

# This presentation premiered at WaterSmart Innovations

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# TGIF: Online Access to the Turfgrass Science and Management Literature

**Pete Cookingham**

**Michigan State University Libraries**

**Watersmart Innovations -- Las Vegas – October 2013**

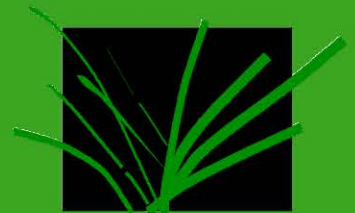


# Turfgrass

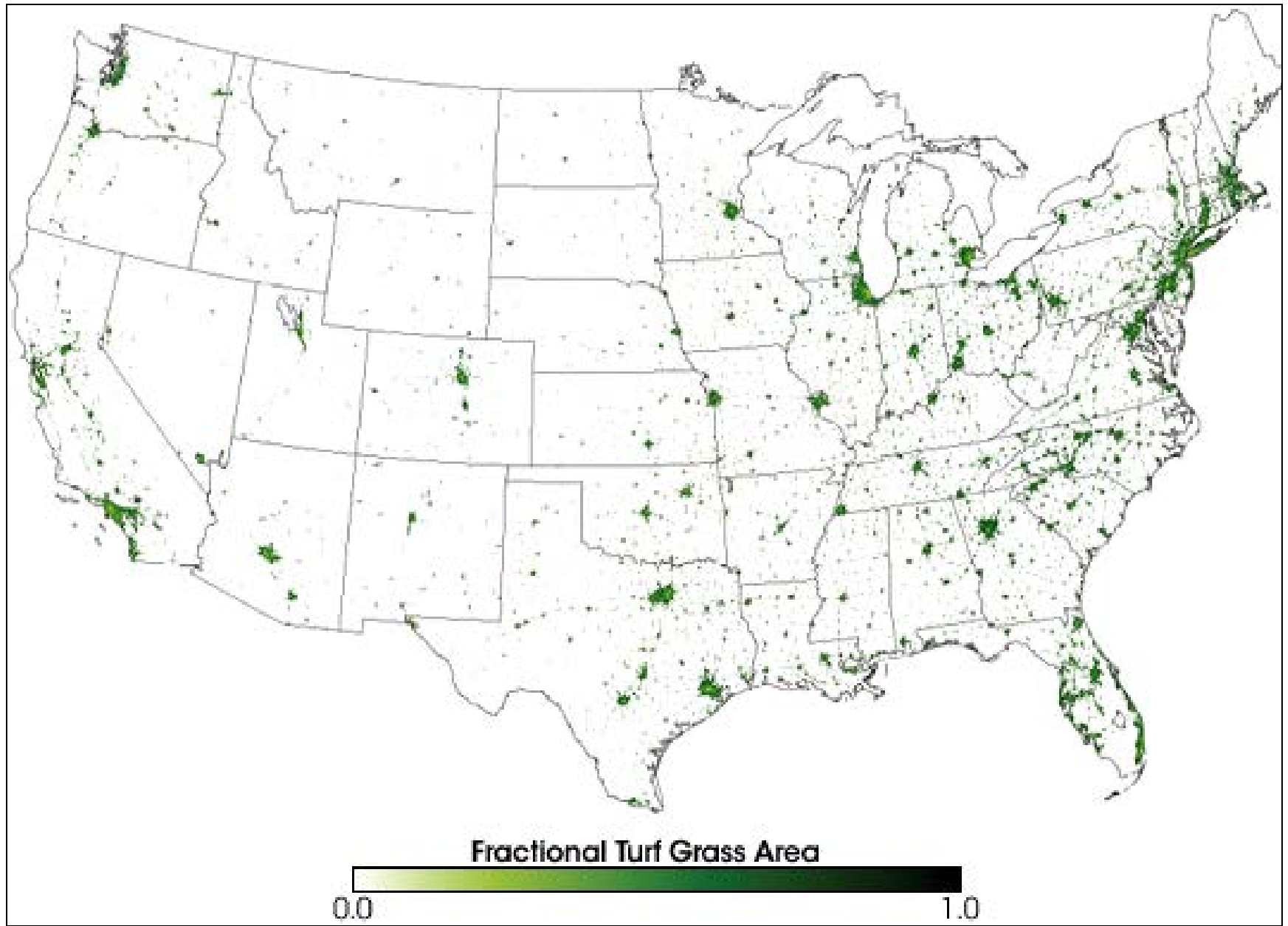
Information Center

## So What?

- Land coverage -- sheer amount of turf



## Extent of Turfgrass Cover USA (Milesi, 2005)







## Industry Sectors & Increasing Maintenance Intensity

- Utility turf/Rights-of-way/levees/dams
- Roadsides/Airfields/Flood plains/brownfields/landfills/orchards
- Cemeteries
- Landscapes/home lawns/parks & grounds/schools/institutions
- Sod production/Seed production
- Golf course/Sports turf











