

Texas A&M AgriLife OSSF Extension and Research Programs

67th Annual V.G. Young School for
County Commissioners Courts
Annual Conference

February 18-20, 2025

Anish Jantrania, Ph.D., P.E., MBA
Professor / Extension Specialist
Texas A&M AgriLife Extension & Research
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BIOLOGICAL AND
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Presentation Outline

- Introduction of TAMU OSSF Team
- OSSF Extension and Research Programs Overview
- Education Programs for Owners and Professionals
- Research and Education Programs
- Questions / Discussion...



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Introduction

Myself... <https://baen.tamu.edu/people/jantrania-anish/>

Work Experience:

Onsite Industry since 1989

- 1.WVU/NSFC 1989-1993
- 2.Gloucester 1993-1996
- 3.Virginia DH 1996-2008
- 4.NSC/NWC 2008-2014
- 5.TAMU/AgriLife 2014-???

Education:

B.E., University of Udaipur, Agricultural Engineering, 1982

M.S., Ohio State University, Agricultural Engineering, 1985

Ph.D., Clemson University, Agricultural Engineering, 1989


M.B.A., West Virginia University, 1994

Registered Professional Engineer in TX and VA

Research Objective: Evaluate and demonstrate cost-effective and sustainable **onsite** water and wastewater infrastructure options.

Research Interests:

- Sustainable and integrated water infrastructure;
- Wastewater treatment and reuse;
- Desalination – groundwater and seawater;
- Cost analysis, pricing, and water economics;
- Regulatory framework for water quality and supply.




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TAMU Onsite Team...




Dr. June Wolfe, III
Research Scientist
BREC-Research



Dr. Gabriele Bonaiti
Extension Program Specialist
BAEN-Extension



Lisa Prcin
Senior Research Associate
BREC-Research



Joshua Segura
Extension Assistant
BAEN-Extension

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TAMU Onsite Team...



Tanya Mitchell
Extension Assistant
BAEN-Extension



William (Bill) Hyder
Program Coordinator I
BAEN-Extension



Jakob Davis
Research Assistant
BAEN-Extension



Dr. Rajiv Srivastav
Post Doctoral Fellow
BAEN/BREC



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OSSF Extension Programs Overview

- Extension programs
 - Homeowner education in-person, virtual (Zoom and Teams), and online/on-demand (no CEUs)
 - Professional education in-person only for now, **but online planned starting Summer this year (CEUs)**
 - Mapping and Inventory focused on coastal zone of Texas, also expanding in other watersheds
 - Repair and Replacement projects in Lampasas Watershed
 - Publications (<https://ossf.tamu.edu/educational-materials-2/>)
 - Presentations at local, state, national, and international events.



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Homeowner's Education

- Half day Septic System Education, about 1.5 to 2 hours of PowerPoint Presentation + Question/Discussion time as needed;
- Offered throughout the state via various Watershed Protection Programs, funded primarily through 319 funding;
- *Planning to develop an online/on demand module for homeowners on a fee-based delivery method!*

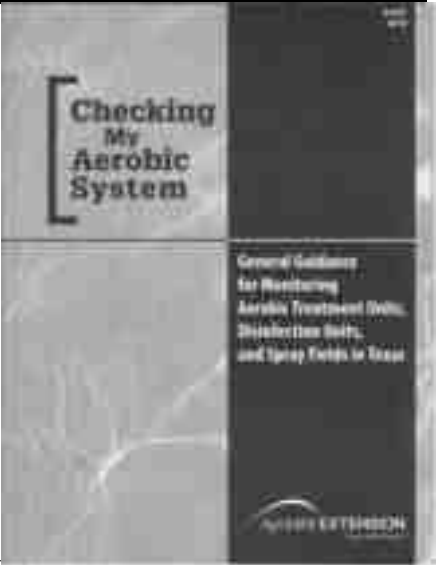


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Aerobic system maintenance course – 6 Hour Program....


- Introduction
- Avoiding illness and accidents
- Understanding how aerobic systems work
- Testing wastewater and reporting results
- Feeding the system
- Checking the O&M of your aerobic system
- Tools, parts, and supplies
- Aerobic system operation checklist.



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Homeowner Maintenance of Aerobic Treatment Units

COURSE INFORMATION

An aerobic system, system, or aerobic treatment unit (ATU) uses oxygen to break down both dissolved and undissolved materials (garbage, fat, oil, and other waste) in your wastewater. This course will help you learn how to properly maintain your system (ATU).

