

Project: Establishment, phosphorous needs, and testing of various Kentucky bluegrass cultivars to determine their mowing and stress tolerance

Principal investigators:

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Objectives:

Evaluate the mowing height threshold of a variety of KBG cultivars

Determine how mowing height affects wear tolerance and recovery as well as disease and weed susceptibility.

Determine the ideal fertility requirements (especially phosphorous) for establishment of dwarf-type KBG depending on prill size

Fourteen varieties of Kentucky bluegrass were planted in the fall 2007. The varieties were then subjected to 5 different mowing heights in the 2008 and 2009 growing seasons. The varieties were evaluated for color, susceptibility to disease, weed encroachment and recovery from divot damage. Although the varieties of the bluegrass ranged from compact types (Dwarf) to more traditional growth habits, mowing height by variety interactions were not prevalent (varieties and mowing heights Listed Below). Although the variety and the mowing height both had an effect on one or more of the parameters studied, the mowing height effect was consistent across all varieties tested.

Treatments:

Kentucky bluegrass variety – morphological type

Touche – Mid-Atlantic Type

Touchdown – Aggressive Type

STR2553

Bandera – Texas Bluegrass Hybrid

Starburst – Aggressive Type

Moon Shadow – Compact Type

Cheetah – Aggressive Type

Chicago II – Compact Type

Nu Density - Compact Midnight Type

Blue Velvet – Compact Midnight Type

Langara – Compact America Type

Argos - Shamrock Type

SR2284

America – Compact America Type

Mowing heights

1.25 cm (0.5”), 2.0 cm (0.75”), 2.5 cm (1.0”), 4.0 cm (1.5”), 5.0 cm (2.0”)

Results and Discussion:

Color

Both visual color ratings and normalized difference vegetation index (NDVI) were measured on the turfgrasses with visual color ratings being presented in this report. While all varieties had acceptable color ratings throughout the growing season there were differences in color between the varieties (Fig. 1). Touchdown is known for its light green color and our test showed it had a lower color rating than the midnight type grasses. Mowing height affected the color of the grasses by reducing the color rating when they were mowed at one half inch (Fig 2). All the heights above one half inch were equivalent. One exception was observed in spring of 2009 when the lower mowing heights had higher quality ratings most likely to a faster green up due to less brown leaf tissue being left behind from the dormant turf at the higher mowing heights. This effect was no longer apparent by the May 4 rating date (Fig. 3).

