

THE IMPLEMENTATION AND IMPACT OF COVER CROPS IN CITRUS

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What are cover crops?

- Cover crops = crops planted to benefit the soil, generally not harvested for profit

- Increasingly common practice for grains, cotton, corn, soybean farmers, but also used with some vegetable production

- Cover crops planted during fallow season

- Cover crop use more frequently combined with conservation or no-tillage management practices

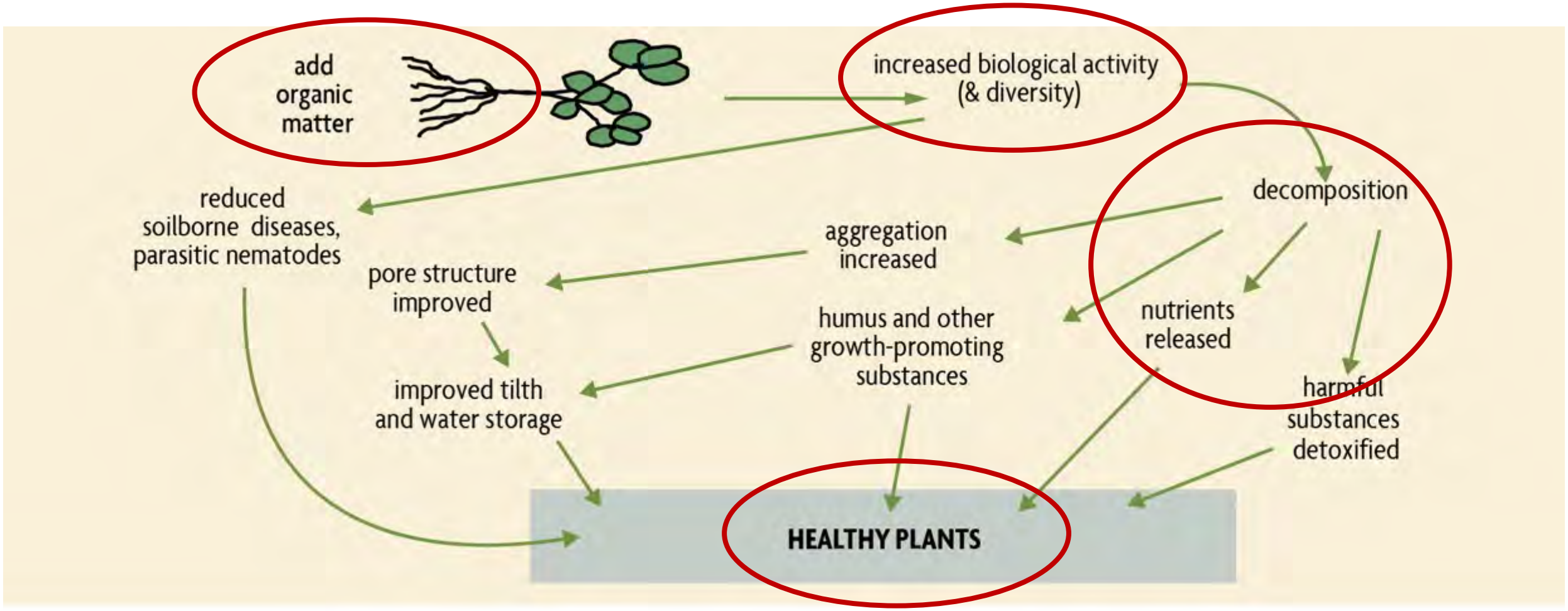
Fig. 135. White mustard (*Brassica alba*) cover crop. Planted September 12, 1929; photographed December 24, 1929. Compare with figures 134 and 136.

The Citrus Industry: Volume II: The Production of the Crop, UC Press, 1948

Why plant cover crops?

- Reduce weeds
- Reduce soil erosion
- Reduce soil compaction
- Increase soil organic matter:
  - Provide nitrogen and enhance nutrient cycling
  - Increase soil moisture

Why is soil organic matter important?



