EFFICACY OF SOIL SOLARIZATION AND ANAEROBIC SOIL DISINFESTATION FOR CONTROL OF NEMATODES, WEEDS, AND SOIL BORNE PLANT PATHOGENS IN CENTRAL FLORIDA

F.V. Sances[1], B. Aglave[1], K. Williams[1], C. Boone[1], S. Sances[2], W. Schonborn[3], & E. Rosskopf[3]
[1]Florida Ag Research, [2]Ag Metrics Group, [3]US Department of Agriculture (Collaboration Only)

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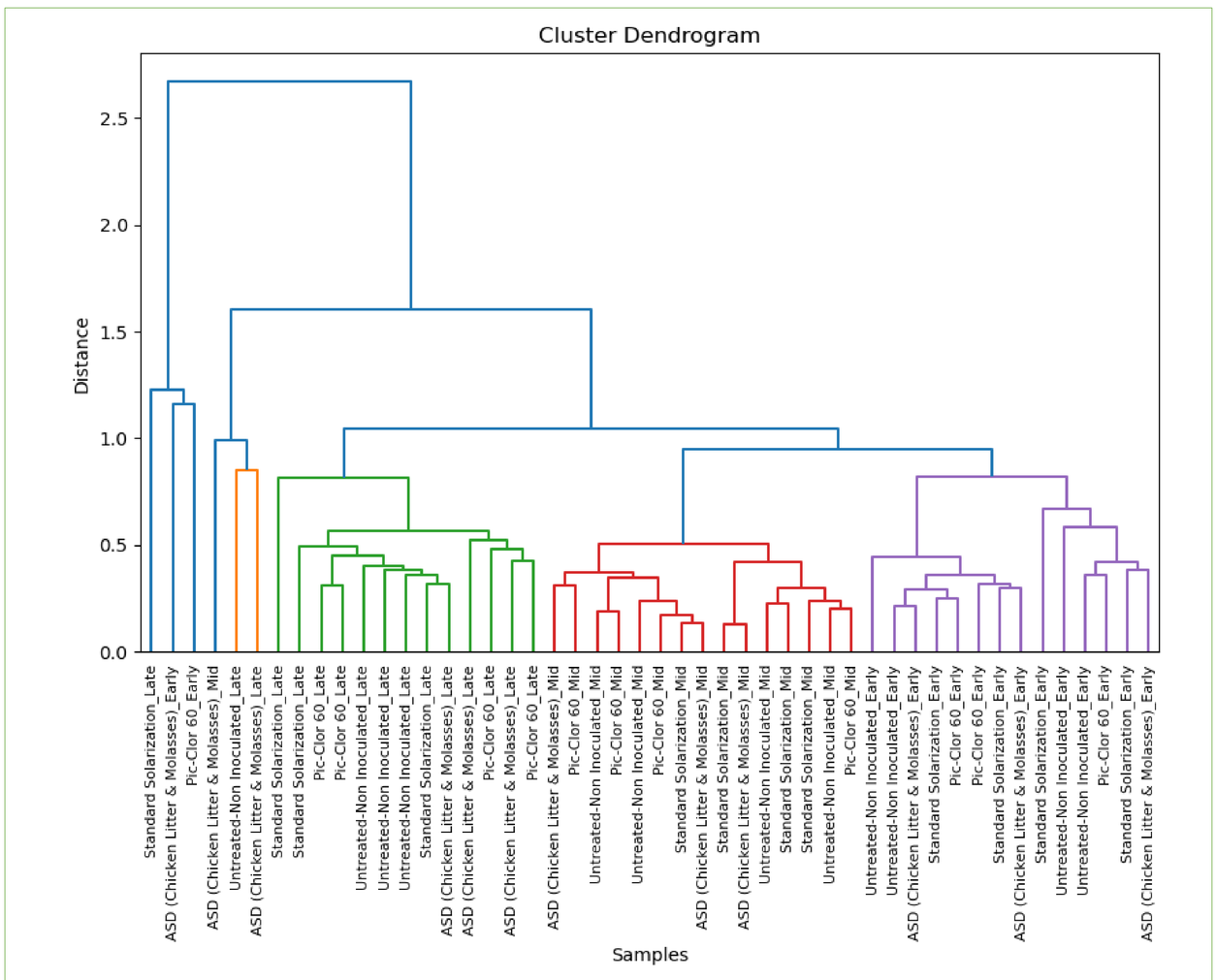
Introduction

The recurring strawberry production challenges of managing soil borne pests in commercial Florida strawberry farms have never been greater. In conventionally farmed operations, increasing regulatory pressures on remaining registered chemical soil fumigants, and the costs associated with their use are important factors that reduce the sustainability of the industry going forward. Also, while still in its infancy, organic strawberry production in Florida is now well established, and the 2022-23 season brought numerous examples of severely impacted plantings from both nematodes and soil borne diseases. To meet the demand for domestically produced winter fruit, Florida's organic strawberry growers have limited options for soil borne pest control and have come to rely on use of new land, field site isolation, high rates of organic soil amendments, and a variety of alternative organically approved soil pest control products with varying levels of efficacy.

