not been applied.

Applications of flowable sulfur resulted in color and growth response on Kentucky bluegrass growing on a clay loam subsoil. These responses have been evident up to one year after application. Other sulfur materials gave limited responses or none at all. No significant effect on pH occured from either 10 or 20 pound per 1000 square feet treatments. The pH on this site was 7.2-7.5. The study is continuing.

TURFGRASS VIDEOS

A set of 6 videotapes on turf maintenance tips was jointly developed by the Michigan Turfgrass Foundation and the Cooperative Extension Service at Michigan State University. These videotapes range in length from 14 to 26 minutes and have been widely accepted for training seasonal employees as well as for use in formal and informal education. Videotapes are available from the Michigan Turfgrass Foundation.

ACKNOWLEDGEMENT

Major financial support for these and other research projects was provided by the Michigan Turfgrass Foundation. Financial support was also provided for some travel and soil analysis expenses as we served the turf industry in Michigan through our Cooperative Extension Service activities. This support from the Michigan Turfgrass Foundation is vital to these programs and is gratefully acknowledged.

COMING EVENTS — PURDUE UNIVERSITY

Turfgrass and Ornamental Chemical Seminar — November 28 to 30, 1989. University Inn, West Lafayette, Indiana.

Midwest Regional Turf Conference — January 22 to 24, 1990, Adam's-Mark Hotel, Indianapolis, Indiana.

TOPDRESSING

by Judith Ferguson Gockel
Agri-Systems of Texas, Inc.

Did you ever wonder what an earthworm might think about topdressing practices on our golf courses? If you haven't, then maybe it's time to take a closer look.

Topdressing for putting green maintenance is an almost universal practice; it is used to true up the putting surface and to help prevent thatch buildup. In recent years, topdressing programs have also been used to increase putting green speeds. If it is done with care and follows some simple guidelines, topdressing can also modify the basic structure of the green. This will improve water handling capacity and add to the life and health of the green and the turfgrass on it.

Topdressing practices are a major reason for the success or failure of new greens. With adequate basic construction and an informed superintendent, a new green can have a predictable life of 20 years or more. Without these fundamentals, the same green can be in serious trouble within a year.

Although topdressing is used widely, the how and why of its function are often misunderstood. We were not aware of the wide variance in practices until recently, when our laboratory developed a new technique for analyzing rates of field infiltration. The method involves using three-inch PVC pipe to take a profile of the green through the seedbed, intermediate layer, gravel, and into the subsoil beneath the green. The tube is submitted whole, tightly packed to prevent movement of the contents. After doing the infiltration test in the pipe, we cut it open to try to determine the reasons for its behavior. In a startling number of cases, it is apparent that topdressing practices have created the problems we've found. There are cores that look like appetizing Viennese tortes, made up of many layers of differing sands and soils, and cores that have been dubiously blessed with every commercial topdressing of the past 15 years, one after another. We find poor greens topdressed with superb materials, and great greens smothered with the cheapest filler available. We have found we can count layers like the rings in a tree and determine when the course changed superintendents, when the budget crunch came, and the year of the big flood, blizzard, or drought. We also see greens that have been maintained to perfection, and are very successful regardless of then age. While it is possible to have problems with the best built and maintained greens, the problems are usually more manageable and involve less brinkmanship on the part of the superintendent to correct.

To understand why correct topdressing practices are so important, it is necessary to think about the growth patterns of turfgrass and to have a basic grasp of water movements in soils.

Where distinct layers of materials exist in a profile, grass roots make a little effort to grow through one layer and into the next. If the roots have as much as an inch of one material to grow in, however poor it is, they will not cross into another layer even though that layer may have optimum growth medium characteristics. We often see well-constructed seedbeds with an inch of a different but equally good topdressing. The turf can usually be peeled off like a rug at the interface, because the layers aren't bound together by a network of roots. Where shallow root systems exist, turfgrass is vulnerable to problems from many sources.

Not only do layers affect the root systems directly, but there is a further problem with water movements through textural barriers. To visualize this involves understanding the way a perched water table works. The perched water table, which is, incidentally, the basic principle upon which the USGA recommended method of greens construction is based, affects all soils. Simply put, the original research demonstrated that water remains within one layer until that layer is saturated. Then it drains into the next, which again must be saturated before it can release excess water.

As layers of topdressing materials different from the basic green are built up, they create additional perched water tables and cause unpredictable consequences. Relatively small variations in soil content and particle distribution can produce significant differences in the interaction of these materials.

Once these principles become clear, choosing appropriate materials for topdressing becomes simpler.

