Unmanned aircraft system (UAS) to study the effects of tillage systems on crop growth and yield

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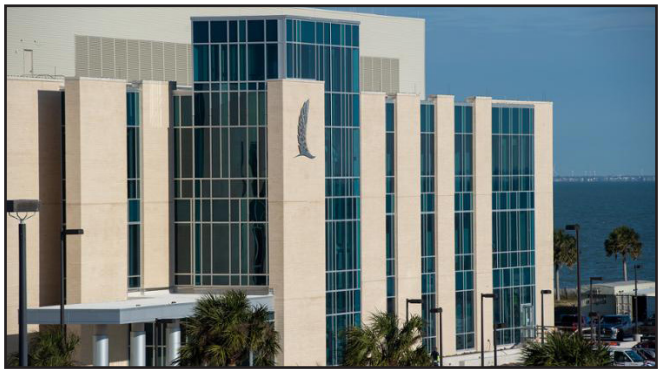
Abstract:

Global warming present serious challenges to world food supply. Increased levels of carbon dioxide and temperature in the atmosphere may help some plants to be more productive. However, the effects of increase air temperature causing floods and drought may reduce crop yields. Agriculture scientists are responding to these challenges by developing resilient cultivars with drought, heat and salt tolerance and cropping systems with improve water use efficiency. Our research team at Texas A&M AgriLife and Texas A&M University-Corpus Christi has develop an UAS-platform to help plant breeder and agronomist identifying elite germplasm and best crop management practices. This study presents a novel approach to use multi-temporal UAS data for comparison of two management practices in cotton, conventional tillage (CT) and no-tillage or conservation tillage (NT). The plant parameters considered for the comparison are: canopy height (CH), canopy cover (CC), canopy volume (CV) and Normalized Difference Vegetation Index (NDVI). Initially, the whole study area was divided into approximately one square meter size grids. Measurements were extracted grid wise using high resolution UAS data captured ten times over whole crop growing season of the cotton. One tailed Z-test hypothesis reveals that there is a significant difference between cotton growth under CT and NT for almost all the epochs. With 95% confidence interval, the crop grown under NT found to have taller canopy, higher canopy cover, bigger biomass and higher NDVI, as compared to those under CT cropping system.

Biography:

Landivar-Bowles joined the Texas A&M University System in 1988 as Research Project Leader. Currently he serves as Director of Research at Texas A&M Agri Life Research and Extension Centers at Corpus Christi and Weslaco, Texas, where he directs programs in the development of cropping systems



for Cotton, Sorghum, Wheat, Citrus, Sugar Cane and Vegetables, the development of Mari-culture technology, beef cattle reproductive physiology and nutrition and sustainable biofuel production systems.He earned a bachelor's degree in crop science in 1976, a master's degree in plant genetics in 1979 and doctorate in crop physiology in 1987, from Mississippi State University.

Publication of speakers:

- Juan Landivar-Bowles et al; The potential of remote sensing and artificial intelligence as tools to improve the resilience of agriculture production systems, 2020 Oct 7
- Juan Landivar-Bowles et al; Prospects of orphan crops in climate change, 2019 Mar 13
- Juan Landivar-Bowles et al; Scenarios reveal pathways to sustain future ecosystem services in an agricultural landscape, 2017 Dec 11
- Juan Landivar-Bowles et al; The quadruple squeeze: defining the safe operating space for freshwater use to achieve a triply green revolution in the Anthropocene, 2016 Jul 14
- Juan Landivar-Bowles et al; Impact of climate change on crop yield and role of model for achieving food security, 2015 Jan 3

2nd Edition of Challenges in Global Climate Change and Oceanography, Nov 17, 2021; Paris, France.

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