



Relationship between Soil Health and Weed Suppression

Koon-Hui Wang, Ph.D.

University of Hawaii at Manoa
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Mechanisms for Cover Crop to Suppress Weeds

- Generate surface organic mulch in conservation tillage system
 - > 3 tons/acre residues suppress >75% of weeds
- Allelopathic effect:
 - rye, sunflower, rapeseeds (other Brassicaceae), sorghum-sudangrass, sweet potato
- Smothering effect
- Weed seed predation



Mechanisms of Cover Crop Weed Suppression

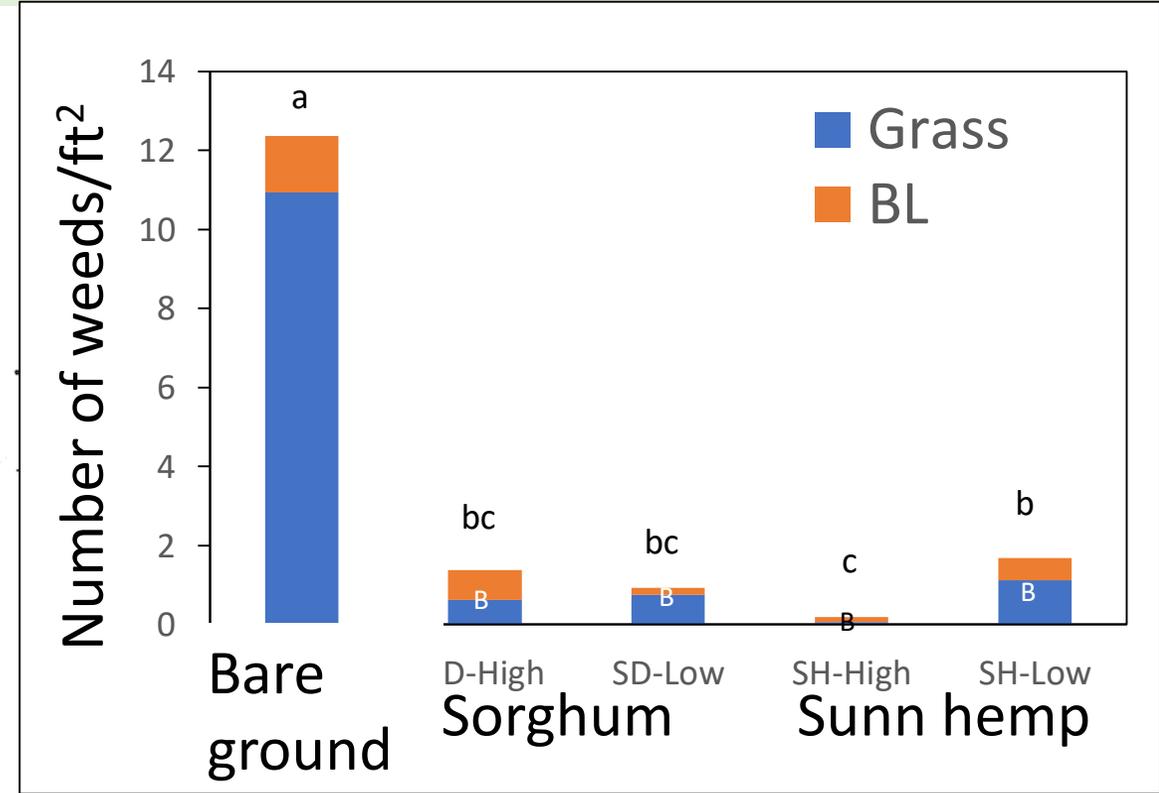


Smothering Effect

Weeds in corn plots with high or low rate of mulch throughout 3 months of corn growth were suppressed by either sorghum or sunn hemp mulch, sorghum mulch also produces HCN that is toxic to weeds.

