

# How Roundup® helped Jim Siegfried renovate this fairway in days, without closing it for one minute.



Take a good look at this good-looking fairway.

Last fall, Jim Siegfried found a way to clean it up, without tearing it up—at the height of his club's busy season. With Roundup® herbicide by Monsanto.

Jim is the Greens Superintendent at Losantiville Country Club, Cincinnati, where bermudagrass had become a serious problem on the 18th fairway. To control it, Jim applied Roundup once—while the weeds were still actively growing—right at the start of the Labor Day weekend.

"That's really 'prime time' here," Jim told us. "But after we applied Roundup, we kept the fairway in play the whole weekend, and after. The members played right over it, with no problem."

Since Roundup has no residual soil activity, and won't wash or leach out of treated areas to injure desirable plants, Jim simply took normal precautions against spray drift—and didn't worry about damaging desirable vegetation along the fairway.

Even better, he was able to re-seed right into the dying bermudagrass only 7 days after applying Roundup—without loss of playing time or inconvenience to the membership.

Reinfestation won't be a big problem for Jim, either. He knows that Roundup destroyed the rhizomes of the treated weeds, helping prevent their regrowth.

Jim thinks he'll use Roundup again this year—and apparently some club members hope so, too. "As soon as they saw how good this fairway looks, some of the members started asking when I'm going to do the same for #10, where we have some more bermuda. I'll probably tackle that with Roundup this fall."

*If controlling many tough emerged weeds and grasses is a problem for you, see your local Monsanto representative or chemical dealer soon for your supply of Roundup.*

*Roundup. It worked for Jim Siegfried. It can work for you.*



**There's never been a herbicide like this before.**

Circle 124 on free information card

ALWAYS READ AND FOLLOW THE LABEL DIRECTIONS FOR ROUNDUP.  
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For more information, contact Monsanto Agricultural Products Company,  
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# golf business/july

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## FRONT COVER:

Dr. Richard Smiley, Assistant Professor of Plant Pathology at Cornell University, established test plots at Mill River Club in Oyster Bay, N.Y., under actual conditions as Fusarium struck. Photo courtesy of Dr. Smiley.

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# Clippings

## Brief bits of news from in and around the golf business . . .

The US Department of Labor is predicting that the 16 to 24-year-old **youth labor force** will increase half a million over the 1978 summer peak. Two-thirds of the youths will be looking for temporary summer jobs. The rest are graduates entering the job market on a permanent basis.

EPA is going to select **10 urban lakes** to upgrade and revitalize for inner city residents. One will be selected in each of the 10 Federal regions of the country. EPA could provide up to \$100,000 per lake in Fiscal Year 1979 for 70 percent of the planning costs. Projects would then be eligible for a 50 percent grant for actual costs.

EPA has revised its water pollution control permit program which limits **wastewater discharges** from some 55,000 industries and city sewage plants. Action will put limits on kind and amount of discharged wastes. EPA claims it will speed up permit process.

OSHA has a new priority system for laboratory analysis of **toxic substance samples** gathered during workplace inspections. Screening tests will determine if a full-shift sampling is warranted. Who knows what will happen if OSHA gets more time on their hands?

Very interesting quote from a song in the Chamber of Commerce's "Washington Report", May 14. Speaking in reference to **regulations and small businesses**: "Taking quick refuge in the high branches of a nearby tree, just out of reach of the bear's snap-ping fangs, the preacher prayed . . . 'O Lord, if you can't help me, for heaven's sake, don't help that bear.' There's a message to government officials. The public too."

Al Wagner, pro owner at Halsey Canyon Golf & Country Club in Saugus, Calif., has announced **free greens fees** Monday through Friday, on the odd-even plan, based on that state's existing gas rationing plan. All golfers who arrive in a qualifying vehicle are eligible. Wagner says it will remain in effect until there is some relief from the present crisis.

Dave Maxson at the Cherry Hill Golf Course in Amherst, Mass., has nine **unique distance markers** for his front nine. Herb Hemmingway, a charter member, made birdhouses, painted them red and mounted them on poles. A house is placed at the edge of the fairway 150 yards from each green. Tree swallows are already moving in, Dave says.