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15



























CUB SCOUTS MON  
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PRESBYTERIAN  
CHURCH  
ESTABLISHED 1837  
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BIBLE STUDY • YOUTH GROUPS  
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# Turfgrass

## Information Center

### So What?

- Land coverage -- sheer amount of turf
- Participation -- sheer number of 'users'















Turf

## Level Grip

Excellent for turf courses. High outside rim for equal traction and balance.



Turf

## Queens Plate

For tracks that do not allow inserts or toe grabs that protrude above the plate.





















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142











## So What?

- Land coverage -- sheer amount of turf
- Participation -- sheer number of 'users'
- Water use -- turf in Las Vegas or Phoenix or Dubai?





















## So What?

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- Water use -- turf in Las Vegas or Phoenix or Dubai?
- Emissions -- mowers, etc.













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- Emissions -- mowers, etc.
- Pesticide use – what/where/when/who









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- Emissions -- mowers, etc.
- Pesticide use – what/where/when/who
- Fertilizer use – what/where/when/who





## So What?

- Land coverage -- sheer amount of turf
- Participation -- sheer number of 'users'
- Water use -- turf in Las Vegas or Phoenix or Dubai?
- Emissions -- mowers, etc.
- Pesticide, etc. use – what/where/when/who
- Fertilizer use – what/where/when/who
- Public policy -- who decides?





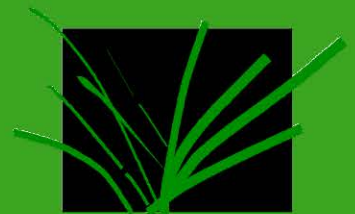








If there is so much interest in the science & psychology of 'turfgrass water use' (however defined) why isn't there more interest in and use of the literature of the discipline?





## Hopefully of interest.....

- We're a documentation center; **we don't do advocacy** (except for access) . We support science and decision-making (including management). We don't have axes to grind.
- **Cooperative/consortium project: sector & geographic independence.**
- **A very grey literature, and poorly collected.**
- **Technology-based delivery to end-users since day one**





## Mission of the Center (TIC)

- **Collect, digitize, & preserve** turfgrass materials, both print & online . **Maximize access** to materials within copyright law and copyright-holder comfort zone.
- **Provide precise access** to turf information resources, including the above (primarily via metadata work).
- **Assist users** of the materials & help with access issues.
- **Provide physical and online infrastructure supporting turfgrass scholarship, and raise the level of scientific discourse.**
- **Build a stable, sustainable long-term structure to continue this work – the TIC Endowment**









JAMES B BEARD  
TURFGRASS LIBRARY COLLECTION













## TIC Online Presence

- **Public website & public resources**
  - Archive of digitized serial runs
  - Archive of digitized monographs
  - Archive of digitized graphic & visual content
- **Turfgrass Information File (TGIF) database**
  - All formats, all languages, all turf, “all content”, *Turfgrass Thesaurus* indexing: moving towards a being a disciplinary discovery device.
- **Limited access resources (within TGIF)**
  - Some digitized serial runs
  - Beard's *Turfgrass Encyclopedia* – full text







# The Turfgrass Information Center

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 Drought](#)

In Memoriam - The  
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 1937-2012](#)

[C. Reed Funk  
 1928-2012](#)

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The Turfgrass Information Center (TIC), a specialized unit at the Michigan State University Libraries (MSU), contains the most comprehensive publicly available collection of turfgrass educational materials in the world. TIC has over 200,000 records in its primary database, the [Turfgrass Information File \(TGIF\)](#), with over 50% linked to the full-text of the item.