New greens should be topdressed initially with the same mixture of materials they were built with. Thus, in building a new green, plan during construction to set aside a supply of construction material adequate to topdress for at least two years. It is prudent to make sure the supplier will have the identical sand available in the future, and keep a supply of the organic material used construction for an indefinite period.

After a period of time, which will vary greatly in individual cases, the roots will begin to provide enough organic materials to meet their own needs for retaining water and for cushioning from the abrasion

CONTINUED PAGE 28

GCSAA NEWS

GCSAA, an 8,500-member international professional and educational association, instituted the certification program in 1971 to recognize outstanding and progressive superintendents. More than 1,000 GCSAA members currently hold "CGCS" status.

Patrick Michael O'Brien, superintendent of Washtenaw Country Club, has been designated a Certified Golf Course Superintendent (CGCS) by the Golf Course Superintendents Association of America - GCSAA.

O'Brien has been superintendent of the Ypsilanti, Michigan course since 1988. He lives at 26094 Westfield in Redford.

To become certified, a candidate must have five years experience as a golf course superintendent and be employed in that capacity. The candidate must pass a rigorous six-hour examination covering the rules of golf, turfgrass management, past management, financial and organizational management and the history, ethics, purpose and procedures of GCSAA. Also, an on-site inspection of O'Brien's golf course operation was conducted by two currently certified superintendents: Kevin M. Dushane, CGCS of Union Lake, Michigan and Bruce J. Wolfrom, CGCS, Ann Arbor, Michigan.

During World War I, Will Rogers had a suggestion for getting rid of the German submarines. "All we have to do," said Rogers, "is heat up the Atlantic to 212°F. Then the subs will have to surface, and we can pick them off one by one.

"Now, somebody's going to want to know how to warm up the ocean. Well, I'm not going to worry about that. It's a matter of detail, and I'm a policymaker."

The rest of us occasionally duck these details too. As a result, many of our "great ideas" fall apart when we try to implement them.

Some ideas work, of course. But others that sound great on paper prove utterly impractical in reality. When an idea does collapse, we should not be too quick to condemn those we've charged with its execution. We should make sure that we ourselves are not at fault.

Getting ideas is often the easiest part. Making relatively sure that they will work **before** we assign responsibility to others is also important.

From **Bits & Pieces**, June, 1984

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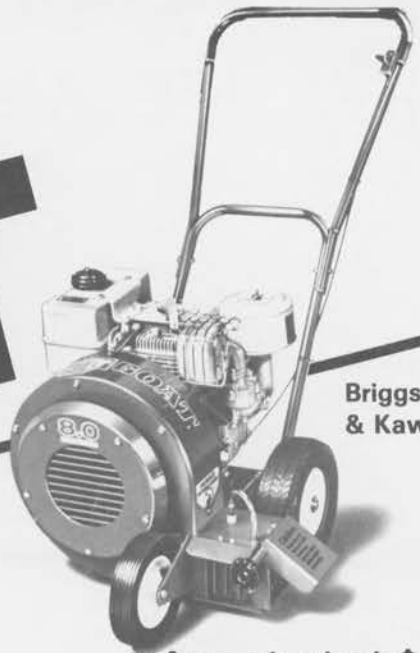

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GOVERNMENTAL AFFAIRS REPORT
TO
ALLIED ASSOCIATIONS IN GOLF
FROM THE
GOLF COURSE SUPERINTENDENTS ASSOCIATION OF AMERICA
MAY 30, 1989

Background and Introduction

All of you are no doubt aware of the daily attention the media is giving to the pesticide and chemical issues with which our society is struggling. Increasing attention is being directed to chemicals which are being applied to turfgrass by lawn care companies. There is no doubt that golf courses and their chemical programs will be discussed more and more in the public debate.

Additionally, federal, state and local governmental policies and law-makers are increasing the rules and regulations concerning pesticide application, worker safety, right-to-know, underground storage tanks, groundwater and other areas to protect the citizenry. Environmental regulatory activity will not decrease and all will have to comply or be subject to large fines and penalties as well as continued public crticism.

GCSAA is monitoring all of this through a variety of resources - including additional staff, consultants, reference material and special customized reporting services via electronic communications.

The reason we are doing this is to serve our members and hopefully, the game of golf. Golf course superintendents are the primary staff management responsible for the chemical application program at a golf course. Therefore in addition to informing our members about the regulatory climate involving pesticides used to manage turfgrass, we also have a continuing duty to educate our membership about all aspects of pesticides.

What is GCSAA doing now and what about the future?

GCSAA already has several key programs in place and a number of new efforts are planned. These efforts will be "proactive" in nature, and will be supplemented when necessary.

