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Balan's new granular form makes it even easier to apply.

PARTIALLY TREATED WASTEWATER SOLVES FLORIDA IRRIGATION PROBLEM

Water waste. It is well-known what will happen if the world continues to waste and abuse the dwindling supply of perhaps its most important natural resource — fresh, clean water.

The City of St. Petersburg, Fla. has a precedent-setting water reclamation project in which this wastewater, treated until it's nearly as fresh as it was when it first passed through household plumbing fixtures, is being used to irrigate golf courses, parks, commercial sites and street parkways.

Recycled wastewater, or "effluent water," first began flowing through a special 14-mile distribution system in St. Petersburg in November, 1976. Located in a region chronically plagued with a shortage of fresh water and surrounded by polluted saltwater bays, St. Petersburg took a bold step.

"We believe our water recycling system for effluent water is the first of its scope in the nation," said Timothy Thornton, of the engineering firm of Black, Crow and Eidsness.

"Our efforts are being carefully watched by a number of state and national agencies, including the EPA. The results we achieve may well influence the development of such systems elsewhere."

Thornton explained that city fathers realized some time ago that they had little choice in

deciding whether to beef up recycling efforts of existing water supplies.

"The community is supplied water from three sources," he said. "Lakes and streams supply a small portion of water, as do subsurface fresh water pockets, though this source is dwindling because of saltwater pollution. However, all of the potable and most of the irrigation water comes from well fields more than 50 miles away."

He said that up to 40% of the potable water brought into the city from the outside has been used to keep areas green during the long dry season. "That's an abuse of drinkable water," he commented.

"We are left with one viable water source for irrigation — effluent water. The only dependable future water supply for irrigation is treated wastewater," Thornton added.

"Three years of research on wastewater purification yielded a process whereby the effluent water is almost as fresh as the city's potable water," said Thornton. The process makes the effluent water safe to use for irrigation and to be stored underground for future use through the use of deep injection wells.

He explained that residents were reassured that the effluent water to be used to irrigate much of the city's landscape is odorless, clear and not a health hazard. It is treated in much the same way as water to be used for drinking, though it retains its nitrogen and phosphorus content because of the value of those chemicals as fertilizing agents.

The spray irrigation system used to water parks,

One of four plants to be built in St. Petersburg to recycle wastewater for irrigation.





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U.S. Plant Patent 2887

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schools and golf courses was supplied by Rain Bird, said Thornton. Bank's Supply Co. supplied 90% of the equipment used on the job.

Thornton reports that public acceptance of the new program has been very good. "The good response is partly due to increased water availability and lower costs. Also, there will be no further release of effluent into the bay. That has resulted in a noticeably cleaner bay. The city also has done an excellent job of selling the whole concept to its citizens," Thornton explained.

Costs are down because nutrients are not filtered out of the effluent irrigation water. There are considerably greater expenditures required to refine these impurities out of water that is to be potable.

A recent legal decision regarding the distribution of wastewater reinforced the effluent water program. The Wilson-Grizzle Bill declared the Tampa Bay area a zero-pollutant zone. That meant that sewage water, no matter how well cleaned, could not be discharged into the surface water.

The city has four recycling plants located in four geographical quadrants of the community. The first plant modernized to perform the new tasks required a total expenditure of approximately \$25 million.

This plant now has a maximum filtering capacity of 20 million gallons per day, up from the former eight million gallon capacity for potable water. Completion time for the project was three



One of the many outlets to the 14-mile distribution system for the recycled wastewater.

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years, though engineering design of the modernization was started before 1973.

Each of the plants is in a different stage of redevelopment. Each has a treatment facility distribution system and deep wells serving as back-up reservoirs for periods of peak water usage. A master control system is planned to eventually link all four plants. So far the first plant is the only one to supply effluent water along the special 14-mile distribution system and to successfully accomplish the goal of zero discharge of effluents into surface waters required by the Wilson-Grizzle Bill.