**Sportsturf Northwest**, headquartered in Bellevue, Wash., has been formed to solve athletic turf problems. The scope of the organization is to extend beyond school athletic field complexes to parks and golf course renovation. Street address is 17012 NE 21st St., zip 98008.

**Briggs & Stratton Corporation** has begun construction on its 744,000 square-foot distribution center and light manufacturing facility in Menomonee Falls, Wisc. Cost is

estimated at \$35 million to be completed in early 1981.

Managers of **landscape businesses** expect 1979 growth to match last year's, with the exception of commercial and residential renovation work, according to a survey taken by the National Landscape Association.

The Council of Tree and Landscape Appraisers has a "Rapid Response" Program for information on how to recoup financial losses from **landscape damages** by natural disasters. Phone number is 202/347-8219.

Modern Talking Picture Service has a free brochure on free-loan **16mm-sound and color motion pictures** that are available to ski, golf and country clubs, among others. Write to Modern Talking Picture Service, 2323 New Hyde Park Rd., New Hyde Park, NY 11042.

The proceedings of the 1979 Irrigation Technical Conference are available. A copy of the 191-page **"Water, Water Everywhere — But Can We Use It?"** is \$12.00. The proceedings is also available on cassette tapes. A three-tape set on turf irrigation is \$27.00. Same for a three-tape set on drip/trickle irrigation is \$27.00. Same for a three-tape set on drip/trickle irrigation for both agriculture and turf. A full 12-tape set is \$80.00. Send prepaid orders to The Irrigation Association, 13975 Connecticut Ave., Silver Spring, MD 20906.

The Erosion Control Systems Group of Gulf States Paper Corp are distributors of **Enkamat**, the new erosion control product. Primary area will be the Eastern US. Gulf States is headquartered in Tuscaloosa, Alabama.

**Kutsher's Country Club** in Monticello, N.Y., has signed Amy Alcott to represent them on the Ladies Professional Golf Association circuit for the next two years. Alcott, a five-year pro, has averaged over \$55,000 in official earnings during her career. She has won six LPGA tournaments and is sixth so far this year in earnings. She also has a film with Arnold Palmer for the USGA entitled "Move Along For Better Golf".

**O.M. "Robbie" Robinson** has joined the marketing staff of Pickseed West out of Tangent, Oregon. His new duties will include direct sales to the professional turf seed market in the Pacific Northwest.

**George Hollander** is the manager of field sales for the Golf Car Division of AMF/Harley-Davidson. He will be in the Milwaukee office.

**Joseph L. Nelson** is marketing manager of Jacobsen Division of Textron Inc. Included in his area of responsibility is commercial grounds maintenance equipment.

**John Ramirez** will sell Johns-Manville's Buckner® Irrigation Systems products in the southern California area. Ramirez lives in Alhambra, Calif.

**Porter Brothers, Inc.**, a Shelby, N.C. distributor of power tools and turf care supplies have presented their 1979 scholarship awards. They have been presented annually since 1967 to students from Burns and Crest Senior High Schools in Cleveland County. A \$500 annual scholarship was presented by Joseph Porter, president of the company, to Deborah Jean Lackey at Burns and Hubert Scott Black at

Crest. \$100 awards were presented to four students from each school.

**James R. Pattee** is the new project manager for the PGA National, home of the Professional Golfers' Association. **Albert N. Frank** is the new project inspector. Frank comes from managing the Apawamis Club in Rye, N.Y. Both were announced by Tom Sansbury, project director.

It is estimated that PGA National will move 2.5 million yards of earth during construction of its first three golf courses, only a part of the unique golf showplace.

Rainbird Sprinkler Manufacturing Corporation now has four component **maintenance manuals** and plans on holding several maintenance and troubleshooting **seminars** on irrigation systems. The new controller manuals cover Model RC-12, RC-18 and RC-23 "A & B" series controllers, Model RC-8A, RC-8LS, RC-11 and RC-11LS series controllers, master controlled satellite systems and general maintenance for irrigation system equipment, respectively.

The Master Controlled Satellite System covers models MC-11, MC-11(IR), DMC-11, DMC-11(IR-s), MC-13 and MC-24 master controllers as well as the Model SC-11AB, SC-22AB and SC-12, 18 and 23 satellite controllers.

The general maintenance manual covers irrigation rotors, impact sprinklers, controllers, control valves, specialty valves, pipe, pumps, etc.

