Development of Insect Resistance in St. Augustinegrass

Scientists: J. A. Reinert, M.C. Engelke, A. Chandra and A.D. Genovesi, Texas AgriLife Research – Texas AgriLife Research and Extension Urban Solutions Center – Dallas

Funding: $5,000

Objectives: Identify St. Augustinegrass with host resistance to southern chinch bug and tropical sod webworm; incorporate the pest resistance into new cultivars; and characterize the mechanisms of resistance.

Impact: The use of a host resistant cultivars of St. Augustinegrass is complementary to others management strategies currently in use or under development and fits well into an overall Integrated Pest Management Program for turfgrass. Genetic plant resistance can be the most effective and cost efficient means of managing turfgrass pests and it should be a primary component of our Management Systems in landscapes and in sod production.

Results-Southern Chinch Bug: Populations of Southern Chinch Bug (SCB) (*Blissus insularis*) have been identified in Texas that are no longer susceptible to the host resistance expressed by 'Floratam', 'FX-10' or 'Captiva' (the new cultivar just released by the University of Florida that is resistant to the SCB in Florida that are no longer impacted by the resistance in Floratam). I have identified populations of SCB in Wharton, Dallas, Houston and Huntsville that are not strongly effected by the Resistance in either Floratam or FX-10. Additionally, these same populations sustained very low mortality (only 5 to 28%) when confined on Captiva for a 7-day feeding period. Based upon the information available on these populations, it has become convincing that a new biotype of virulent SCB are spreading across Texas. I am proposing that this new strain of SCB be designated as Biotype 3, in contrast to Biotype 2 which overcame the resistance in Floratam.

Figure 1. Southern Chinch bugs aggregate at the nodal area of the grass and suck the plant juices while injecting a toxin which causes the grass to die.

Results-Tropical Sod Webworm: The Tropical Sod Webworm (TSW) (*Herpetogramma phaeopteralis*) can cause severe defoliation of many species of turfgrass. Multiple genotypes of both St. Augustinegrass and zoysiagrass were evaluated for resistance to TSW larval feeding. High levels of antibiosis to the TSW were identified among commercial cultivars of St. Augustinegrass. Among the 15 cultivars evaluated, 'Amerishade', 'Floratine', 'FX-10', Captiva' and 'Winchester' each provided near 100% mortality by pupation of larvae that were introduced as neonates and allowed to feed on each cultivar in a no-choice experiment. Additionally, 'BitterBlue' produced 80% mortality of the confined larvae. DelMar, 'Floralawn', Floratam, 'Mercedes', 'Nortam', 'Palmetto', Raleigh, 'Seville' and 'Texas Common' were each susceptible hosts and no more than 40% mortality was recorded on any of them. Additionally, among the 15 genotypes of zoysiagrass evaluated, only TAES3588 and TAES5504–9 exhibited a significant level of resistance, not as increased mortality, but as a longer developmental period from egg hatch to adult emergence.

Figure 2. Petri dish feeding chamber used to evaluate grasses for resistance to tropical sod webworm. Note the heavy feeding on this susceptible St. Augustinegrass cultivar.

Summary: Chinch bug resistance has changed among St. Augustinegrass cultivars once thought to be resistant. Testing old and new breeding lines of turfgrasses for resistance to Southern Chinch Bug and Tropical Sod Webworm enhances the TAMUS turfgrass breeding programs and establishes a base line for commercially available cultivars.

Evaluating New Technology to Eliminate Organic Matter Accumulation in Bermudagrass Putting Greens

Scientist: K. Steinke, Department of Soil and Crop Sciences, – College Station

Funding: $7,000

Objectives: Thatch management methods for ultradwarf bermudagrass putting greens can be divided into three categories: dilution (topdressing), extraction (core removal), and decomposition (venting). Anecdotal information suggests new venting technologies may effectively increase infiltration rates and decrease thatch accumulation while minimally impacting the playing surface. The objectives were to: 1) evaluate the effectiveness of new venting technologies against the industry standard practices (ISP) of core aeration and topdressing at reducing thatch accumulation in high, moderate, and low growth bermudagrass cultivars, and 2) compare the effects of venting to ISP on antecedent soil moisture, hydraulic conductivity, and turf quality. Cultivation treatments are listed in Table 1.

This three-year field trial was conducted at the turfgrass research lab in College Station, TX, on an established bermudagrass putting green consisting of ‘Tifdwarf’, ‘Tifeagle’, and ‘Mini-Verde’ bermudagrass. The green had not been cultivated for several years and contained a substantial organic layer.