Funding for the project is being provided by federal and city monies. Thornton and his associates work primarily with the Public Utilities Department of the city. But on a day-to-day basis, they also work with individuals in nearly all levels of administration and management, from top administrators down to plant operators. Naturally, cooperation is essential.

"A Ph.D. sitting at a drawing board thinking up new systems must have practical input from the field people installing the equipment," said Thornton. "We're all in this together."

What does the future hold for the avant-garde St. Petersburg program? "We see a dual water system available some day," Thornton commented. "Residents and businesses will have one set of pipes at their disposal for potable water and

Reservoirs like this one hold wastewater destined for practical use in irrigation.



another for effluent water. One system will provide drinking water at the present rate of about 60 cents per 1,000 cubic ft. with the price of effluent water at 10 or 15 cents.

"We've also been looking into ways to use the wastewater that's pumped into the ground. For all practical purposes, this is pretty good water. We're thinking of recovering that water, using solar energy as the power source, treating it to restore drinking water quality, and putting it directly back into the potable system. There might also be a

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way to put it directly in the water supply system from the treatment plant. Research is going on."

Thornton cited one very tangible by-product of the St. Petersburg project, large quantities of sludge left from the primary treatment of waste. This material causes no particular problems as it can be added to the green areas and used as an additive to commercial fertilizers.

A number of Florida contractors collaborated on the project. Included were Gulf Contracting, the Boyce Co., Tuttle-White and Lee Construction and

Layne-Atlantic of Orlando. One of the spray irrigation contractors was Moore Golf of Culpepper, Va. Representing Bank's Supply Co., the Rain Bird distributor, was Dick Batchelor, sales manager, and John Swanson, irrigation specialist.

"We're pleased with the work these firms have performed," said Thornton. "This is more than a job, the whole community is backing it. It just doesn't make sense to spend so much money for water and then waste it when it could be reclaimed."

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IN MINUTES



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THE DIGGIN' DUTCHMAN

MICHIGAN TURF AWARDS



Senior Paula Dietz of Michigan State University received the Bert Bradshaw Outstanding Student Award in Turfgrass Management from Gordon La Fontaine (left) and Bert Bradshaw (right) at the 48th Annual Michigan Turfgrass Conference last January.



Steve Vasher (left) and Dale Conzelmann (right) each received the TUCO Outstanding Scholar Award from Henry Lyons of the TUCO division of the Upjohn Company at the conference.



Above, James C. Lass of Caledonia, Mich., received the MTF Norman W. Kramer Outstanding Scholar Award. The award is shown being presented by Ward Swanson (right), Chairman of the Awards Committee. Below, Les B. Rutan is being presented the MTF Outstanding Student Award by James Smith (right), President of MTF.



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KENTUCKY BLUEGRASS

U.S. Plant Patent 3151

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MANAGER'S GUIDE TO WARM SEASON GRASSES

By William H. Daniel, Ph.D., Department of Agronomy, Purdue University

Maintaining a warm season grass for warm weather periods and overseeding with cool season grasses to mask winter's dormancy is the current practice in many warmer climate areas. Bentgrasses, bluegrasses, and red fescues are being used in overseeding mixtures. New cultivars of bermuda, with more hardiness and vigor, plus longer lived perennial ryegrasses now available for overseeding, offer wide possibilities and new combinations for lawns, fairways, tees, and athletic fields. Annual ryegrass is used in over 90% of lawn overseedings.

Some advantages and disadvantages of overseeding with cool season grasses are:

Bentgrasses — good putting, good color, tolerant of extreme cold. Emergence and seedling growth rate slow.

Bluegrasses — *Poa trivialis* on greens, Kentucky blue on fairways, tees. Good color, slow growth. Putting surface poor.

Creeping red fescue — fine leaved, good putting, less frequent mowing, extremely resistant to disease. Expensive, dies out early, may leave bare spots.