-SARE Building Soils for Better Crops, Third Edition, modified from Oshins and Drinkwater (1999)

Cover crop plants provide different benefits

Perennial cover crops

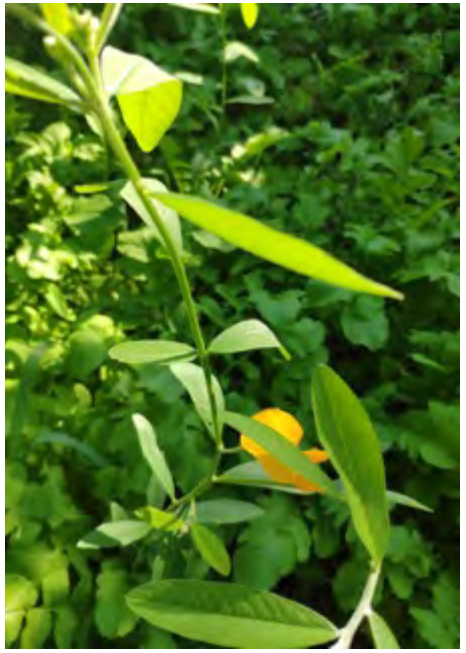
- Perennial peanut (*Arachis glabrata,* Benth)
- Bahia grass

Annual cover crops

- Cowpeas (*Vigna unguiculate*)
- Sunnhemp
- Vetches (*Vicia* spp.)
- Crimson clover (*Trifolium incarnatum)*
- Cereal rye (*Secale cereale)*
- Wheat (*Triticum aestivum)*
- Millets
- Buckwheat (*Fagopyrum esculentum)*