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## Turfgrass Information File

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<i>Publication Title</i>	<i>Publisher</i>	<i>Coverage</i>
 <a href="#">ASGCA Architect's Gallery</a>		
 <a href="#">CUTT</a>	<a href="#">Cornell Cooperative Extension</a>	1990-Present
 <a href="#">The Golf Course</a>	Peterson, Sinclair & Miller Inc. in conjunction with Carter's Tested Seeds, Inc.	1916-1923 <b>Incomplete</b>
 <a href="#">Golfdom</a>	<a href="#">North Coast Media, LLC</a> Includes <i>Turfgrass Trends</i> 2002-2012	1927- Present Less 6 Months
 <b>Future Publication</b>	<b>Golf Course Industry</b>	<a href="#">GIE Media Horticulture Group</a> 1989-2009 <b>Under Construction</b>
 <b>Greenkeeper International</b>	<a href="#">The British and International Golf Greenkeepers Association</a> Includes <i>British Golf Greenkeeper</i> ; <i>Golf Greenkeeping and Course Maintenance</i> ; <i>Greenkeeper</i> ; <i>Greenkeeper &amp; The International Greenkeeper</i> ; <i>Golf Greenkeeping</i> ; <i>The Golf Course</i> ; and <i>Greenkeeping Management</i>	19xx-Present(?) <b>Under Construction</b>
 <a href="#">Hole Notes</a>	<a href="#">Minnesota Golf Course Superintendents Association</a>	1975-Present
 <b>Future Publication</b>	<b>Landscape Management</b>	<a href="#">North Coast Media, LLC</a> 1962-Present

<i>Publication Title</i>	<i>Publisher</i>	<i>Coverage</i>
 <b>Bulletin for Sports Surface Management</b>	<a href="#">Sports Turf Research Institute</a> Includes <i>Sports Turf Bulletin</i> ; <i>International Turfgrass Bulletin</i>	1951-Present Less 1 Year
 <b>Golf Course Management</b>	<a href="#">Golf Course Superintendents Association of America</a> Includes <i>Greenkeepers' Bulletin</i> ; <i>Greenkeepers' Reporter</i> ; <i>Golf Course Reporter</i> ; <i>Golf Superintendent</i>	1933-Present Less 1 Month
 <b>The Grass Roots</b>	<a href="#">Wisconsin Golf Course Superintendents Association</a>	1975-Present Less 1 Month
 <b>GreenKeepers</b>	<a href="#">Asociación Española de Greenkeepers</a> Includes <i>Césped Deportivo</i>	1999-Present
 <b>GreenMaster</b>	<a href="#">Canadian Golf Superintendents Association</a>	1965-Present Less 3 Months
 <b>International Turfgrass Society Research Journal and Proceedings</b>	<a href="#">International Turfgrass Society</a>	1969-Present Less 2 Years, with <a href="#">Author Permission for materials pre-2009</a> <b>Continuous Construction</b>
 <b>Journal of Turfgrass and Sports Surface Science</b>	<a href="#">Sports Turf Research Institute</a> Includes <i>Journal of the Board of Greenkeeping Research</i> ; <i>The Journal of the Sports Turf Research Institute</i> ; <i>Journal of Turfgrass Science</i>	1929-2007



Welcome to the

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A Unique Resource for Turfgrass Researchers, Practitioners, and Students



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<a href="#">California Polytechnic State University, San Luis Obispo</a>	California	USA