GCSAA currently offers these educational seminars dealing specifically with the environment and chemicals:

Disease Identification and Control
Environmental Considerations in Golf Course Management
Golf Course Safety, Security and Risk Management
Integrated Pest Management
Pesticide Regulations
Safe Pesticide Application
Turfgrasses: Qualities, Uses and Sources

We have an extensive certification program (CGCS) that requires a written exam and on-site attestation. This program delves into pesticide management and is being assessed by insurance companies for its risk management strength. Early feedback is that insurance companies may offer pollution coverage and discounted liability premiums to golf courses which have GCSAA superintendents that are certified and enrolled in our Compliance Assistance Program.

GCSAA is also planning to offer additional classroom seminars in areas such as right-to-know and hazard communication, and supplemental training for superintendents to teach their crews proper pesticide application techniques.

By **John M. Schilling,**
Executive Director, GCSAA

PROGRESS IN DEVELOPING IMPROVED ANNUAL BLUEGRASS

Donald B. White
Department of Horticulture
University of Minnesota, St. Paul

Poa Annua is one of the most maligned of grasses. Most people consider it a weed of the first order that threatens their professionalism. It is interesting to note, however, that it makes up the majority of the golf turf in the northern part of the continent. It is one of the most ubiquitous (found everywhere) of grasses. It is circumglobal, found all over the world, in both the northern and southern hemispheres. It is found in the mountains and plains; it is found on isolated islands in the oceans; it is found in warm as well as cold climates. It is also one of the most adaptable of species. After all, what other grass will flower and seed when mowed at 1/8"; grow in sun or shade; grow in well aerated as well as poorly drained soils; will fill in any open spot in turf; will invade even some of the best of bentgrass greens within a few years. I don't know of any other grass that will do all those things.

Some of you know that I strongly support an ecological approach to turf management and have long been a proponent of doing a good job of growing annual bluegrass, if that is what you have. After all, if you have tried everything to get rid of it and it is still around, it has to be one tough customer. I think it appropriate: "If you can't beat 'em, join 'em."

Poa annua appears to have originated in the Mediteranean area; some think during one of the early glacial periods. It evidently has been spread by man where ever he went in the world. I suspect that it arrived on this continent with the settlers in the Virginia Colony around 1570. It is possible that it arrived even earlier than that with the Viking and/or Irish explorers some time around 800 and 1200 AD on the East Coast. At any rate, it has been here long enough to become naturalized.

Interestingly, it is difficult to find any truly annual **Poa annua**. It acts like a winter annual in the South, but it acts more like a biennial in the cooler situations. And, in most populations that I have seen there are substantial numbers of perenial types. One attractive thing about **poa annua** is that it is one of

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News From

AMERICAN SOCIETY OF GOLF COURSE ARCHITECTS

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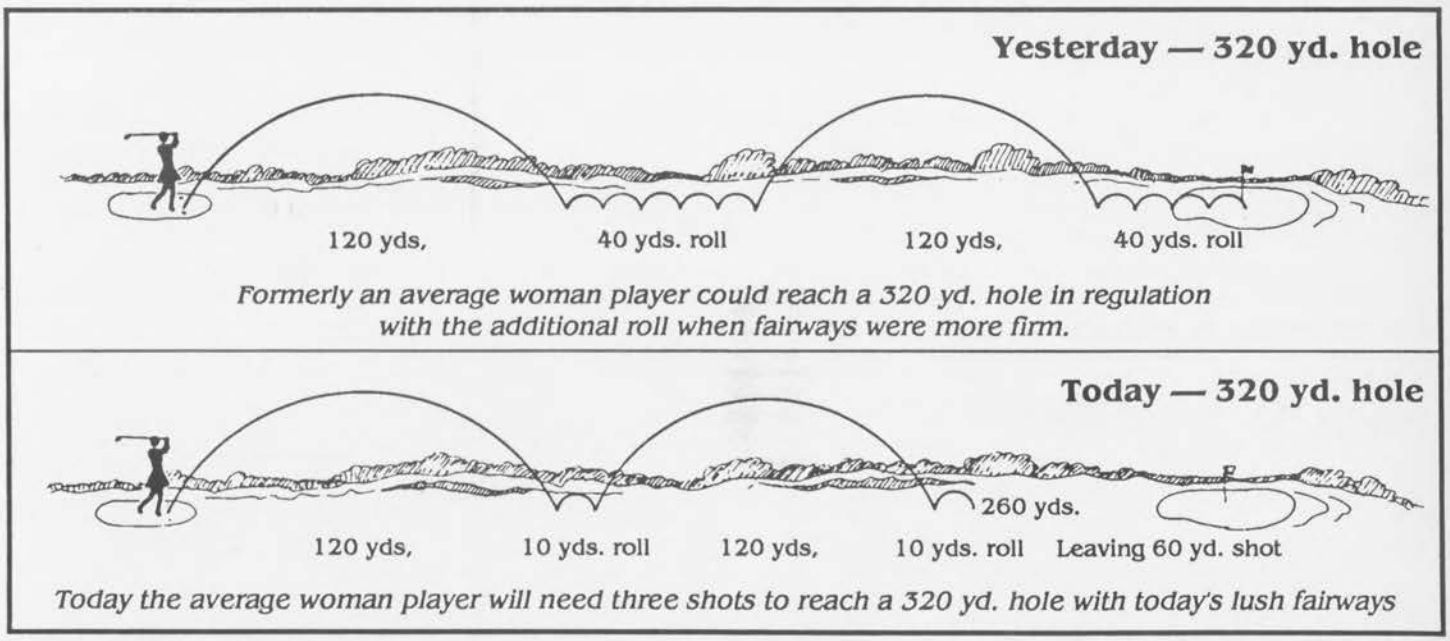
It's Time To Move Forward!



