

BGREEN - BuildinG a Regional Energy and Educational Network:



**Opportunities
with USDA
Event
Texas State
University
May 7, 2015**

Network of 4 Major Universities

UTEP

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Presentation Highlights

- 1) Students Involvement in GREEN
- 2) Students Publications in Journals
- 3) Student Conference Participations
- 4) Students Job and Career Placement
- 5) PI and Co-PI Research Highlights

BGREEN Goals

- 1) Create a collaborative network of researchers, educators, USDA agencies, and non-profit organizations
- 2) Increase educational, training and post-graduation opportunities for Hispanic students in the Sustainable Energy area

BGREEN Summary at Texas State (9/2011 to 5/2015)

- Up to **41** participant students (**six** graduate students).
- **60%** Hispanic students and **70%** with all minorities included.
- More than **50%** female students.
- Total of **seven** majors and **two** colleges. Agriculture, industrial, manufacturing, electrical, technology, computer science, chemistry and geology.
- With **seven** faculty supervisors spanning **five** departments: Department of Agriculture, Ingram School of Engineering, Chemistry Department, Department of Technology, Computer Science Department.

The Faces of BGREEN



Industrial engineering student places 1st at HENAAC Conference

By Kristina Kenney
University News Service
October 19, 2011

Texas State University-San Marcos School of Engineering student Saul Villarreal took top honors at the Hispanic Engineer National Achievement Awards Corporation (HENAAC) Conference on Oct. 8, placing first for his research on "Modeling, Analysis and Integration of Distributed Generation Systems in a Semiconductor Wafer Fab."

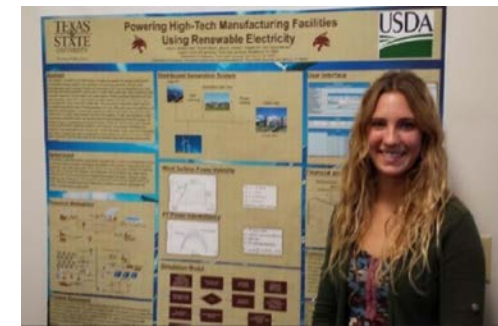
Villarreal, an industrial engineering senior, competed against such universities and laboratories as the University of Notre Dame, NASA Jet Propulsion Laboratory, Clemson University and Florida A&M University. Villarreal worked with assistant professors Jesus Jimenez and Tongdan Jin from the Ingram School of Engineering on the project.

The annual HENAAC conference was initiated in 1989 as a means of identifying, honoring, and documenting the contributions of outstanding Hispanic American science, engineering, technology and math professionals, and during the past 22 years, the conference has evolved to provide additional activities and opportunities for students and professionals. The conference's main goal is to highlight and showcase outstanding role models in order to inspire young people to pursue careers in technology and to motivate professionals to continue to connect with the Hispanic community.

For more information, contact Susan Romanella at (512) 245-7464 or by email at sr23@txstate.edu.



Saul Villarreal



Journal Publications With BGREEN Students

1) [Victor Santana-Viera](#), Jesus Jimenez, Tongdan Jin, Jose Espiritu, “Implementing factory demand response program using onsite renewable energy,” *International Journal of Production Research*, 2014, (in print).

2) [Saul Villarreal](#), Jesus A. Jimenez, Tongdan Jin, and Mauricio Cabrera-Rios, “Designing a sustainable and distributed generation system for semiconductor wafer fabs,” *IEEE Transactions on Automation Science and Engineering*, vol. 10, no. 1, 2013, pp. 10-16.