The seminars will cover controller programming and trouble-shooting. For information on dates in your area, contact Rain Bird Sprinkler Mfg. Corp., 7045 N. Grand Ave., Glendora, CA 91740.

**Field Day** at the Ohio State University Turfgrass Research Facility in Columbus, Ohio will be July 31. The newly completed rhizotron/lysimeter will be one of the main points of interest. Others include shade adaptation, an evaluation of cultivars, mixes, and blends of Kentucky bluegrass, bentgrass fertility, a drop-type spreader evaluation, green bug aphid studies and *Pythium* and dollar spot control on creeping bentgrass. Registration is 9:30 a.m. Program will start at 10:00 and run until 12:30 p.m.

The 48th Annual **Turfgrass Field Day** at the University of Rhode Island Turfgrass Research Arm in Kingston will be August 22. Contact Professor Skogley, Plant and Soil Science Department, University of R.I., Kingston, RI 02881.

The **USDA Turfgrass Field Day** will be also August 22 at the Beltsville Agricultural Research Center-West in Beltsville, Maryland. For more information contact: Jack Murray, Research Agronomist, Field Crops Laboratory, Beltsville Agricultural Research Center, Beltsville, MD 20705.

**Virginia Tech Turfgrass Field Days and Trade Show** will run Sept. 19-20 at Virginia Polytechnic Institute and State University in Blacksburg, Va. Contact J.F. Shoulders, Extension Specialist, Turf, VPI & SU, Blacksburg, VA 24061.

**The National Sporting Goods Association Fall Market Show** will be Oct. 19-21 in Los Angeles. Contact them at 717 N. Michigan Ave., Chicago, IL 60611.

# News

## DISEASE

### Gray leaf spot hits in humid weather

Gray leaf spot develops rapidly during periods of warm temperatures and abundant moisture, warns Dr. Walter Walla, a Texas Agricultural Extension Service plant pathologist. The fungal disease can give St. Augustinegrass, or centipede, a blotchy appearance.

Gray leaf spot first appears in damp, shaded areas. Grass with heavy disease development may have a scorched appearance. The disease is characterized by irregular gray, dirty-yellow or ash-colored spots on grass leaves. The borders of leaf blades may have a brown, purple or water soaked appearance or a gray mold may cover the spots, says Walla.

The disease becomes more severe when excessive nitrogen fertilizer is applied on certain St. Augustinegrass types. Newly-sprigged and rapidly-growing grasses are more susceptible. Walla advises watering during the day so foliage won't remain wet overnight. He also points out that most turf fungicides effectively control the disease when used at 10-day intervals during the warm, humid periods. Mix the fungicide in 15 gallons of water plus two ounces of liquid detergent for each 1,000 square feet of turf.

## LABOR

### Summer labor must comply with law

With summer, many youths look for temporary employment. It is a great source of help during the busy season. However, the Department of Labor warns that the child labor laws must be observed. These laws do not apply to anyone 18 and over.

At 16 and 17 years old, youths may be employed without a limit on hours worked and in any nonagricultural occupation other than those declared hazardous by the Secretary of Labor. Some of those that might apply include:

operating various types of power-driven saws and guillotine shears; operating most power-driven hoisting apparatus such as non-automatic elevators, fork lifts, and cranes; and operating motor vehicles or working as outside helper on motor vehicle.

The Department of Labor office told **Golf Business** that operating a motor vehicle applies to transportation. Driving a tractor, doing work, is not included and is allowable.

However, not for workers under 16. Fourteen and 15 year olds are excluded from working in all hazardous occupations, including operating or tending most power-driven equipment.

If you have a specific question, call Betty Hayes in the USDL information office at 202/523-8743.

By the way, golf course labor is considered nonagricultural.

## PESTICIDES

### DOW requests cancellation move

"We believe that a hearing panel composed of three EPA employees will find it difficult to recommend that he (EPA administrator) reverse his position. The situation calls for independent review."

With that statement, DOW Chemical Company withdrew from the 2,4,5-T and silvex suspension hearings and requested that the Environmental Protection Agency assign an Administrative Law Judge and schedule an immediate pre-hearing so that a full examination on risks and benefits could be undertaken with an ultimate government decision resulting.