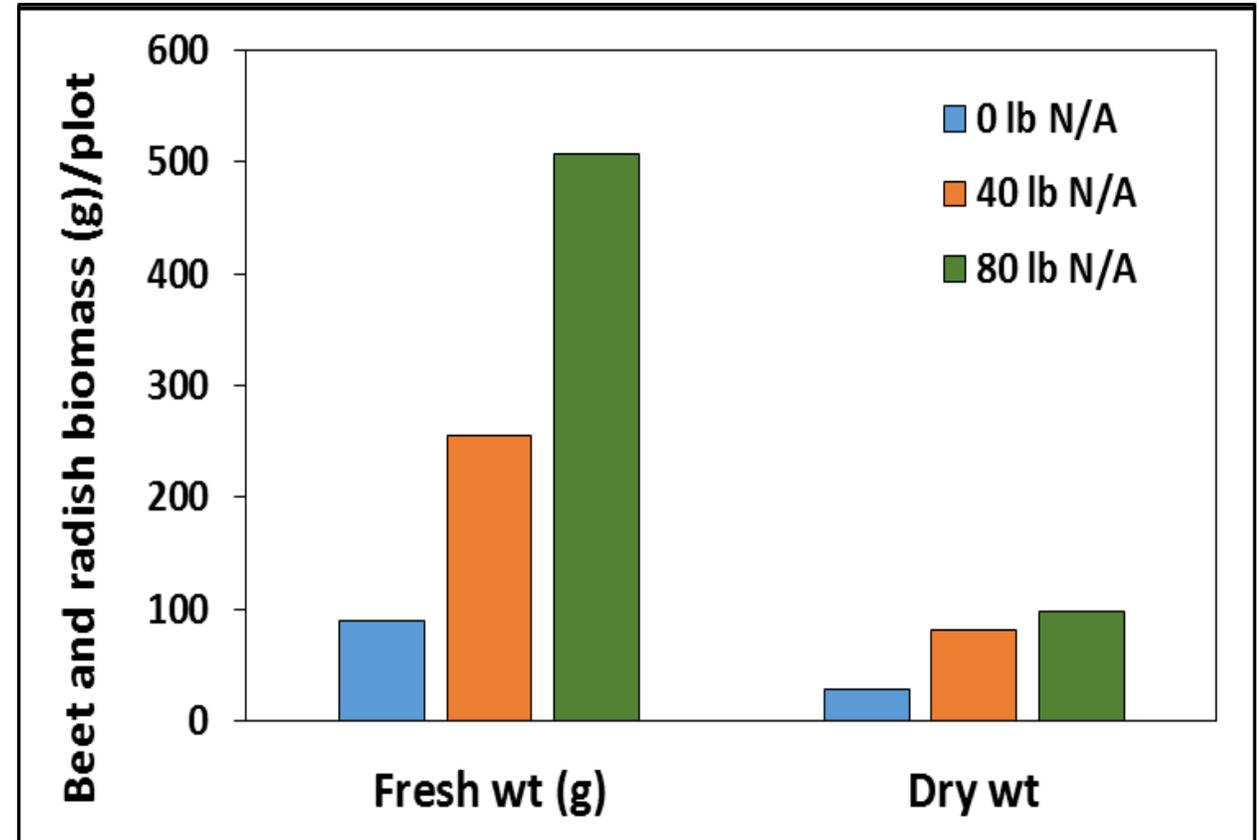


Mulching + Allelopathic Effect



Allelopathic from Root Residues of Sorghum

Sorghum root leachate produce allelopathic compounds that continues to suppress weeds or crops after cover crop shoots removal but fertilizer over come this allelopathic effect.



