

AGRAPRO ON PERFORMANCE UNDER REDUCED FERTILITY & IRRIGATION REGIMES

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MATERIALS AND METHODS

Penncross creeping bentgrass were collected from at the Rutgers turf farm and planted in a mixture of sand (85%) and peat (15%) with an 18-24-6 granular at 1.0 lb/1000 ft² for five weeks in a greenhouse with daily irrigation and trimmed regularly to 2.0 cm height. Plants were then moved to a growth chamber for a two-week pre-stress treatment at 70 F day & 63 F day night temperature's with biweekly foliar applications of 0.07 lb N/1000 ft² with half the plants receiving biweekly foliar applications of AgraPro 1.5 oz/1000 ft² and the other half with water.

Following pre-stress, plants were moved back to the greenhouse at 100 F day and 86 F night temperatures at 60% RH for a six weeks. AgraPro treated plants were separated into three groups and irrigated at 3x/week, 2x/week, and 1x/week. Weekly measurements included visual turf quality, and normalized difference vegetation index (NDVI), and leaf chlorophyll. Leaf tissue samples were collected bi-weekly, and tested for nitrogen, phosphorus, and potassium content.

TURF QUALITY (TQ)

- AgraPro showed no significant difference in TQ with plants irrigated 3x/week.
- AgraPro improved TQ for plants irrigated at 2x/week or 1x/week compared to untreated plants.
- AgraPro treated turf irrigated 2x/week had similar TQ as plants irrigated 3x/week.
- AgraPro treated turf irrigated 1x/week had significantly higher TQ than untreated, irrigated 1x/week.
- Untreated turf irrigated 2x/week had significantly lower TQ.
- Untreated turf irrigated 1x/week consistently showed lowest TQ of all treatments and fell below the acceptable level.
- At no point during stress did plants receiving AgraPro fall below the acceptable level of TQ.

NORMALIZED DIFFERENCE VEGETATION INDEX (NDVI)

- Objective canopy measurements of NDVI showed similar patterns to TQ measurements.
- Untreated turf irrigated 1x/week displayed a drop in NDVI starting at day 21.
- AgraPro treated turf with the same irrigation regimen delayed this decline until day 35.
- Untreated turf irrigated 2x/week began to decline at day 28.
- AgraPro treated turf irrigated 2x/week began to decline at day 35.
- As with the TQ results, there was no significant difference between AgraPro treated and non-AgraPro treated turf irrigated 3x/week.

