

# Regenerative Agriculture using Sorghum as a Cover Crop in a Low Till System

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# Benefits of Sorghum/Sorghum-sudangrass hybrids (SSgH) as Cover crops

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Larger amount of biomass – adds organic matter= Soil builder.

Deep root system –drought tolerant and nutrient scavenging.

Poor /non-host to *Meloidogyne incognita*.

Root leachate is weed suppressive (sorgoleone)

Dual purpose cover crop (forage, grain, energy crop)

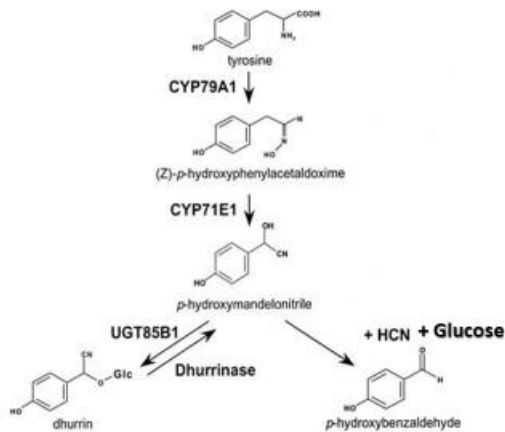
Tolerate high and low soil pH

# Sorghum/Sorghum-sudangrass (SSgH) as a cover crop

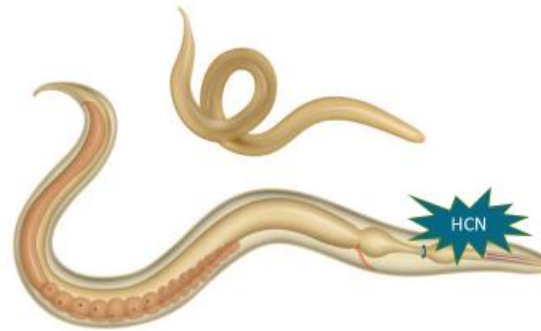
Large amount of biomass – adds organic matter= Soil builder



## SSgH Biofumigation



Busk and Moller, 2002



Leaf tissues release HCN (nematicidal) upon hydrolysis of dhurrin (= Biofumigation).

Shoot tissues release HCN (nematicidal) upon hydrolysis of dhurrin (= **Biofumigation**)

## Objectives

- Evaluate SSgH varieties most efficient in
- 1) Suppressing root-knot and reniform nematodes
  - 2) Enhancing soil health through low-till cover cropping.

