



# Fertilizer Filtration in Conventional Groundcovers



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## Abstract

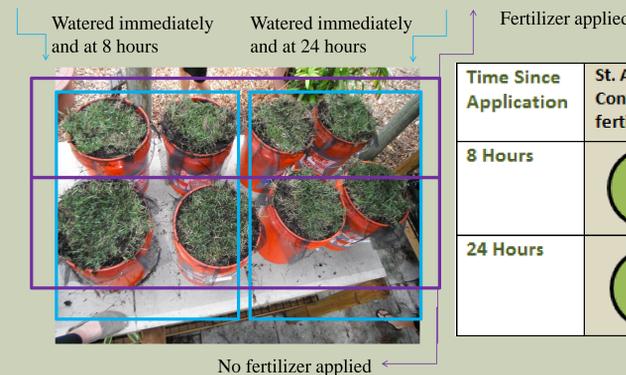
- Expansive green lawns are a cultural norm in the US, even a requirement of many communities.
- We proposed to find the best ground cover for UCF that limits the amount of fertilizer leaching into the groundwater.
- We looked at the fertilizer filtration ability of three different lawn grasses- St. Augustinegrass, Bahiagrass, and Zoysiagrass over different time periods
- The amount of nitrogen that leaches through the grass after watering was measured immediately after fertilizer application, at 8 hours, and 24 hours.
- The results show a similar trend for Bahiagrass and St. Augustine grass, both leaching the most nitrogen after the 24 hour time period.

## Introduction

- Lawn cover in the US surpasses the land coverage of many food crops <sup>1</sup>.
- A sustainable ground cover should have the ability to filter out chemicals and fertilizers that are regularly applied to lawns.
- While nitrogen (N) has allowed humans to grow more crops than the land can naturally sustain and keep green lawns year round, it has become a major waste product within the last 60 years <sup>2</sup>.
- As this waste product moves into natural systems it is having negative effects on ecosystems and human health.
- “Owing to the mobility of nitrate (NO<sub>3</sub><sup>-</sup>), groundwater is vulnerable to contamination from leaching; especially shallow unconfined aquifers” <sup>3</sup>.
- As suburbs and developed areas continue to creep across the country, lawn cover is only going to increase, and with it the use of fertilizers.
- With these definite problems in mind, we propose to find the best ground cover for UCF that limits the amount of fertilizer leaching into the groundwater and at what time interval is best to water after applying fertilizer.

## Materials and Methods

- 8 five gallon buckets were used to test one type of grass at a time
- Sod was elevated to the top of the buckets
- 2 grams of Turf Care 16(N)-0-8 were applied to the pieces of sod, except the controls.
- The amount of fertilizer used was more than the recommended application due to small study size.
- Each piece was watered with one gallon from a rain-head watering can .
- After 20 minutes, a water sample was collected and immediately tested for the presence of nitrogen using a YSI (EcoSense 9500 photometer).
- After 8 hours, 4 of the 8 buckets were watered again with a gallon of water and after 20 minutes a sample was collected and immediately tested for the presence of nitrogen.
- After 24 hours, the 4 other buckets were watered and tested for the presence of nitrogen.
- This design was repeated for all the grass species.
- The results for the water samples with two gallons of water were multiplied by two.



Time Since Application	St. Augustine Control (No fertilizer)	St. Augustine Fertilizer Applied	Bahia Control (No fertilizer)	Bahia Fertilizer Applied	Zoysia Control (No fertilizer)	Zoysia Fertilizer Applied
8 Hours	2x	2x	2x	2x	2x	2x
24 Hours	2x	2x	2x	2x	2x	2x

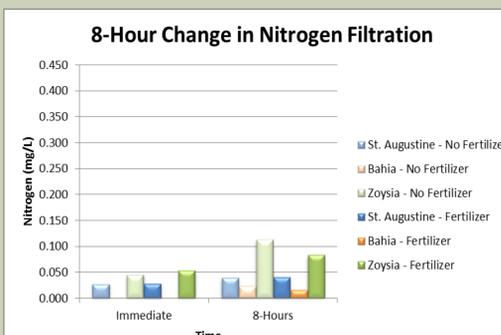
## Discussion

- A greater amount of N was found after watering at 24 hours.
- The results for St. Augustinegrass and Bahiagrass are similar in trend.
- The Zoysiagrass may be showing incorrect results due to dirt substrate particulates clouding the water sample and showing false positives on the YSI.
- If Zoysiagrass was grown on the same sandy substrate as St. Augustinegrass and Bahiagrass it may show a similar trend in nitrogen filtration.
- The different grasses were all received from different sources so they all had different amounts of fertilizer already present.
- These results imply that St. Augustinegrass and Bahiagrass both have similar levels of nutrient absorption
- The results imply that in order to reduce nutrient leaching, grass should be watered 8 hours after fertilizer application.

### Future Experimentation:

- Measure levels of N at more time intervals.
- Recreate the experiment using more replicates
- In order to better demonstrate leaching into the aquifer, recreate the experiment by imitating natural strata.
- Use grass that has been grown on the same substrate and been given the same amount of fertilizer

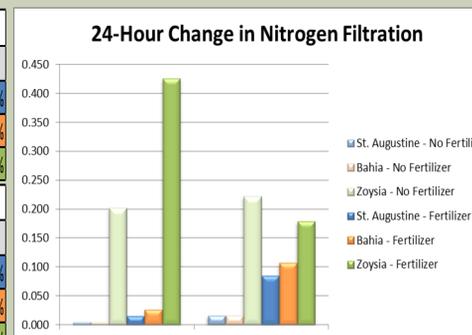
## Results



Percentage Change in Nitrogen at 8-Hours		
Grass Species	No Fertilizer	Fertilizer
St. Augustine	41.82%	40.35%
Bahia	2200.00%	1500.00%
Zoysia	148.35%	55.14%

Percentage Change in Nitrogen at 24-Hours		
Grass Species	No Fertilizer	Fertilizer
St. Augustine	255.56%	448.39%
Bahia	255.56%	303.77%
Zoysia	9.90%	-57.88%



## Work Cited

- <sup>1</sup>Bormann, F.H., Balmori, D., et al., 1993. Redesigning the American Lawn. Yale University Press, New Haven.
- <sup>2</sup>Erickson, John E., Volin, John C., Cisar, John L., Snyder, George H. 1999. A facility for documenting the effect of urban landscape type on nitrogen runoff. *Proc. Fla. State Hort. Soc.*, 112, 266-269.
- <sup>3</sup>Puckett, Larry J., Tesoriero, Anthony J., & Dubrovsky, Neil M. 2011. Nitrogen contamination of surficial aquifers- a growing legacy. *Environmental Science and Technology*, 45, 839-844.

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