

Increasing Both Aesthetic Value and Playability in Secondary Roughs on Golf Courses

Aaron Hathaway, Kevin Frank, & Thom Nikolai

Department of Plant, Soil, and Microbial Sciences, Michigan State University, East Lansing, MI



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Introduction

Un-mowed, naturalized, secondary roughs have become more common on golf courses over the last 20 years. Theoretically, these areas require fewer inputs than finely maintained primary roughs. However, we have learned that they do require some inputs in order to look and perform as desired. Research at MSU is exploring ways to most effectively and efficiently maintain these areas with minimal chemical and cultural inputs. The goal is to maintain the ornamental quality (i.e. inflorescence, adequate turf cover) and playability (i.e. thin enough so golf balls can be found and played). The main focus will be weed control over time, investigating a variety of weed control programs with differing herbicides and timings. Some challenges include applying herbicides effectively in the off-season so sprayer tracks aren't seen all season and making these areas thin enough so an already difficult game doesn't become more difficult and play isn't unnecessarily slowed.

Objectives

Evaluate herbicide programs and differing species mixes/stands to...

- identify the combination(s) that provide the best aesthetic appeal (weed control, inflorescence).
- determine if better golf playability (find and hit golf ball) can be achieved while limiting the overall chemical inputs.

Materials and Methods

- The experiment is a strip-plot design with 4 replications.
- Strip-plot treatment turfgrass species mixes/blends were planted at 24.7 kg/ha (22 lbs/A) in the fall of 2011 in East Lansing, MI.
 - Kentucky bluegrass (KBG) was pre-existing at this time and left in place.
- Whole plot herbicide programs began in 2015 and continued in 2016. Spring/Fall apps in 2015 and 2016 applied on May 14/Oct 6 and April 26/Oct 13, respectively.
- The experimental area was mowed once per year in October (Sept 17, 2015 & Oct. 4, 2016) with no other cultural inputs.
- Visual quality, inflorescence, lodging, golf playability, and weed populations were evaluated multiple times per year.
- Two-way ANOVA; treatments separated with Fishers LSD ($p \leq 0.05$).

Figure 1: Playability visually determined by perceived ability to find a golf ball and, subsequently, play it. Scale from 1-9 where 1 = no chance to find/play the ball and 9 = excellent playability. Means as affected by the main effect of herbicide program from 5 evaluation dates over 2015 and 2016.