Sunn hemp followed by No-till vs Solarization

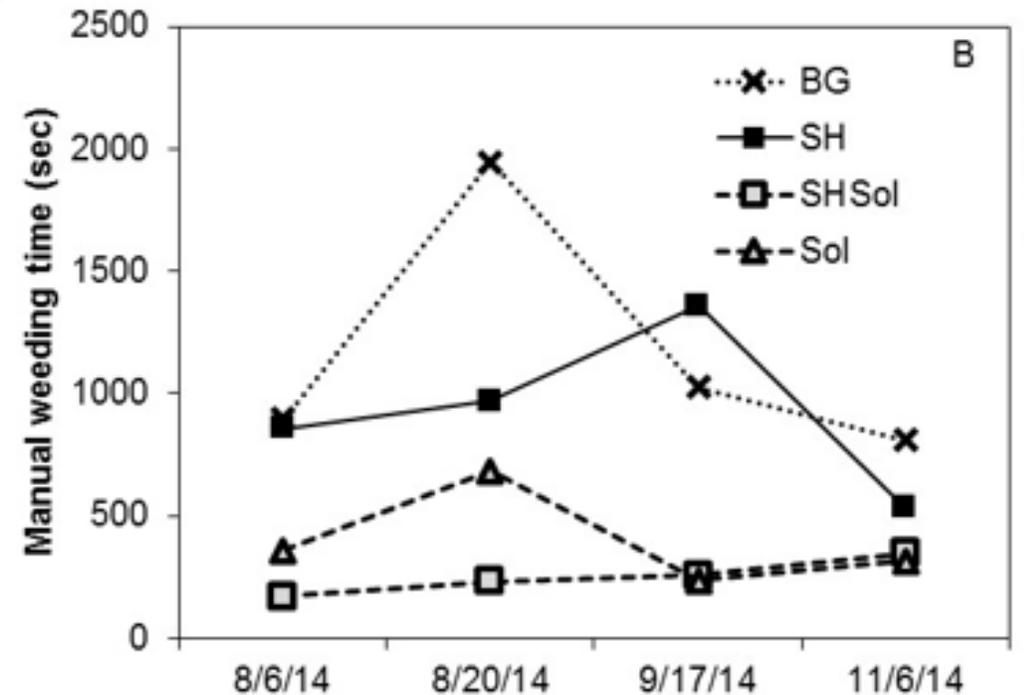
Sunn hemp (No till)



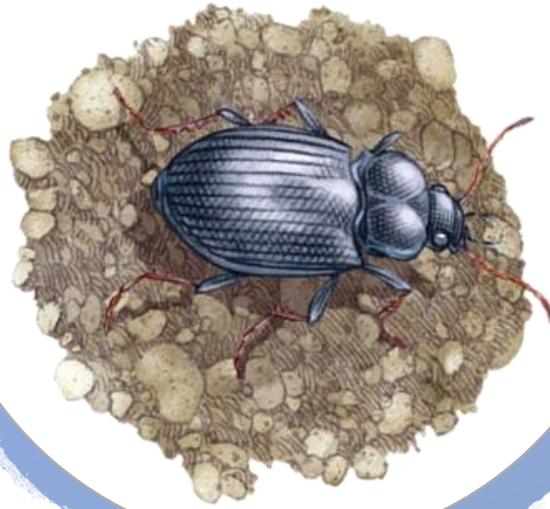
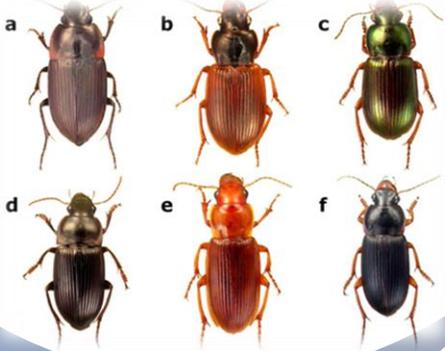
Solarization suppressed weeds most efficiently despite poor in maintaining soil health.