Women are making their presence felt in golf, and now golf courses must be adapted to their game, according to the American Society of Golf Course Architects.

With one in four golfers a woman, and 41% of all new golfers women, the Society's members are designing forward tees on most of their new and remodeled courses.

Alice Dye, the only woman member of the Society, points out that research shows the average woman golfer drives the ball about 130 yards. She says that the low handicap woman golfer is most comfortable playing a course that is approximately 5,440 yards long, while the average woman golfer would find a 4,800 yard course most enjoyable.

The ASGCA architects note that today's lush, watered courses have reduced the roll of the ball. On firm fairways, 33% roll previously was expected and designed into the hole. The two illustrations above show that the average woman golfer could reach a 320-yard hole in regulation with 40 yards of roll, but cannot when the roll is reduced to 10 yards.

Those interested in how forward tees can enhance the playability of a golf course may obtain further information and illustrations by sending a $5 check to the American Society of Golf Course Architects, 221 N. LaSalle St., Chicago, IL 60601.

Worried About Pesticides in Food and Water? Here are the Facts

J. Gordon Edwards, Ph.D.

Dr. Edwards, a Counselor of the National Council for Environmental Balance, is a professor of entomology at San Jose State University, San Jose, California. A ranger, naturalist-botanist, he has written for many publications on biology, eceology, entomology, mountain climbing, ornithology and zoology.

PESTICIDES AND PUBLIC HEALTH

Pesticides, in whatever form and for whatever use, are prime targets for media attacks. Little or no attention is paid to the positive values resulting from their use, while potential adverse effects (usually having little or no basis in fact) are magnified out of all proportion. In reality, the hazards are infintesimal compared to the dangers from common household products and chemicals that occur naturally in the environment. The chlorine in our drinking water is more poisonous than most of the insecticides and herbicides to which we may be exposed. Without chlorination, however, the disease-causing organisms in water would cause serious illness or death to many people, even in this country.

Pesticides annually save thousands of human lives in developing countries, increase the amount and improve the quality of agricultural products, and abate the ravages of malnutrition and disease. Hundreds of millions now alive and healthy would have died long ago if synthetic pesticides had not been used on their behalf. Modern man-made chemicals have replaced the more dangerous "natural" insecticides such as lead arsenate, sulphur, lime, cyanide and fluorine, which were the most widely used pesticides prior to 1940. Those expensive chemicals were extremely toxic to humans as well as non-target birds and mammals, and persisted indefinitely in the environment. Whether pesticides are "natural" or "man-made" has little bearing on how much of a hazard they pose to humans and our environment.

CANCER TRUTH

Dr. Bruce Ames, Chairman of the Biochemistry Department at the University of California in Berkeley, recently stated that "the total amount of possible carcinogenic pesticides we eat in a day, on average, is both trivial and about twenty times less in amount than the known natural carcinogens in a cup of coffee, which is in itself a minimum risk." EDB (ethylene dibromide) was the major fumigant of stored foods before it was capriciously banned by the

CONTINUED PAGE 18

Environmental Protection Agency (EPA). Ames points out that "its abundance in our daily food intake posed only one-tenth the carcinogenic hazards of the aflatoxins (natural chemicals produced by common molds) in a peanut butter sandwich."