- Sorghum-sudangrass
- Daikon radish

Monoculture vs polyculture

- Establishment timing
- Benefit goals



Cover crops in citrus: field trials

Tree growth:

- Canopy diameter
- Canopy volume
- Leaf area

Fruit yield and quality

Soil nutrients : SOM and N

Soil microbial community

Economic benefits

Root growth and density

Weed growth

Co-PIs:
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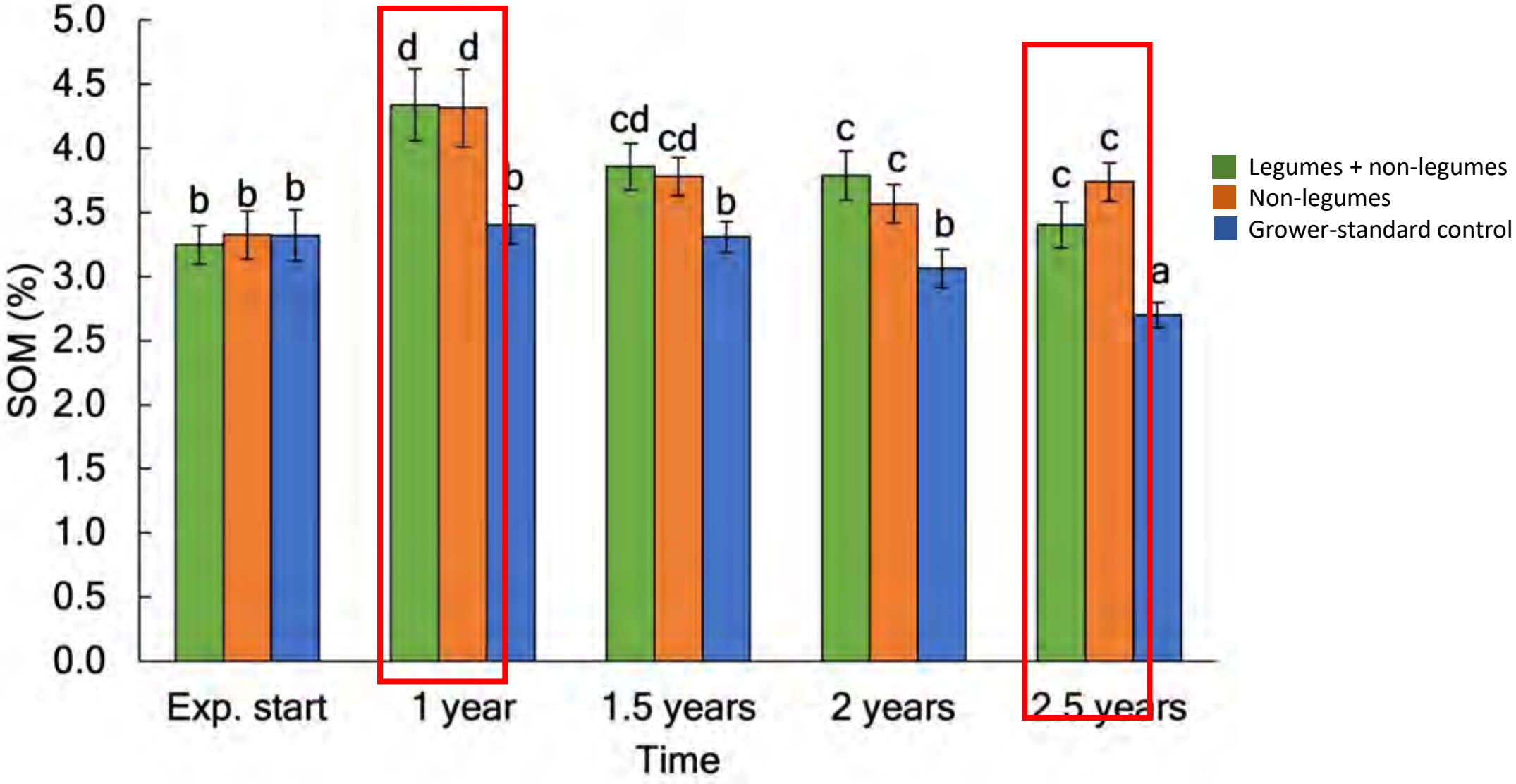
Considerations for planting cover crops in citrus

