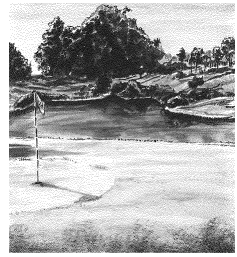

IMPLICATIONS OF SEEDED BERMUDAGRASS PLANTING DATE AND MORPHOLOGY ON COLD TOLERANCE

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IMPACT STATEMENT

An investigation was conducted to determine the effects of planting date on morphological traits of seeded bermudagrass cultivars and their implications on cold tolerance. Rhizome development was almost non-existent for all cultivars. Root biomass, stolon numbers, and stolon diameter were affected by planting date. Vegetative plantings of 'Tifway' were determined to have greater stolon diameter than seeded cultivars. Initial conclusions indicate morphological immaturity in late-seeded cultivars may reduce cold tolerance.

BACKGROUND

Seeded bermudagrass cultivars are known for quick, easy, and economical turfgrass establishment. The major drawback of seeded bermudagrasses is their lack of cold hardiness. Evaluations conducted in Mississippi indicated seeded cultivars suffered severe winter damage during establishment years, with overall plot survival of 0-3%, compared to 55% survival for vegetatively propagated 'Tifway' (Philley and Krans, 1998).

Morphological immaturity may play a major role in a plant's ability to withstand sub-optimal temperatures during its establishment year. Research conducted in Oklahoma (Ahring *et al.*, 1975) found that common bermudagrass must be planted prior to 25 May to permit sufficient time for cold-tolerant morphological characteristics (i.e. rhizomes and crown buds) to adequately develop. The objective of this research was to assess the affect of planting date and morphological development on cold tolerance of recently released seeded bermudagrass cultivars.

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RESEARCH DESCRIPTION

Each planting date treatment was initiated on approximately the fifteenth day of each month, beginning in April and ending in August. Seeded cultivars evaluated in the test were; 'Jackpot','Mirage','Pyramid','Sultan','Sundevil', and 'SWI-10'. 'Arizona Common' was used as a seeded standard cultivar and 'Tifway' was included as a vegetative standard. Sample cores (7.3-cm diameter by 6.35 cm deep) were collected from each plot on 10 November 1998. Stolons were counted and stolon diameters were measured on five stolons of each sample. Roots were collected from the sample cores and oven-dried at 38 °C to determine total dry weight.

FINDINGS

Rhizome development was virtually absent in all seeded cultivars, but was substantial in 'Tifway'. A correlation exists between rhizome density and winter survival. The lack of rhizome development in seeded cultivars may play a role in reported inadequacies of cold tolerance, as rhizomes and stolons are considered to be major carbohydrate storage organs for warm-season turfgrasses. There were no statistical differences between seeded cultivars for any morphological traits (data not shown).

A May planting date produced significantly greater stolon numbers per sample than those planted in June, July, and August, while an April date was greater than June and August, but similar to May and July (Fig. 1). Because seeded cultivars are dependant upon stolons as their sole means of carbohydrate storage, a greater number of stolons would probably allow a greater potential for winter survival. Plots seeded in April also had statistically superior stolon diameter than any other planting date (Fig. 1). Stolon diameter decreased as planting dates progressed through the summer, with stolon diameter conceivably being an indicator of morphological maturity.

Stolons and crown tissue are the most likely sites for carbohydrate storage in newly established bermudagrasses, and diameter may reflect total carbohydrate availability. 'Tifway' has been observed to have greater cold tolerance than seeded bermudagrasses (Philley and Krans, 1998), while in our study seeded cultivars had significantly smaller stolon diameters than 'Tifway' (data not shown). 'Arizona Common', a cold-sensitive bermudagrass, was found to have the smallest stolon diameter of any of the seeded cultivars evaluated.

Root dry weight was statistically greater when planted in April and May compared to other dates (Fig. 1). During spring green-up, DiPaola *et al.* (1982) observed 'Tifgreen' roots undergoing senescence as shoot initiation occurred, without any outward signs of new root initiation. This suggests the plant may be redirecting carbohydrates stored in the roots towards shoot and leaf tissue production. Photosynthesis can then sustain the plant and energy can be directed towards root synthesis. This may explain the three-week delay in root initiation observed by DiPaola *et al.*(1982).

Initial conclusions indicate that a lack of morphological development in seeded cultivars during the establishment year may inhibit cold tolerance. Potential users of seeded bermudagrasses should be aware that Arkansas summers may be too short to allow full growth and maturity which could reduce cold hardiness.

LITERATURE CITED

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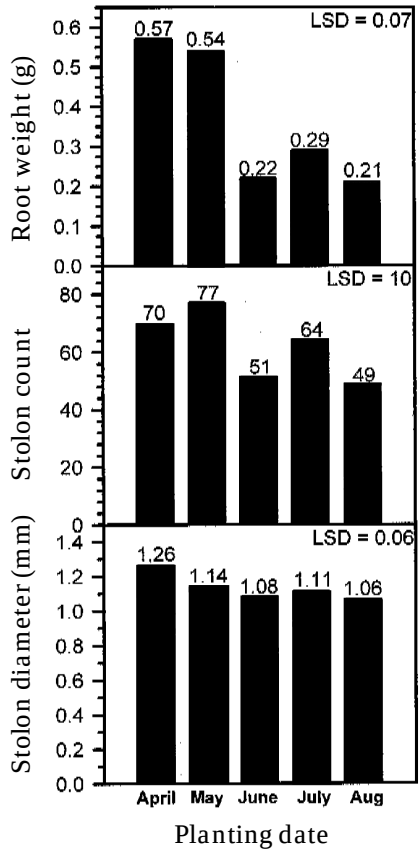

Fig. 1. Root weight, stolon weight, and stolon number of seeded bermudagrasses as affected by planting date.