TOXICOLOGY THAT MAKES SENSE

It is a toxicological principle that almost every chemical (natural or man-made) will be toxic at a large enough dosage, but at low enough levels every chemical is harmless to humans. Most critics of pesticides fail to acknowledge this, deliberately avoid mentioning the monstrous doses that were fed to experimental animals, and do not reveal how much would have to be ingested by a person in order to elicit comparable adverse effects. For example, a human would have to drink over 500 cans of diet soda daily in order to ingest the proportion of saccharin (per kilogram of body weight) that the experimental mice were forced to eat daily by researchers who sought to "prove" that the sweetener might be harmful to humans. There was obviously little reason for concern about drinking one or two diet sodas a day, but the media not only failed to put the experimental data into perspective, but further distorted matters by printing headlines like "PEOPLE EXPOSED DAILY TO CANCER AGENTS IN SOFT DRINKS." Such matters are discussed at length by Dr. Alice Ottoboni's recent book entitled, **The Dose Makes the Poison**, and in Edith Efron's classic volume entitled, **The Apocalyptics.**

The concentration of any chemical in the environment or in food and drink must be expressed as a proportion within the samples analyzed, rather than simply cited as being "present." One part per million refers to the presence of one "part" of the chemical for each million "parts" of soil, water or food. Imagine a huge pile of pennies worth $10,000 (i.e., a million of them). Now add one more penny to that pile, and you will have added "one part per million," or "one ppm." No man-made chemical is toxic enough to exert harmful effects at such low concentrations, but some natural chemicals, such as aflatoxins and botulism toxins, are. A concentration of one part per billion (ppb) is one thousand times less than one ppm. A pile of pennies worth 10 million dollars must therefore be imagined, whereafter one more penny added to the pile would be one part per billion (ppb) of the entire pile. News stories have sought to frighten readers by referring to one part per trillion of DDT in river bottom sediment! Some readers actually think that it is more than one part per million, "because a trillion is larger than a million." The media make no effort to explain that such a concentration is actually a million times less than one part per million!

MEDIA SHOULD EDUCATE

To further lessen public concern, the news media

CONTINUED NEXT COLUMN

could (and should) publicize the extensive testing that is required by the government before any pesticide can become "registered." (None can be marketed until they have been registered.) The toxicity of each substance is indicated by assigning it an "LD_{50}" (meaning "lethal dose for 50% of the test animals"). The LD_{50} of malathion is about 1400 mg./kg; for aspirin it is about 730 mg/kg; and for parathion, it is about 10 mg/kg. Those figures represent the number of milligrams of the chemical per kilogram of body weight of the animal which does kill 50% of the animals. The proportion reference is necessary, because obviously a small dose that barely kills a mouse would have no effect on a dog or a human (with much larger bodies). Notice that the larger of the LD_{50}, the lower the hazard from ingesting, inhaling or handling the chemical, for it takes less of the more toxic material to elicit adverse effects.

Malathion is thus about half as toxic as aspirin and parathion is 70 times as toxic as aspirin.

NUMBERS THAT MEAN SOMETHING

After years of tests on animals, the government determines how many ppm of each chemical might be dangerous to people. That amount is called the "maximum safe residue level." They also calculate a "no observable effect level," or NOEL, for each chemical. Experimental test animals are usually fed 50 to 500 ppm daily of insecticides (and one vociferous anti-DDT biologist at the University of California fed his caged pheasants nothing but grain with 12,000 ppm of DDT. . . and still caused only a few adverse effects). If feeding great doses of a chemical causes no harm, researchers many then inject great quantities directly into the blood, or pump it into the stomach. They also frequently dissolve the insecticide in powerful solvents that do not occur in nature, thereby eliciting adverse effects that cannot be caused by great doses of the pesticides without solvents.

Dr. Ames reminds his readers that every plant in nature produces its own pesticides, comprising as much as 5% of the plant's weight. He observes that "the amount of nature's pesticides we are ingesting daily is at least 10,000 times the level of man-made pesticides" and that "many (natural pesticides) are now being shown to be both mutagenic and carcinogenic." Despite all this, some people eagerly purchase and eat "natural" or "organic" foods, and are hysterically afraid of traces of the carefully-regulated man-made chemicals. (For those inferior foods they usually pay greatly inflated prices!)

Discussions of the safety of food, water, air and the environment are to be encouraged, but the anti-pesticide participants should always include enough solid date to make factual analysis possible. The important issues of carcinogenicity, mutagenicity and teratogenicity of chemicals in the environment, the work-place, and on our tables, deserve our attention and consideration - but always in a rational manner, without the bias that results from distorted media reporting.

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the most variable grass species and variability is what the breeder works with.

It is important to realize that we are talking about the first breeding cycle with **poa annua** ever. We are moving toward a 1993 target that we hope to meet with some very promising materials.

Progress:

We now have small replicated samples of 6 perennial type annual bluegrasses and 2 Poa supinas (a perennial, possibly one of the parents of **Poa annua**) under evaluation at 18 golf course sites around the country.