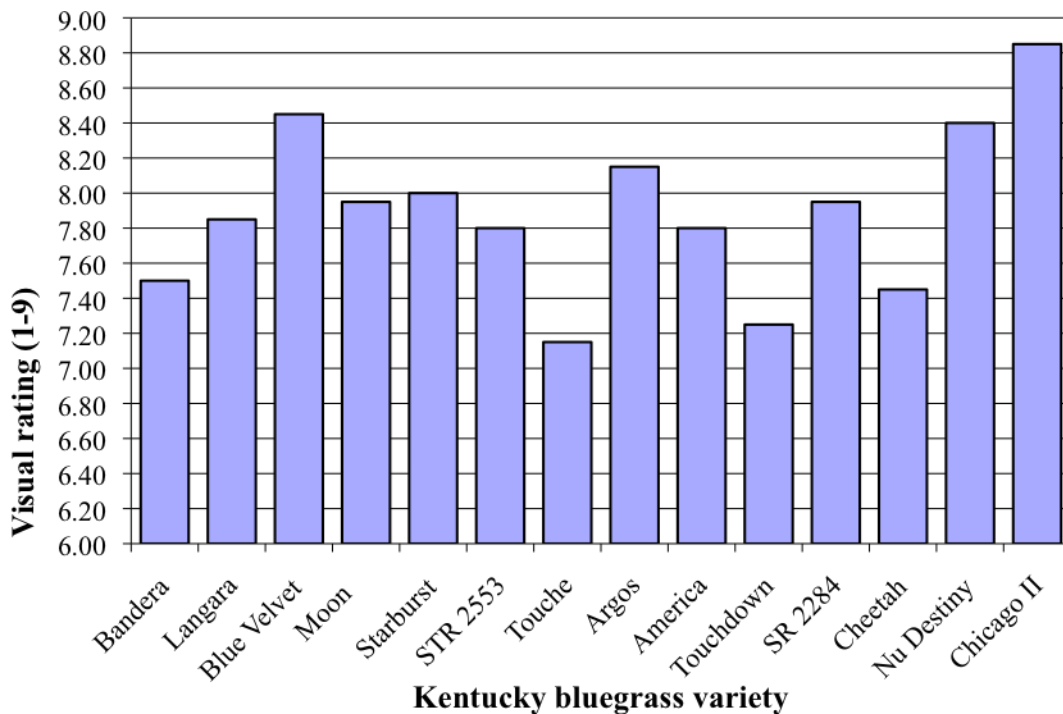


Fig. 1. Visual color rating of Kentucky bluegrass varieties based on NTEP scale (1-9), with 1 being lowest quality, 9 being highest quality and 6 being acceptable quality.

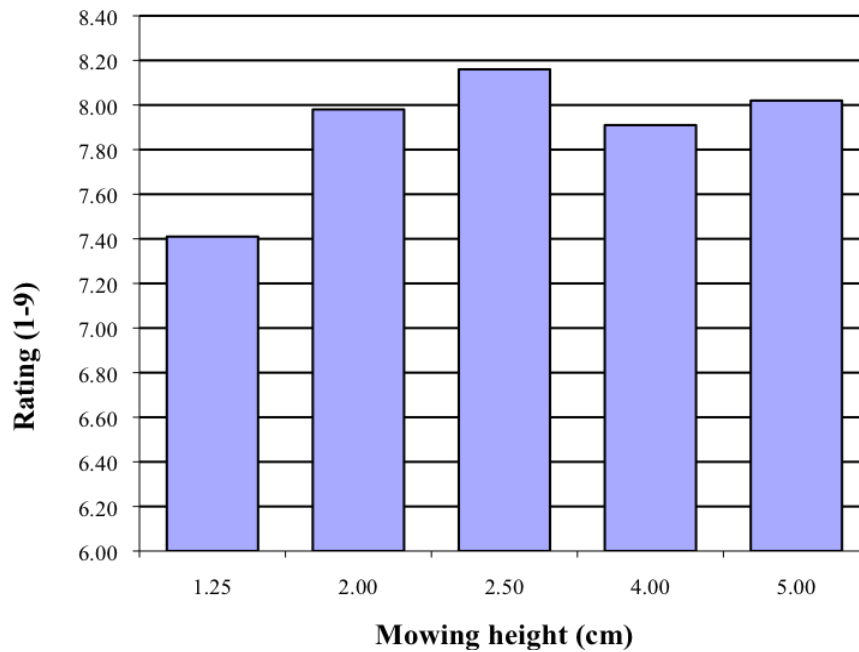


Fig. 2. Effect of mowing height on visual color rating, averaged across all Kentucky bluegrass varieties. Rating is based on NTEP scale (1-9), with 1 being lowest quality, 9 being highest quality and 6 being acceptable quality.