# Evaluate soil amendment of SSgH for plant-parasitic nematodes suppression in the greenhouse

## Sorghum/Sorghum-sudangrass hybrids (SSgH) Screening

**Forage Sorghum**



- Big Kahuna Plus
- Cow Vittles
- Bundle King
- Monster II

**Sudangrass**



- Piper

**Sorghum-Sudangrass hybrid**

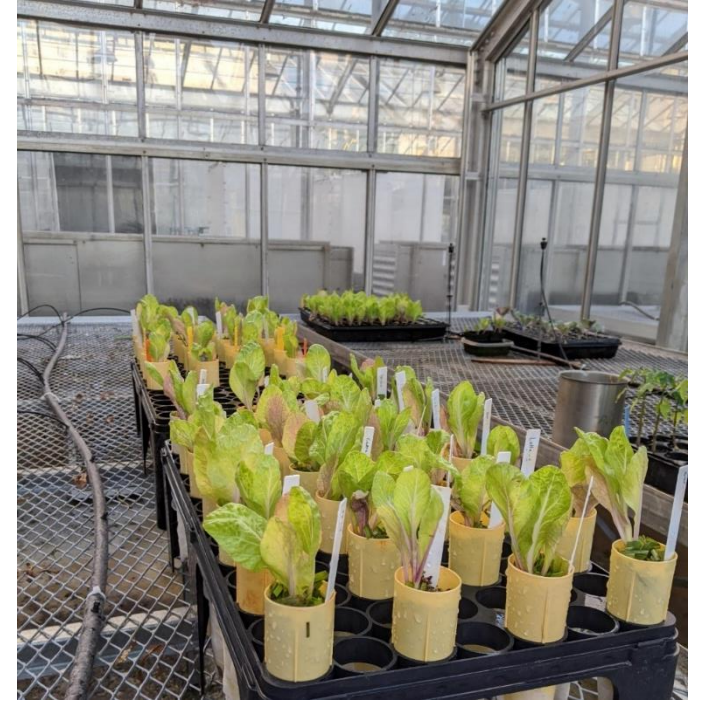


- Latte
- Latte BMR
- 51214
- 53514

**Energy sorghum**

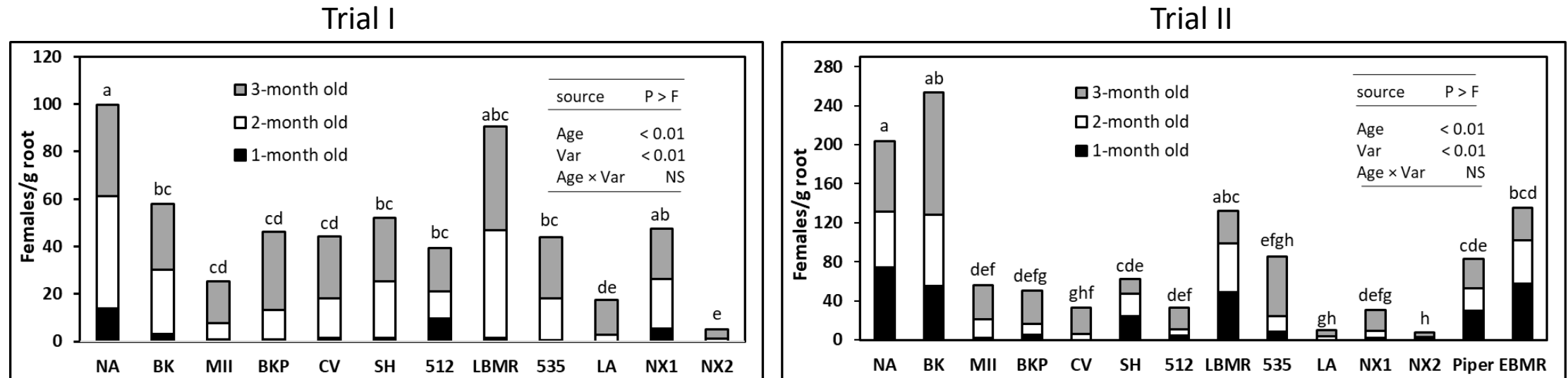


- NX 4264
- NX-D-61



# SSgH Variety Screening Trial

# Effect of SSgH Variety and Plant Age on Root-knot Nematode (*M. incognita*) Suppression

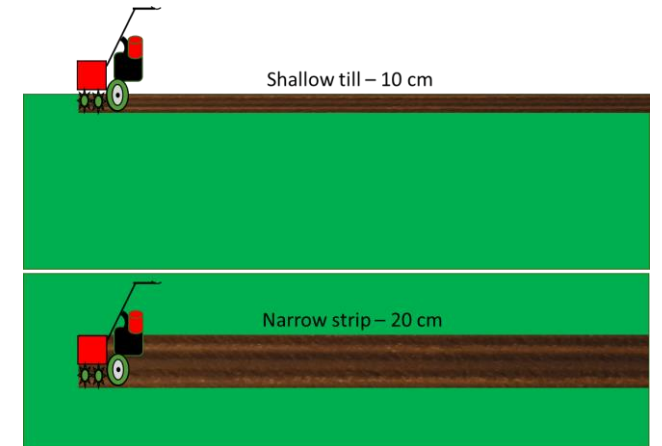


- ‘NX2’ and ‘LA’ were most effective in suppressing root-knot nematode female development.
- Allelopathic Effects of SSgH against root-knot nematodes is age dependent for most varieties except for ‘NX2’.

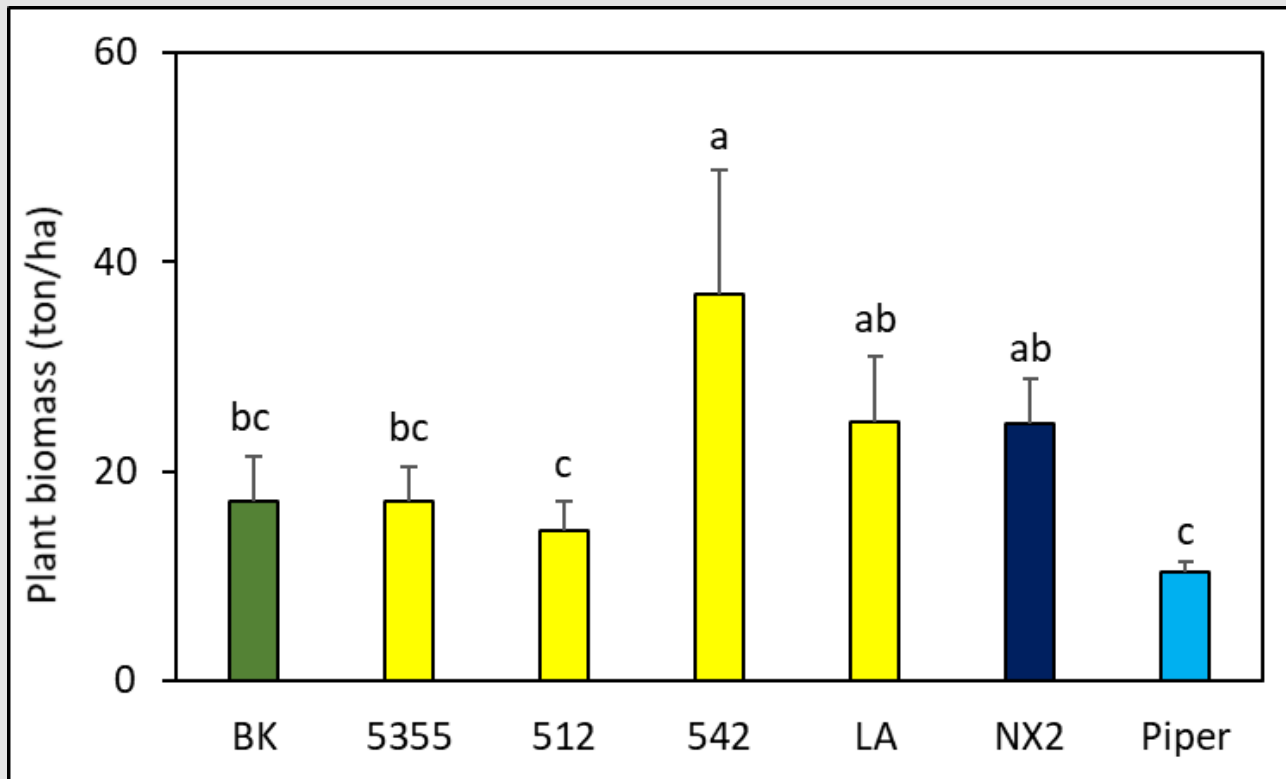
# Evaluate SSgH for soil building and water conservation properties in a low-till system