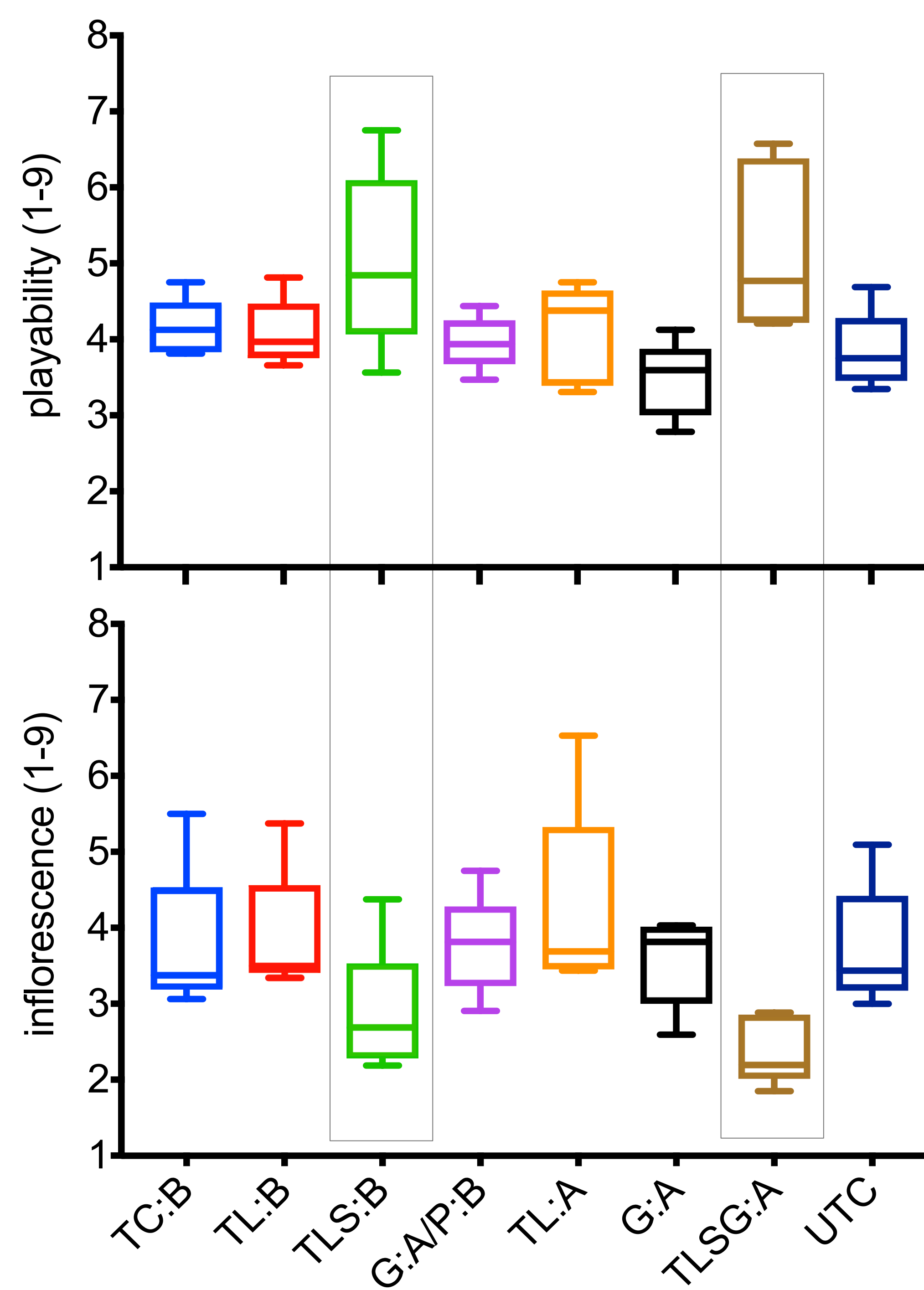


Figure 2: Inflorescence (seedhead production) visually measured on a scale from 1-9 where 1 = no inflorescence and 9 = relatively high relative seedhead production. Means as affected by the main effect of herbicide program from 5 evaluation dates over 2015 and 2016.

Segment: Regardless of application timing, the 2 herbicide programs that included Segment (sethoxydim) increased golf ball playability in these unmowed areas (Figure 1). For simplicity, only herbicide programs main effects are shown, but these programs affected the KBG and Range treatments more than the fine fescue mixes. Segment is safe on fescues, but has activity on most other perennial grasses. Therefore, it injured the KBG and Range treatments, even eliminating certain species in the Range mix. It kept KBG and Range treatments thinner as a result and increased playability. In theory, if there was more perennial grassy weed pressure, like quackgrass, it would also increase golf ball playability in the fine fescue treatments as well. The downside of these Segment applications is that it also selectively decreased the seedhead production of the KBG and Range treatments as seen in Figure 2.