Topics


- Understanding your system and its components
- How to properly maintain your system
- How to properly maintain your system
- How to properly maintain your system

Course Details

Ready to go?

Duration: 6 hours from 9:00 a.m. to 3:00 p.m.

Prerequisites: go to [AgriLife Extension](#) and click on "Training".



Visit the AgriLife Extension website for more information.

Contact: AgriLife Extension, 2024-2025

Homeowner Maintenance of Aerobic Treatment Units Course
PAID AND # OF CERTIFICATES SENT TO CEAs 4/1/2021 - 12/31/2024

Professional's Education

- TCEQ license holders offer OSSF design, installation, and maintenance services to home and business owners; and they need CEUs to maintain their licenses.
- Texas A&M AgriLife is one of many CEU providers "approved" by TCEQ.
- We offer fee-based CEU classes, both in-person and now Online/OnDemand format.
- Professionals also call us directly for phone consultation!

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On-Site Sewage Facilities (OSSF)

<https://ossf.tamu.edu/>



On-Site Wastewater Treatment and Reuse

On-Site Wastewater Treatment and Reuse (OSSF) is a critical component of a property's infrastructure, providing a safe and effective way to manage wastewater on-site. This page provides information on the design, installation, operation, and maintenance of OSSF systems, as well as the latest research and technology in the field.

AgriLife Extension's CEU Courses available online, for professionals in the field. [Download File](#)

Recent developments in On-Site Wastewater Treatment and Reuse systems available online. [Download File](#)


OSF for a Septic System (OSF) is a critical component of a property's infrastructure, providing a safe and effective way to manage wastewater on-site. This page provides information on the design, installation, operation, and maintenance of OSF systems, as well as the latest research and technology in the field.

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OSSF Research Programs Overview

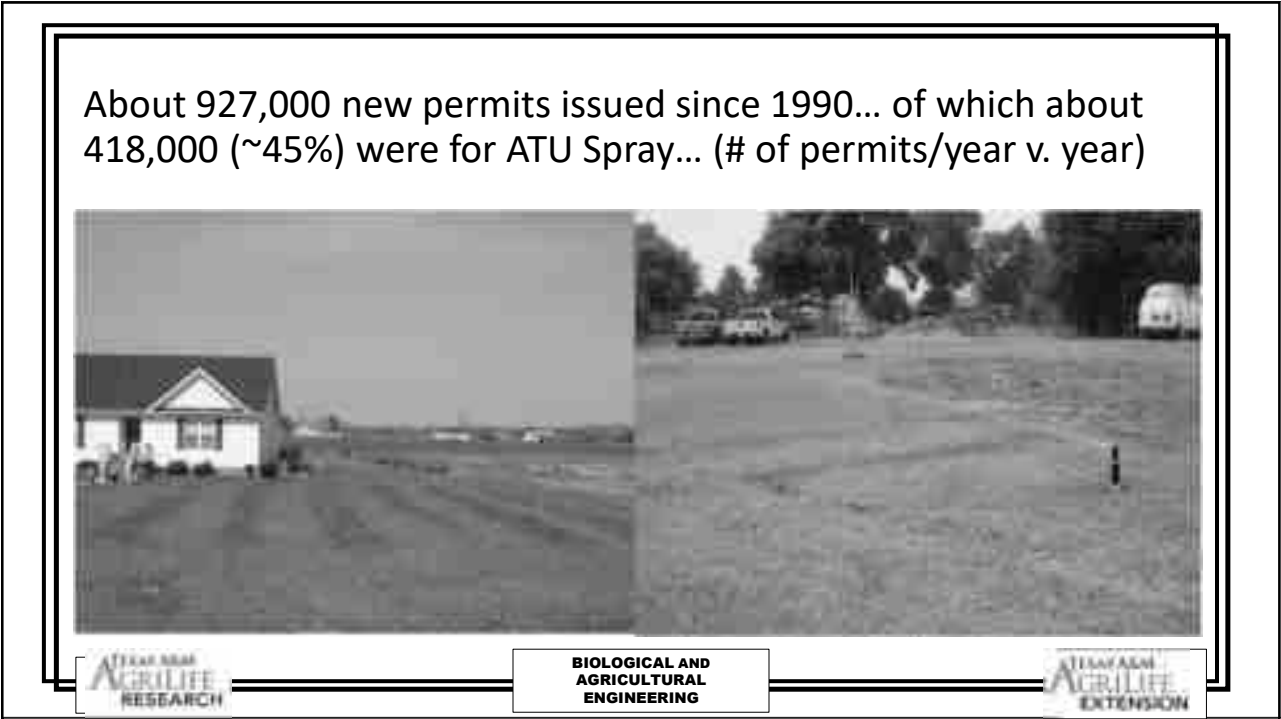
- Research projects
 - TCEQ funded TOGP Phase-I, II, and III projects
 - ATU, LPD, and Reuse (Phase-1), completed
 - RV-ATU, DRIP, and E-FLOW (Phase-2), completed
 - RVR, RtR, and FLOW-EQ (Phase-3), on-going<https://ossf.tamu.edu/togp-research/>
 - TGLO sub-contracts for coastal zone projects
 - Integrative Assessment of Bacterial Pollution (TAMU only)
Galveston web mapping application: <https://arcg.is/184OuH0>
https://benkleinapps.shinyapps.io/gm_exceedance_app/
 - Identify potential BMP tools to reduce bacteria loading in Neches River (Lamar and TAMU)





