

ENDOPHYTES: AN UPDATE

In 1983, WEEDS TREES & TURF first reported on insect-resistant turf containing endophytes. Today, researchers are discovering more about the fungus.

It may be possible some day to buy red fescue seed containing insect-resistant endophytes. Dr. Bill Torello at the University of Massachusetts has successfully "cloned" red fescue plants from tissue cultures inoculated with endophytes. Torello is also working with bluegrass varieties.

An endophyte is a fungus found in certain turf varieties, particularly ryegrasses and tall fescues, which makes the turf resistant to various insects and possibly diseases. Although the fungi were first discovered in New Zealand in the 1940s, it's been in the last several years that intense research on endophytes has been done in the U.S.

Endophytes aren't found in bluegrass and are rare in red fescue. Breeding endophytes into these is impossible since they are maternally inherited. A ryegrass containing endophytes can't be bred with a bluegrass. Inoculating plants with endophytes kills the plant.

The only way to get endophytes into a turf plant is to take a group of cells from a plant, inoculate the callous cells with the fungus, then regenerate plants from the cells. "It's like taking a finger nail from you, and regenerating a new you," Torello says.

The plant generated from the inoculated tissue can then produce seed. "Once the endophyte is established, it goes through the plant and resides there," Torello explains. "When it produces seed, it sits in the seed too."

Such seed could eventually be marketed. But that's years away, says Torello.

Only field testing will reveal if the endophytic seed actually produces a more insect resistant turf than a variety already on the market.

Torello has had success generating red fescues containing endophytes, but hasn't gotten past the inoculation stage with bluegrass.

Torello admits the techniques need refinement. For one thing, re-

searchers have discovered four or five different types of endophytes. So the endophytes found in ryegrass are not necessarily the same as the ones

found in tall fescues.

Dr. Reed Funk at Rutgers University is working on characterizing the various endophytes, and pinpointing the role they play within the plant.

"The use of endophytes in plants can provide biological control against insects without using chemicals," Torello explains. "But it's not the answer. Eventually we want to change the genetics of plants."

Torello is one of the few researchers in the world trying to change the genes in turf through means other than breeding. Although private corporations have large genetic engineering research staffs, almost all the research deals with food crops, in an effort to increase yields.

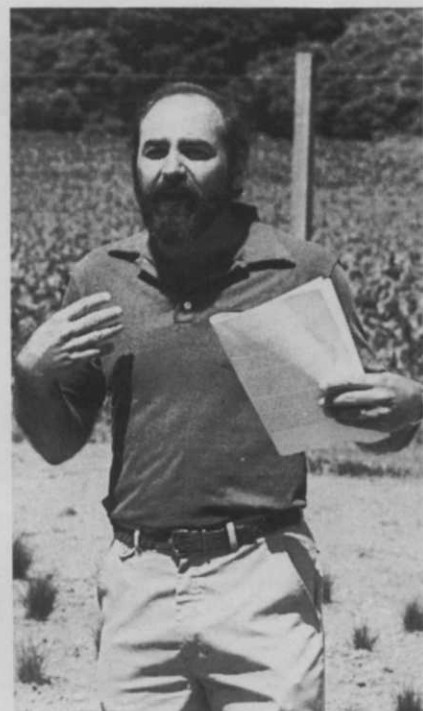
"Tissue culture genetics is new to the turf area," Torello says. "People think it's a pipe dream. It just takes time."

WT&T

ENDOPHYTE LEVELS IN PERENNIAL RYEGRASS VARIETIES

Variety	Moderately			
	High	High	Moderate	Low
✓Allaire				X
✓All-Star		X		
✓Birdie II		X		
✓Blazer				X
✓Citation II	X			
✓Commander	X			
✓Cowboy		X		
✓Dasher		X		
✓Dasher II	X			
✓Delray			X	
✓Derby			X	
✓Eika				X
✓Fiesta				X
✓Fiesta II				X
✓Gator				X
✓Jazz		X		
✓Linn			X	
✓Manhattan II				X
✓Omega II		X		
✓Ovation				X
✓Palmer			X	
✓Patriot			X	
✓Pennant	X			
✓Pennfine			X	
✓Prelude		X		
✓Premier			X	
✓Ranger				X
✓Regal	X			
✓Regency			X	
✓Repell	X			
✓Rodeo				X
✓SR 4000	X			
✓ST-4100	X			
✓Sunrye	X			
✓Tara				X
✓Vintage		X		
✓Yorktown II				X
SR 3000 Hard fescue	X			

NOTE: This data from Rutgers University is obtained primarily from seed lots submitted to the National Testing Program. Seed lots may contain lower percentages of seeds containing viable endophytes because of possible loss of viability during seed storage.



Dr. Bill Torello thinks the industry will eventually change the genetics of plants.