Treatment Description	Thatch Removal Method
Untreated Control	None
PlanetAir venting 1x/month (see above images)	Decomposition
PlanetAir venting 2x/month	Decomposition
PlanetAir venting 4x/month	Decomposition
ISP*: Hollow-tine aeration with topdressing	Removal and Dilution
ISP*: Hollow-tine aeration without topdressing	Removal
ISP*: Solid-tine aeration without topdressing	Decomposition and Venting
Combination: PlanetAir venting 2x/month plus hollow-tine aeration with topdressing	Decomposition, Removal, and Dilution

Table 1. Cultivation treatment comparisons used on three ultradwarf bermudagrass varieties
ISP* = industry standard practice

Plots were established in spring 1997 on a 20,000 ft^2 USGA specified green. The pre-existing organic layer allowed management techniques to be viewed in a curative nature and simulated existing golf courses with thatch accumulation. The study does not allow comparisons to be made between cultivars but treatment main effects within cultivars and the effects of venting compared to industry standard practices were possible.

Plots were mowed with a walking greens mower five times per week at .156 inches from March-November with clippings removed. From November-March, plots will be mowed as needed to maintain the desired height (.156 inches). Fertilizer was applied at a rate of 10 lb. N 1000 ft^2 per year from April to November. Additional fertility requirements were based on annual soil test recommendations.

The following measurements were made on all plots in 2008: turf quality/color, thatch plus mat depth, rooting and organic matter content, volumetric water content, hydraulic conductivity, and ball roll. Visual turf quality and color ratings were made monthly through May and June. Average thatch/mat depths were greatest in hollow-tine with topdressing plots in all cultivars although only Tifeagle was statistically significant. Increases were most likely due to increased mat depths from sand inputs. Organic matter and rooting weights were not significantly affected by treatments. Hollow-tine with topdressing showed significantly less Poa annua than all other plots in Tifdwarf in both winter ratings. Differences in Poa annua coverage may be attributed to the layers of topdressing sand which may be inhibiting some of the existing seed bank.

Summary

Substantial changes in organic matter content require extended periods of time, and differences seen thus far may not be due to treatment effects. In order to allow the turf to better acclimate to the intensive management and greater fertility level of this study, a higher height of cut was previously used. During the 2009 growing season, mowing heights will be reduced to 0.110 inches. In 2009, quality ratings will be taken weekly. In order to quantitatively capture turfgrass response to treatments, digital image analysis will also be used on a weekly basis. These data may provide quantitative information on plant physiological responses, recovery rates, and surface area impacted by cultivation.

Evaluating Herbicides for Weed Control in Texas Turf

Scientists: W. J. Grichar[1], M. A. Matocha[2], P. McGuill[2]; [1]Texas AgriLife Research – Beeville; [2]Texas AgriLife Extension,

Funding: $3,000

Objectives: Weeds can greatly decrease the overall quality of turfgrass found in Texas. A tremendous amount of money is spent each year by golf course superintendents, sports field managers, landscapers, sod farmers, and homeowners to control a plethora of weeds found in turf. Unfortunately, acceptable control is not always possible for several problematic weeds commonly found in Texas turfgrass systems. These weeds include alligatorweed (*Alternanthera philoxeroides*) K.R. Bluestem (*Bothriochloa ischaemum*), Broadleaf signalgrass (*Brachiaria platyphylla*), and sprangeltop species (*Leptochloa spp*).

Herbicides were evaluated in the fall of 2007 and the spring/summer of 2008 at several locations across south and south-central Texas. Alligatorweed was evaluated in St. Augustine grass in east Harris County, broadleaf signalgrass was evaluated in Tifway 419 bermudagrass at the King Ranch Turfgrass Farm near Gonzales, and K.R.bluestem was evaluated at the Texas AgriLife Research Station near Beeville in a monoculture situation. Each study was replicated three times in a randomized complete block design and ratings were taken during the evaluation phase of the project. Herbicides were applied using a small-plot CO2 backpack sprayer calibrated to deliver 20 gal/A at 24 to 30 PSI.

Alligatorweed Control and St. Augustine Response. Manor at either rate provided excellent alligatorweed control with St Augustine injury no greater than 6% (Table 1). Certainty and Sedgehammer failed to control alligatorweed. Certainty caused 6–9% turf injury while Sedgehammer only caused injury at the 1.0 oz/A rate.