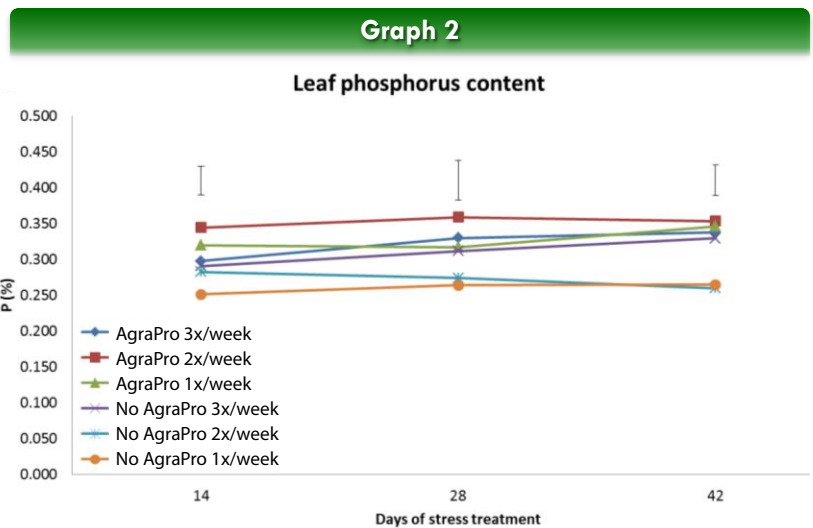
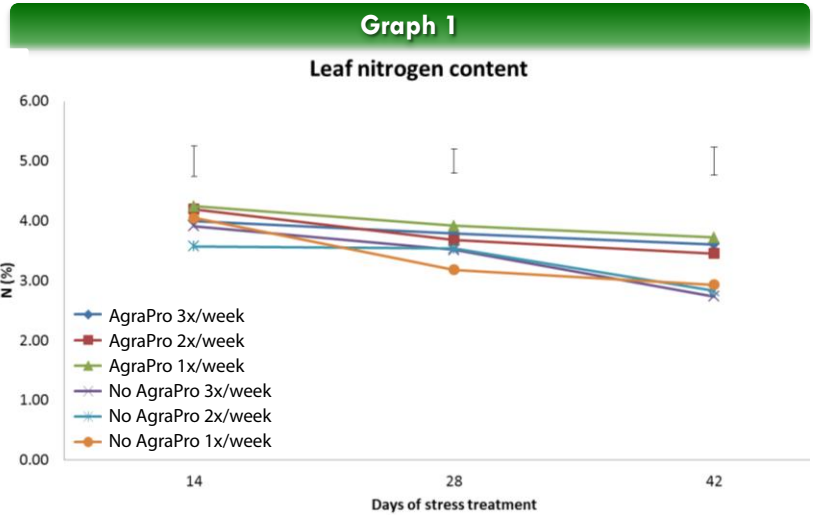
CHLOROPHYLL

- Leaf chlorophyll content declined for all treatments during the stress period, most likely due to intense heat stress in the greenhouse. This was most evident during the 28-42 day time period.
- AgraPro treated turf irrigated 2x or 1x/week had significantly higher chlorophyll content than respective untreated controls at day 28 and was similar to plants irrigated 3x/week.
- AgraPro treated turf irrigated 2x/week still showed a significant difference compared to untreated turf.
- AgraPro treated turf irrigated 2x/week at day 42 had similar results as plants irrigated 3x/week.
- AgraPro treated turf irrigated 1x/week at day 35 showed no significant difference in chlorophyll levels.

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N, P, & K LEAF TISSUE ANALYSIS

- Leaf samples for N-P-K quantification were collected during stress at days 14, 28, and 42, with significant differences noted for nitrogen and phosphorus only.
- Differences in leaf nitrogen content (Graph 1) first occurred at day 28 with untreated turf irrigated 1x/week having significantly lower N content than all turf receiving foliar AgraPro.
- Separation between treatments was most evident at day 42 regardless of irrigation regimen, AgraPro turf had significantly higher leaf N content than untreated plants.
- Leaf phosphorus content (Graph 2) showed differences at day 28, as plants treated with AgraPro irrigated 2x/week had significantly higher leaf P content than untreated controls.
- At day 42 turf treated with AgraPro promoted significantly higher leaf P content in both 2x and 3x/week irrigation regimens.



DISCUSSION AND CONCLUSION

Symptoms of summer stress typically manifests leaf yellowing, canopy wilting, and thinning. When the stress is prolonged or compounded by a reduced fertility regimen, turf stands will quickly lose attractiveness and functionality.

Foliar applications of AgraPro maintained higher content of nitrogen and phosphorus in leaves when turf plants were under limited irrigation (2x or 1x/week) suggesting that turf managers would benefit most to use AgraPro prior to and during periods of stress.

AgraPro treated turf maintained higher nitrogen and phosphorus in the plant system which translated into higher chlorophyll content and a more-desirable turf color. This occurred because nitrogen is a key component of the chlorophyll molecule while phosphorus serves important roles in phospholipids structure.

Overall, this study provides promising results that AgraPro can produce healthier turfgrass when plants are managed under a 30% reduction in fertility and limited irrigation. Healthier plants are then better able to withstand commonly occurring abiotic stresses such as heat and drought.