Conference Publications With BGREEN Students

- 1) [C. Chester, D. Montoya, J. Flores](#), T. Jin, J. Jimenez, “A overview on electric transportation and its role in manufacturing demand responses,” submitted to ISERC Conference, Nashville, TN, 2015 (under review).
- 2) [M. Snead, D. Holt, M. Mullen](#), M. Londa, T. Jin, “Big data intelligence for eco-friendly bus routing: A case study,” submitted to ISERC Conference, Nashville, TN, 2015 (under review).
- 3) [J. Farris, B. Li](#), T. Jin, and H. Chen, “Design of a wireless environmental monitoring system for estimating solar photovoltaics generation,” in Proceedings of The 24th International Conference on Flexible Automation and Intelligent Manufacturing (FAIM), San Antonio, TX, May 20-23, 2014, pp. 1-10.
- 4) [Sarah Abdulsalam, Donna Lakomski](#), Q. Gu, T. Jin, Z. Zong, “Program energy efficiency: the impact of language, compiler and implementation choices.” In Proceedings of International Green Computing Conference, Dallas, TX, Nov. 3-5, 2014, pp. 1-10.
- 5) [I. Zecena](#), M. Burtscher, T. Jin, and Z. Zong, “Evaluating the performance and energy efficiency of n-body codes on multi-core CPUs and GPUs,” in Proceedings of IEEE 32nd Performance Computing and Communications Conference, San Diego, CA, 2013, pp. 1-8.
- 6) [J. Barry, J. Medellin, J. Piechota, M. Harris](#), T. Jin, and E. Perez, “Minimizing renewable energy integration cost under reliability and power quality requirements,” in Proceedings of Industrial Engineering and Systems Research Conference (ISERC), Puerto Rico, 2013, pp. 3122-3131 (final list of the student best paper competition).
- 7) T. Jin, J. Jimenez, and Z. Tian, “Managing demand response for manufacturing enterprises via renewable energy integration,” in Proceedings of IEEE Conference on Automation Science Engineering (CASE), Madison, Wisconsin, 2013, pp. 645-650.
- 8) [L. Sanders, S. Lopez, G. Guzman](#), T. Jin, and J. Jimenez, “Simulation of a green wafer fab featuring solar photovoltaic technology and battery storage,” in Proceeding of Winter Simulation Conference, Germany, 2012, pp. 1-12.
- 9) [I. Zecena, Z. Zong](#), R. Ge, T. Jin, Z. Chen, M. Qiu, “Energy consumption analysis of parallel sorting algorithms running on multicore systems,” in Proceedings of Green Computing Conference (IGCC), 2012, pp. 1-6.
- 10) H. Taboada, Z. Xiong, T. Jin, and J. Jimenez, “Exploring a solar photovoltaic-based energy solution for a green manufacturing environment,” in Proceedings of IEEE Conference on Automation Science and Engineering (CASE), 2012, pp. 40-45.
- 11) T. Jin, Z. Tian, [M. Huerta, and J. Piechota](#), “Minimizing levelized cost of wind energy by coordinating maintenance policy and spares provisioning,” in Proceedings of ICQR2MSE Symposium, 2012, pp. 1022-1027.

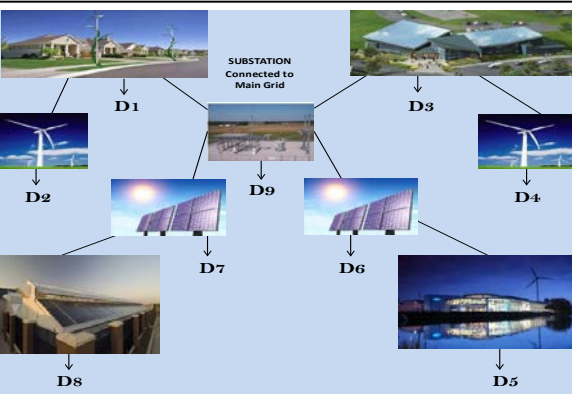
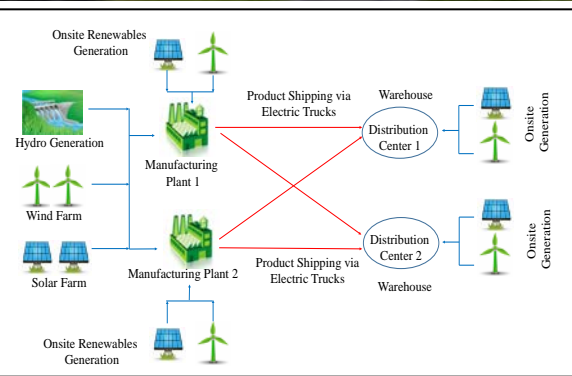
Conference and Poster Presentations by BGREEN Students