Academic Institution	State/Province	Country
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<input type="checkbox"/>	<a href="#">Report</a> Article: Abstract or Summary only	<a href="#">Development and characterization of seashore paspalum SSR markers and identification of markers associated with salt tolerance</a>	Harris-Shultz, Karen R.; Raymer, Paul; Duke, Mary; Ballard, Linda; Scheffler, Brian; Arias, Renee S. 2012. <i>ASA, CSSA and SSSA Annual Meetings</i> [2012]. p. 75038.	<a href="#">MORE</a> <a href="#">Ab</a> <a href="#">Kw</a>	213385
<input type="checkbox"/>	<a href="#">Refereed</a> Article	* <a href="#">DOI link</a> * <a href="#">Effects of salinity on seashore paspalum cultivars at different mowing heights</a> * - Access Restrictions (See More Detail)	Shahba, Mohamed A.; Alshammery, Saad F.; Abbas, Mohamed S. 2012. <i>Crop Science</i> . May. 52(3): p. 1358-1370.	<a href="#">MORE</a> <a href="#">Ab</a> <a href="#">Kw</a>	203705
<input type="checkbox"/>	<a href="#">Refereed</a> Article	* <a href="#">DOI link</a> * <a href="#">Sodium chloride efficacy for smooth crabgrass (<i>Digitaria ischaemum</i>) control and safety to common bermudagrass and seashore paspalum</a> * - Access Restrictions (See More Detail)	McCullough, Patrick E.; Raymer, Paul L. 2011. <i>Weed Technology</i> . October-December. 25(4): p. 688-693.	<a href="#">MORE</a> <a href="#">Ab</a> <a href="#">Kw</a>	193839
<input type="checkbox"/>	<a href="#">Refereed</a> Article	<a href="#">Differential photosynthetic responses to salinity stress between two perennial grass species contrasting in salinity tolerance</a> * - Access Restrictions (See More Detail)	Liu, Liming; Du, Hongmei; Wang, Kai; Huang, Bingru; Wang, Zhaolong. 2011. <i>HortScience</i> . February. 46(2): p. 311-316.	<a href="#">MORE</a> <a href="#">Ab</a> <a href="#">Kw</a>	175821
<input type="checkbox"/>	<a href="#">Report</a> Article: Abstract or Summary only	<a href="#">Salinity impacts vigor of seadwarf seashore paspalum</a>	Berndt, William. 2010. <i>2010 International Annual Meetings: [Abstracts][ASA-CSSA-SSSA]</i> . p. 58711.	<a href="#">MORE</a> <a href="#">Ab</a> <a href="#">Kw</a>	170415
<input type="checkbox"/>	<a href="#">Report</a> Article: Abstract or Summary only	<a href="#">Use of salt to control annual bluegrass in seashore paspalum</a>	White, J. Lewayne Jr.; McCullough, Patrick; Raymer, Paul. 2009. <i>2009 International Annual Meetings: [Abstracts][ASA-CSSA-SSSA]</i> . p. 55395.	<a href="#">MORE</a> <a href="#">Ab</a> <a href="#">Kw</a>	159091
<input type="checkbox"/>	<a href="#">Report</a> Article:	<a href="#">Salinity tolerance of festulolium and major turfgrass species of</a>	Barnes, Brent D.; Baird, James H.; Grieve, Catherine M.; Poss, James A.; Suarez, D. 2009. <i>2009 International Annual Meetings: [Abstracts][ASA-CSSA-SSSA]</i> . p. 55395.	<a href="#">MORE</a> <a href="#">Ab</a> <a href="#">Kw</a>	159091



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<input type="checkbox"/>	Beard Encyclopedia Entry	<a href="#">boron</a>	<a href="#">Beard, James B; Harriet J. Beard. 2005. <i>Beard's Turfgrass Encyclopedia for Golf Courses, Grounds, Lawns, Sports Fields</i>. Michigan State University Press. p. 58-59.</a>		
<input type="checkbox"/>	Beard Encyclopedia Entry	<a href="#">boron source</a>	<a href="#">Beard, James B; Harriet J. Beard. 2005. <i>Beard's Turfgrass Encyclopedia for Golf Courses, Grounds, Lawns, Sports Fields</i>. Michigan State University Press. p. 59.</a>		
<input type="checkbox"/>	Beard Encyclopedia Entry	<a href="#">toxicity, boron</a>	<a href="#">Beard, James B; Harriet J. Beard. 2005. <i>Beard's Turfgrass Encyclopedia for Golf Courses, Grounds, Lawns, Sports Fields</i>. Michigan State University Press. p. 466.</a>		
<input type="checkbox"/>	Chapter	*DOI link* Secondary nutrients and micronutrient fertilization	St. John, Rodney A.; Christians, Nick E.; Liu, Haibo; Menchyk, Nicholas A. 2013. p. 521-543. In: Stier, John C.; Horgan, Brian P.; Bonos, Stacy A., eds. <i>Turfgrass: Biology, Use, and Management</i> . Madison, Wisconsin: American Society of Agronomy.	<a href="#">MORE</a> <a href="#">Ab</a>	220136
<input type="checkbox"/>	<a href="#">Refereed</a> Article	Soil chemical property changes on golf course fairways under eight years of effluent water irrigation	Skiles, David J.; Qian, Yaling. 2013. <i>International Turfgrass Society Research Journal</i> . 12: p. 561-566.	<a href="#">MORE</a> <a href="#">Ab</a> <a href="#">Kw</a>	223309
<input type="checkbox"/>	<a href="#">Professional</a> Article	<a href="#">Nothing minor about micronutrients</a>	Samples, Tom; Sorochan, John; Thoms, Adam; Jakubowski, Brad. 2013. <i>SportsTurf</i> . February. 29(2): p. 8, 10-13.	<a href="#">MORE</a> <a href="#">Ab</a> <a href="#">Kw</a>	216965
<input type="checkbox"/>	Book	<i>Best Management Practices for Saline and Sodic Turfgrass Soils: Assessment and Reclamation</i>	Carrow, Robert N.; Duncan, Ronny R. 2012. Boca Raton, Florida: CRC Press. xxiv, [16], 456 pp.	<a href="#">MORE</a> <a href="#">Ab</a>	183810
<input type="checkbox"/>	<a href="#">Report</a> Article: Abstract or Summary only	<a href="#">Boron tolerance in four turfgrass species</a>	Zhang, Qi; Wang, Sheng; Rue, Kevin; Li, Deying; Hatterman-Valenti, Harlene. 2012. <i>ASA, CSSA and SSSA Annual Meetings</i> [2012]. p. 75438.	<a href="#">MORE</a> <a href="#">Ab</a> <a href="#">Kw</a>	213439



