



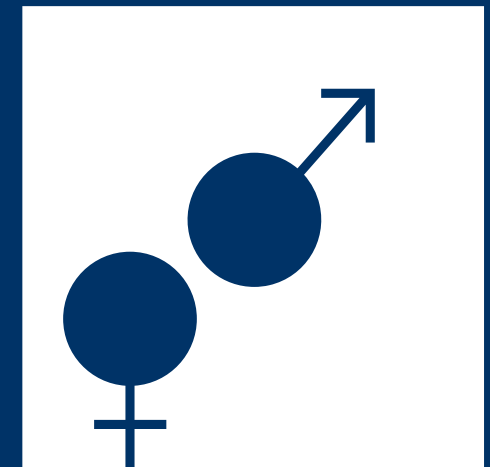
Turf Response To Polymer - Sulfur Coated Urea

LLOYD E. SUTTON. CURTIS J. RANSOM. TRENTON A. BLAIR. BRYAN G. HOPKINS. VON D. JOLLEY.
RACHEL L. BUCK. PLANT AND WILDLIFE SCIENCES, BRIGHAM YOUNG UNIVERSITY

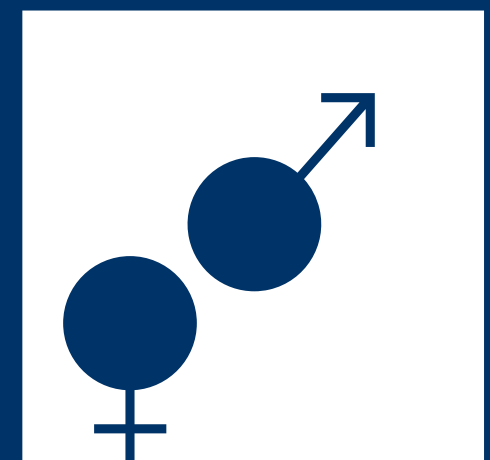
STUDY OBJECTIVES



IMPROVE NITROGEN
USE EFFICIENCY AND
ENHANCE SOIL FERTILITY



IMPROVE SUSTAINABILITY
OF URBAN LANDSCAPES
AND PERMANENT SOD
FARMS



IMPROVE
AGROECONOMICS



DECREASE NITROGEN
LOADING IN SURFACE
AND GROUND WATER



CONSERVE NITROGEN
FERTILIZER PRODUCTION
RESOURCES

ABSTRACT

Turfgrass is the irrigated crop with greatest acreage in the USA. Nitrogen (N) applied to turfgrass contributes to atmospheric and hydrospheric pollution. Slow/control release fertilizers [sulfur coated urea (SCU), polymer-sulfur coated urea (PSCU)] were evaluated as a possible solution to maintain turf growth and verdure while reducing N lost to the environment. Spring and fall trials on Kentucky bluegrass (*Poa pratensis* L.) were conducted over two years comparing SCU and PSCU to an unfertilized control and urea applied either all at once or split monthly. Spring application of SCU and PSCU resulted in minimal slow/control release characteristics, matching response seen by urea applied all at once. For the first six weeks in spring, urea applied all at once, SCU, and PSCU resulted in increased tissue N concentration (22%, 25%, and 24%, respectively), growth (11%, 14%, and 10%, respectively), and verdure (9%, 10%, and 16%, respectively) compared to urea applied monthly. For the remaining 11 weeks, urea, SCU, and PSCU showed a decrease for tissue N concentration (12%, 8%, 12%, respectively), growth (8%, 5%, and 12%, respectively), and verdure (5%, 4%, 6%, respectively) compared to urea split applied. Fall applied PSCU resulted in an average increase of 15% tissue N, 9% height, and 9% verdure compared to urea split application. SCU compared to urea split application showed no significant difference for tissue N or height, but an increase of 8% verdure. Urea applied all at once showed a decrease of tissue N and height by 11%, and 6%, respectively, although no difference in verdure. The PSCU and SCU fertilizers evaluated in this study provide minimal slow/control release properties under spring applied conditions. Fall application results were less clear, but effects were minimal.