Table 1. Alligatorweed control and St. Augustinegrass injury from POST herbicide application.[a,b]

Herbicide	Rate/A	Control	Injury
		———-Percent———	
Manor	0.33 oz	96 a	5 ab
Manor	0.67 oz	99 a	6 ab
Certainty	0.75 oz	3 c	6 ab
Certainty	1.5 oz	7 bc	9 a
Sedgehammer	0.67 oz	10 bc	3 bc
Sedgehammer	1.0 oz	16 b	7 ab
Untreated	-	0 c	0 c

[a]Ratings taken 3 weeks after herbicide application.
[b]Means followed by the same letter within a column are not significantly different at P=0.05.

Weed Control and Bermudagrass Response to Preemergence Herbicides. Weed pressure was light due to lack of rainfall and irrigation at this location. Atrazine at both rates, Monument, Katana, and Sencor controlled weeds at least 92% (Table 2). Only Kerb at 3.0 lb/A failed to control weeds at least 70%. Tifway 419 leaf burn was greatest with Sencor at 16 oz/A and both rates of Ronstar. No stunting with the higher rates of Pennant Magnum was noted during the growing season. This was probably due to lack of rainfall and/or irrigation within a reasonable time after herbicide application.

Table 2. Weed control and Tifway 419 response to preemergence herbicides.

Herbicide	Rate/A	Control[a]	Injury[b]
		——Percent——	
Untreated	-	0	0
Pendilum	4.0 pt	84	0
Barricade	1.0 lb	88	0
Barricade	2.0 lb	88	0
Surflan	2.0 qt	78	0
Surflan	4.0 qt	78	0
Kerb	1.5 lb	83	0
Kerb	3.0 lb	53	0
Princep	1.0 qt	85	0
Princep	2.0 qt	84	0
Atrazine	1.0 qt	94	0
Atrazine	2.0 qt	95	0
Pennant Magnum	1.0 pt	87	0
Pennant Magnum	1.5 pt	87	0
Pennant Magnum	2.0 pt	81	0
Monument	0.56 oz	97	0
Katana	3.0 oz	92	0
Sencor	10.8 oz	94	0
Sencor	16.0 oz	98	8
Dimension	1.0 pt	80	0
Dimension	2.0 pt	74	0
Ronstar	3.0 lb	82	8
Ronstar	6.0 lb	88	25
Dismiss	4.0 oz	77	0
Dismiss	6.0 oz	88	0
LSD (0.05)		19	3

[a] Weeds consisted of burr clover and other winter broadleaf weeds. Weed control ratings taken 46 days after herbicide application.
[b] Bermudagrass injury consisted of leaf burn. Ratings taken 13 days after herbicide application.

Table 3. Broadleaf signalgrass control and Tifway 419 response to postemergence herbicides.

		Injury[b]	Control	
Herbicide[a]	Rate/A	12 DAT[c]	26 DAT	47 DAT
		———-Percent———-		
Untreated	–	0	0	0
MSMA	2.65 pt	0	47	42
Asulam	5.0 pt	7	95	78
Drive	1.35 lb	0	23	10
Monument	0.56 oz	0	10	18
Revolver	26.2 oz	3	7	0
Katana	3.0 oz	8	3	7
Certainty	2.0 oz	3	0	0
Image	11.4 oz	0	0	0
Manor	0.5 oz	0	3	0
Prograss	4.0 qt	13	10	0
Acclaim Extra	20.0 oz	17	52	75
Accent	1.25 oz	0	85	70
Dismiss	4.0 oz	2	0	10
Dismiss	6.0 oz	2	3	3
MSMA + Image	2.65 pt + 11.4 oz	0	33	20
MSMA + Sencor	2.65 pt + 10.8 oz	13	67	72
MSMA + Drive	2.65 pt + 1.35 lb	2	90	89
MSMA + Monument	2.65 pt + 0.56 oz	3	47	37
MSMA + Revolver	2.65 pt + 26.2 oz	2	33	43
Revolver + Sencor	26.2 oz + 10.8 oz	8	7	0
Revolver + Image	26.2 oz + 11.4 oz	0	3	0
Image + Manor	11.4 oz + 0.5 oz	0	0	0
Revolver + Atrazine	26.2 oz + 2.0 pt	0	0	7
Drive + Sencor	1.35 lb + 10.8 oz	12	3	7
Sencor	10.8 oz	0	0	13
Monument + Accent	0.56 oz + 1.25 oz	3	95	91
LSD (0.05)		11	17	22

[a] All herbicides included Induce added at 0.25% v/v.
[b] Injury consisted of leaf yellowing and burn.
[c] DAT=days after herbicide treatment.