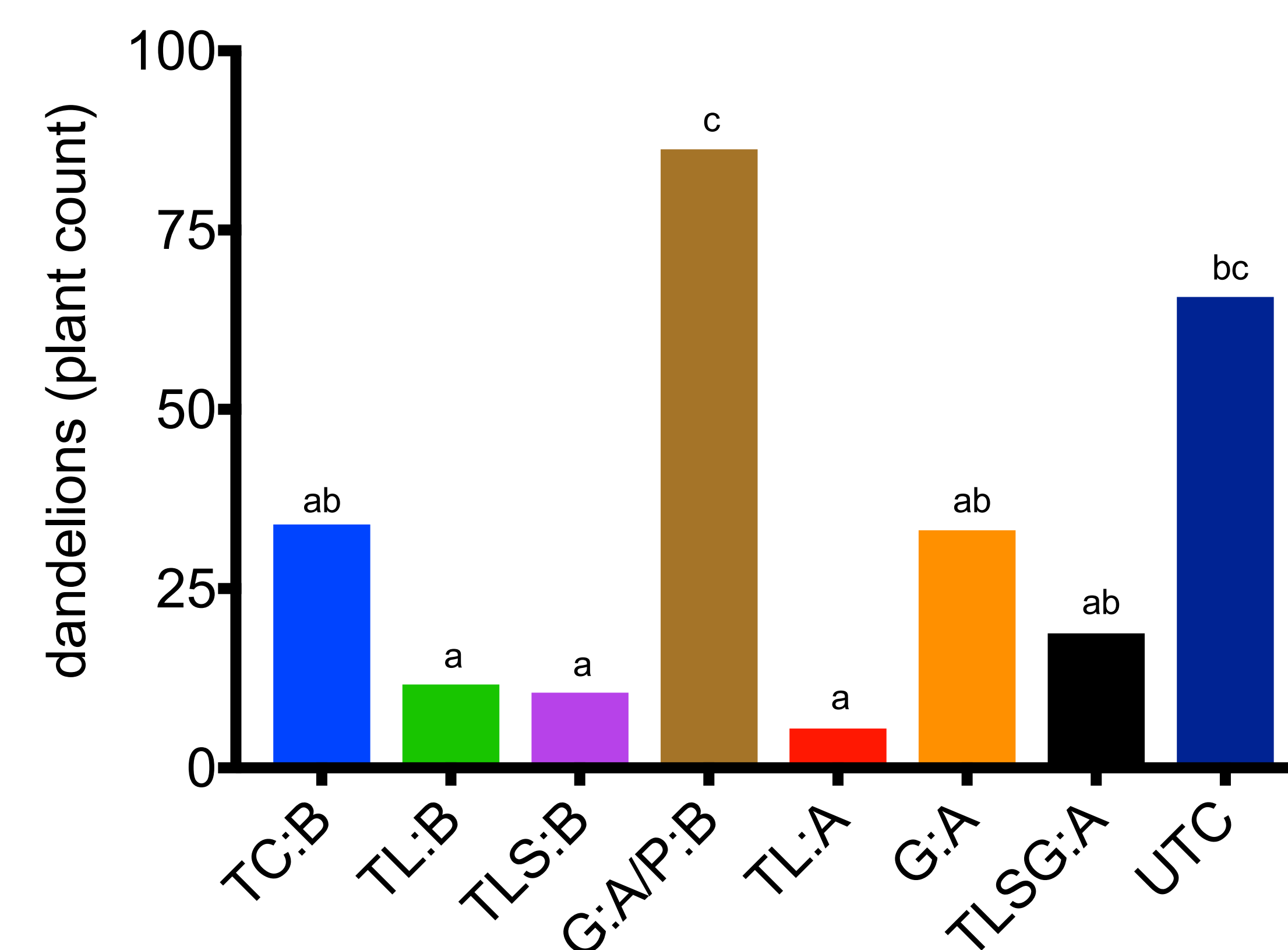


Figure 3: Mean dandelion counts per 14 m² as affected by the main effect of herbicide programs measured in September of 2016 after 2 spring (A) applications and 1 fall (B) application. Means with the same letter are not significantly different ($p \leq 0.05$).

Table 1. Whole plot herbicide programs applied in 2015 and 2016.