DOW attorney Michael J. Traynor stated, "We have participated in two days of suspension hearings before a three-man panel of EPA employees to determine if 2,4,5-T and silvex herbicides should remain off the market during the upcoming six-month to two-year cancellation process. It has become apparent that the fundamental issues, which are the long-term safety and benefits of these products, will not be considered, therefore we are withdrawing from the 'suspension' hearings and pressing for prompt commencement of the broader cancellation hearings. This action is not an abandonment of the products or their defense, but simply a means to expedite the final resolution of their futures by beginning the cancellation hearings immediately."

## DISEASE

### Turf symposium provides update

A symposium on Turfgrass Diseases recently (May 15-17, 1979) took place in Columbus, Ohio. Over 150 were in attendance representing turfgrass pathologists and agronomists from universities, chemical companies, lawn care companies, sod and seed producers, golf courses, and other turfgrass industries. The major disease problems on turfgrasses were discussed by twenty leading experts. Time was devoted to discussion periods in which an exchange of ideas between those attending freely took place. These ideas should prove invaluable in developing new research areas in managing turfgrass disease problems.

The morning of the last day was devoted to a contributed paper session. That afternoon was spent touring turfgrass research facilities at ChemLawn Corporation and Ohio State University.

The symposium proceedings will be published and should be a valuable update on turfgrass disease problems. Anyone interested in purchasing the proceedings should contact the symposium organizers, Dr. P. O. Larsen — Ohio State University (614-422-6987) or Dr. B. G. Joyner — ChemLawn Corporation (614-

885-9588.

The response to the symposium has led to the planning of another symposium for 1980. The 1980 symposium is scheduled to occur on Oct. 14, 15, 16 and will cover insect problems on turfgrasses. Those seeking additional information or wish to contribute ideas for this symposium should contact B. G. Joyner, Plant Diagnostic Labs, ChemLawn.

## EFFLUENT WATER

### Effluent can enrich land, pocket-book

As an incentive for considering innovative treatment processes of sewage, the Federal cost-share percentage is 85 percent, as compared to 75 percent for conventional sewage treatment plants. This is a result of the 1977 amendments to the Federal Water Pollution Control Act. They instructed all construction grant applicants planning new or improved sewage treatment plants to consider innovative treatment processes such as land treatment.

Land near cities can sometimes benefit from the nutrients contained in the effluent, typically 50 pounds of nitrogen, 25 pounds of phosphorus and 40 pounds of potassium, according to Dr. John Sweeten, agricultural Engineer with



*Speakers at the recent symposium on Turfgrass Diseases 1979 (May 15-17) held in Columbus, Ohio. Pictured from left to right, P. O. Larsen (Ohio State University — Symposium Co-Organizer), J. L. Saladini (DuPont-Denver), N. Jackson (University of Rhode Island), T. E. Freeman (University of Florida), B. G. Joyner (Plant Diagnostic Labs., ChemLawn Corp. — Symposium Co-Organizer), L. L. Burpee (Bermuda Dept. Agric. & Fisheries), J. M. Fenstermacher (ChemLawn Corp.), A. K. Hagan (Ohio State University), R. W. Smiley (Cornell University), J. D. Smith (Canada Dept. of Agric.), H. B. Couch (VPI & SU), J. M. Vargas, Jr. (Michigan State University), and L. T. Lucas (North Carolina State University). Speakers not pictured include A. F. Schmitthenner (Ohio Agric. Res. & Devel. Center), R. M. Riedel (Ohio State University), P. F. Colbaugh (Texas A&M University), C. F. Hodges (Iowa State University), R. M. Morrison (Northrup, King & Co.), K. Kmetz (DuPont-Columbus) and H. Cole, Jr. (Pennsylvania State University).*



the Texas Ag Extension Service.

In Texas, two state agencies have primary jurisdiction over land application of municipal sewage. The Texas Department of Water Resources is responsible for systems financed by the Environmental Protection Agency Construction Grants Program and/or the Texas Water Quality Enhancement Fund.

The most stringent requirements apply to public access lands such as recreation areas and to wastewater application systems that would involve an indirect discharge to surface or groundwater. Land application of treated sewage effluent is generally permitted if surface and ground water quality will not be impaired.

Sewage applied to public access land must have received secondary treatment following primary, which is solids separation. Texas does have a limit on bacterial quality and irrigation should not take place when areas are open to the public.