It may be useful to describe the process we are following in developing improved types of **Poa annua**. Steps in the process include: 1) collection of either seed or plants; 2) evaluation of the collection for turf, pollination and perennial characteristics; 3) increase materials that survive intitial evaluation; 4) space plant progeny; 5) conduct self, sib and cross pollinations; 6) establish mowing and disease trials; 7) conduct hardiness and heat stress evaluations; 8) make selections and evaluate under a range of golf course conditions; 9) establish seed and vegetative production trials; 10) the process branches here, one branch recycling back into controlled crosses and starting over; the other moving materials into seed production and introduction of varieties.

We are currently into items 7, 8 and beginning into 9 with materials from our early collections and pollinations. One of the major hurdles will be seed production because many of the best perennial "poas" seed only one time during the year.

We have collections from Canada, Europe and about one-half of the states. We have found that some of these materials are highly self pollinated while others are highly cross pollinated. We have found that some of these materials will not cross with each other while others produce the most seed with sibling crosses. We have found self incompatibility and some male sterility. All of these are important to the breeder but are of no importance to golf.

We have found habits of growth that vary from very dwarf to very vigorous stolon producers. There are materials that maintain very dark green color with very little fertility while others are light green. Some selections have produced very deep roots with root-zone temperatures of 85F at night and 115F during the day for six weeks. We have found that stolons can be stored for at least 22 weeks at temperatures between 32F and 40F and produce strong rooting responses. Some of our selections appear resistant to dollar spot while others are not affected by algae.

The project is sponsored by the University of Minnesota and the USGA Research Foundation with additional support from the O.J. Noer Foundation and many golf course superintendents. The **Poa annua** breeding project is progressing very well toward its objectives.

Preceeding from the 59th Annual Michigan Turfgrass Conference proceedings — January 16-18, 1989.

1989 GOLF DAY — GREATEST EVER

On Monday, October 2, four hundred golfers converged on Oakland Hills Country Club, Birmingham, Michigan to participate in the 24th Annual "Big Event" - Turfgrass Research Benefit Day.

There were two shotgun starts of 200 players each - one at 8:30 am and the second at 1:30 pm. Despite an occasional shower at the beginning of the morning round and again around noon, the day was a total success. For a short time in the afternoon the sun actually came out.

A total of seventeen suppliers manned the tees displaying their wares. Their support is greatly appreciated. Those participating were:

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Gary Thommes, General Chairman of Golf Day

Gerald Prieskorn, left and brother George Prieskorn - sons of George Prieskorn, Sr., one of the originators of the first Golf Day.

L-R; Bob Hall, Meadowbrook C.C., Bob McMasters, Red Run G.C., Pete Jackson, chairman Gam green committee, Neil MacPhee Essex G.C. - all Board members of the Golf Association of Michigan.

Back row, L-R; Doug Johanningsmeier, Howard Altman, Dave Taylor; Front row; Richard Locke, Dan Johanningsmeier.

L-R; Jon Maddern, Ken McRae, Guest, Dr. John Rogers, MSU; on #10 Tee - North Course.

Another big supporter was Scott Pifer of Pifer, Inc. who donated 25 EZ Go golf carts to supplement the Oakland Hills fleet.

Committee members that worked so hard to make the day such a tremendous success were:

Chairman of the Committee, Gary Thommes, Superintendent of Red Run Golf Club; Mailing and receiving entry forms was Doug Johanningsmeier (Turfgrass); Dave Taylor of W.F. Miller handled the registration; Kurt Kraly of Wilkie, in charge of arrangements for food and beverages (the dinner was outstanding); Paul Kolbe, Supt. Maple Lane Golf Club, handled the prizes; Mike Bay, Supt. Tam-O-Shanter CC, responsible for the scoring; Steve Kolongowski, Supt. Salem Hills Golf Club organized the purveyors that sponsored the tees; and of course Doug Boyle and Martin Fuchs, the Superintendents of Oakland Hills' two famous courses and their crews were responsible for the conditioning of the course.

Many thanks to all for such a great day. At last count it looks like we raised **$23,000.00** for turf research!

THOUGHTFUL TREE PLANTING

by Paul Vermeulen, U.S. Golf Association

To the novice golfer or average club official, planting a tree on a golf course seems fairly straightfoward. After all, it only takes a short trip to the nursery and 10 minutes to a dig a hole.

Well, not exactly. An improperly placed tree of the wrong species can seriously interfere with the original intent of the course architect, or even worse, completely destroy a putting green.

The following are 10 guidelines that one should ponder before attempting to plant a tree. Hopefully, these guidelines will help ensure that a new tree becomes an asset to the entire club rather than a thorn in the superintendents side.