Broadleaf signalgrass control and bermudagrass response to postemergence herbicides. Tifway 419 bermudagrass injury (leaf yellowing or burn) was greatest with Prograss, Acclaim Extra, MSMA + Sencor, and Drive + Sencor. Under heavy broadleaf signalgrass pressure, MSMA + Drive and Monument + Accent provided at least 89% control at both ratings (Table 3). Asulam and Accent controlled broadleaf signalgrass 95 and 85%, respectively, when rated 26 days after treatment (DAT) while control was less than 80% when rated 47 DAT. Acclaim Extra controlled 52% broadleaf signalgrass 26 DAT and 75% control 47 DAT. MSMA + Sencor controlled 67 to 72% signalgrass at both ratings. No other herbicides provided better than 50% control.

K.R. Bluestem control using postemergence herbicides. Under a monoculture situation, without any other grasses, glyphosate provided excellent control of bluestem (Table 4). However, none of the other herbicides provided acceptable control when rated 62 DAT.

Table 4. K. R. Bluestem control with postemergence herbicides.

		% Control	
Herbicide[a]	Rate/A	27 DAT[b]	62 DAT
MSMA[c]	2.65 pt	78	38
Glyphosate[d]	3.0 pt	98	98
MSMA + Revolver	2.65 pt + 26.2 oz	68	27
Acclaim Extra	20.0 oz	10	3
Accent	0.83 oz	3	7
Accent	1.25 oz	0	10
Accent + Acclaim Extra	1.25 oz + 20.0 oz	17	7
Accent + Acclaim Extra + MSMA	1.25 oz + 20 oz + 2.65 pt	67	40
LSD (0.05)		17	18

[a] All herbicides included Induce added at 0.25% v/v.
[b] DAT = days after treatment.
[c] MSMA applied twice, approximately 4 wk apart.
[d] Formulated as Durango (5.4 E).

Summary: Several preemergence and postemergence herbicides controlled problem weeds in turf. Alligatorweed was effectively controlled with Manor while Accent, Asulam, MSMA + Drive, and Monument + Accent provided good to excellent control of broadleaf signalgrass. K.R. Bluestem control was excellent with glyphosate; however, under most conditions the lack of selectivity with glyphosate would prevent its use.

NOTE: Herbicide research trials typically use individual products and combinations of products with varying rates to attempt to identify better control strategies for difficult to control weeds. As such, great caution should be taken before transferring research results into a standard practice. Be certain to follow all herbicide label instructions. Obey all federal, state and local pesticide laws and regulations.

Shelf Life and Tensile Strength of Tifway Bermudagrass Sod Amended with Composted Municipal Biosolids.

Scientists: R. Schnell[1], D. Vietor[1], D. Chalmers[2], R. White[1], T. Provin[2] and C. Munster[3]
[1]Department of Soil and Crop Sciences; [2] Texas AgriLife Extension; and [3]Biological and Agricultural Engineering - College Station

Funding: $5,000

Previous studies demonstrated Composted municipal biosolids (CB) and fertilizer N applications could increase turfgrass coverage rates and soil water content at sod harvest. In addition, incorporated CB reduced sod weight and the portion of native soil removed with sod. For CB-amended soils, high leaf and tiller growth rates were a concern if rapid coverage rates occurred at the expense of rhizome or stolon growth and limited sod strength at harvest. In addition, increases in total N and organic C within the sod layer of CB-amended sod could increase heating within pallets or large rolls. Both post-harvest heating in simulated pallets (Fig. 1) and tensile strength (Fig. 2) of Tifway bermudagrass sod were compared among sods harvested from field plots grown with and without CB and at varied N rates.

Fig. 1. Sod incubated in simulated pallets for 36 and 72 hr before transplanting.

Fig. 2. Hydraulic apparatus with load cell was used to measure sod tensile strength.

Post-harvest heating over 72 hr in simulated pallets was only slightly greater for sod with than sod without added CB. High fertilizer N rate increased post-harvest heating slightly in sod after 72 hr, but treatments with and without CB and 0 and high N rates recovered and established well during 21 d after transplanting. Tensile strength was similar among sods harvested from turfgrass grown with and without CB and at monthly fertilizer N rates of 0, 44, and 88 lbs ac-1. Yet, tensile strength was greatest for sod grown with CB at the highest N rate.

Summary: CB application during production was not detrimental to either shelf life or tensile strength after mature sod was harvested. Additional research is needed to evaluate CB and N effects on sod strength soon after complete cover is achieved during establishment or regrowth of St. Augustinegrass, a stoloniferous turfgrass. In addition, CB effects on water use and conservation need to be evaluated during turfgrass production and after harvested sod is transplanted.

