

# GOLF COURSE NEWS

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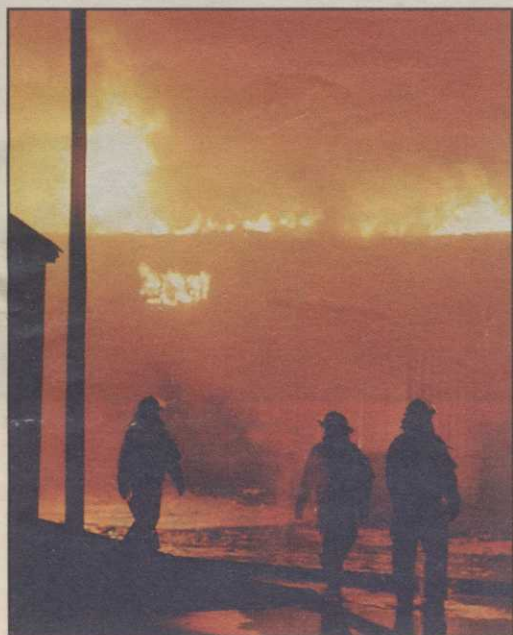
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Greg Brown photo, Waterloo (Iowa) Courier

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## Gunning for better disease resistance

Newest biogenetic research goes biolistic

By PETER BLAIS

The U.S. Golf Association, seed companies and others are taking their first baby steps into the area of genetically engineered turfgrasses, hoping research will eventually lead to plants that are resistant to many turf ailments.

Recent advances in the technology of transferring genetic material, specifically the biolistic method, has helped make that possible, according to Dr. Peter Day of Rutgers University's Cook College.

Basically this involves taking a plastic projectile with a surface layer of tungsten or

gold. It is then coated with DNA containing the desired genetic trait.

The projectile is fired with a 22-caliber cartridge toward a steel plate with a small hole. A partial vacuum containing grass cells is on the other side of the plate. The steel stops the projectile, but the DNA continues through the hole and hits the target cells. Some of the DNA penetrates the nucleus.

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## Reregistration claims another industry victim

By HAL PHILLIPS

The specter of EPA reregistration has doomed another chemical product to the dustbin of history.

Miles Inc. announced in early April that its Dyrene fungicide products, which contain the active ingredient anilazine, have been voluntarily canceled due to the cost of obtaining data for reregistration support.

"There are a lot of people around here who are sad to see it go," said Rick Robb, marketing manager for Miles. "But it was a business decision. We have another fungicide product (Baleton) pending reregistration and it was too expensive to go ahead with Dyrene."

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Jeff Martin

By MARK LESLIE

A living, breathing, working laboratory in which handicapped and able-bodied people alike can play championship-level golf.

That's what the folks at Clemson University hope to develop on a 250-acre plot of land that contains peach orchards and borders manmade Lake Hartwell on their Clemson, S.C., campus.

"This project hits all the hot buttons," said Bob Wilson, the National Amputee Golf Association national director who is involved as a consultant for the

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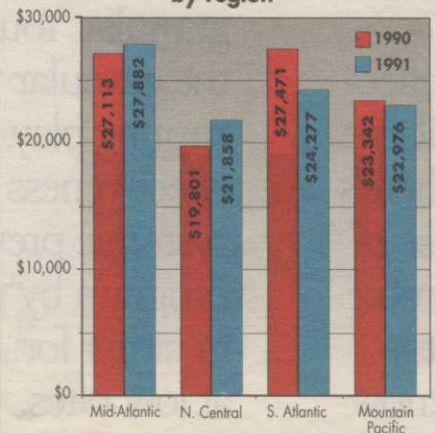
## Clemson University to create course/laboratory



### NEW IDEAS FROM AN OLD MASTER

Architect Robert Trent Jones Sr. stands on the first tee at his Oxmoor Valley course in Birmingham, Ala. Built by Sunbelt Golf Corp., Oxmoor Valley is one of eight golf complexes constructed with Alabama state pension funds. For related story, see page 5.

### Average maintenance expense per hole by region



## PKF report says rounds up, maintenance costs down at resort and daily fee courses

By PETER BLAIS

Signs of recessionary times: Rounds were up, revenues stayed even and maintenance costs went down at daily-fee courses from 1990 to 1991.

That's the message contained in the first "Trends in Resort and Daily Fee Golf" published by the National Golf Course Owners Association and Pannell Kerr Forster Consulting Inc., the accounting firm that also does the "Clubs in Town & Country Report" for the pri

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# Biogenetic researchers in quest of better disease resistance

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"As extraordinary as it may seem, in fairly low frequencies, DNA becomes integrated into some of the target cells. If it confers a selective advantage on the tissue culture medium, grass cells with that advantage will grow," Day said.

Day's colleague, Dr. Lisa Lee, will use this technology in a three-year, USGA-funded study titled "Development of Improved Turfgrass with Herbicide Resistance Through Transformation."

Dr. William Vance Baird of

Clemson University also received funding for a project on "Low Temperature and Drought Regulated Gene Expression in Bermudagrass" as part of the USGA's \$4.15 million in 1993-97 research grants.