- **USDA Meeting at Texas State University**
In 2013 and 2015. Total of 19 student posters
- **International Green Computing Conference,**
In year 2013 (San Diego) and 2014 (Dallas). Total of 2 students
- **INFORMS Conference**
in 2012 (Phoenix), 2013 (Minneapolis), 2014 (San Francisco).
Total of 5 students
- **Industrial and Systems Engineering Research Conference**
in 2013 (Puerto Rico), 2014 (Montreal), 2015 (Nashville).
Total of 9 students.
- **WISE Conference at Texas State U (Women in Science and Engineering)**
in 2014, total of 2 students
- **Southwest Energy Science and Engineering Symposium**
in 2012 (El Paso), total of 1 student

Student Job/Career Placements

- 1) Saul Villarreal graduated with a BS in industrial engineering; Saul joined Energy Solutions as a simulation analyst and then he joined the City of Seattle (WA) as a power analyst.
- 2) Victor Santana-Viera graduated with a BS in industrial engineering; he is currently in the semiconductor manufacturing industry at SAMSUNG.
- 3) Ivan Zecena graduated with a MS in computer science, working in GM for electric vehicle, high performance and green computing development
- 4) Fei Sun, graduated with MS in Technology, and apply for Ph.D. in MSEC at Texas State U, Fall 2015
- 5) Tiffanie Martin is expected to graduate in December 2015 with a BS in industrial engineering; she will join INFINEON (Germany) as intern this summer.

Renewable Energy Integration (Dr. Jin)



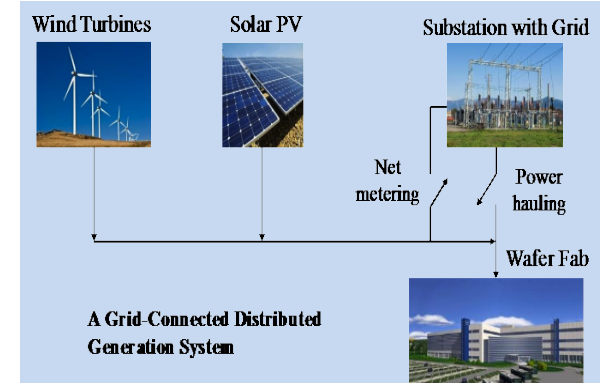
Smart Power Grid:

- Wind turbines
- Solar Photovoltaics
- Electric Vehicles
- Distributed generation
- Dynamic pricing



Benefits:

- Zero Carbon Emissions
- Mitigating Climate Change
- Sustainability

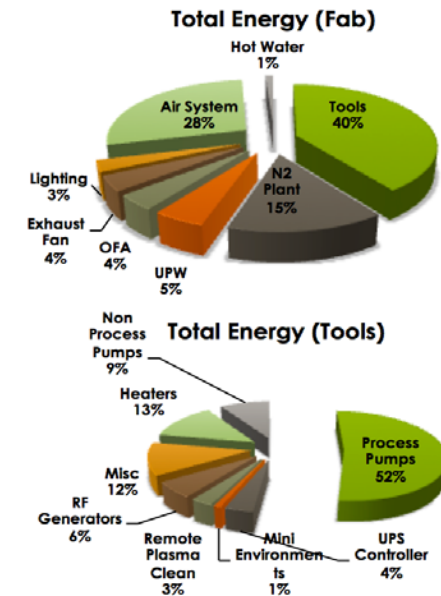
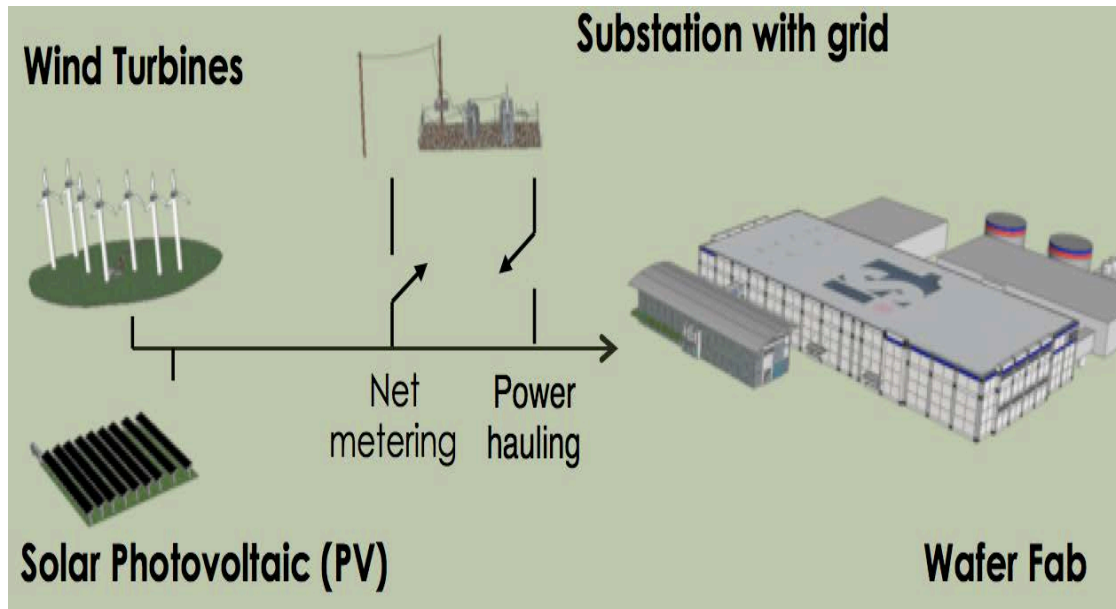