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Number of OSSFs in TX then and now... Inventory and Mapping Program...



OSSF Progress during the 20th Century

- Septic tank drain-field
- Aerobic tank spray-field
- Primary treatment by a septic tank (~20%), rest (~80%) by soil.
- Secondary treatment by ATU or Media filter (~80%), rest (~20%) by soil

TAMU's OSSF Research Center



2-Acre facility on RELLIS with access to water and sewer lines, **wastewater treatment and reuse technologies, POU drinking water treatment technologies, and a field laboratory!**

- In 1987 H.B. 32, 70th Legislative Session, created a fee of \$10 for each permit processed to support OSSF research program;
- 1991 onwards TCEQ collected \$10 fee from local permitting entity and the “Research Council” working with TCEQ funded research programs;
- Research Council sunset in 2011, stopping the research funding but not the \$10 fee collection;
- House Bill 2771 was proposed and passed in 2017, restarting the research funding without the Research Council, under a new program called **TOGP**;
- In 2019 and in 2021, TCEQ issued two RFGAs specifying four “Research Topics” in each RFGA;
- Our OSSF Team developed a strategy that has been successful in securing FULL FUNDING for three times, totaling ~ \$1M;
- Again in 2023, AgriLife was the ONLY agency to respond to TOGP RFGA!

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Projects completed and Final Reports
available on OSSF Website...



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Highlights of TOGP-III 2023-2025 (in-progress)


1.RVR Recreational Vehicle Research, to collect and analyze real-world RV park OSSF data (AJ);





2.RtR Research the Research, to create a database with a high-volume content of literature relating to OSSFs (GB);




3.FLOW-EQ, Flow Equalization or Dosing Refinement determine an optimal dosing period for ATUs (WH).
OSSF Website...











Texas Onsite Grant Program (TOGP) – Phase I (September 1, 2018 – August 31, 2021)



Evaluation of Equalized Dosing and High-Strength Wastewater on the Performance of Aerobic Treatment Units

Research Contract #682-18-00021
Dr. Anish Jantrania, Dr. Shashank Jantrania, and Dr. Anish Jantrania



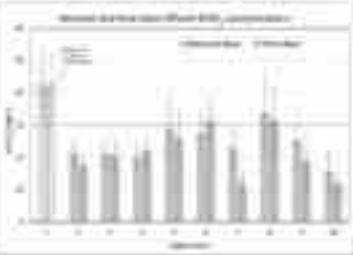
Background: The Texas Onsite Grant Program (TOGP) is a collaborative effort between the Texas A&M AgriLife Research and Texas A&M AgriLife Extension to address the needs of the agricultural community. The program focuses on research and extension activities that improve the efficiency and sustainability of agricultural operations. The current project, "Evaluation of Equalized Dosing and High-Strength Wastewater on the Performance of Aerobic Treatment Units," is a Phase I study that aims to evaluate the performance of aerobic treatment units (ATUs) under various dosing and wastewater conditions. The study is led by Dr. Anish Jantrania, Dr. Shashank Jantrania, and Dr. Anish Jantrania.