For these reasons, both organic and conventional growers need alternative soil pest management techniques, and this project builds on previous work from these and other researchers to develop site-specific "Best Practices" for alternative nematode and pathogenic soil fungi control for Central Florida. These 2023 studies focused on optimizing Soil Solarization and Anaerobic Soil Disinfestation techniques in replicated field experiments, as well as installation of several grower-site demonstrations of these technologies with Central Florida strawberry growers for 2024.



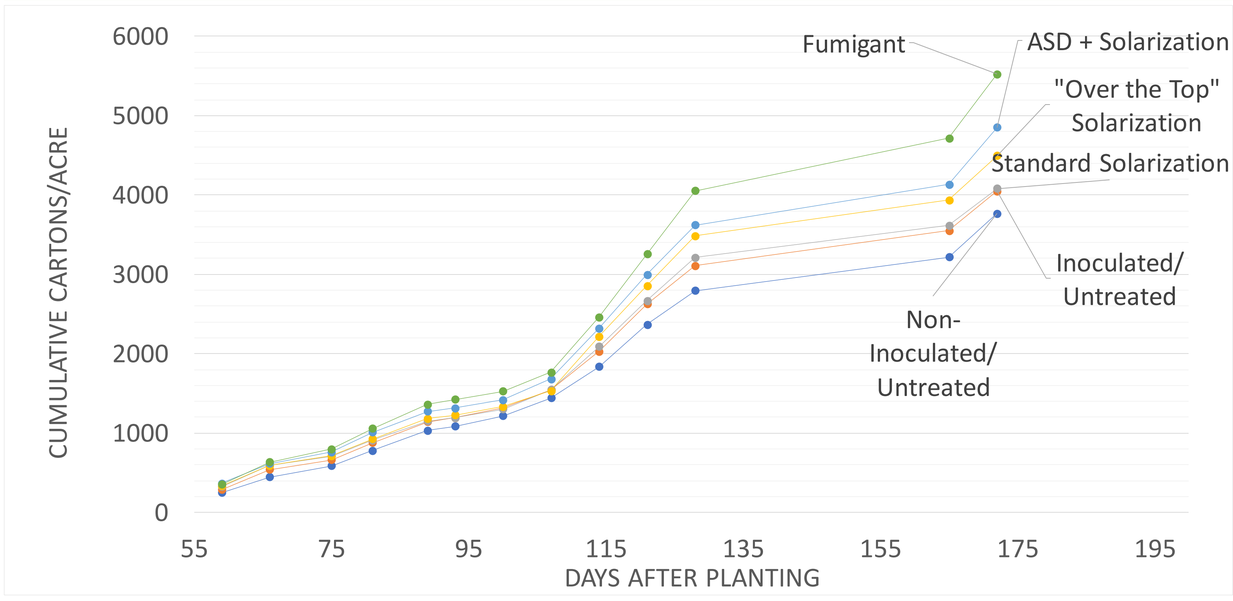
Metagenomic analysis of 16S and ITS sequencing data of soil microbiome. 1149 features detected across 48 samples. Dendrogram determines similarity across samples. Unsupervised clustering (colors) show sample consistency across seasonal timepoints as well as potential outliers (left samples). Processed data was derived from Mr. DNA pipeline. Final timepoint had the clearest separation in soil treatments indicating high reliability of treatment specific species detection.

2022-2023 Data Review

This presentation brings current performance data from these alternative soil management practices, which includes molecular analysis of effects of treatments to the soil food-web, effects on bedding plastics used in solar heating of soil, and a comparison of yield enhancement and pest suppression efficacy of the methods.

Cumulative Yield Comparison

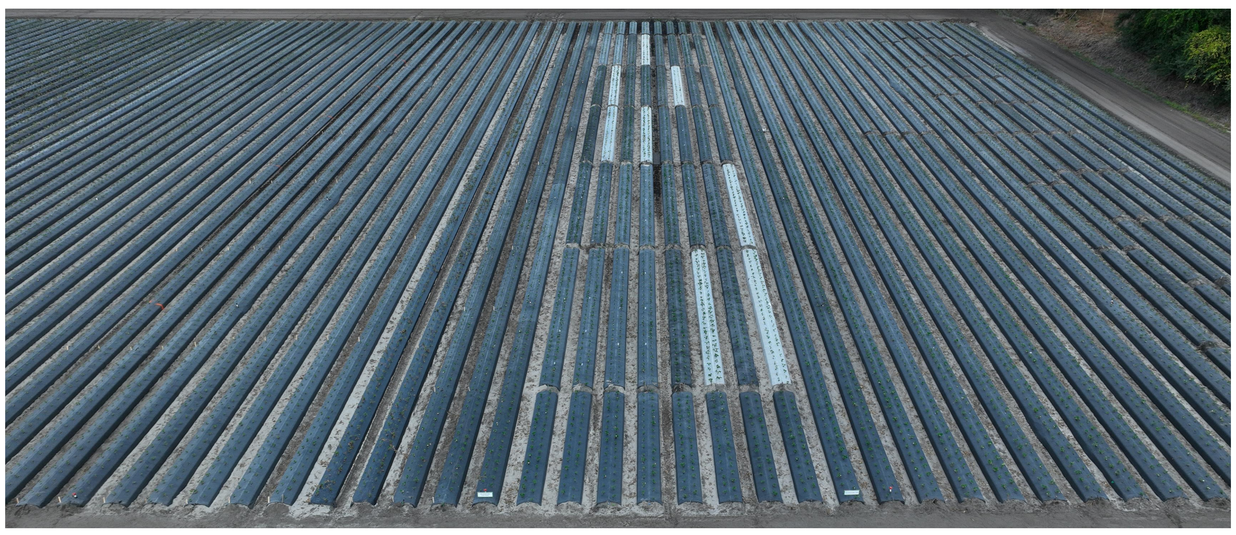
Over the 2022-23 season, the period when soil samples were collected, ASD + Solarization resulted in yields on par with the fumigated plots.