## Field Trial at Poamoho Station

- Treatments – 7 SSgH varieties and one bare ground control (3.6 × 1.2 m<sup>2</sup>)
- Replicated 4 times in a randomized complete block design (RCBD).
- Terminated with a flail mower at 2.5 months.
- Strip till of 20-cm wide and 10-cm deep strip for all SSgH plots.
- Planted eggplant seedlings.



# Cover Crop Biomass



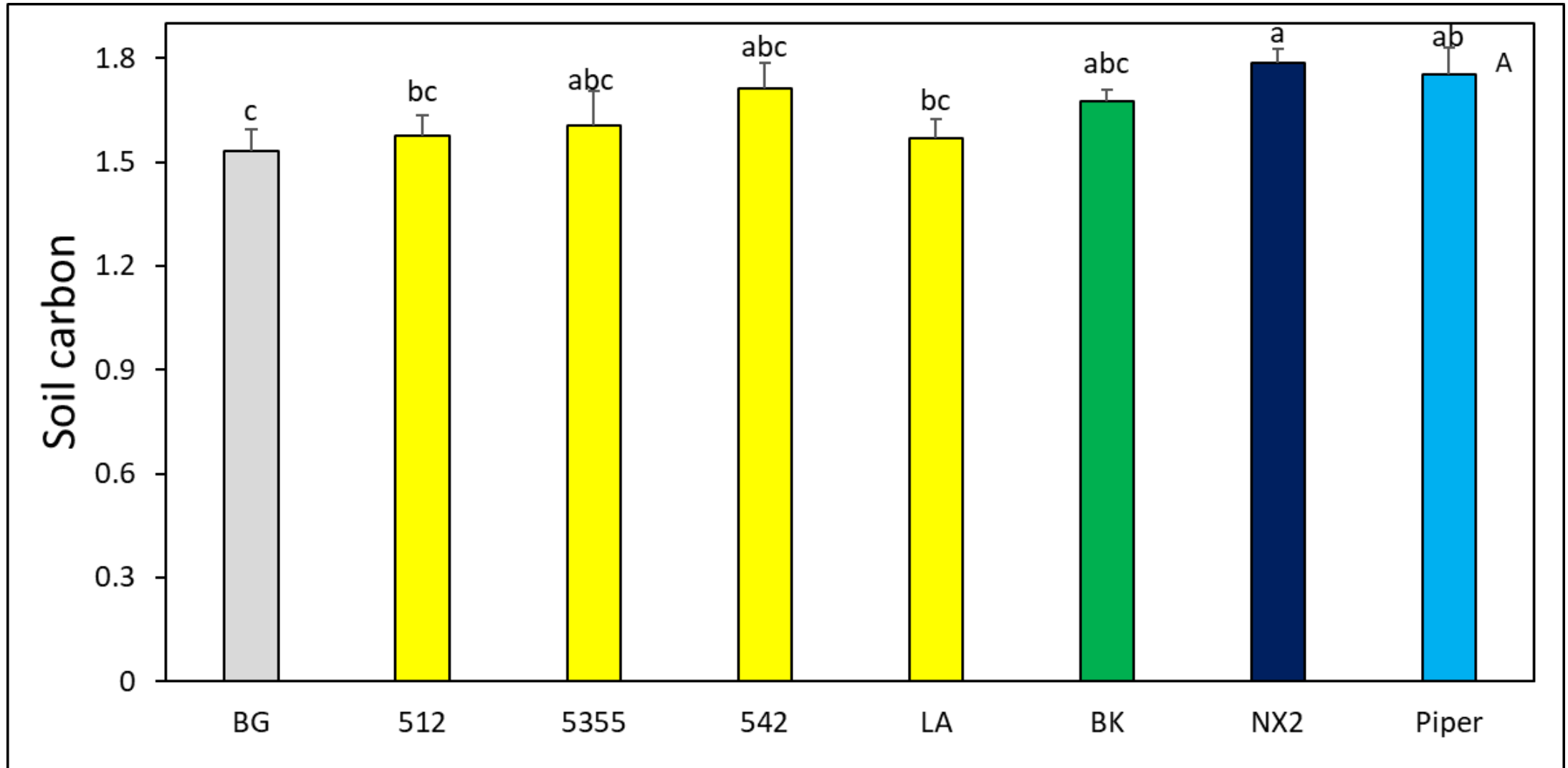
- 542 produced the highest biomass followed by 'NX2' and 'LA'.
- 'Piper' and '512' produced the least.