Turfgrass Research, Teaching, and Extension Laboratory Relocation

Scientists: R. White[1], K. Steinke[1], and D. Chalmers[2] - [1]Department of Soil and Crop Sciences; and [2]Texas AgriLife Extension – College Station

Funding: $20,000

Rationale: The Texas A&M University Turfgrass Field Laboratory is a major center for turfgrass teaching, research, and Extension programs at the College Station Campus. The current Turfgrass Field Space will be used for new General Service buildings based on the Campus Master Plan. Thus, the Turfgrass Field Laboratory will move to a new site that has been identified on F&B Road. Funds are needed to develop a Master Plan for the new Turfgrass Field Laboratory and to aid the accomplishment of Phase I goals.

The Phase I objectives of the project are to develop a Master Plan including a laboratory building, explore soil characteristics, establish initial utility installation plans, and proceed with water and electrical service installation to specific locations within the new Turfgrass Field Laboratory as designated on the Master Plan. Planning meetings were held with departmental faculty with specific research, teaching, and Extension program interests for the new Turfgrass Research and Education Laboratory. Initial utility needs were identified to support specific programs and activities such as irrigation, electronic data capture, and operation of irrigation controllers and utility installation plans were developed. Water and electrical service to the new site was established in late-spring 2008.

During 2008, surface horizons of the soil on a five acre site (initial development site) were mapped to determine topsoil depth. To avoid excess disturbance and creation of excessive variability in soil depth during earthwork operations, the determination of depth of surface soil was imperative. Based on detailed measurements, the surface soils on the initial development site are uniform and relatively deep for the College Station area. Earthwork will be completed on the initial development site during fall 2008. Twelve 50 feet by 100 feet research blocks have been surveyed at the new site along with eight 100 feet by 100 feet research blocks.

Summary: Discussions with University and Industry representatives will continue to identify priority issues, needs, and funding sources for the new facility. Emphasis will be placed on partnerships that lead to the development of a cutting edge research and education field laboratory.

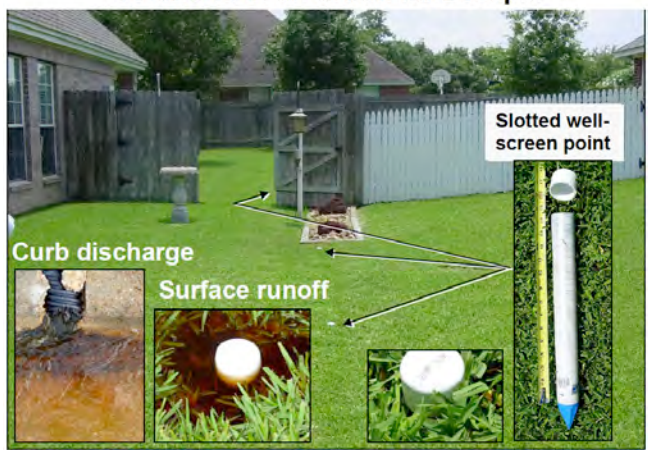
Characterization of turfgrass soil solutions and runoff with respect to nutrients and microbiological quality

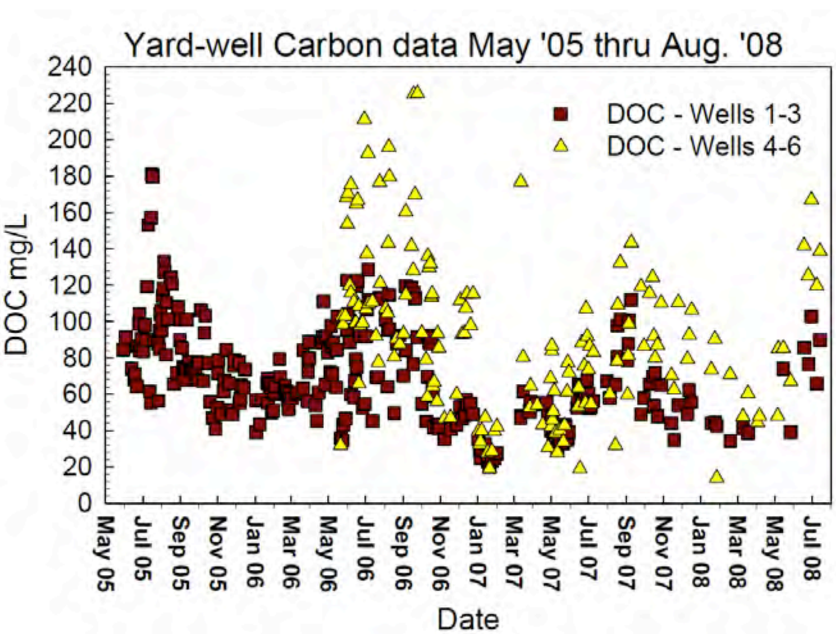
Scientists: D.A. Zuberer[1], T.J. Gentry[1], F.M Hons[1] and T. Provin[2], Department of Soil and Crop Sciences; and [2] Texas AgriLife Extension - College Station