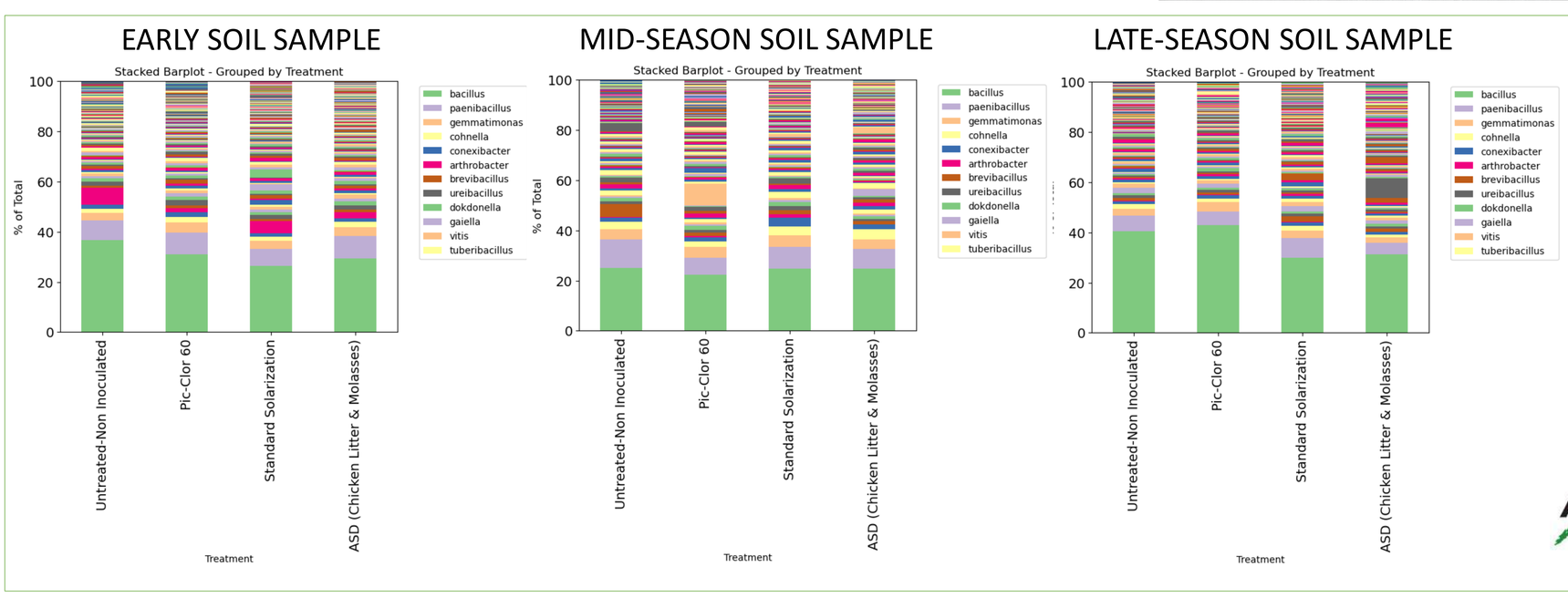


Soil Borne Pest Control

Macrophomina and nematode control for solarized plots was improved by "over the top" and ASD methods. Sting nematode suppression in the ASD and "over the top" treatments were on par with fumigant-treated plots. ASD did have a negative effect on certain brands of clear plastic.

	Macrophomina	Sting Nematode
Untreated - Inoculated	0.0%d	0.0%c
Standard Solarization	9.0%cd	3.5%c
" Over the top" Solarization	13.8%c	34.5%b
ASD +Solarization	10.4%c	50.1%b
PIC-Chlor 60 Fumigant	31.9%b	38.0%b
Untreated - Non-Inoculated	97.3%a	84.0%a





Soil Sample Diversity

Data summaries of "stackplot" representations of abundance data from genus level. Each timepoint grouped by treatment and stacked with detectable genera diversity expressed as percent of total abundance. Top 12 out of 349 genera listed. Alternating color bands show diverse genera, thickness is percent abundance ranked from most (bottom) to least (top).

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3001 N Kingsway Rd. Thonotosassa, FL. 33592 (813) 986-5599