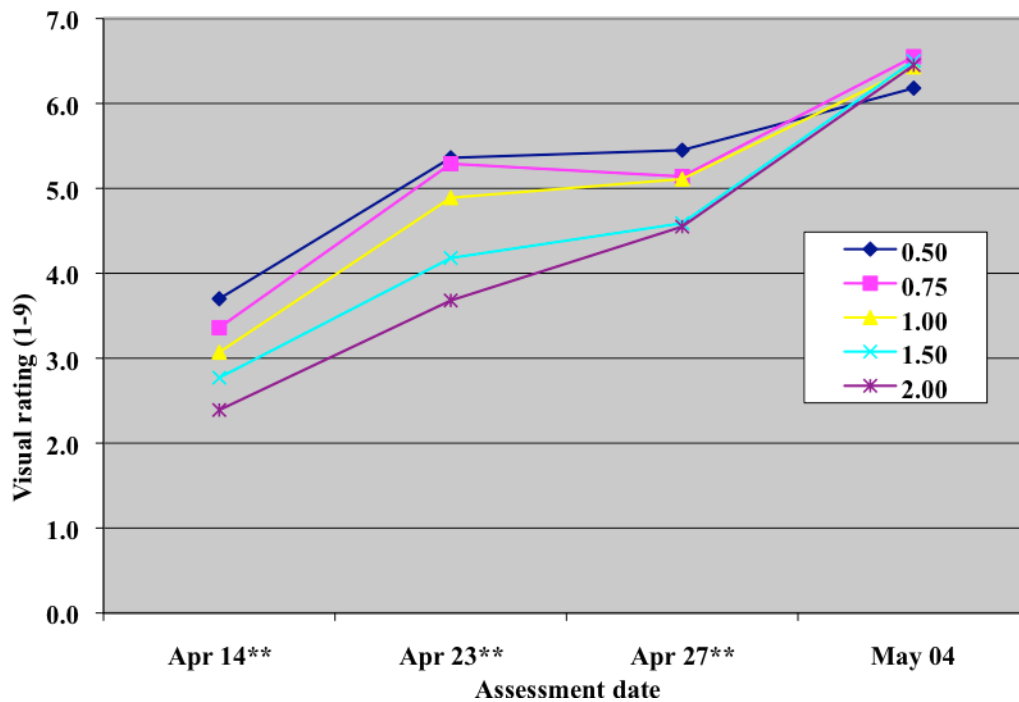


Fig. 3. Visual color ratings of Kentucky bluegrass varieties by mowing height at four different assessment dates. Ratings are based on NTEP scale (1-9), with 1 being lowest quality, 9 being highest quality and 6 being acceptable quality.

Rust Infection

In 2008 significant rust infection occurred, allowing us to evaluate resistance. Three varieties were significantly more susceptible to rust: Touchdown, SR2884 and Chicago II (Fig. 4). Additionally, data showed that rust incidence increased at 2.0 cm (0.75") mowing height (Fig. 5). This height was likely low enough to reduce photosynthetic activity of the varieties, giving the rust pathogen a competitive edge. However, the effect was not observed at the lowest mowing height of 1.5 cm (0.5") as this lower height of cut likely did not lead to the leaf wetness and humidity conditions that favor development of the disease.

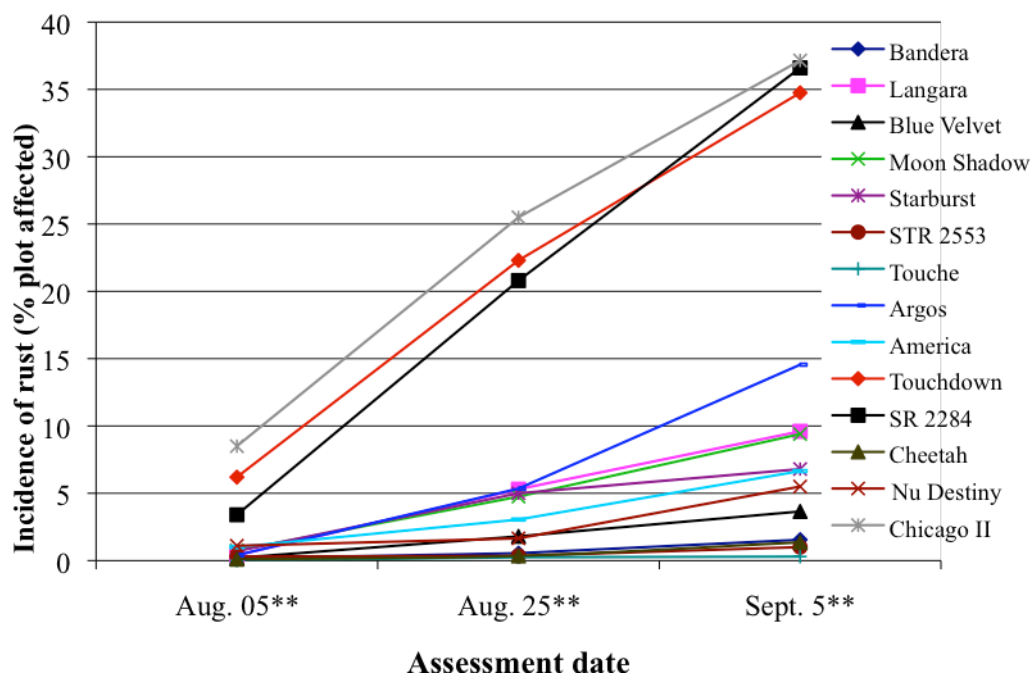


Fig. 4. Incidence of rust (measured by percent plot affected) on each of the varieties, averaged across all of the mowing heights, at three different assessment dates.

