

INTRODUCTION - Flowering bulbs like daffodils (*Narcissus* spp.), hyacinths (*Hyacinthus* spp.) and crocus (*Crocus* spp.) are some of the earliest flowers to appear in gardens each year. Many species will bloom for years with minimal care, while others are best planted for one season's show of color. Spring bulbs will flower from late winter to early summer, depending on species. After bloom is finished, they continue to grow and store energy for a period of time before becoming dormant through the summer and into fall.

Warm-season turfgrasses such as bermudagrass (*Cynodon* spp.) and zoysiagrass (*Zoysia* spp.) also experience an extended dormancy period from late fall to late spring. Since these grasses are predominantly dormant during the period of flowering and growth of early-spring bulbs, it was hypothesized that spring bulbs could be incorporated into a dormant lawn so that a show of spring color could be experienced before active growth of the turfgrass was initiated.

OBJECTIVE – The objective of this study was to examine the flowering capacity of several early-spring bulbs in a zoysiagrass lawn. A second objective was to examine the effects of common pre-emerge herbicides and mowing practices on the success of the bulbs.



PHOTO 1. Establishment of bulbs in hollow-tine aeration holes - Nov., 2010



METHODS

- Turfgrass species – *Zoysia japonica*, cv. Zenith
- Bulb species, cultivar, and planting density (bulbs m⁻²)
 - *Crocus tommasinianus* cv. 'Ruby Giant' (161 m⁻²)
 - *Iris reticulata* cv. 'Cantab' (161 m⁻²)
 - *Galanthus elwesii* (107 m⁻²)
 - *Crocus chrysanthmes* cv. 'Goldilocks' (161 m⁻²)
- Planting date – Nov. 15, 2010
- Planting methods – plot area was cultivated with a hollow-tine cultivator equipped with 1.6 cm tines. Cores were removed and bulbs were planted in open holes
- Pre-emergent herbicide treatments (applied on March 1, 2011 and March 1, 2012)

Active ingredient	Formulation	Rate (kg ai / ha)
Trifluralin	Treflan TR-10 - Granular	3.36
Prodiamine	RegaKade G - Granular	3.84
Pendimethalin	Pendulum G - Granular	3.36
Prodiamine	Baricade 4FL - Liquid	3.84
Untreated		

- Mowing treatments (applied in 2011 and 2012)
 - Mowing initiated on 15 March or 15 April
- Experimental design – Strip, split plot with bulb species as whole plots, herbicides as strips and mowing as the split. Each treatment was replicated three times.

Species and cultivar	2011	2012	AVG
	Date of emergence		
<i>Galanthus elwesii</i>	20-Jan	19-Jan	20-Jan
<i>Crocus chrysanthmes</i> cv. 'Goldilocks'	10-Feb	16-Jan	29-Jan
<i>Iris reticulata</i> cv. 'Cantab'	14-Feb	9-Feb	12-Feb
<i>Crocus tommasinianus</i> cv. 'Ruby Giant'	27-Feb	13-Feb	20-Feb

TABLE 1. Emergence date for spring bulbs over the first 2 years of the trial



PHOTO 2. Plot overview – first spring after establishment – photos taken 1 March 2011



RESULTS

- Pre-emergent herbicides caused no phytotoxicity to any of the bulb species, nor caused any effect on survival or flowering (data not shown)
- Timing to initiate mowing had no effect on bulb survival or performance (data not shown)
- Average emergence date for spring bulbs ranged from mid-January to mid-February (Table 1)
- During the first spring after planting, all species produced significant flowers, although differences in % planted bulbs with blooms was significant (Photo 2 and Fig. 1)

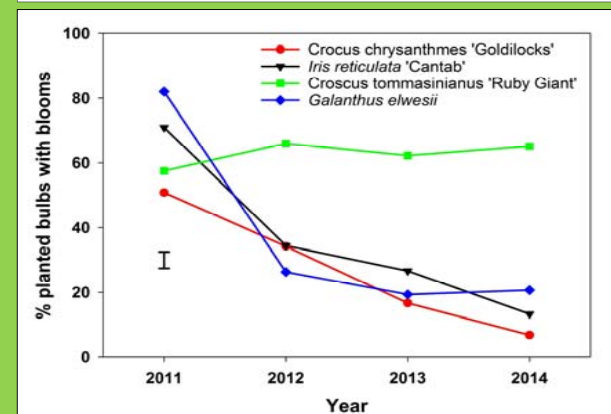


Figure 1. Percentage of planted bulbs that produced flowers over the 4 years of the study. Error bar represents the least significant difference for comparing means (P=0.05)

RESULTS (cont.)

- The percentage of bulbs that produced flowers declined significantly after the first year (Fig. 1) for three of the four species and those species had very low (<20%) flowering by the end of the trial
- The only species tested in this trial that continued to flower at an acceptable level after four years was *Crocus tommasinianus*, cv. 'Ruby Giant' (Fig. 1, Photo 3)



PHOTO 3. *Crocus tommasinianus*, cv. 'Ruby Giant' in the spring of 2014

CONCLUSIONS

- All bulbs tested produced flowers the first spring after establishment
- *Crocus tommasinianus*, cv. 'Ruby Giant' was the only bulb that persisted and continued to flower for 4 years in zoysiagrass turf
- Common pre-emergence herbicides could be safely applied over the bulbs