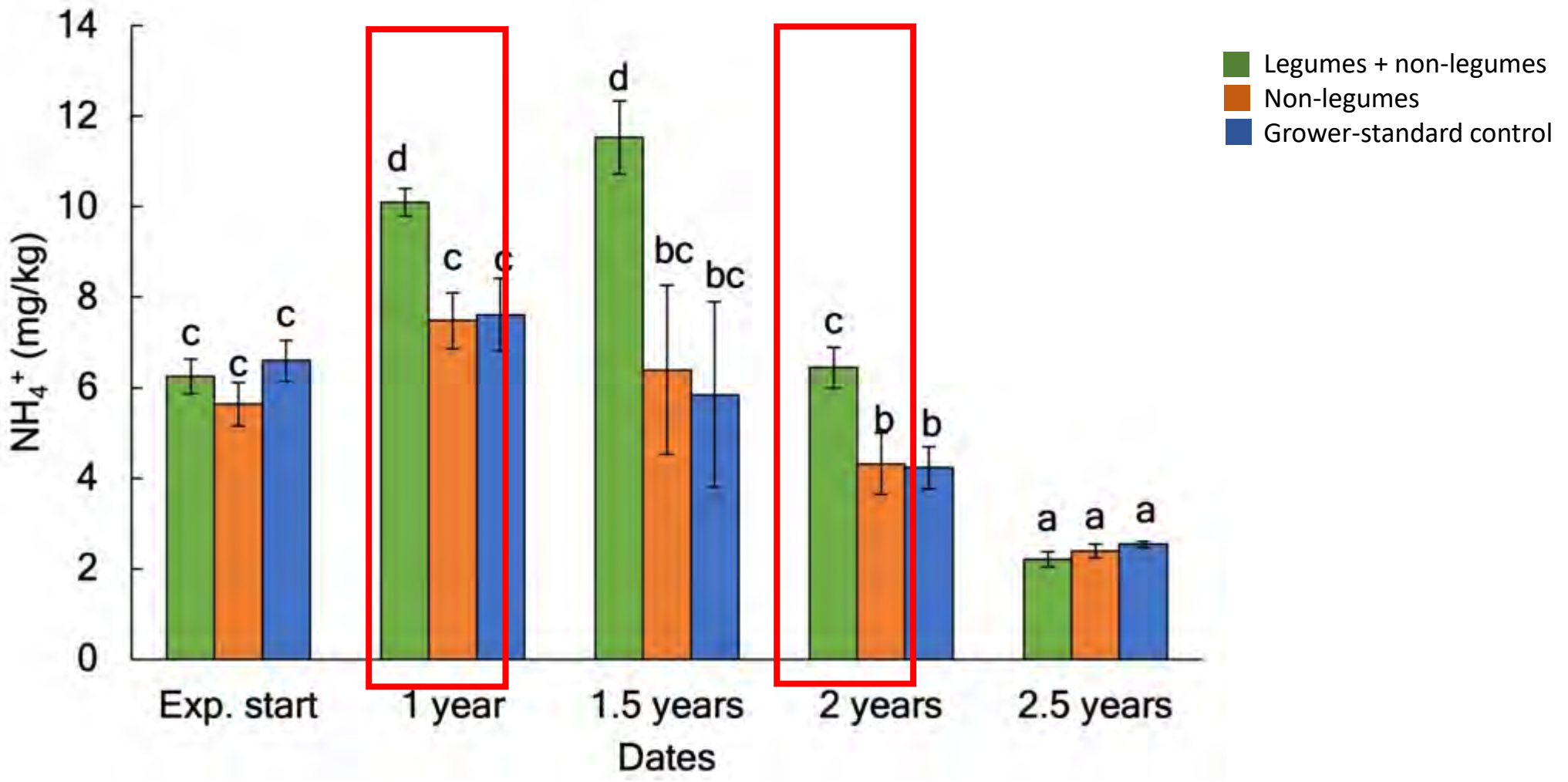
- Location: row middles
- Preparing row middles
- Seed planting methods
- Timing: Multiple plantings per year