Funding: $4,300 (carryover funding from FY 2007)

Researchers at Texas A&M are studying the below-ground environment of turfgrass in a suburban landscape. Using slotted well-point screens installed to a depth of 12 inches, we have been able to collect and characterize soil solutions from turfgrasses in urban settings as well as research plots on the Texas A&M University campus. The principal objective of the project has been to continue characterization of the soil solutions in turfgrass systems with respect to nutrients, in particular nitrogen, phosphorus and dissolved organic carbon, and to initiate a longer term monitoring of the microbiological quality of the soil solution and storm-water runoff in an urban landscape.

Monitoring wells for characterization of soil solutions in an urban landscape.

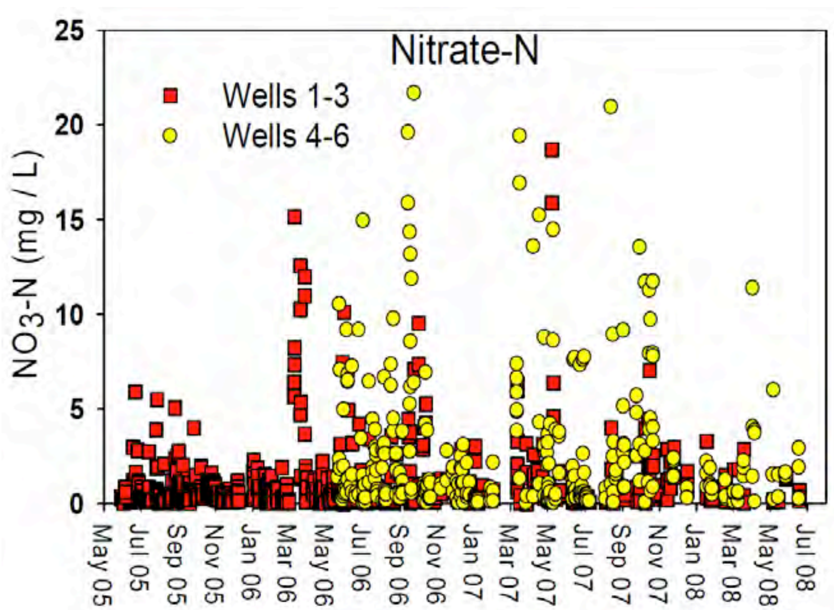


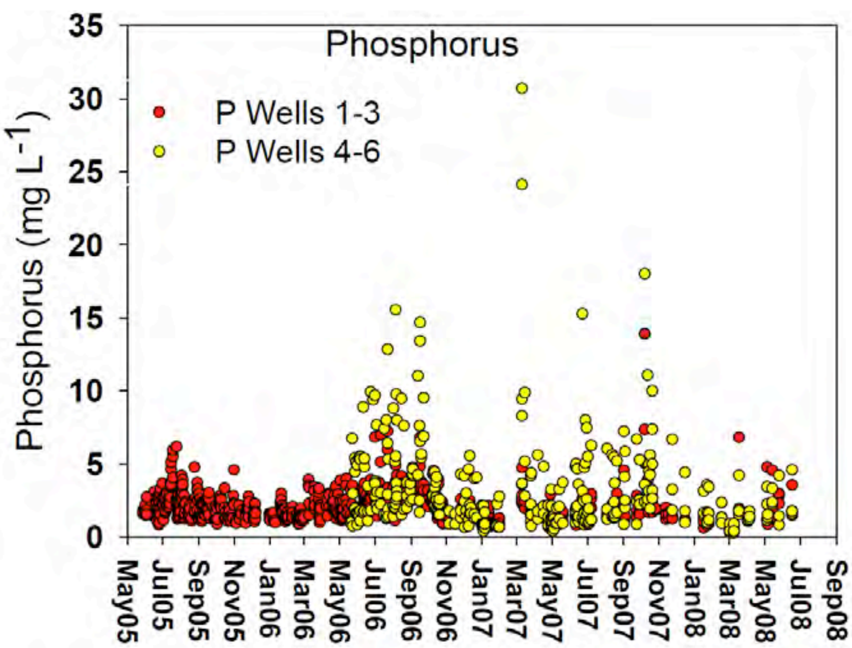