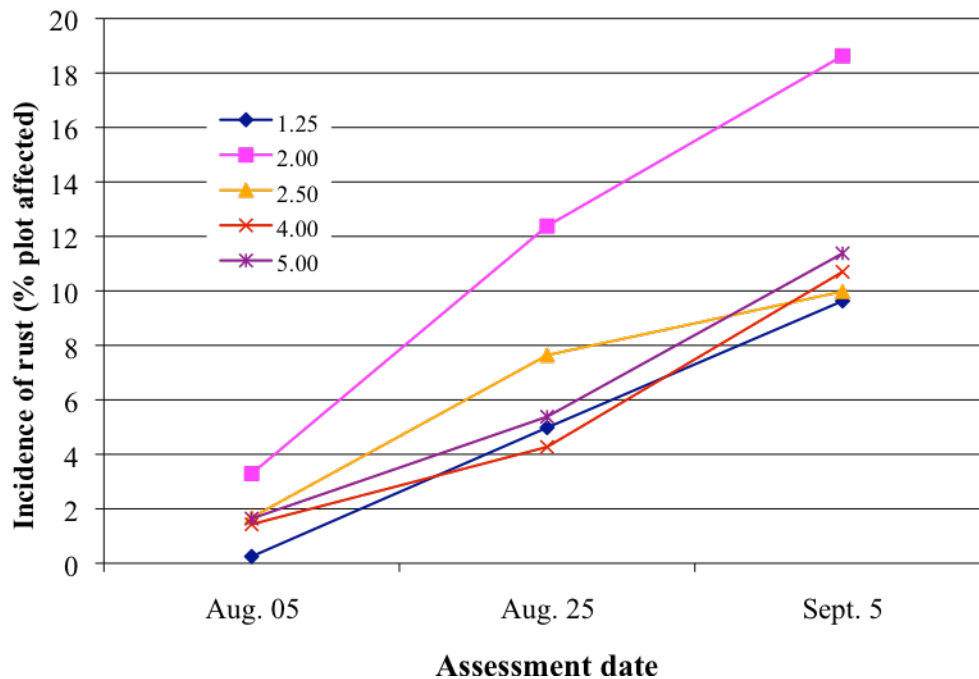


Fig. 5. Incidence of rust (measured by percent plot affected) by mowing height (in cm), averaged across all of the Kentucky bluegrass varieties, at three different assessment dates.

Weed Encroachment

Reducing the mowing height below 4.0 cm (1.5") increased the total weeds, broadleaf weeds and annual bluegrass and bentgrass encroachment for all cultivars (Figs.6 and 7). Variety did not have a significant effect on weed encroachment. Previous research has shown increased crabgrass infestation with low mowing during establishment. To our knowledge this is one of the first studies to show increased weed infestation, both broadleaf and cool season grass weeds caused by low mowing. It should be noted there was no difference in weed encroachment between 4.0 cm and 5.0 cm (1.5" and 2.0") so it appears that there is a lower threshold for resistance to weed encroachment and for the grasses tested it is between 2.5 cm and 4.0 cm (1.0" and 1.5")