Soil organic matter increased after 1 year of cover crops



No. of observations per treatment (n = 6)
Error bars represent standard error
Bars with the same letters are not significantly differ (p≤0.05)

Soil nitrogen increased in legume cover crop mixes



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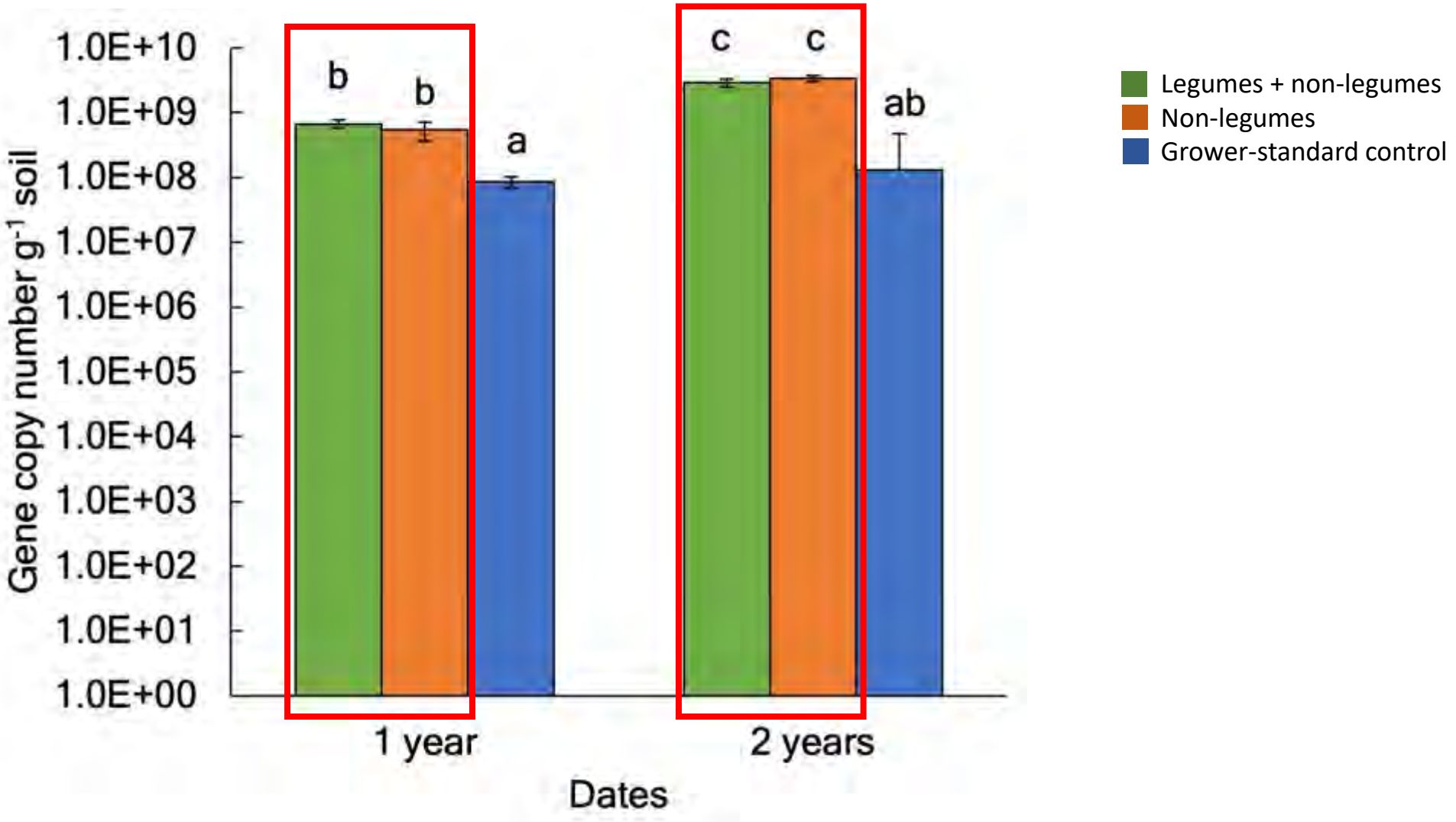
Bacteria and archaea increased in soils with cover crops



