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# Are Ornamental Grasses Acceptable Alternatives For Low Maintenance Landscapes?[1]

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## Abstract

A survey instrument was designed to determine public perception of selected landscape (ornamental) grass species, the use of grasses in public landscapes, and the importance of research on the water consumption. Results from the survey indicate that 90% of the respondents felt that grasses have landscape (ornamental) value, and 96% felt that municipalities should utilize these plant materials in public landscapes. In addition, 92% of the respondents deemed research on the water conserving abilities of landscape grasses important and 96% would use them if they helped conserve water. When specific grass species were rated for preference by the respondents, statistical differences were noted between the two field sites, survey dates, and desirability of individual species. Grasses located at the site where plants were allowed a longer establishment period had significantly higher visual rankings. Summer visual ratings of grasses were significantly higher than fall ratings. Native Texas and introduced species were rated equally in desirability. Overall the most popular species was Purple Fountaingrass (*Pennisetum macrostachyum*) with 96% of survey participants agreeing or strongly agreeing that they would use it in their personal landscape. Big Bluestem (*Andropogon gerardii*) was the least popular species with only a 46% positive rating.

**Index words:** ornamental grasses, landscape grasses, landscape plants, native grasses.

**Species used in this study:** Big bluestem (*Andropogon gerardii* var. *geredii*); bushy bluestem (*Andropogon glomeratus*); Wilman lovegrass (*Eragrostis superba*); Japanese bloodgrass (*Imperata cylindrica*); maidengrass (*Miscanthus sinensis var. gracillimus*); Lindheimer's muhly (*Mulenbergia lindheimeri*); paspalum, (*Paspalum intermedium*); purple fountaingrass (*Pennisetum macrostachyum*); white fountaingrass (*Pennisetum orientale*); little bluestem (*Schizachryrium scoparium* var. *scoparium*); Indiangrass (*Sorghastum nutans*); and Eastern gammagrass (*Tripsacum dactyloides*).

## Significance to the Nursery Industry

Plant materials with low water and maintenance requirements are important components of urban horticulture today. Landscape grass species may fit these requirements and are currently enjoying a large popularity being utilized in parks, public plantings, and commercial landscapes (5). Because of this growing popularity, it is important for industry professionals to not only know which species perform the best in urban environments, but also to know which species will be accepted and bought by their customers. Results from a public survey indicated not only that participants readily accepted the use of landscape grasses, but that water conservation was an important issue to them. The survey also indicated that the age of the plant and growing season significantly affected public opinion on the visual appeal of these grasses, implying that marketing strategies such as display gardens and picture tags may be necessary in order to ensure successful sales of these grasses.

## Introduction

Many popular articles have promoted the low water use, low maintenance requirements, pest resistance, and other virtues of landscape grasses (5, 9, 10, 11), but little research has been conducted to support these traits. Native plant species in general have been praised for their superior adaptation to their environment due to evolutionary development (1). These are all desirable traits for landscape plant material, however, visual appeal also plays a major role with the consumer when choosing landscape plant material.

Visual evaluations have been frequently used to assess the visual appeal and performance characteristics of turfgrass cultivars (3), vegetable cultivars (6), and bedding plants (8). The advantages of doing visual evaluations are that they can be taken quickly in the field and provide valuable information for evaluation and selection of plant materials that may not be otherwise obtained due to time or cost constraints (14). Another technique that can be combined with visual evaluations is a survey tool. Simple surveys commonly use the Likert scale (7) to measure responses to statements (4). Such surveys have been utilized to evaluate the desirability of various water-conserving landscapes (13). This study utilized a survey tool to determine public response to selected ornamental grass species, both native and introduced, grown in two test gardens. In addition to evaluating aesthetic appeal, the survey requested respondents to note their attitudes toward landscape grasses in general, the use of these plant materials in public plantings, the use of landscape grasses based solely on their water conserving abilities, and the importance of research on water consumption.

## Materials and Methods

*Plant material.* Twelve grass species were selected for this study after evaluating material currently used in the nursery trade and identifying species commonly recommended in popular literature (Table 1). Six of the twelve species were Texas natives while the remaining six were introduced species. Survey participants were not given any information about individual species until after the survey had been administered.