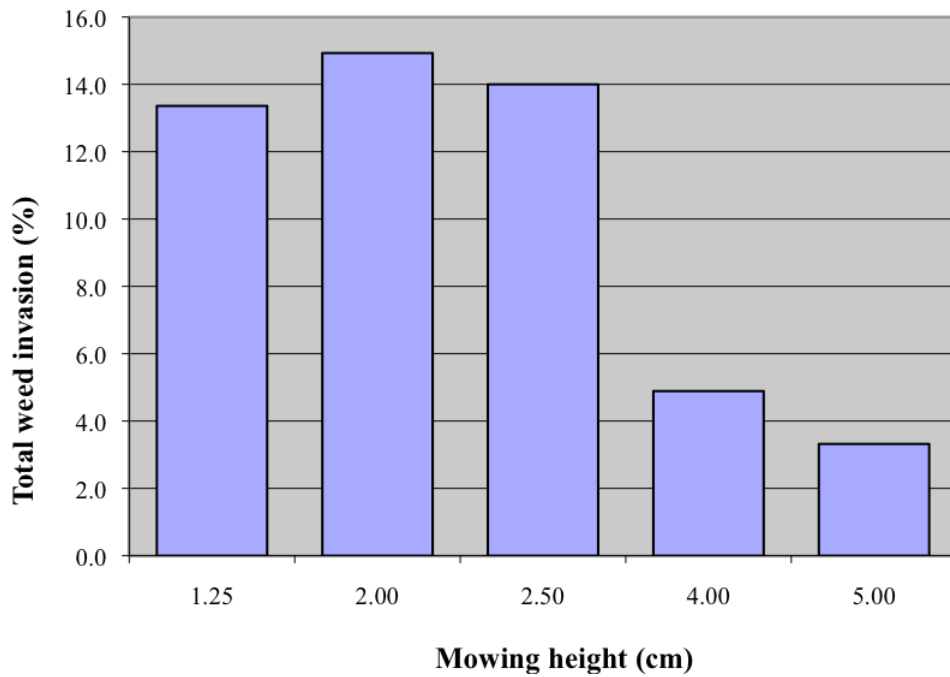


Fig. 6. Effect of mowing height on percent weed invasion of Kentucky bluegrass plots, averaged across all varieties.

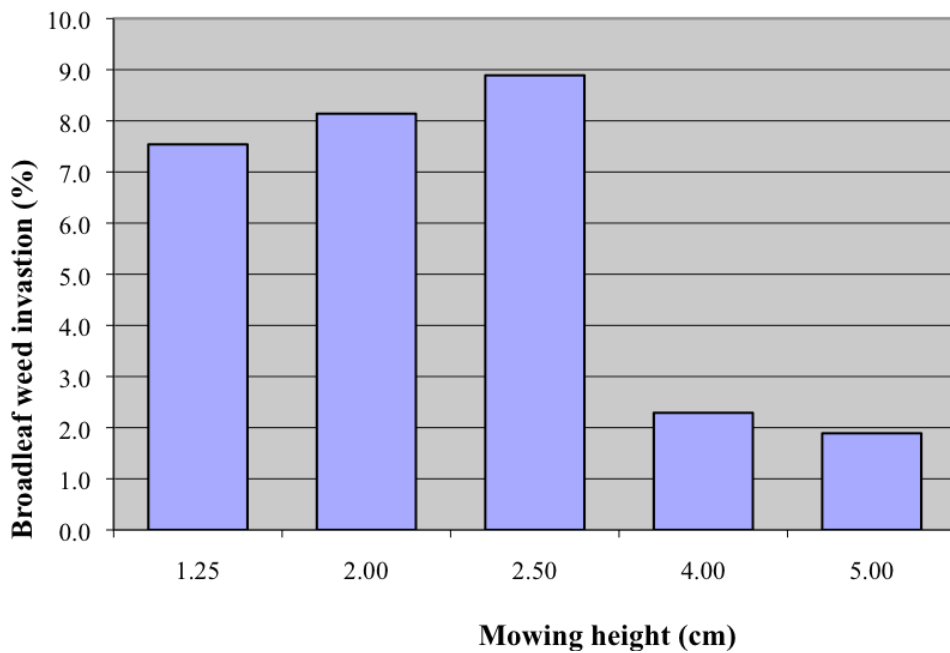


Fig. 7. Effect of mowing height on percent broadleaved weed invasion of Kentucky bluegrass lots, averaged across all varieties.