Objectives: The primary objective of the study is to evaluate the performance of ATUs under various dosing and wastewater conditions. The specific objectives are to: 1) Determine the optimal dosing rate for ATUs. 2) Evaluate the effect of high-strength wastewater on ATU performance. 3) Compare the performance of ATUs under different dosing and wastewater conditions. 4) Develop a dosing strategy that maximizes ATU performance and minimizes the risk of system failure.

Methods: The study will use a combination of laboratory and field experiments. Laboratory experiments will be conducted to determine the optimal dosing rate for ATUs. Field experiments will be conducted to evaluate the effect of high-strength wastewater on ATU performance. The study will also include a comparison of ATU performance under different dosing and wastewater conditions.


Results: The results of the study will be presented in a report that will be made available to the public. The report will include a detailed description of the study, the methods used, the results obtained, and the conclusions drawn. The report will also include a summary of the findings and recommendations for future research.


Conclusions: The study will provide valuable information on the performance of ATUs under various dosing and wastewater conditions. This information will be used to develop a dosing strategy that maximizes ATU performance and minimizes the risk of system failure. The study will also provide valuable information on the effect of high-strength wastewater on ATU performance, which will be used to develop strategies to mitigate the risk of system failure.



Parameter	Condition 1	Condition 2	Condition 3	Condition 4
Flow (m³/d)	100	150	200	250
DO (mg/L)	2.5	3.0	3.5	4.0
Efficiency (%)	85	90	95	100