Challenges:

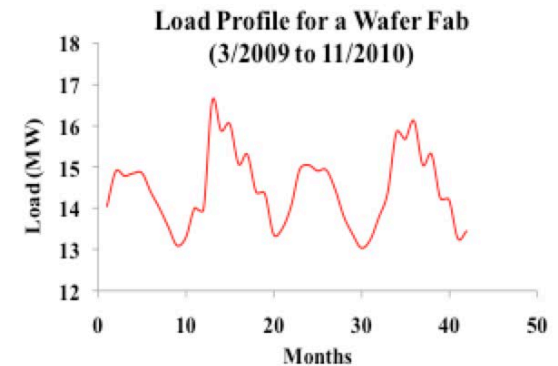
- Power Intermittent
- Equipment cost
- Paradigm Shift



Sustainable Manufacturing (Dr. Jimenez)



- Develop analytical and simulation models to:
 - Design and implement “zero” waste in manufacturing systems.
 - Identify and reduce levels of carbon emissions.
 - Design facilities with optimal amount of wind turbines, PVs, net metering, etc.
 - Analyze equipment power consumption.



Sustainable Agriculture (Dr. Richardson)



Water



Tillage



Sustainable Agriculture



Photoperiod



Probiotics/Microflora

Personnel

Faculty Supervisor	Undergraduate Students	Graduate Students
Richardson, C. R.	Contreras, A. J. Gaffney, C. B. Garcia, D. S. Gonzalez, Q. R. Gurerra, M. F. Herrera, A. S. Firova, D. J. Juarez, M. E. Juarez, M. I. Manibusan, M. J. Molina, E. M.	Hoitt, C. B. Cervantes, M. A. Martinez, S. P. Riggs, S. B. Galvan, H.
Total	11	5
Total Students Involved	16	

The Agriculture BGREEN Story

Posters & Abstracts

- BGREEN- Farm in a Box “Design”
- Promote sustainability
- Small scale demonstration
- Water availability
- Floating gardens
- Next generation of water sustainability
- Inoculation
- Soil Sifting

Project Focus

and Student Involvement

- Focus: Shape tomorrow's Hispanic sustainable energy leaders
- Student Involvement
 - Participate in brainstorming and planning meetings
 - Participate in BGREEN plant research trials
 - Participate in data analysis
 - Preparation of posters and abstracts on BGREEN research
 - Preparation of articles for publication

Design and Use of BGREEN Farm in a Box to Produce Vegetables in South Central Texas