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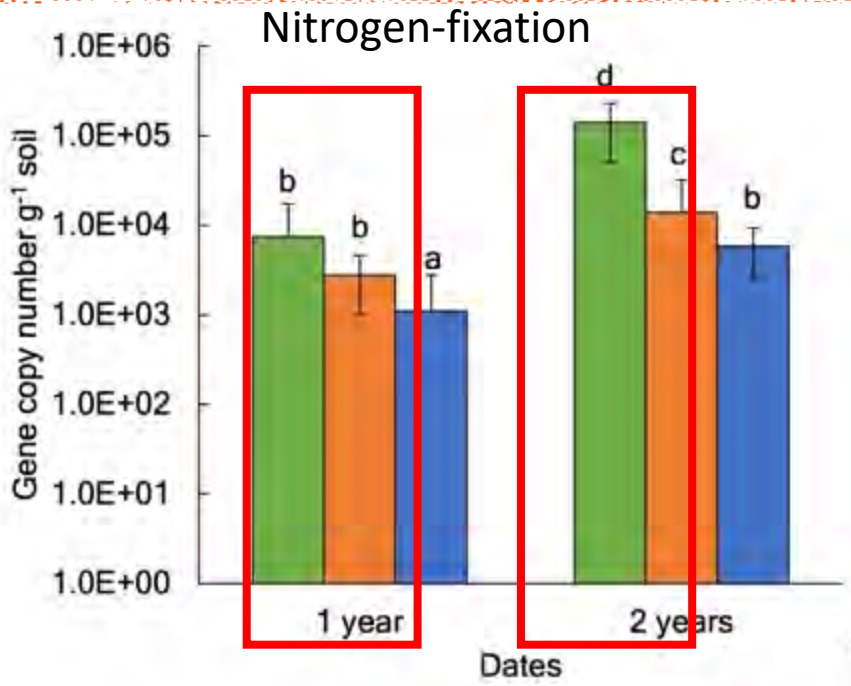
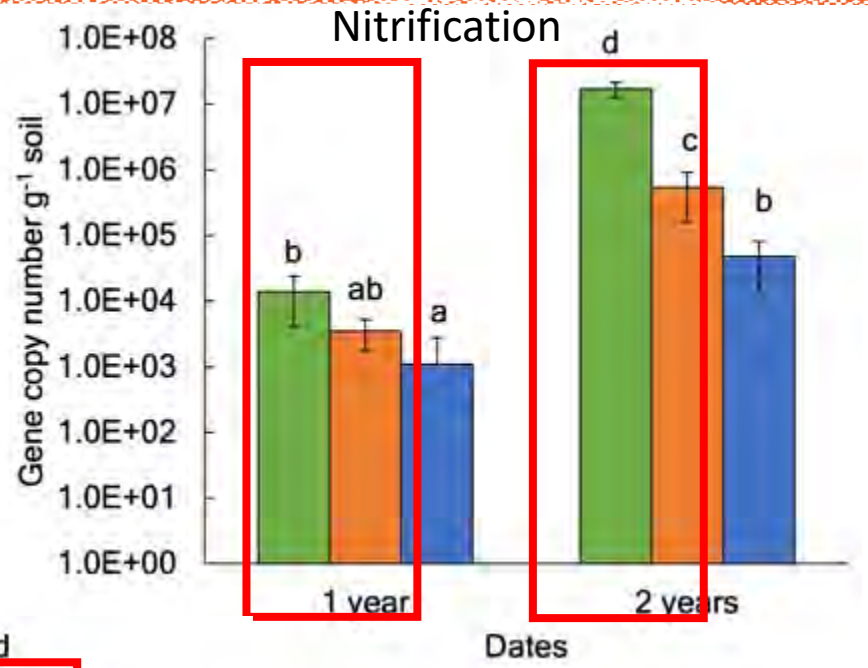
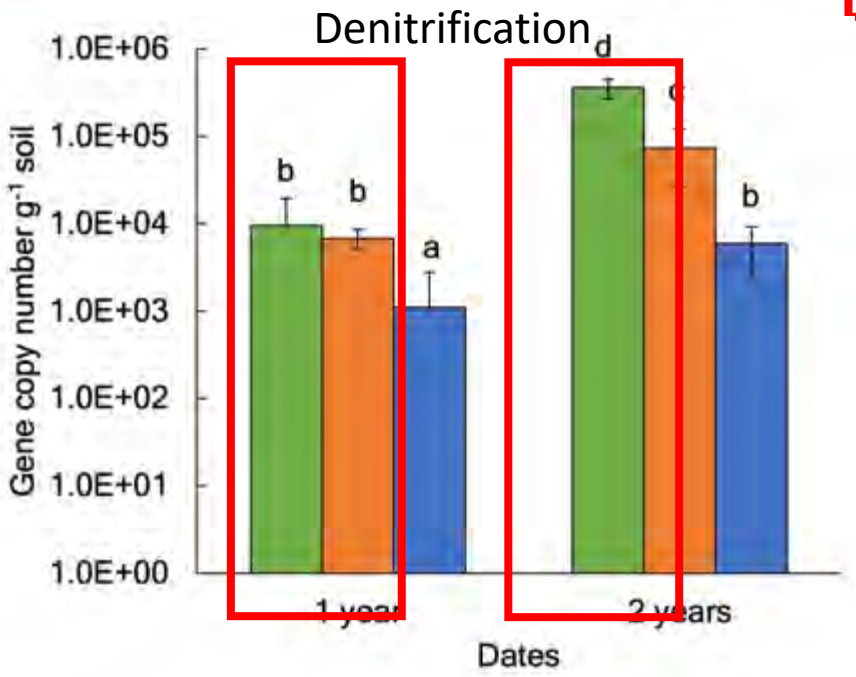
Soil nitrogen-cycling microorganisms increase with cover crops



