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# Cover Crops for Citrus



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# Cover Crops for Citrus

## Why plant cover crops?

- Cover crops are crops not planted for harvest and sale
- Cover crops can:
  - Improve the physical, chemical, and biological properties of the soil
  - Supply nitrogen, reduce leaching of nutrients and pesticides, reduce erosion, and reduce weeds
- Benefits from cover crops may be an additional strategy to improve Florida citrus production and reduce fertilizer and water inputs impacted by HLB





# Cover Crops for Citrus



## Cover crops improve soil health

- Soil organic matter (SOM) is the sum of living soil organisms, actively decomposing soil organisms, plant and animal materials, and their stable breakdown products
- SOM is one of the most important factors contributing to soil health because of its influence on soil chemical, physical, and biological properties.
- SOM can be sustained and increased with regular additions of plant residues including cover crops



# Cover Crops for Citrus

## Cover crop varieties currently being tested in UF trials

Type of cover crop	Winter/Spring Cover Crops	Summer Cover Crops
Legumes	Sunn hemp ( <i>Crotalaria juncea</i> ), Sesbania ( <i>Sesbania grandiflora</i> ), Alyceclover ( <i>Alysicarpus vaginalis</i> ), Crimson clover ( <i>Trifolium incarnatum</i> ), and Yellow clover ( <i>Melilotus officinalis</i> )	Sunn hemp ( <i>Crotalaria juncea</i> )
Non-legumes	Daikon radish ( <i>Raphanus sativus</i> ), Common oat ( <i>Avena sativa</i> ), Rye ( <i>Secale cereale</i> ), Buckwheat ( <i>Fagopyrum esculentum</i> ), and Common millet ( <i>Panicum miliaceum</i> )	Browntop millet ( <i>Urochloa ramosa</i> ), Buckwheat ( <i>Fagopyrum esculentum</i> ), and Common millet ( <i>Panicum miliaceum</i> )

# Cover Crops for Citrus



Sunn hemp nodules



Cowpea nodules

## Cover crops provide nitrogen

- Legume cover crops, through a symbiotic relationship with specific soil microbes, can fix nitrogen (N) from the atmosphere and add it to the soil, thus increasing soil N
- Cover crops also increase soil N content when cover crops decompose



# Cover Crops for Citrus



## Cover crops suppress weeds

- Cover crops suppress weeds most commonly by using light, water, and nutrient resources before the weeds do
- The degree of weed suppression depends on the density and diversity of weed species, the cover crop species, and management and climatic conditions



# Cover Crops for Citrus

## Cover crops: management considerations



Legumes (A), legume + non-legumes cover crops (B), and a grower standard control (C) in a commercial citrus grove in South Florida (Immokalee)

- Current vegetation should be mowed before planting cover crops
- Herbicide may be applied to reduce germination competition
- Germination and early stand establishment are substantially improved if rainfall or irrigation occurs soon after planting
- Mowing frequency depends on planting timing and growth rate
- Standard mowing practices will keep the biomass within the row middles, providing additional soil carbon and nutrient inputs for that portion of the grove



# Cover Crops for Citrus



## Cover crops: insect management

- Management for insect and mite pests is likely influenced by the addition of cover crops
- Cover crops in fruit groves can increase abundance and diversity of predatory arthropods
- These help to reduce the number of pest insects like aphids, scales and mites
- Some plant species in cover crop mixes can attract other pests which may not be currently problematic in citrus groves



# Cover Crops for Citrus

## Citrus cover crop challenges

- The appropriate cover crop mix will largely depend on grove needs (e.g., increase SOM or weed management) and location (e.g., soil characteristics or weather)
- Research is being done in Florida to determine what amount of nutrients are released into the soil from cover crops planted in a citrus grove, particularly those that increase biological nitrogen fixation



A look at cover crops 2 weeks (A) and 2 months (B) after sowing in a commercial citrus grove in South Florida (Immokalee)



# Cover Crops for Citrus



An aerial view of cover crops in citrus groves in South Florida (Immokalee)

## Citrus cover crop challenges

- Little is also known about the economic benefits of cover crop adoption for citrus in Florida
- Some considerations to keep in mind are capital investments in a planter (e.g., no-till planter), seed costs, labor, and time needed to learn effective management of this system



# Cover Crops for Citrus



## Citrus cover crop challenges

- Because of Florida's low SOM and unique climate, increasing SOM and soil nutrients is expected to be a long-term process
- It may take several years for changes in soil health to translate to changes in tree health and productivity