Private agricultural land may be irrigated with water receiving only

solids separation, provided discharge to surface or ground-water is prevented. Sweeten says the city or farmer may own the storage facility.

The application systems include irrigation without discharge, overland flow and infiltration-percolation. The application rate for the systems varies with soil type and depth, percolation rate, slope, water table level, crop growth and other related factors.

More than 200 Texas cities and towns have installed land application systems for treatment and disposal of municipal sewage effluent.

## IRRIGATION

### Temperature can show when to water

There is now a "gun" on the market that will measure the canopy temperature of a crop and the air temperature and give a digital readout of the difference. The gun weighs about 2 pounds, is carried

in a holster, and has rechargeable batteries.

The theory behind use of the gun is that when evapotranspiration depletes the soil moisture below the plant's needs, the plant's temperature rises, due to stress. When the crop temperature exceeds the air temperature for a certain length of time, depending on the crop, it is necessary to irrigate. This concept has been under study by USDA scientists at the U.S. Water Conservation Laboratory in Phoenix, Ariz., for the past few years.

The concept is being "fine-tuned" by three scientists with USDA's Science and Education Administration-Agricultural Research. Ray Jackson, Robert Reginato and Sherwood Idso have developed a system that they call "stress-degree-days". Wheat, for instance, on Phoenix area soils has a tentative stress-degree-day classification of +10. If the differential reading on a wheat field one day is +2, the next day +3, and the following day +5, the total accumulation of +10 indicates that

the crop needs water.

We need a turf scientist to come up with figures for turfgrasses. Then when to irrigate will be as easy as that.

## COURSES

### Pinehurst no. 2 closed for original restoration

The Pinehurst no. 2 course, designed by Donald Ross, is currently closed for restoration of the layout to its original design and condition. The seven-year-old Penncross bent greens were stripped and are currently being resodded with a Bermuda hybrid strain similar to the grass Ross last used.

Three greens have undergone further surgery — only minor, again to restore the course to the design and shape that existed just after Ross' death in 1948.

A second step in the restoration program involves returning the greens to their original size.

"Over the last 20 years, the greens of No. 2 have shrunk . . . so slowly that it was hardly perceptible except to the trained eye," Miller said. "But the greens had lost at least two dozen excellent pin placements in the process." Restoring greens size does not involve redesigning but requires, simply, cutting larger greens. The enlarging will return more than 50 per cent in green dimensions and will bring several mounds once again more closely into play.

A third step entails restoring 17 sand traps that had been converted to grass bunkers over the last 30 years. These will not add appreciably to course difficulty, Miller said, but will provide contrast for depth perception and hole definition.

Those involved in the restoration note that firm greens were once a trademark of No. 2 Course. Returning to Bermuda-grass greens will "put the pitch and run shot back into No. 2," said golf course architect Tom Fazio of the design team of George and Tom Fazio, who built the Pinehurst No. 6 Course and completed redesign work at Inverness Club in Toledo, Ohio, for the 1979 U.S. Open. "Bermuda-grass greens will eliminate the approach shot hit directly to a pin placement. Rather, as is more common on Bermuda-grass greens, players can expect a big first bounce before an approach shot holds," Fazio said.

GOLF BUSINESS pulse report — March*	% of sample	average expenditure	total expenditure within sample	total expenditure projected to universe**
dry turf fertilizer	79	\$2694.36	\$118,552	\$25,000,000
liquid turf fertilizer	11	513	3,080	650,000
tree fertilizer	25	400	5,600	1,200,000
pre-emergence herbicide	46	780	20,272	4,300,000
post emergence herbicide	63	667	23,352	5,000,000
aquatic herbicide	29	319	5,096	1,000,000
fungicide	66	1709	63,224	13,000,000
turf insecticide	50	518	14,504	3,000,000
tree insecticide	25	200	2,800	590,000
seed	61	781	26,544	5,600,000
sod	14	1617	12,936	2,700,000
trees	34	1512	28,728	6,100,000
ornamentals	25	1948	27,272	5,800,000
soil amendments	34	799	15,176	3,200,000
tractors:				
under 10 hp	9	1523	7,616	1,600,000
10-20 hp	5	3808	11,424	2,400,000
21-30 hp	0	1	—	—
31-50 hp	7	11,172	44,688	9,500,000
larger	4	2500	5,000	1,100,000
tractor drawn mowers:				
rotary	4	2828	5,656	1,200,000
reel	14	2345	18,760	4,000,000
flail	7	1204	4,812	1,000,000
self-propelled mowers:				
rotary	30	2994	50,904	11,000,000
reel	34	5123	97,328	21,000,000
flail	2	400	400	85,000
irrigation equipment:				
pumps	18	7717	77,168	16,000,000
sprinklers	43	2480	59,528	13,000,000
pipe	43	1204	28,896	6,100,000
controls	30	2253	38,304	8,100,000