*Field sites.* Two field sites were prepared. Locations included: the intersection of Avenue H and 31st Street in Temple, TX (site one) and the floral test gardens on the cam-

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**Table 1. Ornamental/landscape grasses planted at Temple and College Station, TX.**

| Common name | Scientific name | Source |
|---|---|---|
| Big Bluestem* | *Andropogon gerardii*[y] | Tarrant Co., TX[z] |
| Bushy Bluestem* | *Andropogon glomeratus* | Tarrant Co., TX |
| Wilman Lovegrass | *Eragrostis superba* | USDA/Temple, TX |
| Japanese Bloodgrass | *Imperata cylindrica* | Texas A&M Univ. |
| Maidengrass | *Miscanthus sinensis*[x] | Kurt Blumel Inc. |
| Lindheimer's Muhly* | *Mulenbergia lindheimeri* | Travis Co., TX |
| Paspalum | *Paspalum intermedium* | USDA/Temple, TX |
| Purple Fountaingrass | *Pennisetum macrostachyum* | Texas A&M Univ. |
| White Fountaingrass | *Pennisetum orientale* | Texas A&M Univ. |
| Little Bluestem* | *Schizachryrium scoparium*[w] | Tarrant Co., TX |
| Indiangrass* | *Sorghastum nutans* | Bell Co., TX |
| Eastern Gammagrass* | *Tripsacum dactyloides* | Bell Co., TX |

[z]All species from Texas (except USDA/Temple, TX) were field collected and propagated by the author.

[y]var. *gererdii*.

[x]var. *gracillimus*.

[w]var. *scoparium*.

*Native Texas Grass.

pus of Texas A&M University in College Station (site two). Site one was established in spring, 1991, while site two was planted in spring, 1992. Both sites were maintained and irrigated to insure the survival of the grasses.

*Public survey instrument.* The survey consisted of a series of questions to determine general attitudes toward landscape grasses and provide a visual ranking of the twelve grass species being evaluated (Tables 2 and 3). All statements, with the exception of the first, were evaluated on a five point Likert scale (7), with one indicating 'strongly agree', two 'agree', three 'no opinion', four 'disagree', and five 'strongly disagree'. The last twelve questions were utilized to develop a visual ranking of the species represented in this study. This ranking was also analyzed to differentiate between preferences for native versus introduced species. Survey participants were mainly homeowners visiting the sites. Participants were asked to respond to the first five questions and then led through the test garden and asked to evaluate a group of three representative plants of each of the twelve species. A total of 50 individual responses were collected. Of these, 33 were collected from site one. The remaining 17 responses were collected from site two on October 24, 1992. This number of responses was adequate for supplying ideas and trends for the given sample population, but is not intended for generalizations to other populations. Surveys were administered at site one on July 25, September 11, and October 17, 1992.

*Data analysis.* The data were analyzed using the Statistical Package for the Social Sciences (SPSS®) for Windows™ Release 6.1 (12). Query scores were subjected to a Chi-Square analysis of frequency distribution to determine whether significant differences were present between gender, site location, date of survey , and the preferential variables. The alpha level (P value) was set at 0.05 in all cases.

## Results and Discussion

*Public survey instrument reliability.* A Cronbach's alpha reliability test was performed on the public survey instrument used in this study and a coefficient of 0.80 was reported.

*Gender.* Out of the 50 participants, 22 were male and 28 were female. No statistical differences were noted between males and females. Overall, males and females strongly agreed or agreed (96%) to the first four questions of the survey. Since both genders had similar trends in their responses, the data were pooled for the remaining comparisons.

*General attitude statements.* One-hundred (100) percent of respondents highly agreed or agreed to the first statement, and the vast majority of survey participants (96%) responded positively (highly agree or agree) to statement two (Table 2).

**Table 2. Attitude statements concerning ornamental/landscape grasses.**

| Question | Highly agree | Agree | No opinion | Disagree | Highly disagree |
|---|---|---|---|---|---|
| 1. In addition to lawn use, I think grasses have ornamental value. | 80% | 20% | 0% | 0% | 0% |
| 2. I would like municipalities to utilize ornamental grasses in public landscapes. | 79.6% | 16.3% | 0% | 4.1% | 0% |
| 3. I think research on the water consumption of ornamental grasses is important. | 78% | 18% | 4% | 0% | 0% |
| 4. I would use these ornamental grasses if they helped to conserve water. | 74% | 18% | 8% | 0% | 0% |

