Cover Crops May Exacerbate Moisture Limitations on South Texas Dryland Farms

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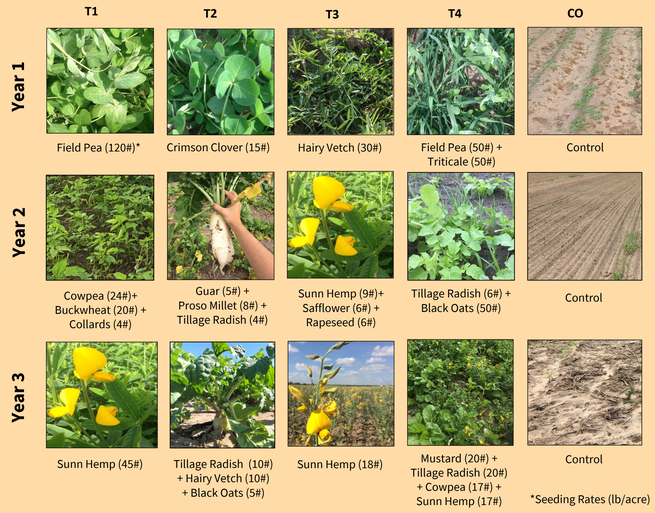
Methods

- 12-acre dryland grain sorghum plot in Lyford, TX
- Complete randomized block design
  - 4 cover crop treatments + control
  - 25 total blocks, each 6 m x 100 m
- Soil surface moisture (0-5 cm) with TEROS 12 probe weekly during cover crop season, monthly otherwise
- Correlations tested (Spearman):
  - Cover crop biomass vs post-cover crop moisture
  - Cover crop seeding rate vs post-cover crop moisture
  - Post-cover crop moisture vs sorghum germination



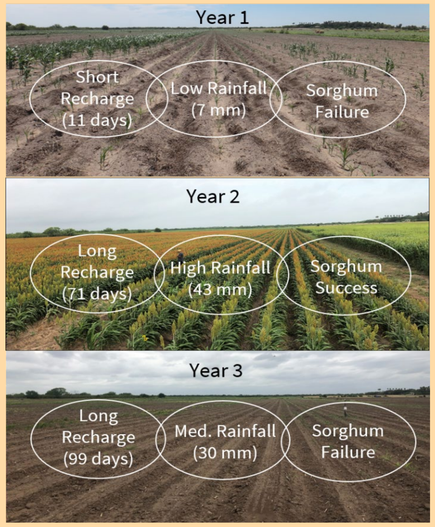
Highlights

- Cover crops created soil moisture deficits in three consecutive seasons
- Moisture deficits reduced cash crop (sorghum) germination and yield in two of three seasons
- Reduced tillage, longer recharge windows, lower seeding rates, and crop selection can reduce moisture deficits
- However, short term cover crop risks may outweigh long term benefits for farms without irrigation in the semi-arid subtropics

Introduction

- Cover crops are a popular management tool for soil health and weed suppression (Snapp et al. 2005)
- Other semi-arid regions have seen yield loss following cover crops (Nielsen et al. 2016), so south Texas farmers are reluctant to adopt cover crops
- Our study confirms that cover crop-induced moisture deficits are a major challenge to cover cropping for south Texas farms without irrigation access

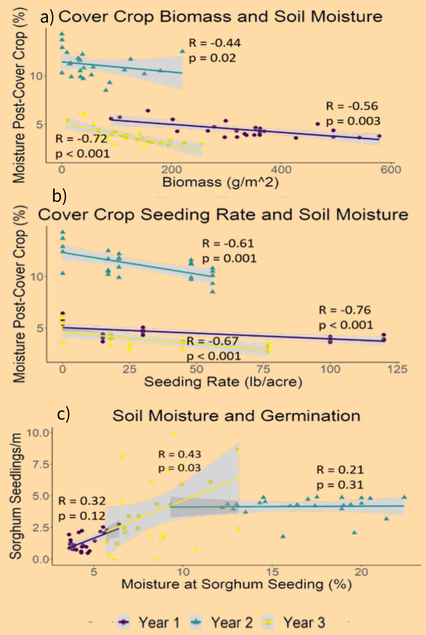
Results



Year 1 – Cover crops induced moisture deficits that decreased sorghum germination compared to controls.

Year 2 – Increased recharge period and wetter season allowed for moisture recharge before sorghum planting. No germination lag or yield loss.

Year 3 – Despite a long recharge period, moisture deficit remained and sorghum germination lagged again behind control plots.



↑ Cover Crop Biomass
=
↓ Soil Moisture

↑ Cover Crop Seed Rate
=
↓ Soil Moisture

↓ Soil Moisture
=
↓ Sorghum Germination
(especially if soil moisture < 10%)

Discussion

Strategies to reduce cover crop risks

- **Reduced tillage termination** - challenging for subtropical organic farms without herbicides or winter-kill
- **Longer recharge periods -** increases probability of rain, but rainfall patterns are erratic and unpredictable
- **Reduced seeding rates -** moisture conservation at the expense of biomass production
- **Water efficient species** - sunn hemp and vetch use less moisture than triticale and tillage radish

Short-term Costs vs Long-term Benefits

- Cover crops may gradually increase organic matter and improve water holding capacity
- Short-term costs, especially the risk of cash crop failure, reduce the likelihood of farmer adoption in water limited regions

Acknowledgements

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