Others interested in genetic research include Turf Seed and Jacklin Seed, both reportedly studying biotechnological methods of introducing herbicide resistance. Japanese companies are also rumored to be spending millions of dollars in genetic research on turfgrass.

"The United States has had superiority in biological research for years. But the Japanese are catching up. If they put serious money into genetic turfgrass research, like they put money into VCRs, they could probably out-compete us," warned Jacklin Research Director Doug Brede.

Day said work at Rutgers has been successful in using endophytes to control insects in turfgrass.

Day believes that grasses resistant to broad-spectrum herbicides transferred into turfgrasses

would enable superintendents to treat weedy areas without killing the grass.

Presently, often the only choice is to re-sod a heavily weed-infested area, an expensive and time-consuming process sure to result in disgruntled golfers, Day explained.

If all goes well, genetically engineered, herbicide-resistant grasses could be on the market in four to five years, Day predicted.

The technology could be expanded to traits like drought resistance and shade tolerance. But

that could take longer, since identifying the genes responsible for those traits is more difficult than identifying the genetic material causing herbicide resistance, the Rutgers researcher said.

Baird's work on cold and drought tolerance is more preliminary than Day's, Baird said. Clemson researchers have done considerable work on broadleaf plants, mostly food crops, that Baird hopes may be applicable to turf.

Baird is scouring the country in search of the most cold-tolerant Bermudagrass germplasm available. He will use that material to try to understand cold hardiness at the genetic level.

That will be difficult because the trait is complex. It probably is not controlled by a single gene as is most herbicide resistance, he explained. The same is likely true of drought resistance, he added.

Baird hopes to have a positive identification of both traits by the end of the three-year USGA funding.

Introducing the genetic material to Bermudagrass tissue will not be difficult. Getting the turfgrass to regenerate from a few cells will, he predicted.

"Turfgrasses have been hurt by lack of research in the regeneration area," the Clemson professor said. "More work has been done on food crops because they are generally considered more important."

Scientists have identified a gene in halibut that stops the fish's blood from freezing in cold northern waters, Baird said. The gene is being tested in food crops, which could eventually benefit turf research, he added.

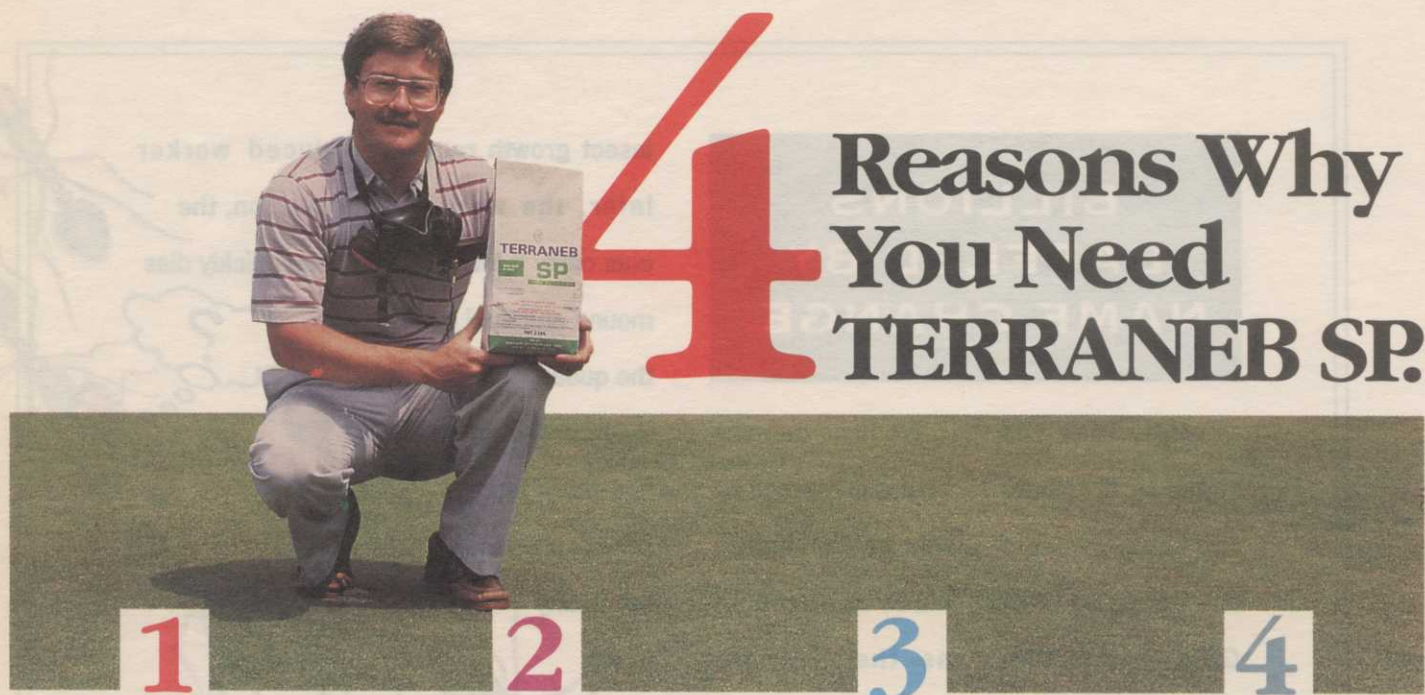
Turf Seed is supporting university work into genetically engineered herbicide resistance, according to company plant breeder Crystal Fricker. The Oregon-based firm is also working on marker genes that would help identify its grasses and make certain other companies did not infringe on its patents, she added.