TRT	Application Timing			TRT Alias
	Spring PRE	Spring POST	Fall POST	
1	Pendulum AQ		Trimec Classic	TC:B
2	Pendulum AQ	Turflon Lontrel		TL:A
3	Pendulum AQ	Turflon Lontrel		TL:B
4	Pendulum AQ	Turflon Lontrel Segment		TLS:B
5	Pendulum AQ Gallery			G:A
6	Pendulum AQ Gallery	Turflon Lontrel Segment		TLSG:A
7	Pendulum AQ Gallery		Pylex	G:A/P:B
8	Pendulum AQ			UTC

Table 2. Strip-plot species treatments.

Highlander Links Fescue (HLF)	
49%	'Beacon' Hard Fescue
40%	'Jamestown IV' Chewings Fescue
10%	'Cidy Lou' Creeping Red Fescue
Sheep/Hard Fescue (SHF)	
50%	'Marco Polo' Sheep Fescue
50%	'Ecostar' Hard Fescue
Range & Field Mixture (Range)	
29%	'Kentucky 31' Tall Fescue
25%	'Climax' Timothy
14%	Orchardgrass
10%	Alsike Clover
9%	Perennial Ryegrass
5%	Gulf Annual Ryegrass
4%	Kentucky Bluegrass
Existing Kentucky Bluegrass (KBG)*	



Quality: Quality was primarily affected by weed infiltration and inflorescence. Herbicide programs that included Turflon + Lontrel, except for that which also included Gallery, regardless of application timing, were the only treatments to provide significant dandelion control relative to the untreated after 2 years (Figure 3). These treatments also did not have a negative affect on inflorescence (Figure 2).

Species: the dynamic of the different mixes/blends of turfgrasses changed over time. The 2 fine fescue mixes had the most inflorescence and best overall quality by the end of 2015. By 2016, however, most of the Range treatments were dominated by one or a few beginning components (tall fescue and orchardgrass). As the Range treatments thinned themselves out through competition, they produced more seedheads and increased in quality. KBG and the fine fescue treatments produced very few seedheads in a very hot and dry 2016, relative to 2015.

