ENHANCING PLANT PRODUCTIVITY DURING DROUGHT CONDITIONS

VIRGINIA TECH UNIVERSITY

Dr. Erik Ervin Ph. D, Dr. Xunzhong Zhang Ph. D, and J. Roberts

Dr. Erik Ervin, professor of turfgrass ecology and physiology, specializing in ecology, physiology, and biochemistry of cool and warm season grasses, tested the effects APEX-10 had on a mature stand of Penncross Bentgrass grown under well-watered conditions and drought conditions.

TEST PLOTS

APEX-10 was applied August 13th, September 4th, and September 25th on a mature stand of Penncross Creeping Bentgrass grown on silt loam soil.

A nitrogen urea (46-0-0) in April, June, August and October at the rate of 1/2 lb per 1000 sq. ft. and also applied in September and November at the rate of 1 lb per 1000 sq. ft.

Plots were randomly arranged with 4 replications of control and 4 replications of APEX-10.

The area was well irrigated to avoid any type of drought related conditions and the test ran from August 13th through November 28th when plugs were harvested and readings were recorded.

HARVESTING

On October 16th, two 4" plugs were harvested from each plot. All roots and soil were removed

at the thatch layer, placing additional stress on the plugs and also to simulate a sod cut.

Each plug was transplanted to a 12" sand-filled can and placed in the greenhouse; all pots were placed under a mist and allowed to acclimate to these conditions for 13 days.

On October 29th half of the pots remained irrigated, the other half were removed and placed in the sun with no water to impose drought conditions. All of the pots remained in their current conditions for 3½ weeks, upon which final readings were taken.

RESULTS

Well Watered Conditions

APEX-10 did not greatly increase bentgrass quality, color, or percentages of nitrogen within the leaf tissue. However, 6½ weeks into the study there was on average an increase in photochemical efficiency due to APEX-10. This is a precursor to what we found under drought stress conditions.

Drought Conditions

Following 3½ weeks of the drought conditions, bentgrass treated with APEX-10 retained much higher visual quality, less wilting, sustained growth, and sustained function when compared to the control.

Results confirmed greater photochemical efficiency, a greater ability to grow and maintain root mass, and SOD antioxidant activity measured greater during drought stress.

The trend is clear. Greater antioxidant activity within the plant resulted in the increased photochemical efficiency. This allowed for sustained leaf function and root growth under drought stress conditions.

These are very promising results.

Dr. Erik Ervin Ph.D.

Virginia Tech University

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Above: Plugs mowed at 3/8"and pulled after 3½ months. Plugs were grown in the field with proper rates of fertilizer and irrigation applied.

Above: Plugs mowed to3/8" and pulled, soil & roots cut to thatch layer, let acclimate for 2 weeks. Plugs were then placed in the sun for 3½ weeks without irrigation.

Left: Plugs mowed to 3/8" and pulled, soil & roots cut to thatch layer, let acclimate for 2 weeks. Then placed in the sun for 3½ weeks without irrigation. The presence of white roots demonstrates the continued growth during the 3½ week drought period.

WELL WATERED CONDITIONS

Data Description	Date	Increase
Photochemical Efficiency	9/27	11.32%
Quality	10/8	4.28%
Leaf Tissue Nitrogen	10/8	3.95%
Root Weight	11/28	9.30%

DROUGHT CONDITIONS

Data Description	Date	Increase
SOD (Antioxidants)	11/12	27.26%
Photochemical Efficiency	11/21	51.22%
Quality	11/21	36.00%
Root Weight	11/21	69.93%