- 3 spring and 1 fall field sites (2012)
- treatments (4 replications in RCBD in 3 m² plots) at 140 kg N ha⁻¹ applied as urea, SCU, or PSCU applied all at once, and urea applied in split monthly applications (GSP) at the beginning of spring and fall
- shoot N measured every two weeks with Leco® (TruSpec® CN elemental determinator, St. Joseph, MI, USA)
- average heights recorded weekly (before mowing)
- verdure rating taken weekly on a scale of 0-5 with NDVI measurmetns using a handheld Greenseeker (Trimble®, Sunnyvale, CA)
- significance determined with ANOVA and means separated with Tukey HSD at P<0.05

METHODS

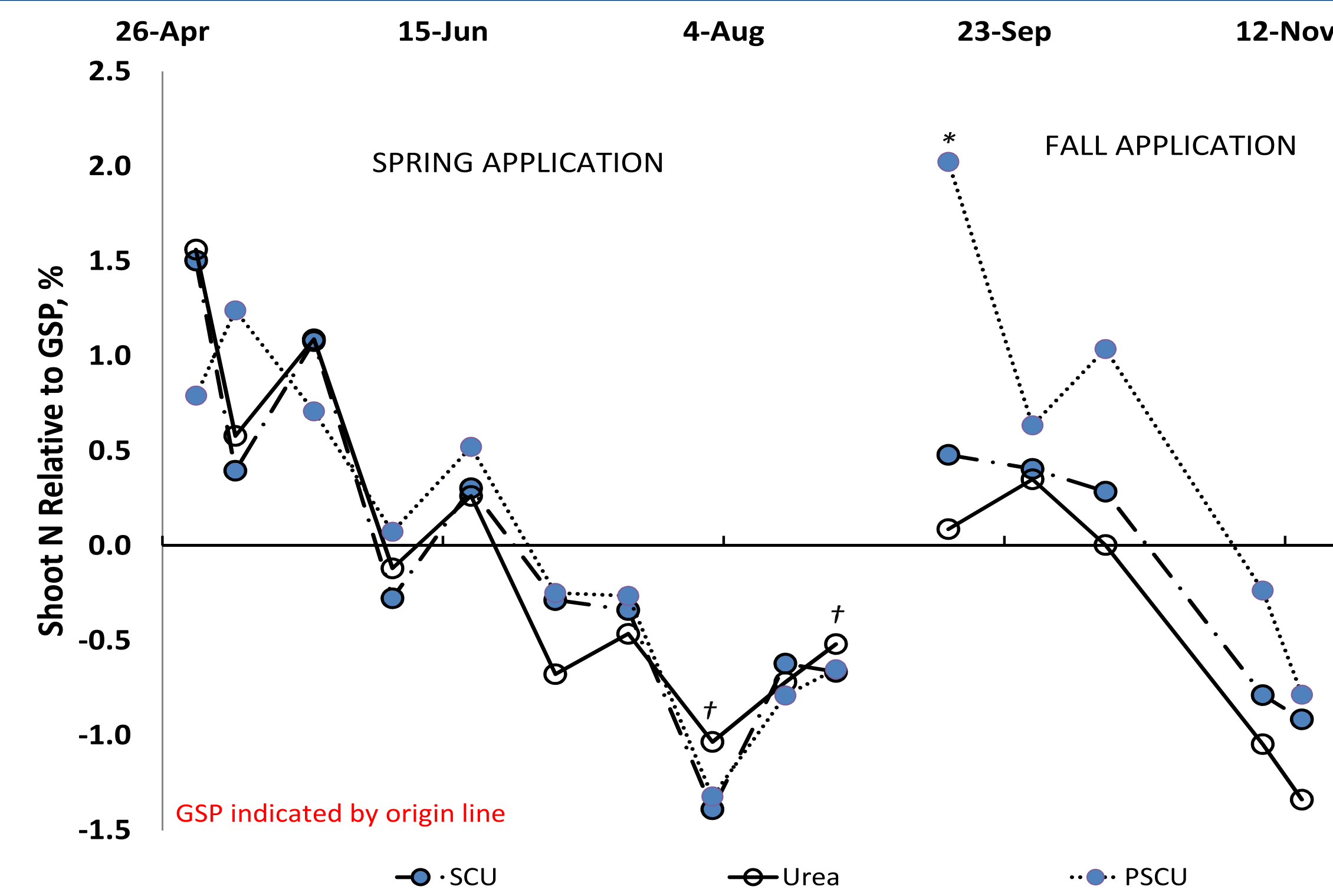


Figure 1: Shoot N (%) relative to GSP (urea applied monthly). Measurements were taken every two weeks. No significant difference between urea, SCU, and PSCU. † indicated all treatments significant from GSP (P<0.05), * indicates when PSCU is significant from GSP while one or both of the remaining treatments are not significant from GSP (P<0.05).

