Bermudagrass Breeding - Vegetative

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Goals:

- To develop improved, fine-textured bermudagrass for golf course putting greens, tees and fairways.
- Develop and refine efficient screening techniques for evaluating cold-hardiness and energy reserves.

Winter injury and survival continues to be one of the major problems of bermudagrass in the transition zone. Bermudagrass has winter survival problems during some years, and bentgrass has summer survival problems in other years. Careful management, daily vigilance and use of fungicides can help bentgrass survive disease attacks associated with warm, muggy summers.

The lost of bermudagrass turf during an occasional winter is not so predictable. A weather front that drops night temperatures below zero, but allows day temperatures of 45° when the sun shines, will have little effect on soil temperature unless repeated for several days. Most arctic fronts in the South last less than a week, and they usually allow no time for plants and grass to harden off before they arrive.

For years, we have been trying to breed more freeze tolerant turf and forage bermudagrasses. Lack of an effective screening method has kept us from making the progress that should be possible. We are trying to freeze plugs as one approach that others have tried with little success. In our last report, we described our freeze procedures. Since then we replaced the seed germinator with a small freezer unit that can maintain 10°F below zero.

We are still inverting the plugs, exposing them to the two bottom coils, and insulating the bottom of the plugs from the freezing effect of the top coil. We have found that the management of the genotypes to be screened must be uniform, that the moisture in the soil must be uniform, and that it is still difficult to get consistent results. We plan to continue to try to improve our freezing efforts as time permits.

We are convinced that the concentration of reserves in a grass sod will influence its winter

hardiness. In a grass sod, these reserves, non-structural carbohydrates, proteins and other growth promoting compounds, may be in crowns, corms, rhizomes, and roots. In year-old sod, some of the crowns, corms, rhizomes, and roots will be dead or so nearly dead that they cannot generate a plant, but many will contain non-structural carbohydrates. In grass sod, it is impossible to separate those organs capable of generating new growth from those that are not. Therefore, we believe that growing plugs in the dark and measuring the etiolated growth produced is the only way to measure significant reserves in a sod.

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-inch 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 adding water. The cans are attached to each other with electricians black plastic tape which 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. More detailed information on our method to evaluate carbohydrate reserves can be found in the manuscript that has been accepted for publication as a note in *Crop Science* in 1995.