\*56 strategically located superintendents reported their expenditures for the month of March. GOLF BUSINESS presents these figures as an ongoing effort to accurately picture the dollar volume in the golf market.

\*\*These figures are based on the assumption that what is true of the superintendents responding to the questionnaire is true of superintendents in general. A universe figure of 11,885 superintendents is used.

# Finally, An Aid For Teaching Turfgrass

Superintendents, Contractors, Lawn Care Managers, New, On-the-Job Reference. The Turf Managers' Handbook is a comprehensive, organized approach to turfgrass science and care. It has been designed and written by leading turf specialists from Purdue, Dr. William Daniel and Dr. Ray Freeborg, for on-the-job reference and as a text for students.

The book contains 150 illustrations and 96 color photographs. Data includes 240 tables and forms. Included are specifications for rootzones, employment, calculations for

chemical applications, and extensive metric-imperial conversion. Business and technical aspects of turfgrass management are covered in this 424-page Planning, purchasing, hiring, construction, and plant selection are put together for easy on-the-job reference. Markets covered include lawn care, sod production, golf course management, cemeteries, athletic fields, and low maintenance areas. If it concerns turf, it's in the Turf Managers' Handbook.



## TURF managers' Handbook

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Please send \_\_\_\_\_ copies of the hardback (\$18.95 ea.)  
\_\_\_\_\_ copies of the paperback (\$14.95 ea.)

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# Modified sand topdressing at Stony Brook

Recently there appeared, in a local publication by a turf products supplier, the following admonition:

**"THE OLD PRO SAYS:**

In the long run, topdressing with a commercially prepared mixture can be cheaper than topdressing with sand. That's because sand can bring on long-term effects that are costly both from an agronomic and financial point of view. John Hall, Extension Turf Specialist at Virginia Polytechnic Institute, lists these potential problems with sand topdressing: (1) excessive water infiltration; (2) excessive nutrient leaching; (3) lower microbial activity; (4) hydrophobic drying; (5) lack of moisture reservoir; and (6) susceptibility to drying."

Having topdressed with sand, plus various adjuvants in minor amounts, for four years with apparently excellent results, I thought it best to stop and consider whether we were approaching the dire consequences predicted above. Our green's top soil consisted of 70 percent coarse sand, 30 percent clay soil, and 10 percent peat. It tested about 1.2 inches per hour according to the N.G.A.A. green's section procedure but not as high as that proposed by Marvin Ferguson, an enthusiastic investigator then in charge of testing. For five years we topdressed with this mixture until we listened to a discourse on sand topdressing at a University of Massachusetts Turf Conference. We were assured by several west coast operators that sand had been successfully used for upwards of ten years and therefore appeared to be good choice.

Implementing this idea, however, was difficult because the damp sand would not pass through the spreaders. It was impractical for us to dry it to make it flow reliably. We did find an easy means of drying the sand by mixing one part calcined clay, (fine Terragreen), to 5-6 parts by volume of moist sand. While we were mixing, it was found practical to incorporate other materials such as hardwood ashes, ground limestone, gypsum, iron sulphate, etc.

We did not rely solely on sandtopdressing to control thatch, however, but made a practice of dethatching one or two times during season. We used both the Scotts Pro-turf Aerator and the Ryan Ren-o-Thin

IV, and blew off a few bushels of thatch, mowed to 5/16" and topdressed followed by a drag mat.