Dissolved organic carbon and soluble nutrients in soil solutions under St. Augustinegrass were measured in shallow wells over a three year period. Quantities of DOC in the soil solution run parallel with the productivity of the turfgrass in this suburban landscape peaking in mid-summer through early fall followed by a decline as the turfgrass goes dormant through the winter months. Similar patterns of DOC abundance have been measured in Bermuda-, St. Augustine and zoysiagrass turfs at the Texas A&M Turfgrass research center. Nitrate concentrations rarely exceed 5 mg L-1 whereas soluble phosphorus was typically in the

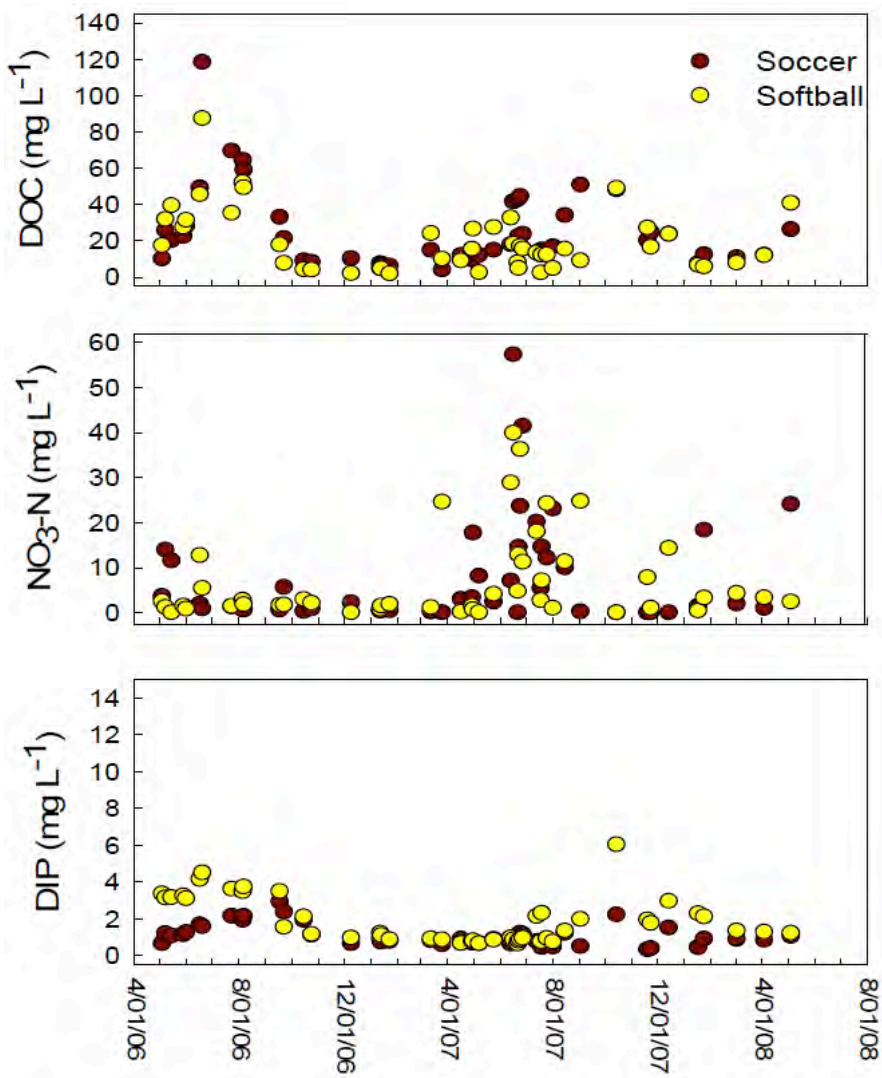
range

of 1 to 4 mg L-1 (below). Fertilizer applications are clearly detectable in the figures below but elevated levels of N and P only persisted a few days past the time of application.





Dissolved organic carbon (DOC), nitrate and inorganic phosphorus in drainage from the TAMU soccer complex and softball field is shown in the figures below.