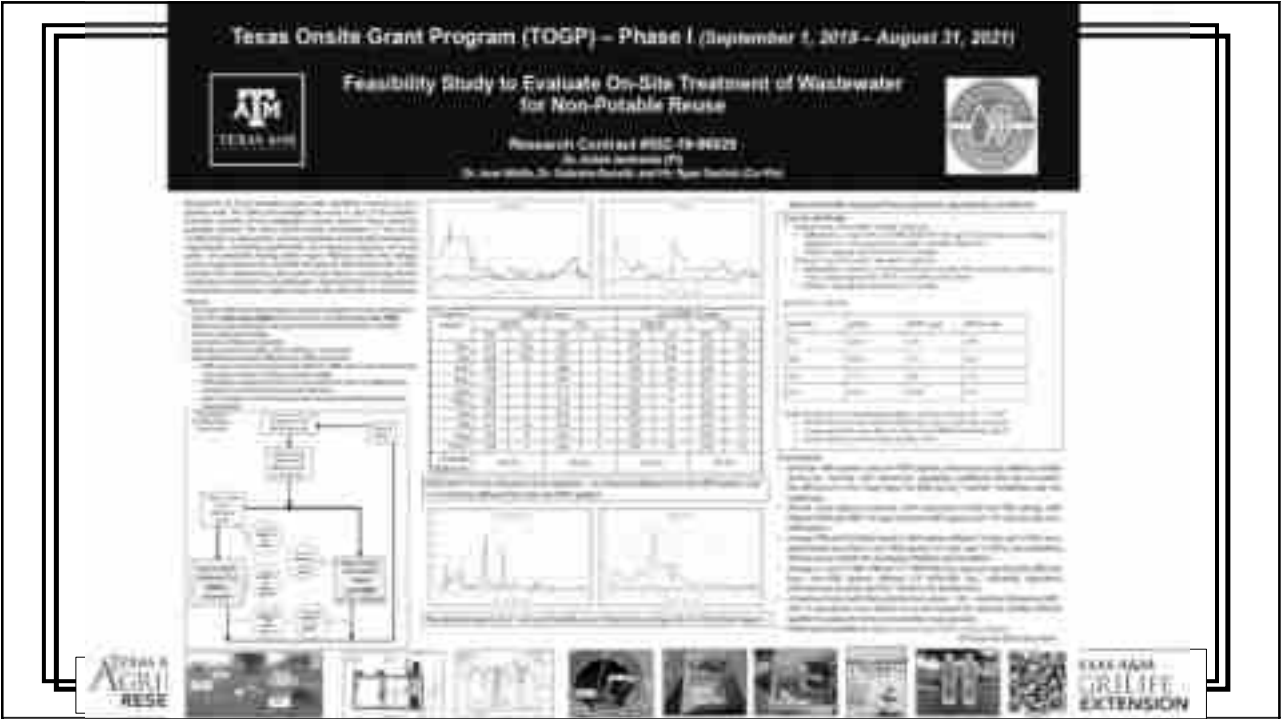
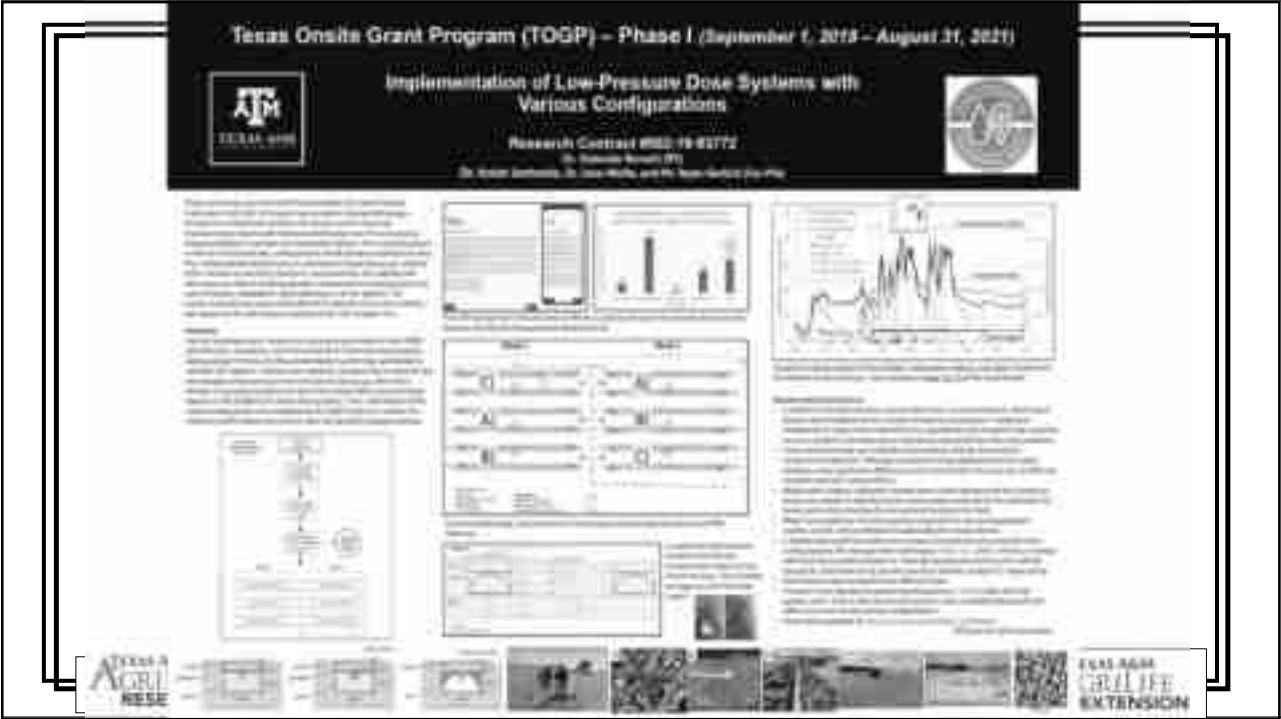