Before reviewing these guidelines, please realize that each may not always apply strictly in all situations. For example, a large tree planted 25 yards away from a putting green on the south side will cause greater problems than a tree planted the same distance on the north side, due to heavy shading.

Guideline No 1: Make sure to select a planting location so that the mature canopy of the tree will not protrude on the line-of-flight between a tee and a fairway. Trees with protruding limbs dramatically reduce the usable size of a tee.

For example, a tree planted too close to the front right-hand side of a tee will promote concentrated use on the left-hand side of the tee. The result of such concentrated divoting on one side of the tee usually promotes discussion about the superintendents abilities. The solution to large overhanging limbs is usually sympathetic pruning that leaves the tree permantently disfigured. Actually, complete removal of a tree could be the best solution.

Guideline No. 2: To allow for vital air movement and exposure to sunlight, resist the temptation to plant dense groves of trees around greens, tees and fairways. Poor air circulation, especially in areas where greens are located produces soaring temperature and humidity during the summer that in turn promotes harmful disease development. Furthermore, poor air circulation and dense shade during the winter produces cooler soil temperatures that severely retards the growth rate, leaving greens helpless against foot traffic. In situations where poor air circulation and restricted sunlight penetration cause unacceptable turf loss, tree removal is absolutely necessary.

Guideline No. 3: Never try to completely fill in rough areas between adjacent fairways with trees for the sake of safety. No matter how many trees you plant to protect neighboring players, the odds are the first high handicapper will find a way through. Once they do, look out! The player automatically feels qualified to join the PGA tour and aims directly into the oncoming players, hoping to hit a fadeback over the trees.

If your intent is to protect golfers in adjacent fairways, then plant groups of trees strategically near the tee. This will prevent errant shots from even having a chance to stray. Leave several openings between adjacent fairways near the landing area so that if someone does stray, they have the opportunity to return to their fairway uninhibited.

Guideline No. 4: Never plant large trees closer than 75 feet from a green or tee, because they will become serious competitors for available water and nutrients. Most individuals are under the mistaken impression that tree roots cannot extend outward from the trunk further than the drip line of the tree. In reality, tree roots can extend outward from the trunk approximately one to one and a half times the total height of the tree.

For example, if a tree is 100 feet tall, its roots can extend as far as 100-150 feet. Once tree roots have invaded underneath a green or tee, they sap water and nutrients away due to their overwhelming size. In situations where tree roots are a problem, sever them with a trencher and install a permanent barrier.

Guideline No. 5: Without question, flowering trees add unmistakable beauty to any course. However, due to their tender bark and dwarf stature, they are extrememly sensitive to mower damage. This extreme sensitivity makes most flowering trees a poor candidate for use on golf courses unless they can be carefully protected. Augusta National is a good example. The beautiful flowering dogwoods and azaleas have been planted underneath large pine

CONTINUED PAGE 27

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trees where there is never an occasion to operate heavy mowing equipment.

Guideline No. 6: Try to avoid screening out scenic vistas. Scenic vistas include the clubhouse, ocean or mountain views, lakes or other open areas of the course. Once a scenic vista has been lost, it is usually forgotten and consequently may be lost forever.

Guideline No. 7: It is often best to avoid using a standardized tree planting as yardage indicators. Problems arise in the future when one of the plantings is lost or damaged.

For example, if palm trees are used on each hole to indicate a distance of 150 yards, it will be impossible to replace a dying palm with one of matching size. In addition, a tree planted to the edge of a fairway can severely penalize a golfer.

A better means of indication yardage may be to mark large, landmark trees already present throughout the course with a small wooden or metal plaque. The advantages of marking landmark trees is that they blend in with the course surroundings, they are already present throughout the course and because of their size they can be seen by golfers that stray into adjacent fairways.

Guideline No. 8: When selecting a tree, choose species that match the existing vegetation and have favorable characteristics. Cottonwoods and large fruit trees are not good candidates for golf courses because they are either strong surface rooters or require continuous maintenance.

In addition, try to limit the number of different species as much as possible. A continuous vegetation scheme is often the trademark of many of America's highest ranked courses. For example, the site of this year's U.S. Open is Oak Hill CC in Rochester, New York. This particular course has a continuous theme of oak trees from the first tee through the 18th green. Courses that tend to plant a potpourri of tree species are usually unflatteringly referred to as tree zoos or specimen parks.

Guideline No. 9: Try to naturalize the appearance of large tree plantings by randomizing the distance between each tree. A good way to develop a randomized tree planting would be to hit several dozen golf balls into a rough area from a distance of 200 yards. Then place a small flag where each ball has landed and selectively remove one flag at time until there are an appropriate number left.

