1993 ANNUAL RESEARCH REPORT

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The 1992-1993 winter was too mild to separate bermudagrass genotypes in the field. The need for a laboratory method to consistently screen for cold tolerance in bermudagrass genotypes is apparent.

We have continued to try various freezing procedures. All involve a grow-out period of frozen plugs planted in sand on the greenhouse bench. Our freezing chamber is 18"x18"x24" with slides for 18"x18" shelves 3" apart. The unit is thermostatically controlled and can be adjusted to quite stable freezing temperatures that usually fluctuate no more than 3°C. We have developed .5" hail screen shelves and put an electric fan in the bottom of the cabinet to circulate the air.

Our most recent approach consists of inverting plugs on one shelf in the freezer to try to simulate what happens when cold air hits the top of the dormant or green bermudagrass growing on the golf course. We have worked with cup cutter plugs 4" in diameter and 3" thick placed in holes the same size in a styrofoam block. These are covered with a .5" screen shelf. An 18"x18"x1" solid styrofoam block is placed on the bottom side of the plugs. One unit at a time is slid into a shelf with the green grass plugs facing the fan that blows cold air onto them. We have altered temperature and time of exposure. We can only subject 5 cup cutter plugs at a time. We have also prepared another unit that will hold 9 smaller plugs at a time. These plugs are only 3" in diameter and are cut with a bulb cutting tool.

We think this technique has potential. We have found that the soil from which the plugs are cut must have a uniform moisture content. Also the genotypes must have had uniform management for more than one year. There is also a sampling problem. We plan to continue to work with this procedure as time permits.

Winter survival in plants has been associated with reserves stored in their roots and underground parts. In 1962 we described "A Method for Measuring Sod Reserves", *Agronomy Journal* 54:53-55. The method involved cutting 6" plugs of sod, putting them in empty No. 10 cans from a cafeteria, letting them develop etiolated stems in the dark and measuring the dry matter so produced. We have modified this method, since used by others, by inverting another can over the one containing the plug. A small black opening is left on the north side for air exchange and water and the cans are attached to each other with electricians black plastic tape that excludes the light. We have then been able to grow them out in the lighted greenhouse and separate the cans to measure the etiolated growth.

We have also modified the method by cutting both ends out of one can and attaching it to an inverted can leaving an air opening by pushing the bottom can in about 3/8" and painting it black. The two cans are taped together and forced into a cut in the soil made by the plug cutter. The cutter goes deep enough to insure that only rhizomes within the 6" plug contribute to the growth under the can. The cans are forced into the soil about 1.5". With this method we were able to establish significant reserve differences between 16 genotypes that involved the winter hardy Berlin bermuda as one parent. These had been mowed regularly and given low maintenance for 20 years. The number of reserve cans needed to sample a plot will depend on the variation within the plot. We are using a total of 10 counting plot replications in another test.

We have submitted a manuscript to *Crop Science* describing these procedures and hope it will be accepted and published as a note.

We hope to use these techniques in the future but to show a consistent relation between quantity of reserves and genotype survival will not be easy.