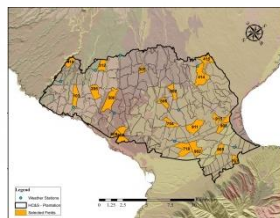


Resource Assessment Framework For Dependable Feedstock Supply To Produce Advanced Biofuels in Hawaii

Description

1. Develop crop parameters to simulate high biomass energy crops; sugarcane, energy cane, energy sorghum, and Napier grass with the ALMANAC and SWAT models
2. Compile ALMANAC Model parameterization data along with data on weather, soils and management
3. Apply the parameterized and tested ALMANAC model to assess feasibility and sustainability of biofuel feedstock production in Hawaii

Tools & Methods



1. Using field measurements of plant growth on Maui, HI, and at Temple, TX, derive plant parameters for relevant plant species/cultivars, and compile ALMANAC model parameterization data on weather, soils and management across HC&S plantation fields on Maui
2. Add the CENTURY SOC module to enhance the ALMANAC model's capabilities to simulate SOC
3. Incorporate the gathered parameters into the ALMANAC model and test the model's capability to simulate ratoon biomass yields, water use efficiency, and associated environmental impacts on SOC and N₂O GHG emissions

Key Accomplishments & Findings

1. Derived plant parameters for sugarcane, energy cane, energy sorghum, and Napier grass developed for ALMANAC and SWAT models
2. Parameterized ALMANAC Model and enhanced the model's capabilities to simulate SOC
3. ALMANAC Model extensively tested with HC&S historical sugarcane yields, weather and management practices
4. Evaluation of ALMANAC model simulated baseline (current) sugarcane management practices against ratoon harvested sugarcane, energy cane and Napier grass
5. Ideal bioenergy feedstock crop should have high biomass yields – net C balance and water use efficiency . Field performance is however affected by site-specific factors that include soil texture, elevation etc.
6. Publications: Six manuscripts and two book chapters (see Appendix)

Project Management Information

1. Collaborators:
 - Texas A&M AgriLife Research, Temple, TX
 - University of Hawaii at Manoa researchers, HI
 - Hawaii Commercial & Sugar Company researchers, HI
 - ARS Parlier and Riverside researchers , CA

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ONR Program Officer: Rich Carlin

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Appendix - Publications

1. Manyowa N. Meki, Jim R. Kiniry, Adel H. Youkhana, Susan E. Crow, Richard M. Ogoshi, Mae H. Nakahata, Rebecca Tirado-Corbalá Ray G. Anderson, Javier Osorio and Jaehak Jeong. 2015. Two-Year Growth Cycle Sugarcane Crop Parameter Attributes. *Agronomy Journal* 107:1310-1320.
2. Suchada Ukaew, Emily Beck, Manyowa N. Meki, and David R. Shonnard. 2014. Application of the RSB Method to Regional Differences in N₂O Emissions for the Rapeseed Hydrotreated Renewable Jet Life Cycle. *Journal of Cleaner Production* 83:220-227.
3. James R. Kiniry, Manyowa N. Meki, Thomas E. Schumacher, Cody J. Zilverberg, Felix B. Fritschi and Vijaya G. Kakani. 2014. Modeling to Evaluate and Manage Water and Environmental Sustainability of Bioenergy Crops in the United States. doi:10.2134/advagriscystmodel5.c6. *Advances in Agricultural Systems Modeling, Practical Applications of Agricultural System Models to Optimize the Use of Limited Water*, 5:139-160.
4. Manyowa N. Meki, James R. Kiniry, Kathrine D. Behrman, Meghan N. Pawlowski and Susan E. Crow. 2014. The Role of Simulation Models in Monitoring Soil Organic Carbon Storage and Greenhouse Gas Mitigation Potential in Bioenergy Cropping Systems. In Claudia do Rosario Vaz Morgado and Victor Paulo Pecanha Esteves (Eds), *CO₂ Sequestration and Valorization*. Chapter 9, pp 251-279. InTech Europe.
5. Manyowa N. Meki and James R. Kiniry. 2013. A Dynamic Tool - Resource Assessment Framework for Dependable Feedstock Supply to Produce Advanced Biofuels in Hawaii. *International Innovation: The Global Forecast*, October 2013. Research Media, UK, p118-120, ISSN 2051-8544.
6. Manyowa N. Meki, John L. Snider, James R. Kiniry, Randy L. Raper, Alexandre C. Rocateli. 2013. Energy Sorghum Biomass Harvest Thresholds and Tillage Effects on Soil Organic Carbon and Bulk Density. *Industrial Crops and Products* 43:172-182.
7. Gesch, R.W., Isbell, T., Oblath, E.A., Allen, B.L., Archer, D.W., Brown, J., Hatfield, J.L., Jabro, J.D., Kiniry, J.R., Long, D.S., Vigil, M.F. 2015. Comparison of several Brassica species in the north central U.S. for potential jet fuel feedstock. *Industrial Crops and Products*. 75(B):2-7. <http://handle.nal.usda.gov/10113/61656>.
8. Emily A. Oblath, Terry A. Isbell, Mark A. Berhow, Brett Allen, David Archer, Jack Brown, Russ W. Gesch, Jerry L. Hatfield, Jay D. Jabro, Jim R. Kiniry, and Dan S. Long: Development of near-infrared spectroscopy calibrations to measure quality characteristics in intact *Brassica* germplasm. (Submitted to *Industrial Crops and Products* in 2015).

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