Drainage was collected from the main drains of the Airfield system following rainfalls sufficient to cause water to exit through the drainage system. Dissolved organic C closely follows the growing season of the bermudagrass. Nitrate and phosphorus were linked to the applications of fertilizers during the growing/playing season. Fertilizer nutrients have the potential to move offsite with drainage when heavy rains “flush” the sand-based root zones of the Airfields. It appears that the sand-base retains nutrients in the matrix as long as water flow through the profile is insufficient to lead to drainage but during heavy rainfalls the system “loads up” and excess nutrients are discharged in the drainage. Thus, managing fertilizer applications on these highly modified root zones requires attention to minimize negative environmental effects.

Summary: The approach and information is important in understanding the sources of nutrient movement and potentially pathogenic microbes in the urban watershed and what if any practices might be put in place to reduce any negative environmental consequences. These data also serve as an indicator of what might be expected in a typical urban watershed.

Evaluation of Smart Sensor Technologies for Irrigation Management

Scientists: K. Steddom[1], L. Nelson[2] and V. Haby[2]; [1]Texas AgriLife Extension and [2]Texas AgriLife Research – Texas AgriLife Research and Extension Center at Overton

Funding: $4,934

Objectives: Determine the ability of newer commercial irrigation scheduling systems for their ability to conserve water, reduce nutrient leaching, and reduce foliar diseases.

Impact: Timer based irrigation systems tend to overwater turf, especially following periods of rainfall, even with the use of rainfall sensors. Newer commercial systems use either soil moisture sensors or weather data to determine the irrigation frequency. These systems should use less water than conventional systems. This reduction in the amount of water applied and the frequency of application should result in less fertilizer leaching and fewer foliar diseases.

Results: This project is a collaboration between the East Texas Irrigators Association (ETIA), Texas AgriLife Research, and Texas AgriLife Extension Service. Funds from this grant were used to purchase sensors, water meters, and equipment, while the ETIA paid for irrigation supplies and provided installation labor. After consultation with ETIA, it was decided to reduce the complexity of the trial and split it into two phases. Phase one uses research grade equipment to control irrigation schedules. This was done to provide a vendor neutral baseline for comparisons to commercial systems. Research plots have been established at the Overton Research and Extension center, adjacent to the evapotranspiration weather station. Each plot is 11 feet square irrigated by four 12 foot quarter circle nozzles. This provides a high degree of uniformity to irrigation coverage. In the center of each plot a Decagon EC-20 soil moisture sensor has been installed perpendicular to the soil surface and two inches below. Each sensor is 6 inches longs and measures soil moisture across this entire area. Adjacent to the soil moisture sensor is a suction tensiometer installed at a depth of 18 inches. This will enable collection of the soil moisture that has moved below the majority of the turf root system. This water can then be tested for the presence of nitrogen. A single valve controls each plot and a water meter will be installed for each plot. Soil moisture for each plot and ET data will be collected hourly for the duration of the trial.

The first phase will compare irrigation from either a simple timer or one that has been equipped with a rain cutoff sensor, to irrigation based on evapotranspiration or based on soil moisture. The timers will be set to water every other day for 15 minutes regardless of season. The rain cutoff sensor will delay this irrigation base on the presence of recent precipitation. Irrigation based on ET will use data from the Overton ET weather station to control irrigation. Hourly ET data will be collected and summed to measure total water use. Rainfall data will then be subtracted from this amount to determine the water loss according reference evapotranspiration. This reference ET will then be multiplied by the crop coefficient of 0.7, resulting in the estimated amount of water used by the turf. When this value has reached 0.3 inches, irrigation will be scheduled for the following morning. In the morning, that treatment will receive sufficient irrigation to replenish all of the water that has been used to date. For the soil moisture treatments, water use will be monitored until the soil moisture has reached 75% of field capacity. At that point, irrigation will be scheduled for the following morning. In the morning, the sprinklers will irrigate until the soil returns to field capacity. The second phase will be an equivalent set of plots in the same location. Commercial irrigation systems will be installed by the individual manufactures to their specifications.

Members of the East Texas Irrigators Association provided the labor to and supplies to install the irrigation system.

To date water and power have been run to the site and the plots for phase one have been graded to level and sprinkler heads, lines, soil moisture sensors, and suction lysimeters have been installed. The irrigators association will return in late spring to install the valves and water meters. The plots will then receive a final grading to within 1 inch of level and sod will be installed. The sod will be allowed to establish before each treatment is begun. To encourage nutrient leaching and brown patch the plots will be fertilized heavily in the late fall and early spring. The plots will be over-seeded with Acella annual rye each fall, given time to germinate, and then the treatments will be reestablished.

This work to date has been the subject of a press release by Texas A&M AgriLife Communications. See: http://agnews.tamu.edu/showstory.php?id=1153