**Table 3. Respondents anticipated use of each ornamental/landscape grass in their personal landscape.**

| Grasses: I would use this ornamental grass in my personal landscape. | Highly agree | Agree | No opinion | Disagree | Highly disagree |
|---|---|---|---|---|---|
| *Pennisetum macrostachym* | 66% | 30% | 2% | 2% | 0% |
| *Mulenbergia lindheimeri* | 66% | 22% | 8% | 4% | 0% |
| *Sorghastrum nutans* | 34% | 40% | 18% | 6% | 2% |
| *Miscanthus sinensis* | 38% | 32% | 14% | 10% | 2% |
| *Imperata cylindrica* | 28% | 40% | 18% | 8% | 6% |
| *Pennisetum orientale* | 32% | 36% | 12% | 10% | 10% |
| *Schizachyrium scoparium* | 38% | 26% | 22% | 10% | 4% |
| *Paspalum intermedium* | 26% | 38% | 22% | 4% | 10% |
| *Andropogon glomeratus* | 24% | 32% | 22% | 8% | 14% |
| *Tripsacum dactyloides* | 24% | 32% | 22% | 8% | 14% |
| *Eragrostis superba* | 26% | 28% | 26% | 14% | 6% |
| *Andropogon gerardii* | 10% | 36% | 22% | 18% | 14% |

**Table 4. Comparisons of ratings of the statement that respondents would use each ornamental/landscape grass in their personal landscape between study sites on October 17 in Temple, TX, and October 24 in College Station, TX.**

| Question | Highly agree/ Agree | No opinion | Disagree/ Highly disagree | p-value |
|---|---|---|---|---|
| *Mulenbergia lindheimeri* | | | | 0.012[z] |
| Temple | 7 | | | |
| College Station | 13 | 3 | 1 | |
| *Miscanthus sinensis* | | | | 0.03 |
| Temple | 6 | 1 | | |
| College Station | 4 | 5 | 8 | |
| *Schizachyrium scoparium* | | | | 0.001 |
| Temple | 7 | | | |
| College Station | 3 | 9 | 5 | |

[z]Statistically significant at p = 0.05.

These responses indicated that the participants accepted the idea of using grasses in landscapes and that they would support municipal utilization of such materials in public areas. Ninety-six (96) percent of survey participants gave a positive response to question three 'I think research on the water consumption by ornamental grasses is important'. In contrast, 4% of the respondents indicated that they would not utilize these grasses in their landscapes based solely on their water conserving abilities (Table 2). This would indicate that for some of the people participating in the survey, visual aesthetics may play a role in their acceptance of these grasses as landscape materials.

*Grasses*. Respondents were asked to rate how agreeable each grass would be in personal landscapes. Over half of respondents 'highly agreed' or 'agreed' that they would use all the grasses in their personal landscapes with the exception of *Andropogon geradii* (46%) (Table 3). The most popular grasses among respondents were *Pennisetum macrostachym* (96%), *Mulenbergia lindheimeri* (88%), and *Sorghastrum nutans* (74%).

Perhaps one of the most important comparisons that was made was between the native and introduced species of grasses. Comparisons that were made between these groupings yielded no statistically significant differences. This could be interpreted to indicate that the native grasses used in this study were just as acceptable for landscape use as the introduced species.

**Table 5. Comparisons of ratings of the statement that respondents would use each ornamental/landscape grass in their personal landscape between dates at Temple, TX.**

| Question | Highly agree/ Agree | No opinion | Disagree/ Highly disagree | p-value |
|---|---|---|---|---|
| *Tripsacum dactyloides* | | | | 0.03[z] |
| July 25, 1992 | 10 | 5 | 3 | |
| September 11, 1992 | 7 | 1 | | |
| October 17, 1992 | 1 | 3 | 3 | |
| *Pennisetum macrostachym* | | | | 0.03 |
| July 25, 1992 | 18 | | | |
| September 11, 1992 | 8 | | | |
| October 17, 1992 | 7 | | | |
| *Andropogon glomeratus* | | | | 0.03 |
| July 25, 1992 | 10 | 5 | 3 | |
| September 11, 1992 | 7 | 1 | 3 | |
| October 17, 1992 | 1 | 3 | 3 | |

[z]Statistically significant at p = 0.05.

*Sites*. There were significant differences in the comparisons of the two sites of Temple and College Station (Table 4). Three grasses were rated differently including *Mulenbergia lindheimeri* (p = 0.012), *Miscanthus sinensis* (p = 0.03), *Schizachyrium scoparium* (p = 0.001). Overall, Temple participants responded more positively than did College Station participants. This may be due to the age of the plant material. The grasses in Temple were planted in spring, 1991, whereas, the grasses in College Station were planted in spring, 1992. At the time of the study, the maturity difference in plants may have affected the visual appeal of these plants.