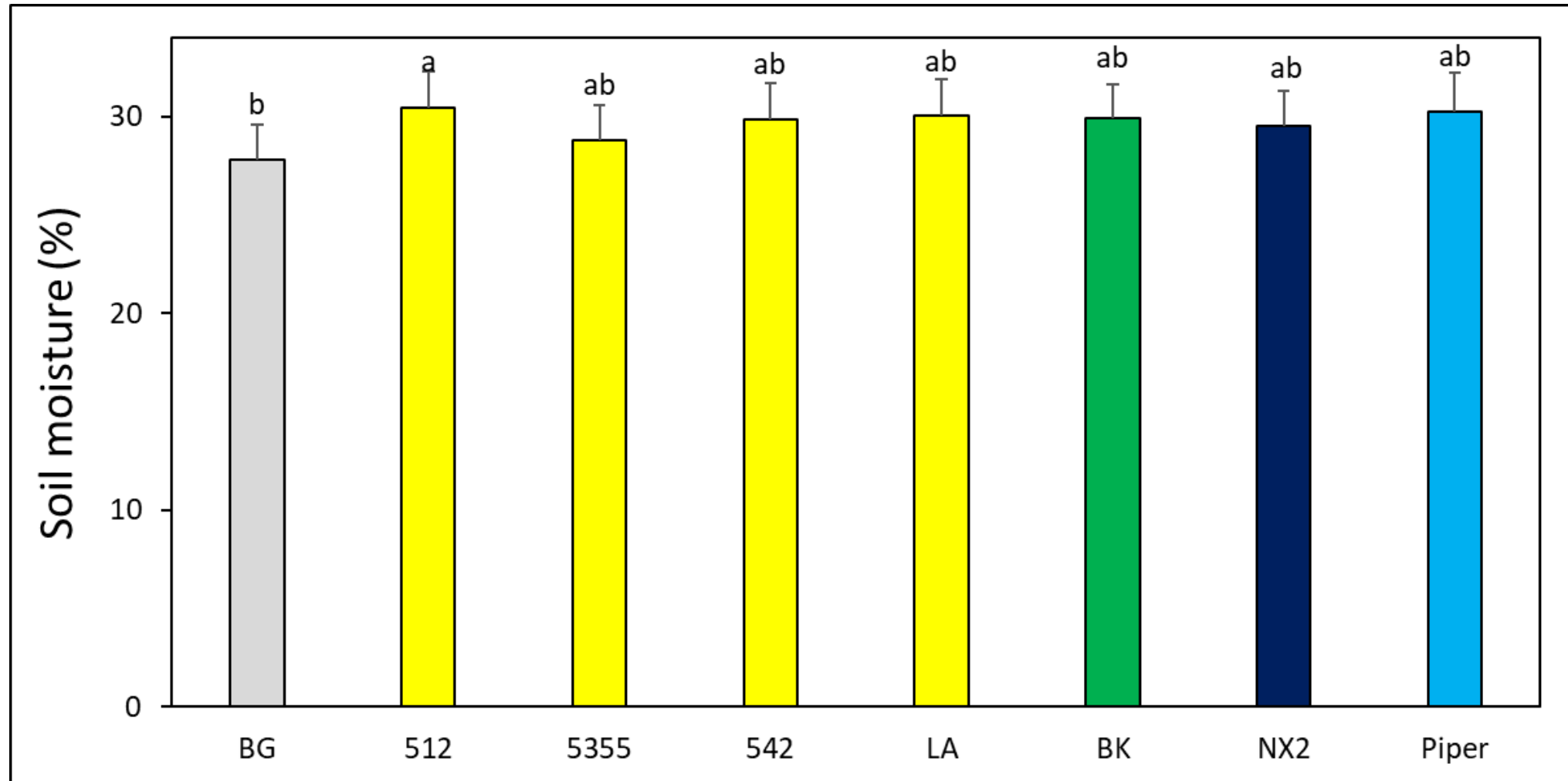
# Soil Carbon

NX2 and Piper increased soil C throughout the SSgH-eggplant cropping cycle.



