

Final Report
Idaho Nursery and Florists Grant Program
NAC-ISDA 2011-3 “Irrigation and Nitrogen Fertilization Effects on White Clover
Persistence in a Kentucky Bluegrass Turf”

Authors: Thomas Salaiz, Support Scientist, University of Idaho
Aberdeen R & E Center, 1693 S 2700 W, Aberdeen, ID 83210;
(208-397-4181); tsalaiz@uidaho.edu
Dr. Don Morishita, Weed Scientist, University of Idaho
Kimberly R&E Center

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Objectives

1. Evaluate irrigation x nitrogen effects on white clover encroachment and persistence in a turfgrass stand.
2. Establish a turfgrass research plot area with flexible irrigation treatment capabilities for future research and outreach activities.
3. Demonstrate to lawn care professionals and the general public proper irrigation and fertilization management methods for turfgrass in the Magic Valley of Idaho during biennial twilight tours and other university sponsored field days, educational seminars, and visits by horticulture students from the College of Southern Idaho and the University of Idaho.
4. Publish results in Weed Science, HortScience or Crop Science.
5. Prepare University of Idaho bulletin on cultural weed control methods for lawn maintenance.

Methods

An irrigation system was installed at the Kimberly R&E Center in May of 2011 (Figures 1-2). The irrigation system consisted of nine (9) independently controlled, 25 ft squares, with 4 Rainbird® 3000 series rotating heads per square, and three electric control valves which control three of the 25 ft squares at one time. This design will allow us to have three irrigation rates with three replications. Irrigation regimes are: 110 %, 90%, 70% ET replacement.

Following the irrigation system installation, the entire area was fertilized with a starter fertilizer (10-10-10) at a rate of 1 lb N/1000 ft², tilled, smoothed with a landscape rake and lightly rolled. The area was then seeded with a mixture of Kentucky bluegrass blend and white clover. Kentucky bluegrass was seeded at a rate of 2 lbs PLS/1000 ft², and the white clover was seeded at 2 lbs PLS/A which will attain a white clover density of 36 plants per square ft. This density will allow us to effectively evaluate encroachment rate. Seeding was accomplished on June 1, 2011.

Following seeding, the trial area was watered daily to encourage germination, and light frequent irrigation continued until grass seedlings were large enough to be mowed. Irrigation frequency was then reduced to encourage deep rooting and maturity. Mowing was started on July 9th, and a mowing height of 2.5 inches was maintained weekly. By the end of July, a good stand of turf and clover had been established. By the end of August, the turf had thickened and the decision was made to commence irrigation and fertilizer treatments.

Fertilization treatments are: 0, 2, 4 and 6 lbs N/1000 ft² per season. Applications will be made in spring and fall with total seasonal amounts divided into four equal applications (2 in spring and 2 in fall). Fertilizer applications were applied with two passes of a 3 ft drop spreader for a 6 ft wide strip for each fertilizer treatment. A 31-3-7 fertilizer containing 30% poly-coated urea was used. The first fertilization application was applied the week on September 16th, and a second application on November 4th. Turf color and quality ratings were taken on October 5, and again on November 16, 2011. Clover density measurements were taken on November 16, 2011, using a three 1 ft² quadrates per plot, and the average of the three measurements analyzed for statistical significance.

Results

Installation of the irrigation system went very smoothly and the trial is located north of the new lab facilities at the Kimberly R&E Center (Figures 1-2). The location will provide ease of access during 2012's Twilight Tour.

No significant differences were observed between irrigation treatments for any of the variables measured (Table 1). Fertilization rates did result in a significant difference in turf color on the October 5 observation date. Only one of the four yearly split applications had been applied by this observation date, and the higher rates resulted in darker green color as expected. Turfgrass quality is affected by many factors including turfgrass density, uniformity, and color. Since only two fertilization treatment applications had been applied, it is not surprising that measurable differences in quality were not observed. As additional fertilizer applications and as irrigation treatments are applied during 2012, it is anticipated that visual differences will become more evident. Color and quality measurements will continue on a monthly basis in 2012.

As with color and quality, clover density was not affected by the time density counts were taken in mid-November. Again, as irrigation and fertility treatments begin to significantly affect turf color and density, it is anticipated that clover counts will be affected as well. Monthly clover density measurements will continue in 2012.

Figure 1. Arnulfo Carrillo, Tom Salaiz, and Whitney Egbert install electric valves for irrigation system.



Figure 2. Irrigation system is providing uniform coverage following seeding operations.



Table 1. Irrigation and fertilization treatment effects on color, quality and white clover leaf density at Kimberly, Idaho during fall of 2011.

Treatment	†Color		†Quality		Clover Leaves #/ft ²
	10/5	11/16	10/5	11/16	11/16
Irrigation					
110% ET	7	6	3	4	62
90% ET	7	6	4	5	25
70% ET	7	6	3	4	76
‡LSD (0.05)	NS	NS	NS	NS	NS
lb N/1000 ft ²					
0	6	5	4	4	48
2	7	6	4	4	56
4	7	7	4	4	50
6	8	7	4	5	55
‡LSD (0.05)	1	NS	NS	NS	NS

†Color and quality ratings based on a 1-9 scale with one equal to lowest color and quality and nine equal to highest.

‡LSD (0.05) = Least Significant Difference; differences between two means within the same column are significantly different if greater or equal to 1. NS = No significant differences observed.

Summary

- Irrigation system installed successfully.
- Plot area successfully seeded with Kentucky bluegrass and white clover.
- Color, quality and white clover density measurements commenced.
- No irrigation or fertility differences observed on white clover density or turfgrass quality.
- Turfgrass color was higher at higher nitrogen rates.

Expenditure Report

The majority of the budget was used for irrigation and fertilizer application supplies as well as hourly maintenance and travel during irrigation installation. Additional funds were used for plot marking equipment.