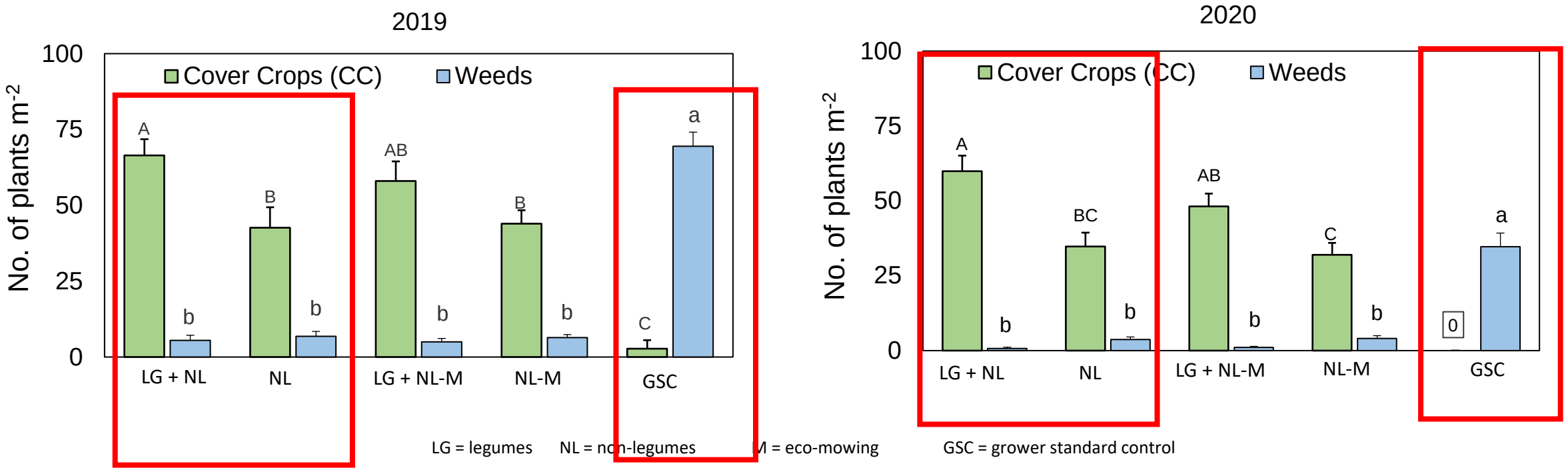




Legumes + non-legumes
Non-legumes
Grower-standard control

No. of observations per treatment (n = 6)
Error bars represent standard error
Bars with the same letters are not significantly differ (p≤0.05)

Cover crops reduced the weed pressure in the treated row middles



- No. of observations per treatment (n) = 18
- Error bars represent standard error
- Bars in a variable category with the same letters do not significantly differ (Tukey's HSD, P≤0.01)

Summary of current results

- No changes to yield, tree canopy, or roots after 2 years
- Planting mixtures of annual cover crops increases soil organic matter and microbial abundance
- Cover crops changed soil microbial nitrogen cycling
- Planting cover crops reduces mowing frequency
- Timing of planting is critical for cover crop establishment

Additional considerations for cover crops in citrus

- Continue to optimize mixes
- Additional measurements to better understand cover crop contributions to soil C and N and availability to trees
- Examine cover crops in Ridge soils and with younger trees

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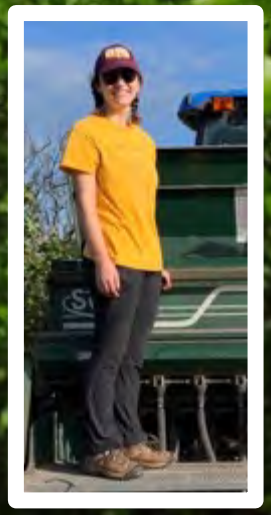

