

# CAN BENT GRASS BEAT THE HEAT?

Jeffrey V. Krans  
Professor of Agronomy  
Mississippi State University

Creeping bentgrass is unquestionably an important turfgrass species used on golf greens throughout the U.S. However, its zone of adaptation is limited by its own physiology; it is a cool season plant type. Research at Mississippi State University shows that its thermal physiological limit (TPL) (tolerance to high temperature) is 127°F. This critical temperature can be compared to bermudagrass which shows its TPL is 150°F. Although bentgrass could not attain the same TPL as bermudagrass, research has shown that the 127° TPL of creeping bentgrass can be extended. To what degree this expansion can be made is not yet known. However, the important point is that the genetic diversity does exist for improvements.

Over the past ten years, we have been conducting research at Mississippi State University to develop an improved creeping bentgrass. Our goal is to release a seeded bentgrass cultivar with improved tolerance to direct high temperature stress. As a means to achieve this goal, research has been based on tissue culture techniques. Briefly stated, tissue culture is the culture or maintenance of plants at an unorganized cellular level (Fig. 1). This approach differs

from conventional plant breeding in that tissue culture is based at the cell level, whereas, traditional plant breeding utilizes plants at the whole plant level. Tissue culture takes place in sterile containers, usually a petri dish containing various growth substances and nutrients that support plant (cell) growth. Changing one or more components in the tissue culture media affects the degree of growth and differentiation of the cells and therefore gives this process its uniqueness (Fig. 2).



Fig. 1 Tissue culture of creeping bentgrass growing as organized aggregates of cells called callus. It is at this stage of culture that superior cell lines are recovered using a process called *in vitro* cell selection.

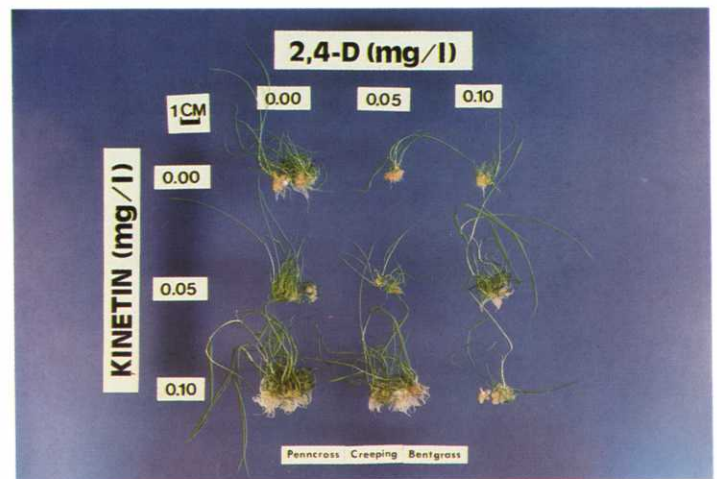


Fig. 2 By varying the concentrations of two plant growth regulators (Kinetic and 2, 4-D), the degree of root and shoot formation can be made to vary. It is this regeneration ability that allows for the recovery of superior plants from previously selected superior cell lines.

By subjecting large numbers of creeping bentgrass cells to normally lethal levels of extreme high temperatures, tolerant cell lines have been isolated and whole plants regenerated with survival features. Currently, we have recovered and field tested over 500 superior types of creeping bentgrass. Of this group, 8-10 variants have been selected as the best survivors. Since 1985, we have been sending these superior plants to Oregon for seed production. This fall  
*(continued on page 14)*

# OUR NAME AND THE BEST KNOWN NAMES IN TURF EQUIPMENT TOGETHER SINCE 1932

Distributors for:  
Toro Mowers & Turf Equipment  
Toro Turf Irrigation  
Toro String Trimmers  
Billy Goat Vacuums  
Cushman Turf Care System  
Ryan Turf Care Equipment  
Mitsubishi Tractors

HMC String Trimmers  
Power Trim Edgers  
Lely Spreaders  
Standard Golf Supplies  
Florida Turf Sprayers  
Broyhill Sprayers  
Olathe Turf Equipment



EQUIPMENT CO.



Jacksonville  
1741 Hamilton St. 32210  
(904) 387-0516

Orlando  
11405 Rio Grande Avenue 32085  
(305) 841-8460

## PRODUCTS TO HELP KEEP THE GREENS GREEN!

BOYNTON PUMP & IRRIGATION  
SUPPLY IS A FULL SERVICE  
DISTRIBUTOR OF IRRIGATION,  
PUMP AND ALLIED PRODUCTS.  
SERVING FLORIDA SINCE 1958.

- TECH TIPS • PRODUCTS
- DESIGN SERVICE

**RAINBIRD GOLF DISTRIBUTOR**

NEW STORE  
NORTH PALM  
863-5580



**BOYNTON PUMP &  
IRRIGATION SUPPLY**

FT. PIERCE  
485-1966

BOYNTON  
732-9810

FT. LAUDERDALE  
791-1984

(continued from page 12)

we planted our first experimental cultivar (MSX-68) (Fig. 3) and are looking forward to next summer and high temperature stress. Based on recent tests conducted on the parents used in seed production, results show physiological evidence that we have increased the heat tolerance in creeping bentgrass. How much and to degree this has been sexually transmitted to the progeny (seed) will be determined during the next two summers. Bentgrass will never have the heat tolerance of bermudagrass. However, we now know that we can improve this species and make it more heat tolerant. To answer the question: "Can bentgrass beat the heat?" we are sure it has good promise, but how good is "good" is still unknown. With continued research, the full answer to this question will become more apparent.



Fig. 3 Initial establishment (3 weeks post-germination) of the first experimental heat tolerant cultivar in comparison to Penncross and Pennlinks creeping bentgrass. This experimental putting surface will be used to evaluate relative heat tolerance of these cultivars.

**Acknowledgements:** Our creeping bentgrass heat tolerance research has been funded in part by the Carolina Golf Association, Georgia Golf Course Superintendents Association and the United States Golf Association.

**Editor's Note:**

Jeff Krans, Ph.D., has been teaching Turfgrass Management at Mississippi State University for the past 15 years. He earned his Ph.D. from Michigan State University. His current research is on plant breeding activity in heat tolerance of creeping bentgrass.