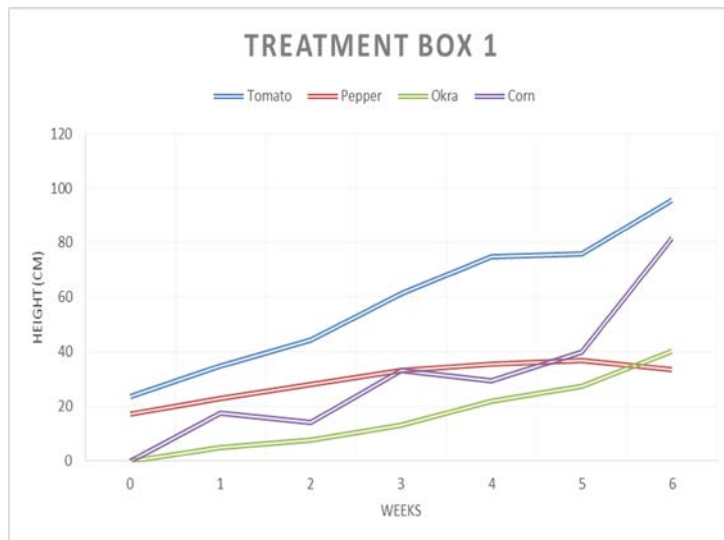
Objectives:

C. B. Caffery, M. A. Cervantes, S. P. Martinez, C. B. Hoitt, S. B. Riggs, and C. R. Richardson

- Demonstrate maintaining a vegetable farm in a limited space
- Evaluate benefits of gardening with probiotics and using a raised bed
- Appraise potential of BGREEN Farm in a Box for Hispanic families

Design and Use of BGREEN Farm in a Box to Produce Vegetables in South Central Texas

Results from garden bed with mycorrhizae



Raised garden bed



Inoculation: Medical Break Through or Agricultural Break Through

Q. R. Gonzalez, C. B. Hoitt, M. A. Cervantes, S. P. Martinez, and C. R. Richardson

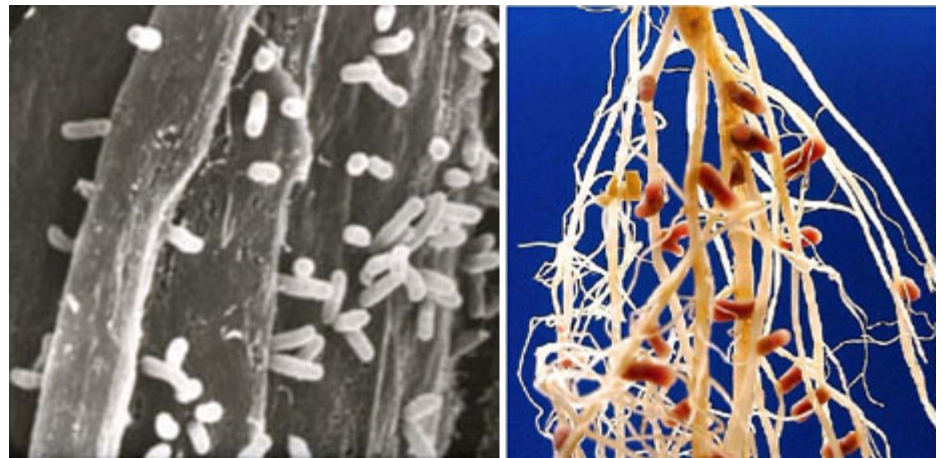
Objectives:

- Can plants that do not have a relationship with the *Rhizobium* bacteria be inoculated with a strain of the bacteria and sustain nitrogen fixation?
- Would this be an affordable solution to crop improvement
- Determine if inoculating different fruits and vegetables will provide more efficient edible crops
- Evaluate supplemental income, and self-satisfaction indicators in financially burdened communities

Inoculation: Medical Break Through or Agricultural Break Through

Why use mesquite trees?