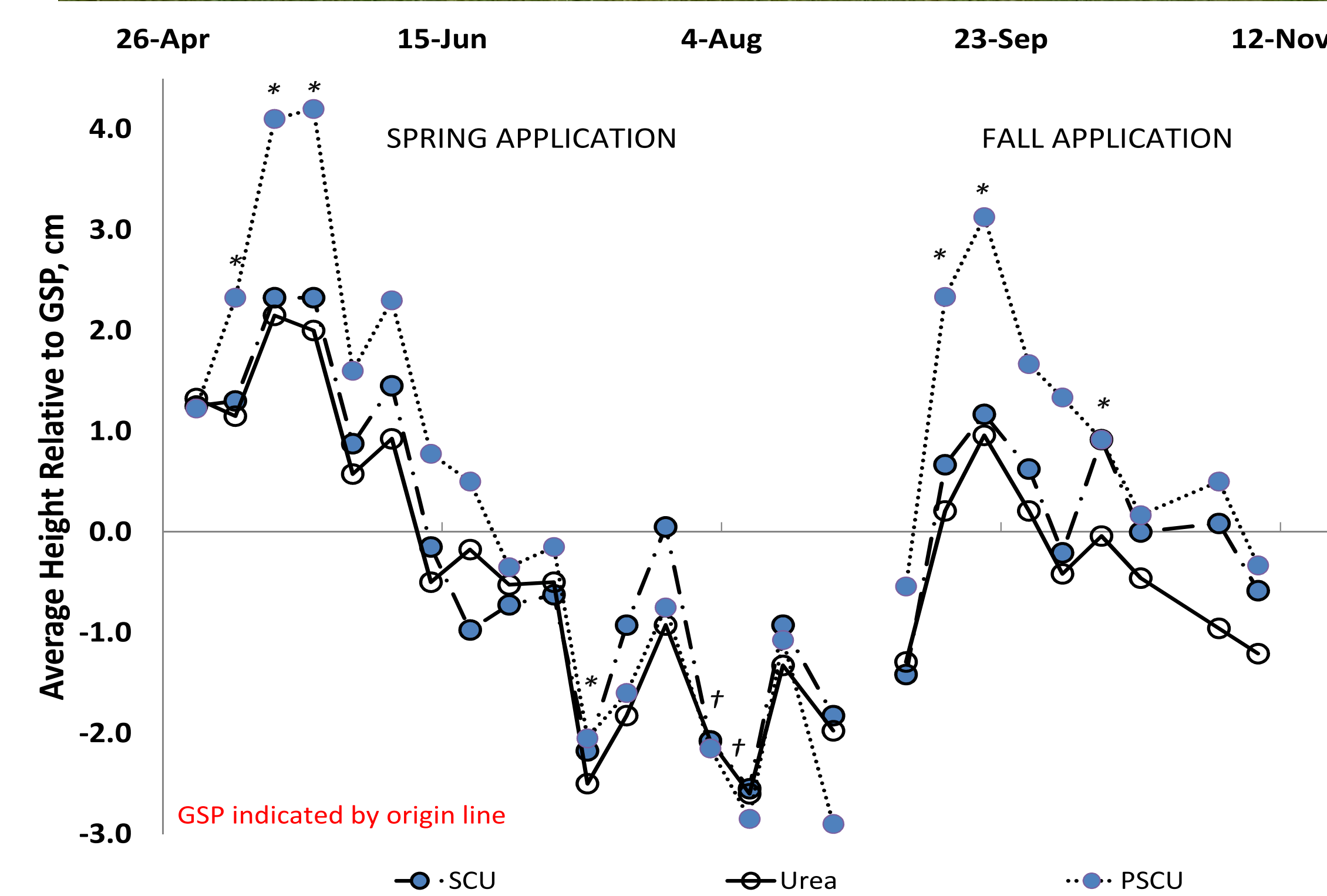


Figure 2: Average height relative to GSP (urea applied monthly). Height measurements were taken weekly before mowing to 5 cm height. No significant difference between urea, SCU, and PSCU. † indicated all treatments significant from GSP (P<0.05), * indicates when PSCU is significant from GSP while one or both of the remaining treatments are not significant from GSP (P<0.05).