# Soil Moisture

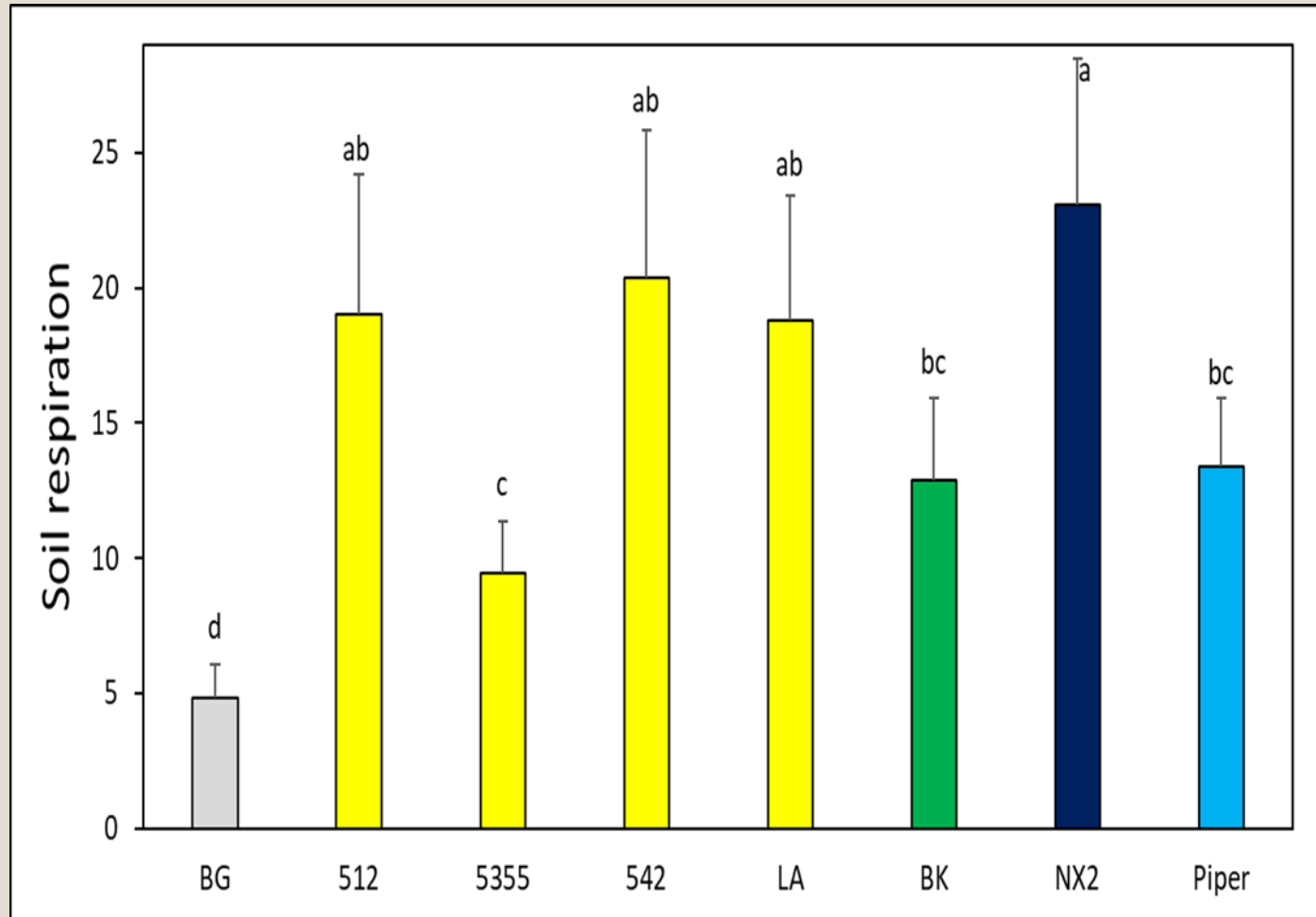
SSgH (512) increased volumetric soil moisture throughout the SSgH-eggplant cropping cycle.