- Adapted to survive in arid conditions
- It is a phreatophyte
- Roots can grow long to acquire water



The Value of BGREEN Farm in a Box: To Produce and Promote Sustainability in a Hispanic Home

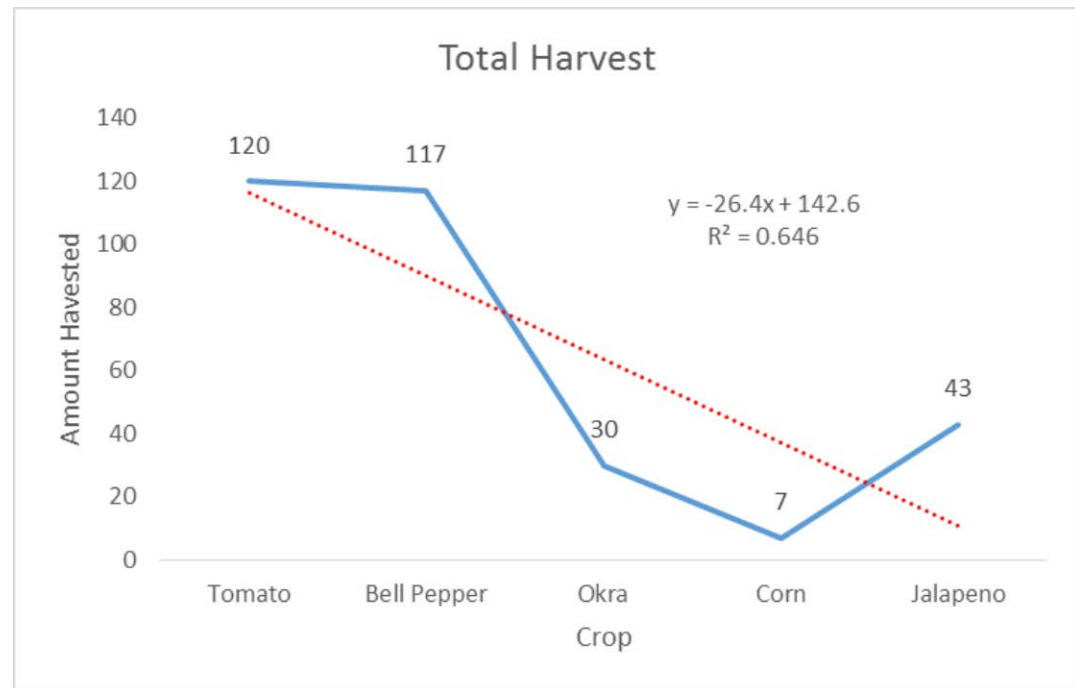
D. S. Garcia, M. A. Cervantes, M. F. Guerra, C. B. Hoitt, and C. R. Richardson

Objectives:

- To identify how you can promote the sustainability of Farm in a Box
- Promote this method to those in Hispanic Homes
- Provide the information needed to promote and make it widely known

The Value of BGREEN Farm in a Box: To Produce and Promote Sustainability in a Hispanic Home

Farm in a Box has been demonstrated and results indicate that this strategy can be valuable in sustaining home vegetable production



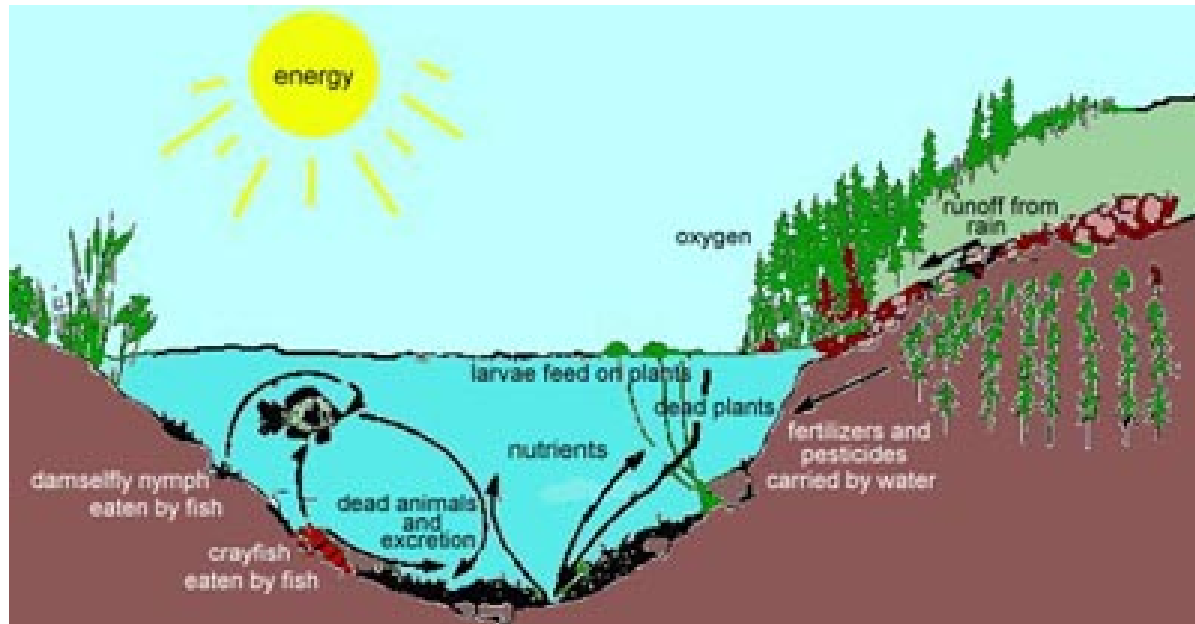
The Texas Stock Tank and its Uses for BGREEN Benefit for People, Livestock and Wildlife