Guideline No. 10: To prevent unnecessary neglect of newly planted trees, never plant more than the maintenance staff can adequately maintain. During the first year of establishment, small trees require extra attention and frequent hand-watering during

CONTINUED PAGE 30

of heavy traffic. Because this is a gradual process, only by observing the root zones regularly can you know when you reach the point for a gradual cutback in the organic component. This is done best by looking at the root systems regularly. A cup cutter is a good tool to use for this examination. Go to an average area on the green and cut the deepest cup possible. Carefully extract the plug from the cut and look at the roots. In an ideal situation, the material around the roots is very similar to that below, and the roots themselves are plentiful and have a plump, healthy look. There should be no compacted area developing, nor any indication of unusual moisture retention. The topdressing program is ideal if these criteria are met.

If the top two to three inches of the core are hard and the root system scanty and weak, the organic component is very likely inadequate, and there may be an excess of silt and clay. It will be necessary to use aerification with core removal, and topdress with a clean sand of a similar type combined with about 10 percent organic material to correct this development. If the soil is becoming spongy, the organic material should be cut back gradually over several topdressings until pure sand is being used.

The same technique should be used for problem analysis on older greens. It is an excellent means for determining the history of the green; an informed superintendent can often see what he is dealing with more quickly through this method than with any other single tool at his disposal.

A variety of conditions may be discovered in an older green. There may be layering from multiple topdressing. This condition can be relieved to some extent by aerifying several times, removing cores, and topdressing each time with a clean sand in the medium to fine size range. This technique will be helpful if the layer is less than three inches deep.

Problems may appear in the form of a spongy upper layer, perhaps resulting from on-site mixing during construction, which has left excessive quantities of organic material in the upper portion of the green. This is more difficult to correct, although the same basic technique may be tried. It is sometimes necessary to remove the sod and remix the seedbed before real gains can be made.

The upper layer may be hard and compacted, indicating an excess of silt and clay in the topdressing material, often in combination with very fine sand. Here again a very clean medium to fine sand may be employed in conjunction with aerification. It can be helpful to add up to 10 percent peatmoss in this instance.

Beyond the top three inches or so, it is almost impossible to make significant changes in the green's behavior using topdressing modifications. New technologies developing in some areas may make it possible to modify most of the seedbed. Time and experience will give us a better idea of their long-term effectiveness.

A current trend, which has caused many problems,

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is the building up of a sand layer on top of greens that are basically soil in order to improve putting speed. While it is possible to modify the greens in this manner, it should be done gradually over a couple of years rather than in an abrupt changeover. The modifying sand should be selected and mixed into the existing topdressing in a ratio of about 25 percent of volume. This material should be used several times and then further divided into a 50/50 proportion for several more topdressing. Continue increasing the quantity of sand in the topdressing until roughly a two-inch transition layer has been built up. This slower procedure allows the soil and sand to blend well enough for water to be moved as if there were no change. The infiltration rate will be that of the soil portion of the green, of course. Regular aerification should be done throughout the transition period, and cores should be removed each time.

If the original material of which a good green is built becomes unavailable for topdressing purposes, it is crucial to locate the closest possible substitute. This can be done by taking the particle analysis of the original sand to area sand suppliers to seek a match. Fortunately, similar sands are often available from the same area. Locating a close substitute will allow a continuing successful topdressing propgram.

Regular examinations of the seedbed using this core sampling technique are helpful in becoming aware of problems before they deveop into serious conditions. Success or failure often takes place on the worm's eye level.

Topdressing is more than a filler. It plays an active part in keeping good greens good, golfers happy, costs down, and aggravations to a manageable level. These are goals well worth pursuing.

Credit: **The Florida Green**

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the summer. If you must purchase trees in large numbers due to cost, it might be best to establish a tree nursery near the maintenance facility where they can be easily cared for. Then, over the next several years, slowly spread them over the course.

Summary: Remember that a good tree-planting program on any course starts with a long-range plan. What makes a golf course different from a park or from your front yard is the presence of sensitive putting greens and the integrity of the game.

The agronomic impact of misplaced trees is commonly seen in the form of shade, root competition and poor air circulation. Thoughtful tree planting should not only improve the appearance and playability of your course, but more importantly remove the thorn from your superintendent's side.

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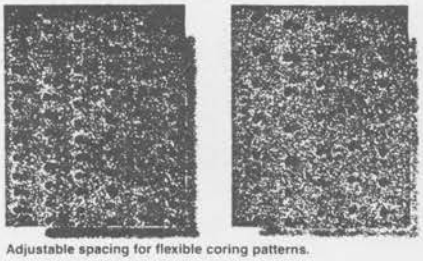

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