We have justified this practice by the following reasons, (taking our cue from the "Old Pro")

(1) "As for" excessive water infiltration," we use so little topdressing that no noticeable effect could be observed, nor would we expect any. We think sand is ideal because its primary function is to reduce thatch by inducing decomposition. When clippings and stems decompose, having an initial dry composition of perhaps 70% cellulose and 30% lignin, there is left the lignin which has a very long life. If left undiluted or not removed by drastic dethatching, the surface will become excessively spongy (less able to support traffic) and less able to transmit water. If you make a percolation test on a sample high in lignin (humus), you will find a greatly reduced rate of percolation though its total capacity for absorbed water is increased; their effects run in opposite directions.

(2) "Excessive nutrient leaching": We would agree that if large amounts of sand are used, the surface will become excessively permeable and nutrients will be lost. But if the amount of sand is held to that which is necessary to complement the build up in humus, no harm is done. That is why we do not use, nor prefer to use, the ordinary top dressing equipment. Rather, we use the kind that is more commonly used for fertilizers and granules. These are capable of spreading very evenly and in carefully controlled amounts. Calibration and actual use of our drop-type spreader showed a range of application of between one and two cu. ft. per 1,000 sq. ft. which amounts to a surface thickness of only between one and two hundredths of an inch. If this is repeated three times during the season, you can understand how little build-up there is. Of course, if there were bad holes or defects that needed to be filled, we would use the same mixture as originally used for the green's top soil.

Another factor that minimizes undesirable effects is the use of calcined clay which possesses a very high capability for absorbing water and nutrients and which has even been advocated by the manufacturer as the sole top dressing agent.



Sand for topdressing at Stony Brook is selected on the basis of a size that will infiltrate the grass leaves and not be picked up by mower blades.

(3) "Lower microbial activity": This would naturally follow with the use of an excessive amount of sand.

(4) "Hydrophobic drying": Again, this would follow the excessive use of sand.

(5) "Lack of moisture reservoir": As above.

(6) "Susceptibility to drying": As above.

Although the use of straight sand can be justified under some conditions, as the principal means of achieving satisfactory decomposition of thatch and still promoting good percolation, we now prefer to modify it with judicious amounts of:

(1) An absorbent agent, such as fine grade calcined clay, to increase its capacity to absorb water, plant food, and particularly the metal cations that possess a high attraction for clay; (cation exchange capacity.)

(2) Whatever ground limestone is needed to maintain an acceptable pH and furnish a source of calcium and magnesium.

(3) Gypsum — a source of both calcium and sulphate which not only promote decomposition of thatch but has an agglomerating effect on fine particles (will say more on this topic).

(4) Plant food, iron, etc. as may be necessary.

(5) Might consider this a means of applying fungicides and insecticides; a separate study.

It is a mistake to think that a relatively small amount of topdressing



# Golf Course

by Ernest L. Kallander



The author believes that his use of sand as topdressing is successful. He prefers to apply the sand with a fertilizer spreader to insure even distribution.

would produce a separate and continuous layer. When the particles of sand, etc. infiltrate the fibrous body of thatch, a continuous layer is impossible. It is broken up by a mass of fibers. It becomes a heterogeneous mixture of sand, fibers, sand, fibers, calcium carbonate, fibers, calcium sulphate, fibers, etc. Furthermore, the effect of the gypsum, calcium sulphate, having an appreciable solubility in water, is to agglomerate fine particles into rather large agglomerates which remain distinct (promoting good percolation) until dispersed by a combination of excess water, and mechanical action (stirring or compression). I have isolated large proportions of these agglomerates, some of which are as large as one-eighth of an inch. It has been reported that humus and certain salts have a similar effect.

I have relied on selecting a sand on two chief bases. Sand:

(1) should not contain too many large particles for they will not infiltrate the grass leaves, and will be picked up and ground by the mower blades.

(2) should have a very high permeability, upwards of 500 inches per hour when done by the method prescribed by the Green's Section of U.S.G.A.

If there is access to screens, and sufficient knowledge to interpret the results, a good estimate of a satisfactory percolation can be predicted. But

the percolation test can be made without expensive screens. A good approximation can be made with only a tin can perforated at the bottom and an inverted bottle. Moreover, with a percolation test of 500 or so we are not after the precision provided by laboratory equipment designed to measure accurately only a few inches of water per hour. Moreover, there is an excellent chance that whatever fines there are will be agglomerated.