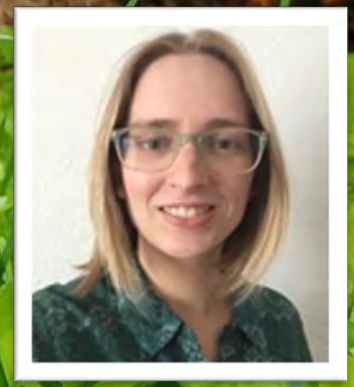

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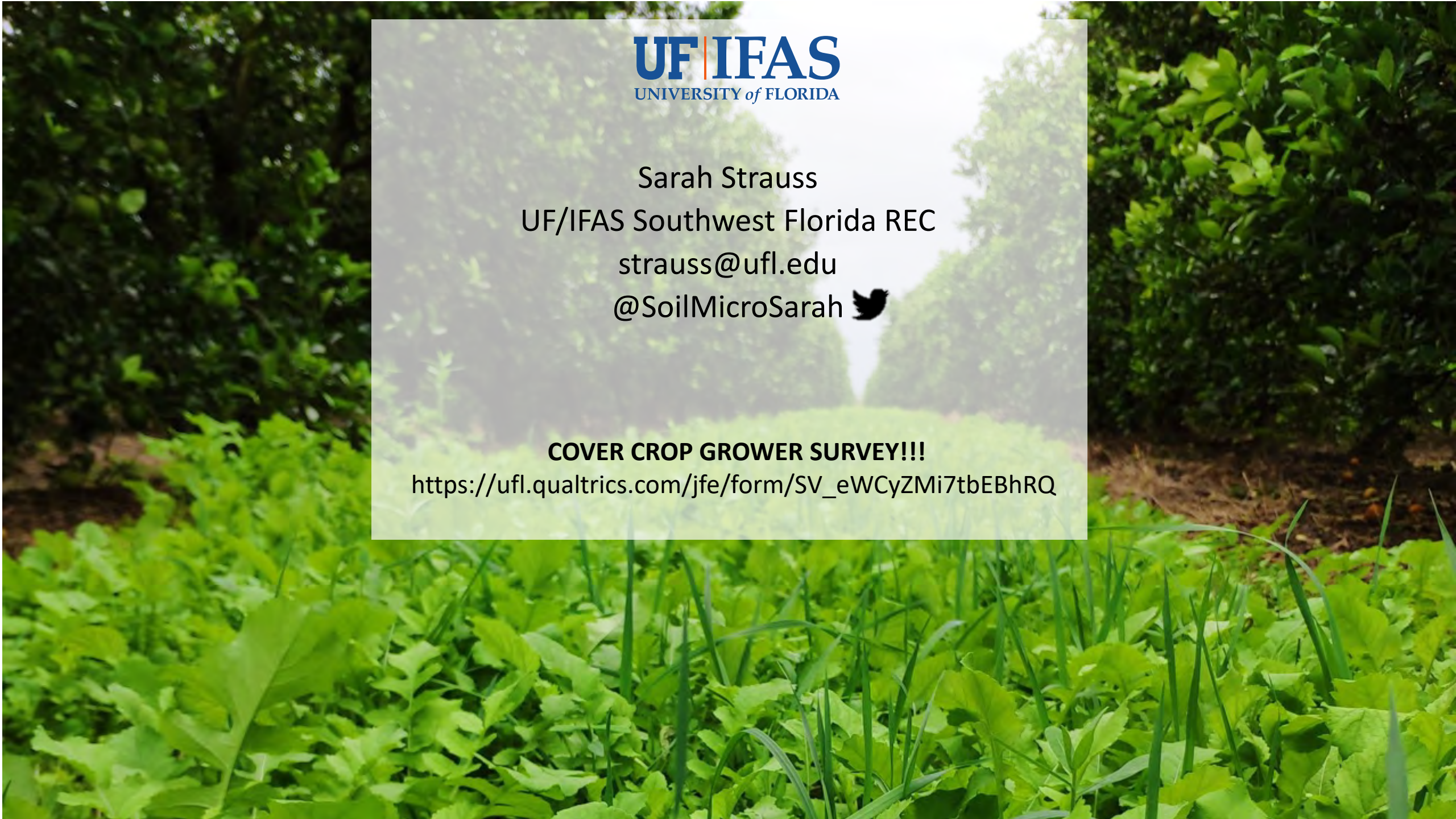

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COVER CROP GROWER SURVEY!!!
https://ufl.qualtrics.com/jfe/form/SV_eWCyZMi7tbEBhRQ