Nitrogen fertilization impacts on nitrate leaching and aesthetic quality of St. Augustinegrass

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BACKGROUND

- Nitrate pollution of water is one of the major environmental issues in Florida
- Turf fertilization is regarded by some environmentalists as one of the sources of nitrate in Florida's waters
- Some counties are adopting the summer fertilizer black out period
- More than 1 lb nitrogen per 1000 square feet at a time is not allowed

Factors affecting nitrate leaching:

- source, timing, fertilizer amount, irrigation practice, soil type, plant demand

Approaches to reduce leaching:

- maintaining quality, demand based application, disease pest control, irrigation management

Factors to be considered:

- uniform color and density over time, runoff and leaching loss, mowing frequency, fertilization frequency, disease pest incidence, frost resistance

MATERIALS AND METHODS

- Variable sources (Soluble vs controlled release fertilizers (CRF))
- Summer application vs summer black out
- Variable amounts (0, 3,4 and 5 lbs per year 1000 square feet)

- Fig. 1. Lysimeters along with excavated pits

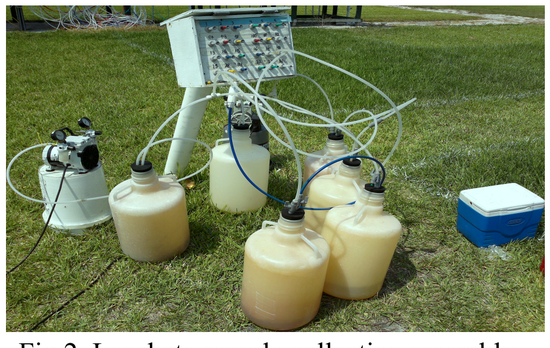

Fig.2. Leachate sample collection assembly

Fig. 3. NDVI turf color meter

Fig. 4. Irrigation system

RESULTS AND DISCUSSION

- Nitrate leaching was greater just after sodding in March 2010
- After that leaching was consistently low for the rest of the year
- No difference in nitrate leaching between different sources, amounts and timings of application. Fertilization in summer did not increase leaching
- Leaching load of nitrate even lower during summer months (fig. 5).
- Slightly higher leaching in diseased plots where turf density was lower
- NDVI (Normalized difference vegetation index-green color) increased with fertilizer nitrogen during Fall (Fig. 6)
- NDVI decreased with increasing amounts of nitrogen during winter (Fig. 7)
- Winter kill more severe under higher amounts of nitrogen
- More biomass produced under higher amounts of nitrogen

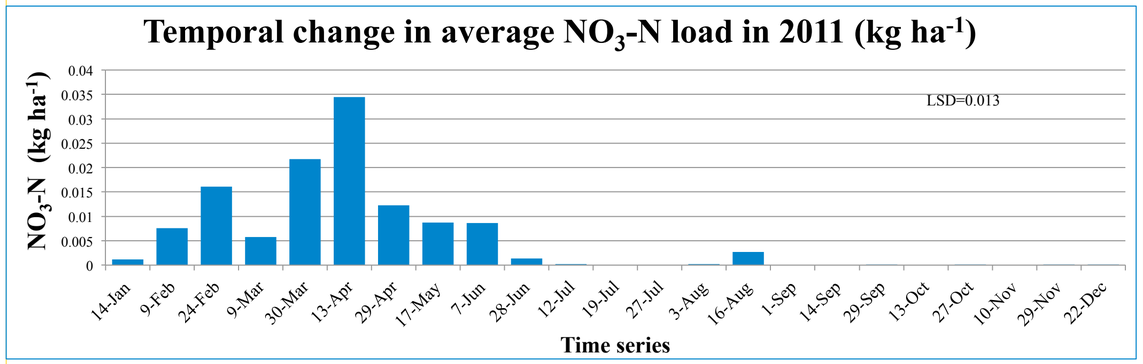

Fig.5. Seasonal pattern of nitrate nitrogen load in 2011

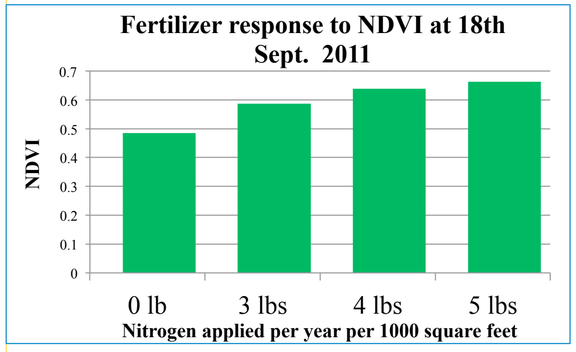

Fig. 6. NDVI at September

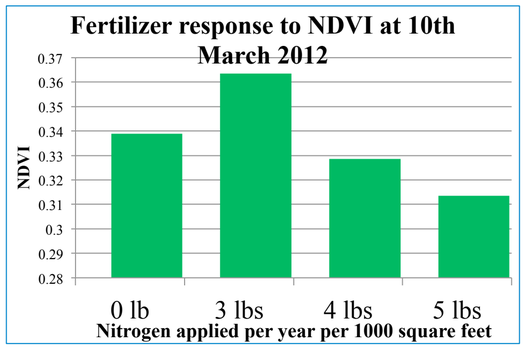

Fig. 7. NDVI at March

CONCLUSIONS

- Lowest amount of nitrogen can't give a quality (acceptable density and color) turf. Highest amount will need more investment in fertilizer, increase mowing frequency, decreased winter hardiness, increase possibility of runoff and leaching loss and increase disease pest attack
- An optimum amount based on the plant demand can give a quality turf in an economical way without much risk of disease pest and environmental pollution