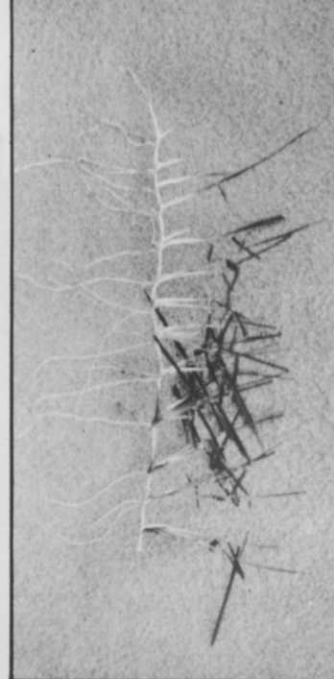
Ryegrass — germinates rapidly, grows fast. Competes too much with existing bermuda, may lose color in extreme cold, susceptible to pythium, brown patch, and dollarspot, and when young thins rapidly when these diseases may be active.

In choosing a warm season grass the selection of species and cultivars should depend on the adaptability to environmental conditions, use to be imposed on it, and the level of management which will be provided.

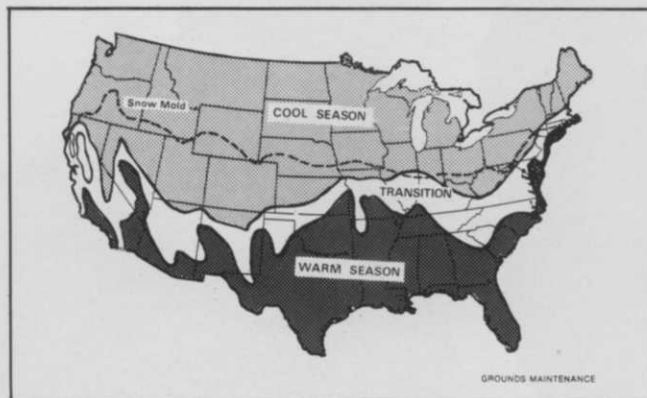
The loss of chlorophyll in the leaves which precedes the onset of winter dormancy is related to temperature. Test results indicated that U-3 bermudagrass maintained normal color when the temperatures were 60° F during the day and 40° at night, or a minimum of 50° constantly. In contrast, temperatures of 60° days and 34° nights, as well as 50° in the day and 40° at night both produced discoloration.

Bermudagrass

Common bermudagrass seed is harvested in the dry southwest. This seed produces a relatively



Right: Zoysia runner from established sod.
Below: Turfgrass zones of the United States.



coarse textured, open, and fast spreading turf. The seedlings produced vary in texture and vigor.

The preferred time for seeding bermudagrass, *Cynodon dactylon*, is during the warm days of late spring; frost damage must be avoided. Seedlings produce stolons slowly and are favored by starting thin stands, but with ample nutrition. Optimum soil temperature for root growth of bermuda is approximately 80° F. The shade tolerance of common bermudagrass is poor.

After winter-caused dormancy, new growing points must be initiated from the dormant buds. This process depletes the stored nutrients in the rootstocks (hard white underground stems) so if a late spring frost kills the newly emerged tender shoots the next emergence of new growth will be limited and slow. Thus, late spring frost can be more critical than severe winter temperatures in actually weakening or killing bermudagrass.

All improved bermuda cultivars are vegetatively propagated. The limited availability and uncertain identification of stolons for a specific cultivar from the sod nurseries may be a limitation in local areas.

There are three classifications of the bermuda grasses as to their "cold tolerance" — poor, medium, and good.

Poor Tolerance to Low Temperatures. — This is the designation for the grasses that are suited for areas



Dr. Daniel is in the final stages of writing his new "Handbook for Turf Managers." The book has 39 chapters on topics such as Management, Grasses, Rootzones, Pest Control, and Turf Uses. The new book will be available from Harvest Publishing Co. this summer.