*Dates*. There were statistically significant differences between comparisons of dates that the surveys were administered in Temple, TX (Table 5). Three grasses were rated differently including *Tripsacum dactyloides* (p = 0.03), *Pennisetum macrostachym* (p = 0.03), and *Andropogon glomeratus* (p = 0.03). Overall, respondents answered more positively in July and September, than in October. This difference may be attributed to plant attractiveness that varies from the summer to the fall seasons.

Horticulture is the practice of growing plants for profit (2), and visual aesthetics play a large role in the acceptance of plant material by consumers. The results from this survey indicated that the public accepted grasses as options for their landscapes. In addition to this finding, the survey results indicated that both native grasses and introduced grasses were acceptable landscape plant alternatives. It appeared that the public was open to using these native grasses in their landscape. Public preferences of grasses were found to differ due to maturity of the plant and season of rating. This may indicate that successful marketing of these species could depend on established display beds and picture tags showing plants at peak aesthetic value.

Another important finding was that the public feels that research on water-conserving plants is important to them, and they would be willing to incorporate landscape grasses if they helped to conserve water. This is important information for nursery and landscape professionals because they can begin to encourage customers to purchase water-conserving species that will be more environmental friendly.

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# Effects of Primo on Selected Bedding and Woody Landscape Plants[1]

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## Abstract

Primo (cimectacarb), applied as a foliar spray, suppressed shoot growth of four of six bedding plants and all four woody landscape species tested. However, phytotoxic symptoms occurred on the foliage of all bedding plants and two woody species and to flowers of three bedding plants and one woody species. Foliage and flowers of affected plants exhibited a loss of pigmentation that increased at higher rates of Primo, resulting in a bleached appearance.

**Index words:** growth retardant, growth inhibition, cimectacarb, CGA 163935.

**Growth regulator used in this study:** Primo (cimectacarb), 4-(cyclopropyl-alpha-hydroxy-methylene)-3,5-dioxo-cyclohexanecarboxylic acid ethyl ester.

**Species used in this study:** 'Pinkie' Madagascar periwinkle (*Catharanthus roseus* (L.) G. Don 'Pinkie'); 'Jazz Bronze' coleus (*Coleus* x *hybridus* Voss. 'Jazz Bronze'); 'Goldcrest' yellow cosmos (*Cosmos sulphureus* Cav. 'Goldcrest'); 'Accent Deep Pink' impatiens (*Impatiens wallerana* Hook.f. 'Accent Deep Pink'); 'Celebrity Lilac' petunia (*Petunia* x *hybrida* Hort. Vilm.-Andr. 'Celebrity Lilac'); 'Bonanza Yellow' French marigold (*Tagetes patula* L. ' Bonanza Yellow'); 'Royal Red' butterfly-bush (*Buddleia davidii* Franch. 'Royal Red'); 'Nellie R. Stevens' holly (*Ilex* x 'Nellie R. Stevens'); privet (*Ligustrum japonicum* Thunb.); and 'Mrs. G. G. Gerbing' azalea (*Rhododendron* x 'Mrs. G. G. Gerbing').

## Significance to the Nursery Industry

Height control of bedding plants and development of good form of woody landscape plants during production are essential to obtaining a quality product. Primo (cimectacarb), a growth retardant labeled for warm- and cool-season turfgrasses, provided acceptable growth suppression in most species tested; however, phytotoxic symptoms developed on all bedding plant species and two of four woody landscape species making quality unacceptable. Based on these results, the use of Primo as an alternative to other chemical growth retardants in the production of herbaceous and woody landscape plants is not recommended. Additionally, concentrations of Primo applied to species in this study are similar to those recommended for turfgrasses; this raises the concern of potential injury to herbaceous and woody plants in the landscape from drift or overspray when Primo is applied to turfgrasses.

## Introduction

Chemical growth retardants such as B-Nine (daminozide), Cycocel (chlormequat chloride), A-Rest (ancymidol), Bonzi (paclobutrazol), and Sumagic (uniconazole) are applied to bedding plants to promote compactness and uniformity and to extend marketability (6). Growth retardants may also improve transplant survival by maintaining favorable root to shoot ratios and reducing water use, hence increasing a plant's drought tolerance (10).

Mechanical pruning to control excessive vegetative growth and improve plant form is a major expense in the production and maintenance of woody landscape plants. Numerous compounds have been tested to retard woody plant growth, but most remain uneconomical or cause undesirable side effects (3, 4, 9). Currently registered chemical growth retardants for use in the production of woody landscape plants include

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