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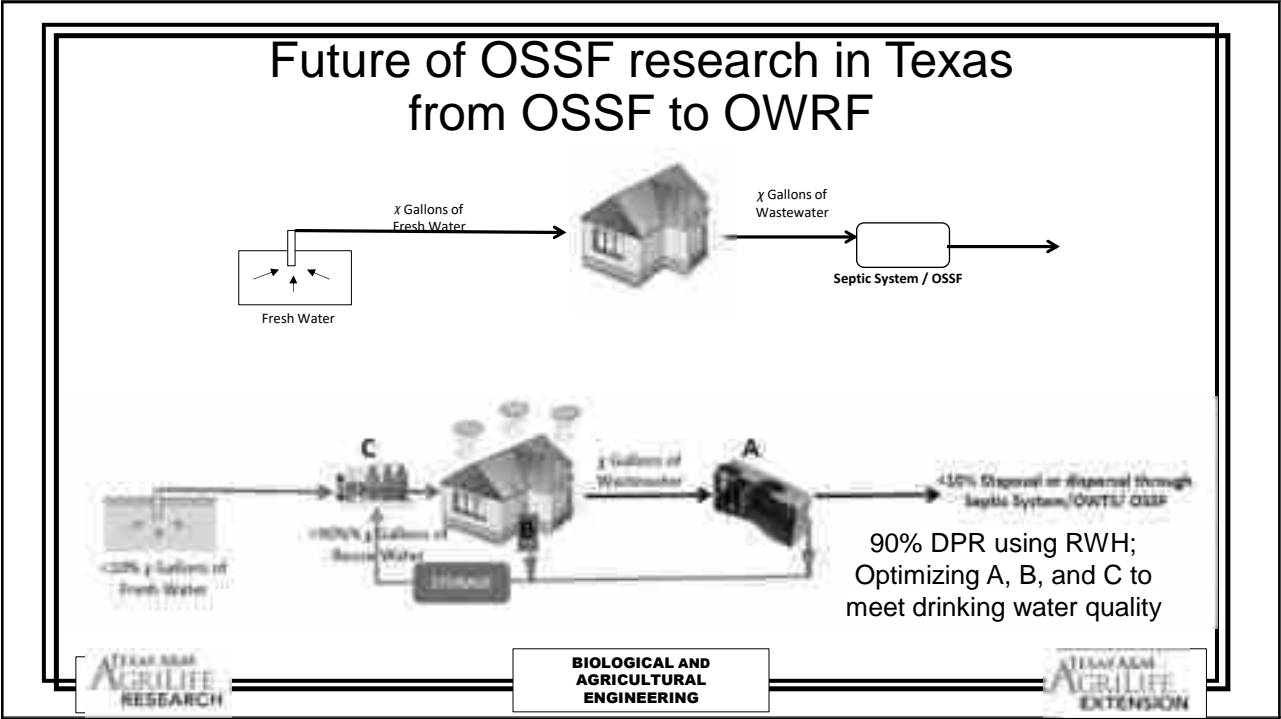