Sunn hemp + Solarization



Weed Seed Predation and Soil Health



Weed seed predation was found to be positively related to abundance of omnivorous and predatory nematodes, but their predation activities were positively related to higher weed coverage (Wang, Waisen, Hooks and Leslie, unpublished)

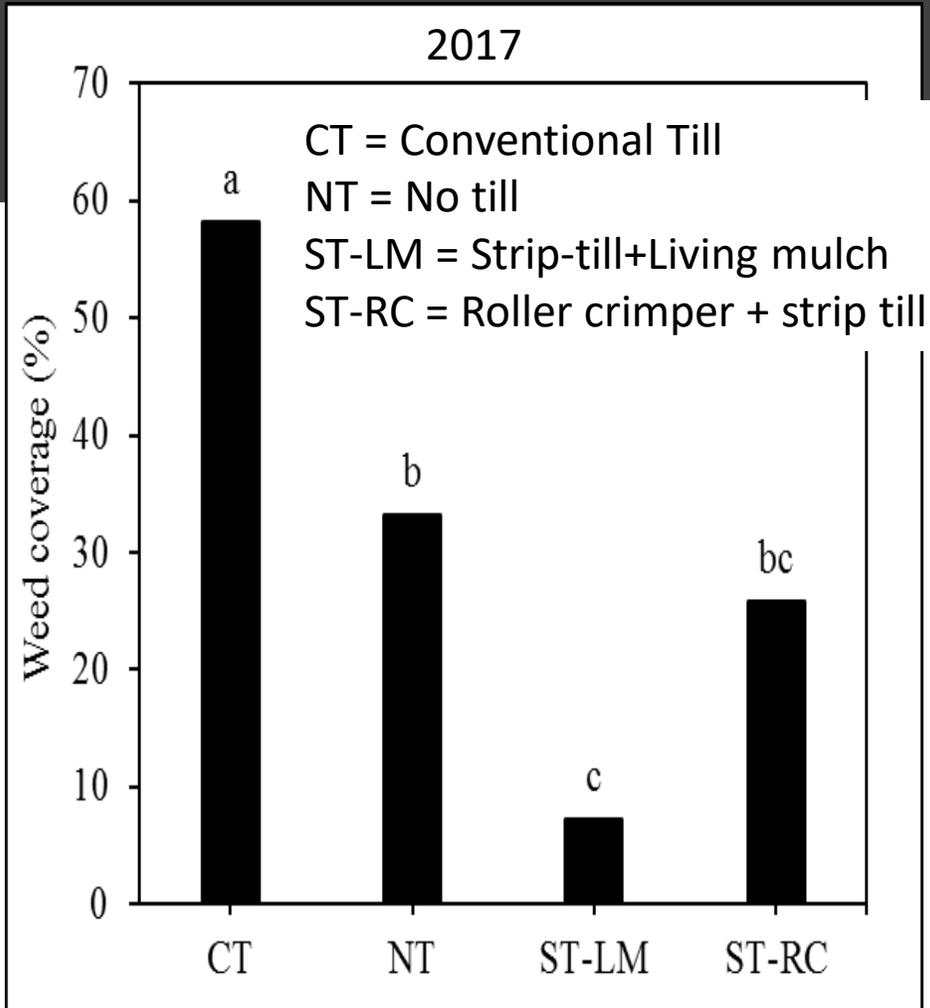


Omnivore

Predator

Correlate with less soil disturbance and more structured soil food web

Effects of Different Conservation Tillage on Soil Health and Weed Suppression



Weed suppression is mostly negatively related to the amount of cover crop residues, or % of ground cover by red clover living mulch, occasionally weed suppression is positively related to abundance of omnivorous and predatory nematodes. Indicating less soil disturbance would lead to less weed coverage over time.



(Wang, Waisen, Leslie and Hooks, unpublished)

Take Home Message

- Conventional tillage is effective for weed management if followed by pre-emergence herbicides or effective sterile seed bed practices.
- Effective use of cover cropping for weed management relies on amount of cover crop residues, availability of allelopathic compounds, and the smothering effect of the cover crop to reduce weed seed bank.
- Weed seed predation in organic system did not contribute significantly to weed suppression in field trials conducted here.

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Sustainable Pest Management Lab
University of Hawai'i at Mānoa,
College of Tropical Agriculture and Human Resources