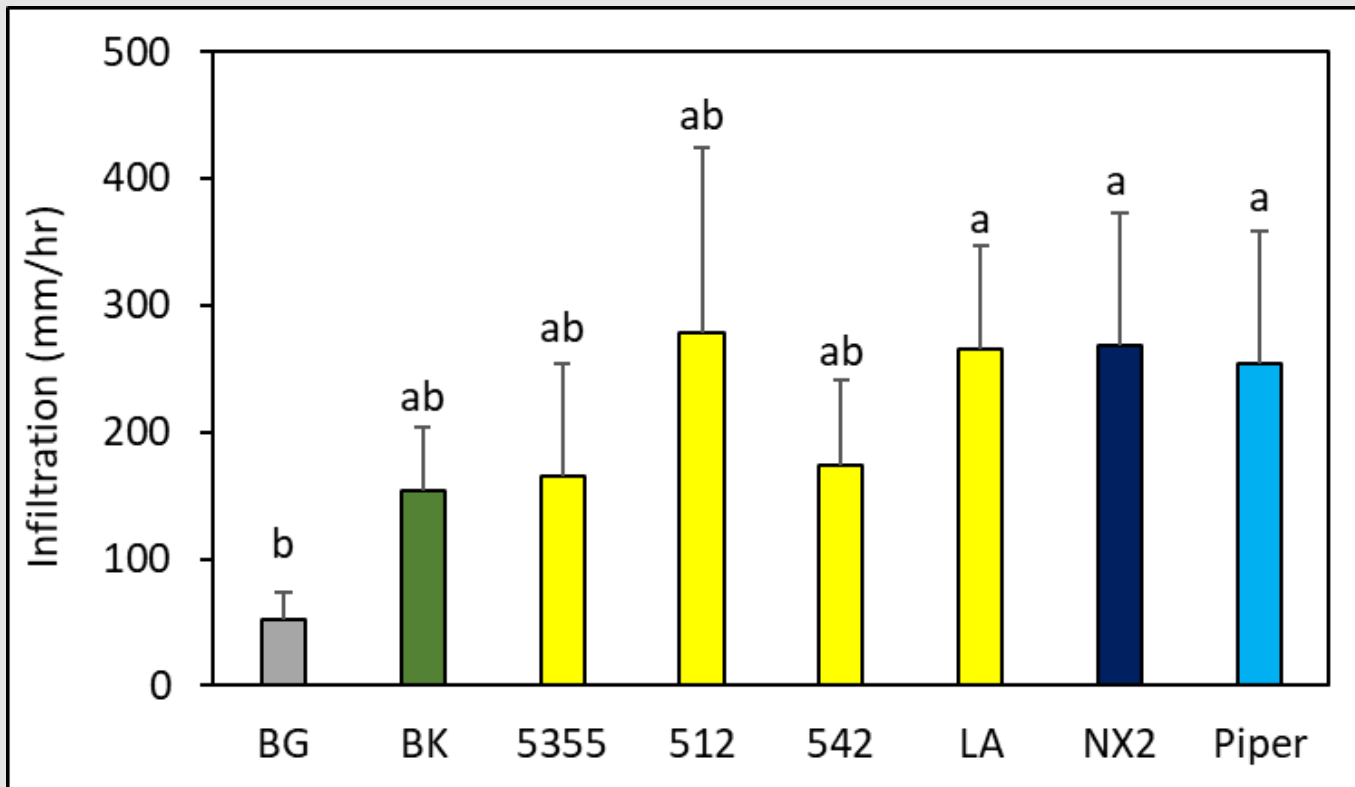


# Soil microbial respiration

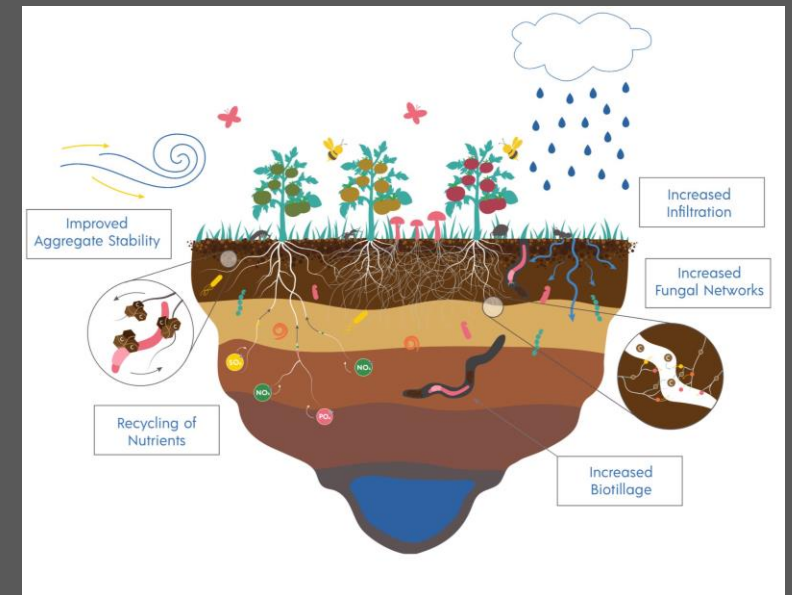
- All SSgH enhanced soil microbial respiration than BG.
- 'NX2' had the highest respiration rate.