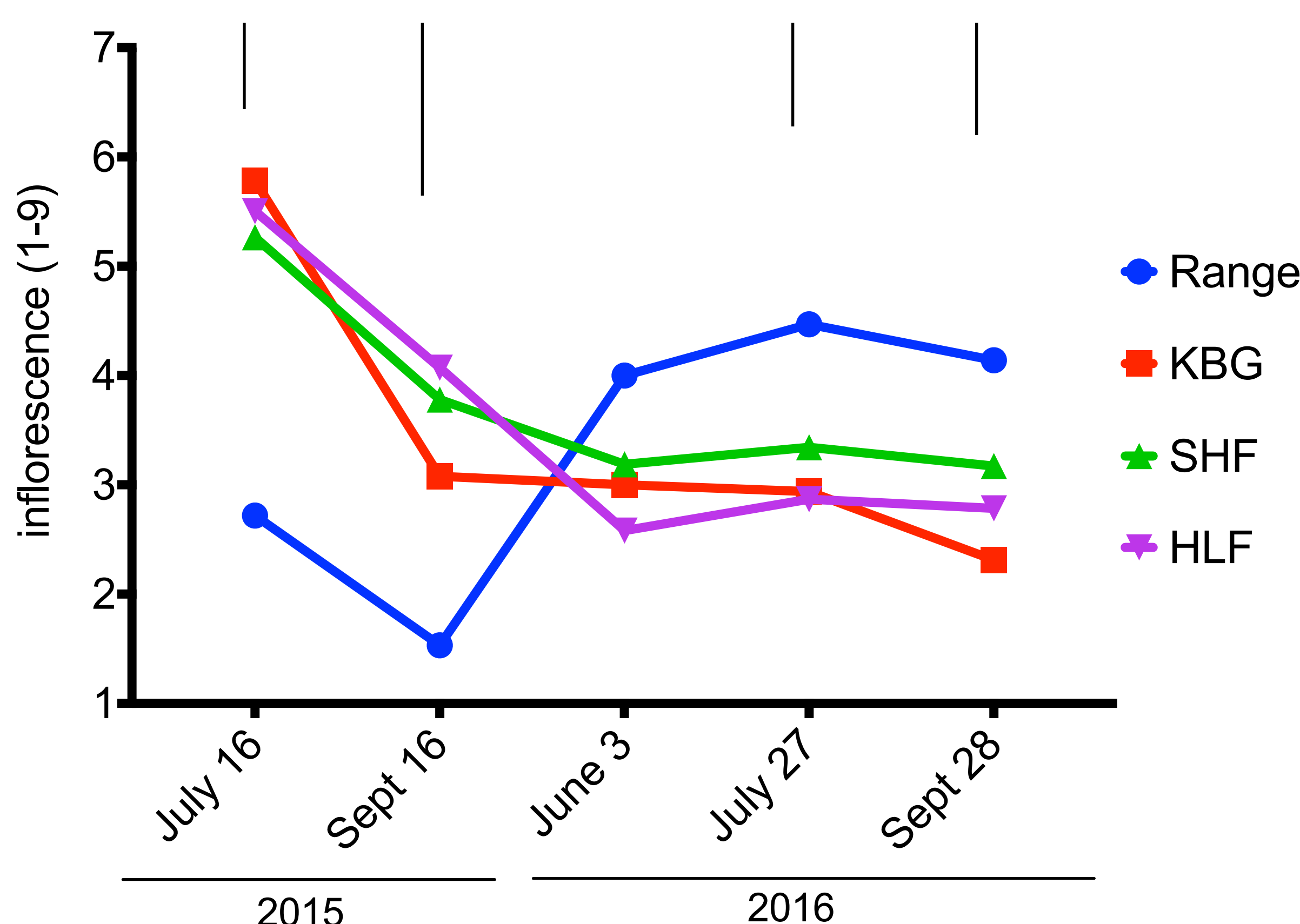


Figure 4: Mean inflorescence in 2015 and 2016 as affected by the main effect of species mix/blend. Vertical LSD bars indicate least significant difference values ($p \leq 0.05$) for treatment comparison on a given day.

Conclusions:

1. Segment can be used to increase playability by thinning non-fescue stands and/or possibly controlling infesting grassy weeds. Segment may also limit seed production of susceptible grass species, decreasing overall quality.
2. Some type of postemergence herbicide program is necessary to limit broadleaf weed infestation. Turflon + Lontrel provided the best control of the major weed problem, dandelion, in this trial.
3. Preemergence herbicides (Pendulum AQ and Gallery) have yet to make an impact in weed control, which may be due to the primarily perennial broadleaf weeds. Time and change in plant dynamics could change these results down the road.
4. Seedhead production seemed to be the determining factor in perceived stand quality, especially seen from a distance. Fescue dominated stands excelled in this category in 2015 and the Range mix produced more seedheads (mostly the tall fescue portion) in 2016, which had markedly higher temps.

Herbicide and Timing Justifications:

- **Triclopyr (Turflon)** and **clopyralid (Lontrel)** can be applied at higher rates when tankmixed than when applied as a premix (Confront).
- **Segment** is safe on fescues and, therefore, is great for control of perennial grasses in exclusively fescue mixes; the upside to its use in mixes with other species is potential to thin the stand, possibly increasing playability of the stand.
- IF **Pendulum AQ**, a preemergence herbicide in a microemulsion that may better move to the soil/thatch interface, can provide enough weed control on its own, weed control can be cheap, but a postemergence partner may be necessary.
- **Gallery** is a broadleaf preemergence that could be a good partner for Pendulum AQ.
- **Application timings** could make a difference in the ability of some of these herbicides to control difficult perennial weeds like Canada thistle. Fall applied herbicides can often be more effective because they move to new growth which is in the roots in the fall and are more detrimental to weed health.
- Herbicide applications are often timed after mowing occurs in the fall which means weed foliage must grow through residue if it is to take-up these herbicides OR the herbicides must make it to the roots for effective absorption.