Anish Jantrania, Ph.D., P.E., MBA

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RELLIS Experimental Reuse Facility

Reuse

EVED

ATU

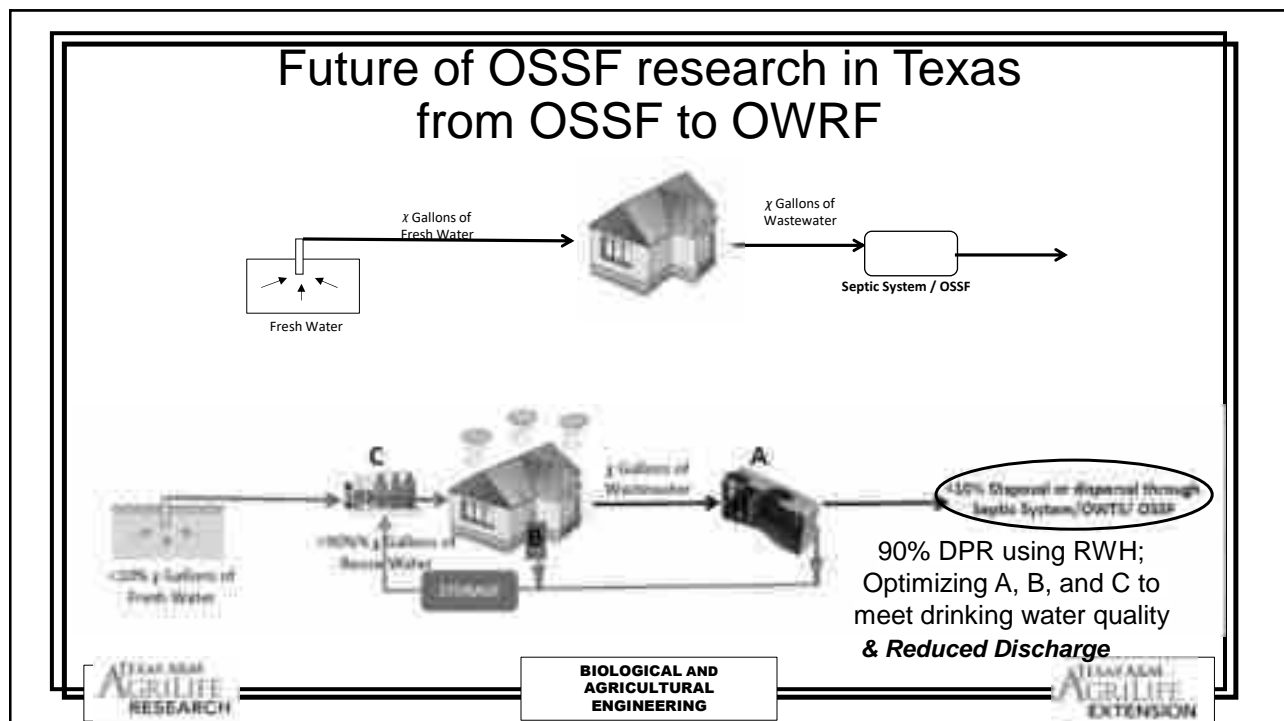
**New OSSF Design
EVED + Reuse**

Data collection to start soon to study water quality and discharge quantity reduction....

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Texas Onsite Grant Program (TOGP) - Phase II (September 1, 2021 - November 30, 2022)

Understanding Problems and Identifying Solutions for Texas OSSPs using Drip Irrigation

Research Summary #52-21182
 Dr. Barbara A. Auer
 Texas A&M University, TAMU-CC
 1400 University Blvd., Box 21182, Houston, TX 77002-1182

Abstract

Onsite Sewage Treatment (OST) systems are used to treat wastewater from residential, commercial, and industrial facilities. OST systems are designed to treat wastewater on-site, typically using a combination of physical, chemical, and biological processes. However, OST systems can be problematic, especially in arid regions like Texas, where water is scarce and the soil is often saline. This research project aimed to identify the problems associated with OST systems in Texas and develop solutions to improve their performance. The project focused on the use of drip irrigation as a solution to the water scarcity and soil salinity problems associated with OST systems. The research was conducted in two phases. Phase I involved a literature review and a field survey of existing OST systems in Texas. Phase II involved a series of experiments to evaluate the effectiveness of drip irrigation as a solution to the problems identified in Phase I. The results of the research showed that drip irrigation was an effective solution to the water scarcity and soil salinity problems associated with OST systems. Drip irrigation reduced water consumption by up to 50% and improved the quality of the treated effluent. The research also identified several other factors that can affect the performance of OST systems, such as the type of soil, the climate, and the design of the system. The research project was funded by the Texas Onsite Grant Program (TOGP) and the Texas A&M University System.

Introduction

Onsite Sewage Treatment (OST) systems are used to treat wastewater from residential, commercial, and industrial facilities. OST systems are designed to treat wastewater on-site, typically using a combination of physical, chemical, and biological processes. However, OST systems can be problematic, especially in arid regions like Texas, where water is scarce and the soil is often saline. This research project aimed to identify the problems associated with OST systems in Texas and develop solutions to improve their performance. The project focused on the use of drip irrigation as a solution to the water scarcity and soil salinity problems associated with OST systems. The research was conducted in two phases. Phase I involved a literature review and a field survey of existing OST systems in Texas. Phase II involved a series of experiments to evaluate the effectiveness of drip irrigation as a solution to the problems identified in Phase I. The results of the research showed that drip irrigation was an effective solution to the water scarcity and soil salinity problems associated with OST systems. Drip irrigation reduced water consumption by up to 50% and improved the quality of the treated effluent. The research also identified several other factors that can affect the performance of OST systems, such as the type of soil, the climate, and the design of the system. The research project was funded by the Texas Onsite Grant Program (TOGP) and the Texas A&M University System.

Methods

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Results

The results of the research showed that drip irrigation was an effective solution to the water scarcity and soil salinity problems associated with OST systems. Drip irrigation reduced water consumption by up to 50% and improved the quality of the treated effluent. The research also identified several other factors that can affect the performance of OST systems, such as the type of soil, the climate, and the design of the system. The research project was funded by the Texas Onsite Grant Program (TOGP) and the Texas A&M University System.

Conclusions

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References

1. Auer, B. A. (2021). Understanding Problems and Identifying Solutions for Texas OSSPs using Drip Irrigation. Research Summary #52-21182. Texas A&M University, TAMU-CC.

2. Auer, B. A. (2022). Understanding Problems and Identifying Solutions for Texas OSSPs using Drip Irrigation. Research Summary #52-21182. Texas A&M University, TAMU-CC.

3. Auer, B. A. (2023). Understanding Problems and Identifying Solutions for Texas OSSPs using Drip Irrigation. Research Summary #52-21182. Texas A&M University, TAMU-CC.

