





INTRODUCTION

The Lower Rio Grande Valley is a major agricultural region in Texas yet cover cropping to encourage soil health remains an uncommon practice.¹ Cool season cover crop trials were initiated at Hilltop Gardens in Fall 2017. Since then, 17 different cover crop species have been planted to determine their impact and practicality in organic sorghum production.

To assess the impact of cover crops on soil biological, physical and chemical properties, we measured and analyzed soil respiration for microbial activity, soil moisture, bulk density, total organic carbon and weed biomass throughout the cover crop season.² The selection of cover crop treatments varied from year to year based on previous performance and farmer recommendations. The re-trialed cover crops are species that strongly compete against weeds, fix or scavenge nitrogen, and support mycorrhizal fungi.

METHODS



150 rows = 25 six-row blocks.

erial Imagery of Hilltop Garden Block 15 - M. Kutugata 2019



TEROS 11 Moisture Sensors (left) LICOR 6400XT Soil Respiration Chamber (right)

Cover Crop History & Seeding Rates (Ibs./acre)













Sunn Hemp





Control (no cover



+ Triticale 50#

illage Radish

crop)

Tillage Radish crop)



17#+ Sunn Hemp

17# (74# tot.)



- 12-acre dryland grain sorghum plot in Lyford, TX
- Complete randomized block design
- 4 cover crop treatments + control
- Organic Matter
 - Loss on ignition method
 - Sampled each year before cover crop season
- Soil Respiration
 - LiCor 6400XT Soil Respiration Chamber
- Bi-weekly measurements during cover crop growth Weed Suppression
- Cover crop and weed biomass sampled just before cover crop termination each year
- Above Ground 1/2 m² sampling ring
- Below Ground 1/6 m² sampling ring
- Bulk Density
 - 25 soil cores (5 reps per treatment)
 - Sampled at cover crop termination each year

📕 Year 1 📕 Year 2 📒 Year 3

• No differences across treatments for Year 1, 2 or 3 • Average field OM increased significantly (10%) from Year 1 to 3



- Strongest weed suppression effects in Year 3 Weakest effect in Year 2 due to tillage for weed control in control plots during that season

STUDENT PARTICIPATORY RESEARCH



Habraham Lopez, M.S. (left) -Weeds and Soil Nematode Communities & Roberto Reyna Oviedo (right) -Soil Microbial Communities



Qulina Rai -Sunn Hemp Pathogens and Nitrogen Fixation





Katie Lavallee – South Texas Native Cover **Crop Species**

Undecided Hairy Vetch Mustard*; Hairy Vetch*; Black Oats*; Cereal Rye (in progress)

*Poor germination due to planting time and/or germination

• Generally, \uparrow cover crop biomass = \uparrow soil respiration Year 3 respiration increases likely related to sorghum residue

Bulk Density

• Average field bulk density increased significantly (21%) from Year 1 to 2, then declined (9%) from Year 2 to 3

Year 1 sampled from raised beds, Year 2 and 3 from flat ground

Stephanie Kasper, M.S. – Limitations to Nitrogen Fixation



Matthew Kutugata -**Measuring Biomass** through Aerial Imagery



Mandip Tamang – Plant Densities & Rhizobacteria Communities

DISCUSSION

Cover Crop Challenges

FUTURE WORK







REFERENCES & ACKNOWLEDGEMENTS

A&M Agrilife.

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 Effective No-Till Termination Seeding Rates and Planting Dates Community Incentives Equipment Availability and Affordability Moisture Management in the Semi-Arid Subtropics





Videos and Publications **English and Spanish**

¹ Masabni J & Dainello F. 2009. *The Vegetable Growers Handbook*. 4th ed., Texas

²USDA/NRCS. 2009. Soil Quality Indicator Sheets. www.nrcs.usda.gov/