S. B. Riggs, C. B. Hoitt, S. P. Martinez, and C. R. Richardson

Objectives

- Evaluate water availability for animals
- Evaluate water source for sustainable vegetable gardens
- Identify methods and procedures needed to improve long-term water availability
- Disseminate information at the county and state level

The Texas Stock Tank and its Uses for BGREEN Benefit for People, Livestock and Wildlife



Small Scale Demonstration and Benefits of Producing Vegetables in BGREEN Boxes

M. E. Juarez, M. A. Cervantes, C. B. Hoitt, S. P. Martinez, and C. R. Richardson

Objectives:

- Observe the way the plants benefit and aid each other's growth
- Harvest corn, beans and squash
- Donate harvested crops to the Hay's County Food Bank to help the less fortunate and feed the hungry

Small Scale Demonstration and Benefits of Producing Vegetables in BGREEN Boxes



Floating Garden Beds

M. I. Juarez, M. A. Cervantes, C. B. Hoitt, S. P. Martinez, and C. R. Richardson

Objectives:

- Recreate the chinapma into a more modern, easy, and affordable way
- Test if this method of agriculture proves to be a competitive alternative to traditional land methods
- Find ways to improve utilization of land space covered by water
- See if floating garden beds can be an alternative way to grow plants that have major pest problems

Floating Garden Beds

Preliminary Results:

- Floating garden beds have reduced the need for irrigation systems and the time one would spend on setting up an irrigation system as well as time spent turning the irrigation system on and off
- Floating gardens may be a way to grow corn and other crops that usually do not do well in this area due to pests
- This new take on ancient growing methods could be a way to revitalize these methods as well as utilize land more efficiently

The Next Generation of Water Sustainability

M.F. Guerra, M. A. Cervantes, C. B. Hoitt, C. R. Richardson, and D.G. Morrish

Objectives

- Determine how effective this device is
- Determine who will benefit from this device
- Determine how difficult the building process is

The Next Generation of Water Sustainability



Soil Sifting Your Garden

D. J. Firova, M. F. Guerra, C. B. Hoitt, and C. R. Richardson

Objectives:

- To remove unwanted material from soil such as rocks, large clay particles, parasitic larvae, and debris
- To create wide rows, deep soil, and raised beds

Soil Sifting Your Garden



Summary

- Total of 16 enthusiastic students were involved
- Internal internships were successfully completed
- Student research involvement was high
- Four undergraduates are now in graduate school

Conclusions

- Students were able to see, feel, and touch concepts and aspects of this BGREEN project
- Undergraduate student education and research exposure was developed
- Graduate student professional development was apparent

Implication

Student involvement in the BGREEN project increased awareness in sustainable agriculture and should be a positive factor in tomorrow's Hispanic leaders in Texas

Acknowledgements

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Please contact Tongdan Jin at tj17@txstate.edu with your questions.