While I have specified "upwards of 500 inches" we have used sands as low as 63, a practice that can be justified by the following considerations:

Let us assume that we have a fairly well drained green's soil having a permeability of (a) 1.0, according to the procedure given by Musser p. 328 Turf Management; and (b) 2.0 according to a procedure written by Ferguson et al. In engineering terms, these values are relative to Fluidity which is the inverse of Viscosity. If our sand has a value of 60, at a 3" depth, and our actual depth is 0.1", (a rather heavy application) then the value for the sand is  $60 \times 3$  over 0.1 equals 1800. Since the resultant Viscosity is the sum of the soil and the sand the results are:

$$(a) R_v = \frac{1}{1.0} + \frac{1}{1800} = 1.0005$$

Which show how little the sand has affected the Fluidity (Permeability)

$$(b) R_v = \frac{1}{2.0} + \frac{1}{1800} = 0.5005$$

and again, the Permeability has been effected to a negligible degree.

It is because of the above factors that many operators have used ordinary soil for top dressing and have not been able to discern any effect on the green's receptivity to water even though the soil has perhaps 100 times the resistance to permeation of sand. The key here is the relatively thin layer.

In order to measure the effectiveness of various drying agents on the ability of the top dressing to pass through the openings of our spreader, the angle of slip was measured; various amounts of drying agent were mixed with the sand and the angle of slip measured. This is the angle with horizontal that is made by a smooth cone. Without detailing all the data, it was found that a satisfactory angle, about 25 degrees, was achieved with 23 percent (by volume) of calcined clay, 20 percent fine vermiculite, and

23 percent dry peat. No amount of perlite sufficed. Apparently the particles of sand adheres too strongly to the perlite. The use of peat did not appear practical since the angle of slip was very variable depending on the degree of mechanical agitation given the mixture, and the addition of peat would further slow percolation; why add something like that when we were trying to dilute?

I have never found a sand commonly sold for brick masons that did not satisfy; probably because it is always washed. □

## Bibliography

(1) *Permeability of various grades of sand and peat and mixtures of these with soil and vermiculite*, by William L. Garmon, Asst. Prof. of Soils, Cornell University, *USGA Journ & Turf Mgt.* April 1952.

In part: "Peat, when compacted ... becomes almost impervious. A vermiculite-soil-sand mixture, 1-1-1 ratio, showed higher permeability and more resistance to compaction than a peat-soil-sand mixture, 1-1-1 ratio."

(2) *Soil Modification — Practices with Putting Green Soils* by Marvin N. Ferguson, *USGA Green Section*.

In part: With respect to a mix with very fine sand and silt) "it will be necessary to reduce the peat a great deal to insure adequate infiltration and percolation."

(3) *Soils* by Marvin N. Ferguson, Nat. Res. Coord., *USGA Green Section*.

(4) *Minimizing Compaction in Putting Greens* by O. R. Lunt, Dept. of Irr. and Soils, University of Cal., *USGA Journ & Turf Mgt.* Sept. 1956.

In part: "Lack of oxygen (due to compaction) is major factor in limiting growth to shallow depths" — resulting in necessity for frequent aeration and irrigation.

(5) *Principles for Any Green* by Wayne Morgan, Kellogg Supply Co., Wilmington, Cal. *Turf Bull.* Spring 1970.

In part: Roots do not grow when it is too dry nor too wet. They grow only when there is a favorable soil nutrient, air-moisture relationship. Such a relationship is possible when there is excessive compaction (as evidenced by the necessity for frequent aeration)."

(6) *Sand Topdressing of Greens* by Ray Knapp, Tuckaway CC, Milwaukee, Wisc.

This report indicated use of about 30 cu. ft. per 1000 sq. ft. per year, which is about 15 times as much as we use. Yet Knapp reports:

- eliminates thatch
- no aerating or dethatching
- graininess eliminated
- putting faster, less foot printing
- no abrasive action on leaf or mower
- less fungicide needed
- need to replace phosphorous because of its loss (I can't understand why)

(7) *The Effects of Compaction on Golf Mixtures* by Kunze, J. B., Ferguson, M. H., and Page, J. D., *USGA Jr.*, Vol. X No. 6 Nov. 1957.

(8) *Thatch — A Luxury We Can Do Without* by Richard L. Duble, *Turf Grass Times*, Sept.-Oct. 1976.



**"Why am I  
so strong on service?  
Because Jacobsen customers  
say they expect it."**