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5. Auer, B. A. (2025). Understanding Problems and Identifying Solutions for Texas OSSPs using Drip Irrigation. Research Summary #52-21182. Texas A&M University, TAMU-CC.

6. Auer, B. A. (2026). Understanding Problems and Identifying Solutions for Texas OSSPs using Drip Irrigation. Research Summary #52-21182. Texas A&M University, TAMU-CC.

7. Auer, B. A. (2027). Understanding Problems and Identifying Solutions for Texas OSSPs using Drip Irrigation. Research Summary #52-21182. Texas A&M University, TAMU-CC.

8. Auer, B. A. (2028). Understanding Problems and Identifying Solutions for Texas OSSPs using Drip Irrigation. Research Summary #52-21182. Texas A&M University, TAMU-CC.

9. Auer, B. A. (2029). Understanding Problems and Identifying Solutions for Texas OSSPs using Drip Irrigation. Research Summary #52-21182. Texas A&M University, TAMU-CC.

10. Auer, B. A. (2030). Understanding Problems and Identifying Solutions for Texas OSSPs using Drip Irrigation. Research Summary #52-21182. Texas A&M University, TAMU-CC.

Figure 1: Bar chart showing water consumption (gallons per acre) for different irrigation methods. The chart compares drip irrigation (blue bars) with other methods (grey bars). Drip irrigation shows significantly lower water consumption across all categories.

Figure 2: Bar chart showing crop yield (pounds per acre) for different irrigation methods. The chart compares drip irrigation (blue bars) with other methods (grey bars). Drip irrigation shows higher crop yields across all categories.

Figure 3: Map of Texas showing the location of the research site in the southeastern part of the state.

Figure 4: Photograph of a drip irrigation system installed in a field.

Table 1: Data for Figure 1: Water consumption (gallons per acre)

Irrigation Method	Water Consumption (gallons per acre)
Drip Irrigation	~100
Other Methods	~200-300

Table 2: Data for Figure 2: Crop yield (pounds per acre)

Irrigation Method	Crop Yield (pounds per acre)
Drip Irrigation	~1000
Other Methods	~500-700

Figure 5: Photograph of a drip irrigation system installed in a field.

Figure 6: Photograph of a drip irrigation system installed in a field.

Figure 7: Photograph of a drip irrigation system installed in a field.

Figure 8: Photograph of a drip irrigation system installed in a field.

Figure 9: Photograph of a drip irrigation system installed in a field.

Figure 10: Photograph of a drip irrigation system installed in a field.

Figure 11: Photograph of a drip irrigation system installed in a field.

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Figure 13: Photograph of a drip irrigation system installed in a field.

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Figure 20: Photograph of a drip irrigation system installed in a field.

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Figure 30: Photograph of a drip irrigation system installed in a field.

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Figure 70: Photograph of a drip irrigation system installed in a field.

Figure 71: Photograph of a drip irrigation system installed in a field.

Figure 72: Photograph of a drip irrigation system installed

USDA-NIFA Funded REEU Program


- Phase-1 2017 and 2018, and renewed as Phase-II in 2019 for five years... <https://reeu.baen.tamu.edu/>




2017 2018

2019 2021


2022



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PRairie View
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Sustained Funding Needed to Support TAMU's OSSF Research and Extension Center....

- There is still need for improvements at the Center, which requires sustainable financial support ~\$250K/year...
- \$10 Fee set in 1990s worth <\$5 now (Inflation calculator), should the Fee be increased starting FY26?
- TAMU-OSSF Team has been selected for the first two rounds of TOGP funding, can it be the "sole-source"?...
- <\$0.50/\$ collected for the research program is "allocated" to TOGP funding, can that be increased?



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On-Site Wastewater Training Center (before)

Year 2013-2015



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On-Site Wastewater Training Center (now)




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In Summary...

- Texas A&M AgriLife OSSF team is actively engaged in meeting the current needs for research and extension programs in Texas;
- We are also developing new programs and exploring new funding resources at local, state, and federal levels;
- Small-scale decentralized i.e., Onsite Water and Wastewater systems are integral part of Water Infrastructure in Texas and in the country;
- Our Center has potential to grow to become a workforce development center along with the research and education center, for which we need sustained financial support mechanism.



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Questions / Discussion...

Anish Jantrania, Ph.D., P.E., MBA
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Texas A&M AgriLife Extension & Research
<https://ossf.tamu.edu/>



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