Divot Recovery

As with weed encroachment there were no differences between varieties of KBG. However, there was a significant effect of mowing height on recovery time from divots with the 1.25 cm (0.5") mowing height taking a longer time to recover than the 4.0 cm and 5.0 cm (1.5" and 2.0) mowing heights (Fig. 8). This is evidence that the mowing heights reduce the growth rate and vigor of the KBG and this may also relate to the increased weed encroachment observed.

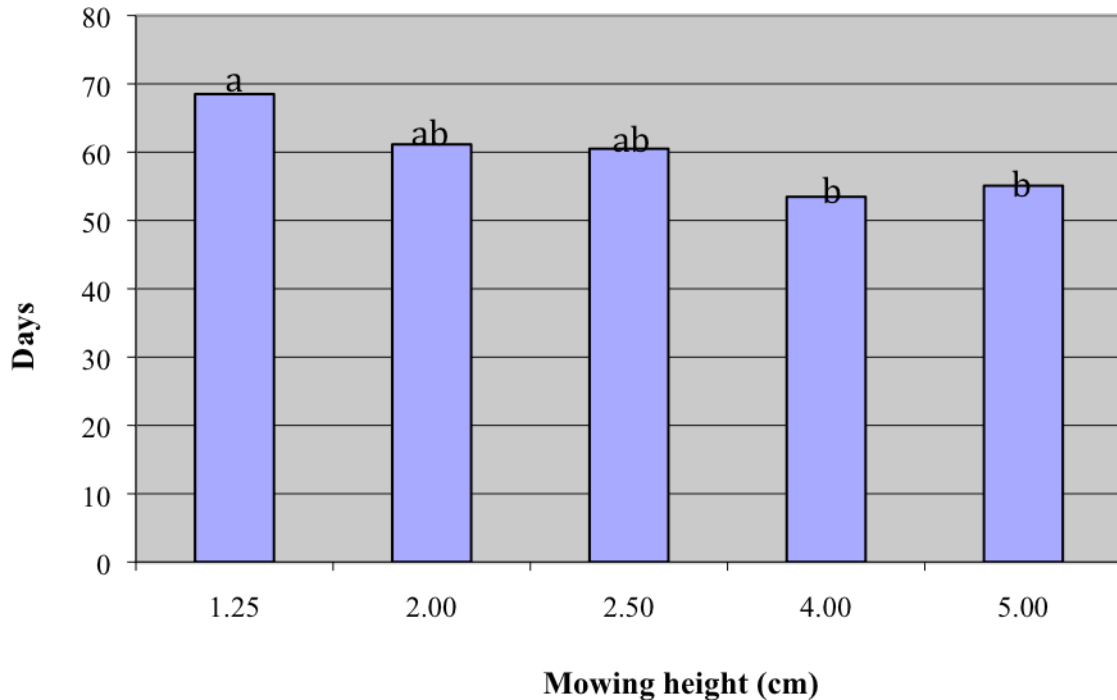


Fig. 8. Effect of mowing height (cm) on days to recovery from divot injury averaged across all Kentucky bluegrass cultivars. Letters above each data point that differ are significantly different from each other.

Phosphorus application at establishment.

The field plots established in the fall of 2007 had significant infestation from annual bluegrass. The experiment was repeated in 2008 and the plots were planted with the same treatments from the proposal (various P rates and prill sizes). Early growth in the fall was affected by both prill size and rate. Higher rates of phosphorus and smaller prill sizes had increased early growth. The rate effect was not apparent in the 2009 season. This reduction in P effect after the establishment period is common in P requirement studies that have been done on agricultural soils that are not sufficiently low in P to show differences between growth of plants with mature root systems. Our studies confirm that short-term studies of establishment related to P rates are not effective at predicting the needs of KBG for sod production in an 18-month cycle. The research resulted in funding for the inclusion of P rate trials across Ontario on different soil P levels to revisit the P recommendations based on harvest not on short-term establishment.

Matching funds were obtained from the MOE to reduce phosphorus loading of the Lake Simcoe Clean-up Fund (\$253,000). One of the objectives of that experiment is to repeat these initial experiment on working sod farms in the Lake Simcoe watershed to potentially reduce the environmental impact of sod production in that area.