As for herbicide resistance, because of the regeneration problem, "We're probably five years away from a biotechnically engineered grass," Fricker said. "And it would take another two years to register it."

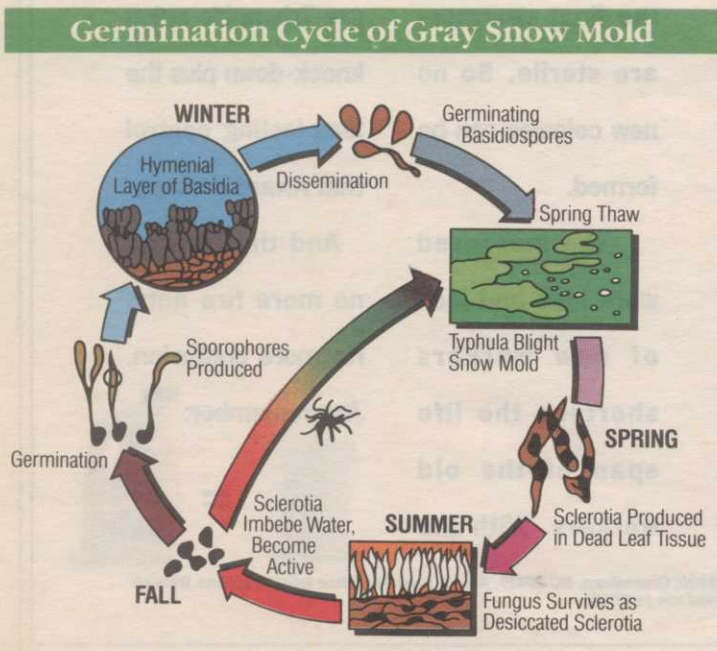
Brede predicted a genetically engineered, herbicide-resistant grass will be available in 10 years, with drought- and disease-resistant strains 20 to 30 years down the road.

Japanese companies, with whom Jacklin has already had some preliminary discussions, could get there sooner, Brede said. While the U.S. government stresses competition, the Japanese encourage two or three companies to cooperate and pool finances on research efforts.

"Sometimes that stops us from doing research as effectively as the Japanese," Brede said.



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<p><b>GRAY SNOW MOLD</b></p> <p>Also known as Typhula Blight, Gray Snow Mold attacks most northern turfgrasses. The disease usually develops under a snow cover and is seen as the snow melts. Fungus development is favored by high soil moisture and temperatures between 32 and 40 F. Usually visible at the first spring thaw, it appears as circular dead areas up to 6 inches in diameter, but can grow to 2 feet or more and eventually kill large irregular areas of turf. Typhula Blight not only attacks foliage, but infects deep into the crown area, completely destroying the plant.</p>	<p><b>PYTHIUM</b></p> <p>Pythium attacks all cool season turfgrasses and Bermudagrass, especially grass seedlings, which will die (damping off), resulting in irregular dead patches in the turf. Normally, it is a high temperature, high humidity and wet weather disease. Mower movement will spread fungus from diseased areas to healthy areas, thereby quickly spreading the disease. Late stages of pythium can spread very quickly and can kill large, irregular sections of turf in 24 to 48 hours.</p>	<p><b>BROWN PATCH</b></p> <p>The most common turf disease, Brown Patch, can destroy a stand of bent-grass within a few days. Prevalent during extended periods of high temperature and humidity, the disease is also encouraged by poorly drained soil, lack of air circulation and excessive nitrogen. At first it appears as a circular area of light brown grass, ranging from a few inches to several feet long. The circular areas grow and turn brown.</p>	<p><b>SCLEROTIUM BLIGHT</b></p> <p>Also called Southern Blight, Sclerotium Blight attacks annual bluegrass, Kentucky bluegrass, ryegrass and bent-grass in all sections of the country. The fungus begins to spread from the soil and surrounding debris to the grass during hot, humid weather. In its early stages, the disease looks like a frog-eye, having small, circular dead areas with tufts or apparently non-diseased grass. The circles may grow up to three feet in diameter.</p>



## HOW YOU CAN GET CONTROL

Keeping your turf looking good all year long is a tough job. The turf invaders such as Brown Patch, Sclerotium Blight, Pythium and Gray Snow Mold can easily destroy all your hard work. Any of these four most common turf diseases are reasons enough to find help, and with one product, **TERRANE B SP**, you get fast, effective control.

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