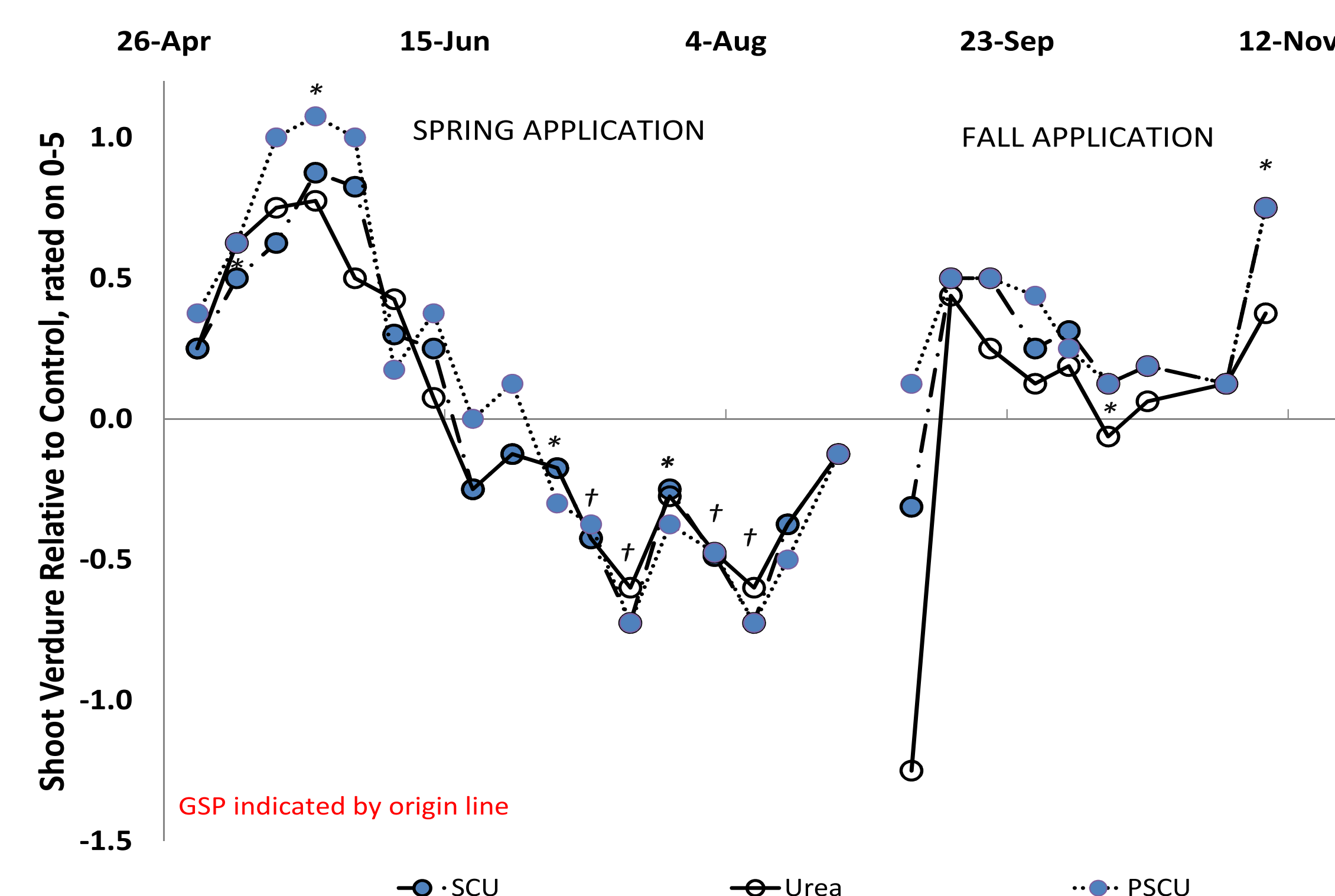


Figure 3: Verdure ratings taken weekly on a scale of (0-5; 0 being dead, 5 dark green). No significant difference between urea, SCU, PSCU. † indicated all treatments significant from GSP (P<0.05), * indicates when PSCU is significant from GSP while one or both of the remaining treatments are not significant from GSP (P<0.05).

Statistics

- All models highly significant: site*treatment interaction for shoot N, but no interaction was seen for verdure and height.

Shoot N (Figure 1)

- Relative to the other fertilizers (urea, SCU, and PSCU) applied all at once, the GSP (urea applied monthly) had a steady amount of shoot N concentration with a trend for less average N immediately after application and significantly greater N at the end of the summer and a similar trend at the end of fall.
- No difference in urea, SCU, and PSCU applied all at once except in initial fall measurement.
- The following spring (2013) data showed a higher shoot N for GSP although not significant from SCU, and PSCU but significant from urea. SCU, PSCU, and urea treatments were not significant from each other (data not shown).

Verdure (Figure 2)

- Verdure followed same trend as shoot N with initial decrease in verdure for GSP and end of season increase over all other treatments. Fall results showed slight difference in GSP compared to PSCU, whereas SCU and urea were relatively lower with the latter a result of fertilizer burn.
- Urea, SCU, and PSCU treatments were not significantly different from each other throughout entire study except for the initial rating of the fall application with urea significantly lower than GSP, SCU, and PSCU.
- Spring (2013) NDVI readings showed significantly better plant health for GSP, SCU, and PSCU compared to urea applied all at once (data not shown).

Height (Figure 3)

- GSP trended for reduced heights after initial spring application compared to urea, SCU, and PSCU. PSCU was significantly higher than GSP for weeks 3, 4, and 5 while urea and SCU were not significant. GSP had significantly higher heights to all treatments for weeks 14 and 15, and was significant from urea and PSCU on week 11. Fall data resulted in less GSP growth compared to PSCU for 3 of the 9 weeks measured.
- Urea, SCU, and PSCU were not significant from each other except for 1 week in the fall when PSCU and SCU were significant from urea and GSP.

RESULTS

CONCLUSION

The SCU and PSCU evaluated in this study showed minimal slow/control release properties under the conditions tested compared to urea. There was no fertilizer burn with these products compared to urea in fall application resulting in a significantly higher shoot N and verdure ratings the following spring. Spring application resulted in greater growth than GSP (increasing mowing needs). The SCU and PSCU treatments showed minimal added value to warrant use for turfgrass systems when compared to GSP.