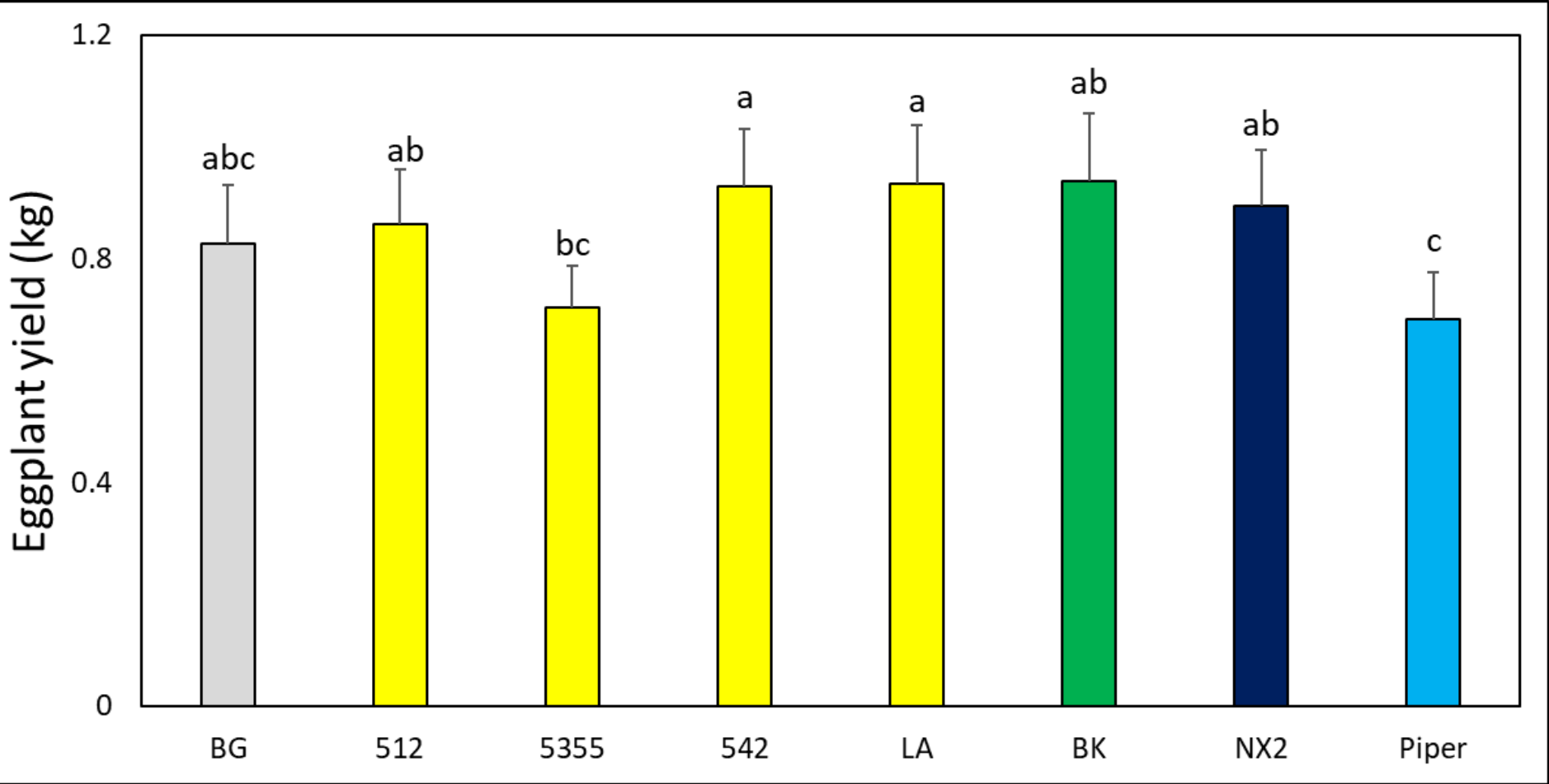
# SSgH in a low-till system improved water infiltration