## How do we fit in your work?

- Turfgrass Science is a subject of applied international interest without widespread 'library' collections of note.
- TIC at the MSU Libraries intends to exhaustively collect and index this literature.
- You can utilize much of our work via our open-access resources, and you can directly link to every record within TGIF regardless of your affiliation with us. The literature is thus identifiable, verifiable, & accessible.







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Retrieved 1 Record(s).

### Full TGIF Record for: 223309

<b>Author(s):</b>	Skiles, David J.; Qian, Yaling
<b>Author Affiliation:</b>	Department of Horticulture and Landscape Architecture, Colorado State University, Fort Collins, CO
<b>Title:</b>	Soil chemical property changes on golf course fairways under eight years of effluent water irrigation
<b>Section:</b>	Soil biology, chemistry and plant nutrition <a href="#">Records with this section</a>
<b>Meeting Info.:</b>	Beijing, China: July 14-19, 2013
<b>Source:</b>	<i>International Turfgrass Society Research Journal</i> . Vol. 12, 2013, p. 561-566.
<b># of Pages:</b>	5
<b>Publishing Information:</b>	Madison, Wisconsin: International Turfgrass Society
<b>Keywords:</b>	Chemical properties of soil; Effluent water use; Nutrients; Soil testing
<b>Abstract:</b>	"Effluent water used for landscape irrigation has the potential to change soil chemical properties over time. Changes in soil chemistry can be observed across a range of time scales and in a variety of soil conditions. The objective of this study was to determine long-term changes in soil chemistry in soils under effluent water irrigation on golf course fairways. Soil testing was conducted for the years of 1999, 2000, 2002, 2003, and 2009 for Heritage Golf Course in Westminster, Colorado. Parameters of each soil sample tested included pH, extractable salt content (calcium, magnesium, potassium, sodium, iron, manganese, copper, zinc, phosphorus, and boron), base saturation percent of calcium, magnesium, potassium and sodium, soil organic matter (SOM), and cation exchange capacity (CEC). Regression analysis was used to evaluate the changes in individual soil parameters over time after the use of effluent water for irrigation. Soil pH, CEC, extractable aluminum, copper, manganese and iron along with both base saturation percentages and exchangeable percentages of calcium and magnesium did not change over time. The strongest indications of change are seen for extractable boron ( $R^2 = 0.56$ ), Bray II extracted phosphate ( $R^2 = 0.56$ ), and sodium base saturation percentage ( $R^2 = 0.44$ ). The regression analysis indicated that B, P, and sodium increased linearly during the 8 year's irrigation with effluent water. Further studies are needed to determine if these parameters would continue to increase or would stabilize. Continued accumulation of sodium could eventually result in loss of soil structure."
<b>Language:</b>	English
<b>References:</b>	26



## **We need you!**

email if questions or with leads on local turfgrass resources which we should know about. We need you as a supplier, cooperator – and user!

Pete Cookingham

[cooking1@msu.edu](mailto:cooking1@msu.edu)

**tic.msu.edu**

**thank you!**







# Turfgrass

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