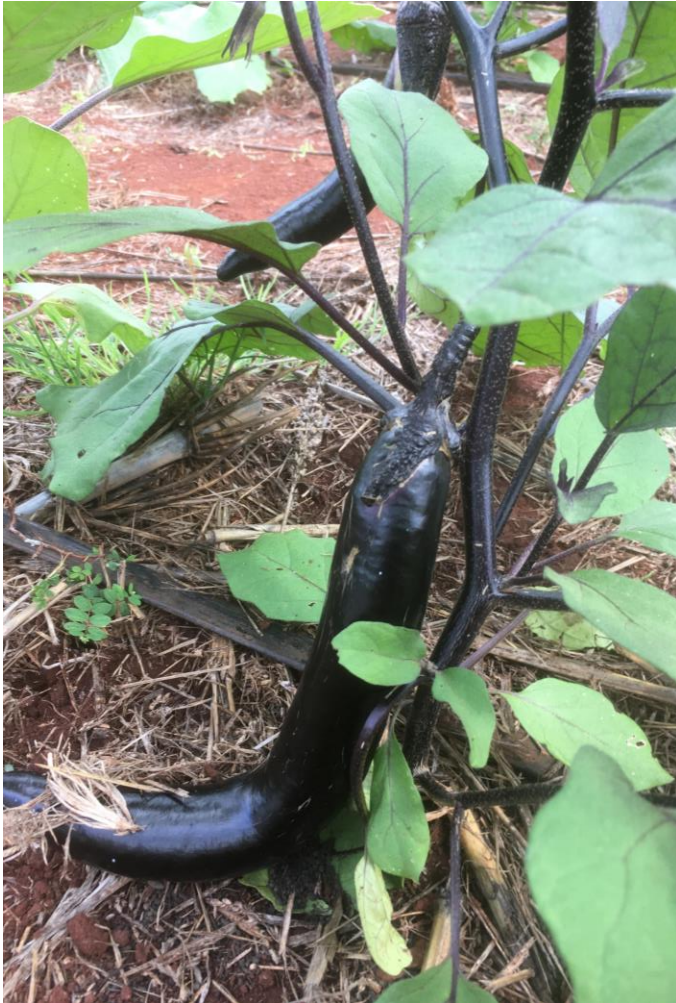
- 'NX2', 'LA', and 'Piper' increased water infiltration.



# Eggplant Yield



# Summary

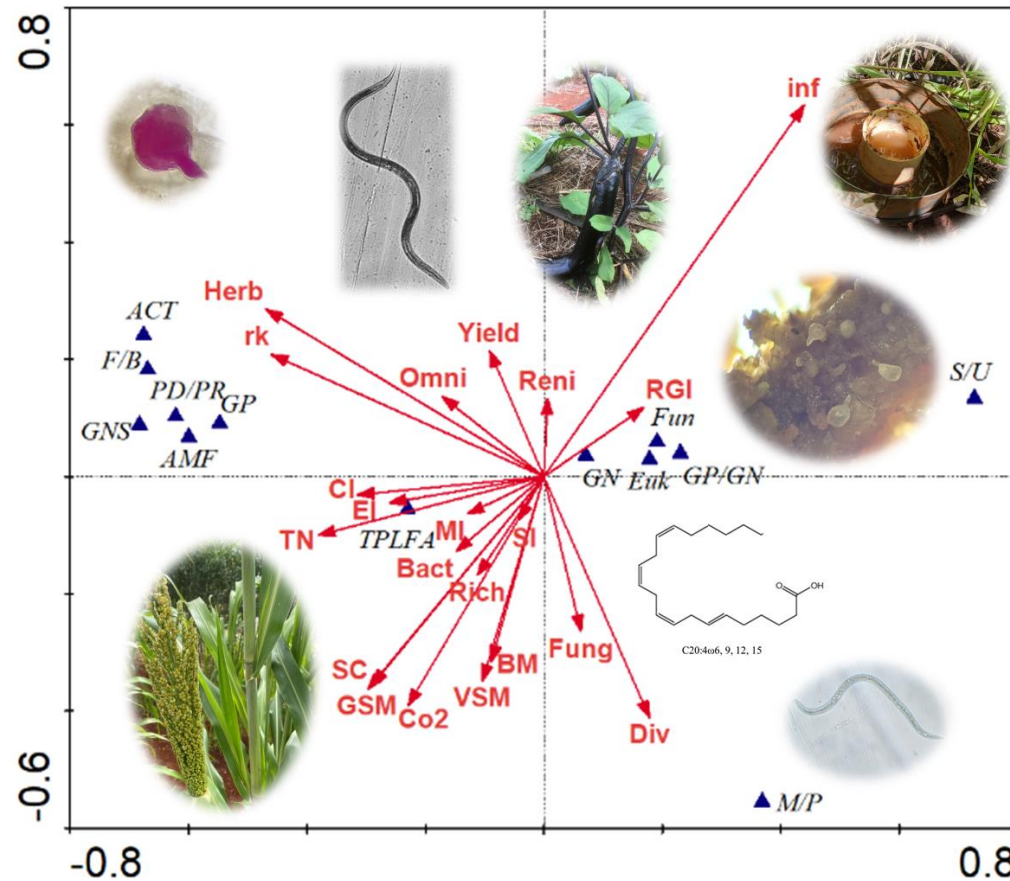


## *Low-till field trial*

- 'NX2' sorghum increased microbial respiration and soil carbon.
- SSgH cover cropping in a low-till system improved the water infiltration – '512' and 'NX2' sorghum showed the greatest improvement.
- Terminating SSgH cover crop in a low till system improve soil health better than in a no-till system but longer term of continued SSgH low-till practice is underway to track if it can also improve crop yield.

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