Combining Soil Solarization with Conventional Chemical Fumigants and Anaerobic Soil Disinfestation (ASD) in Florida Strawberry Production

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Introduction

This "Proof of Concept" field demonstration is intended to evaluate the suitability of using solar radiation to enhance soil borne pest control with Conventional Fumigants and Anaerobic Soil Disinfestation in commercial Florida strawberry production.

Potential benefits:

a) Organic growers need weed and soil pest control options
b) Conventional ag could use less chemicals in warm soil
c) Potential waste recycling system.

Photo 1. Jul 9 - Trial initiation. ASD components; chicken manure and molasses applied under both black and clear plastic mulch.

Methodology

Alternate use of clear plastic for summer solarization with chemical fumigants and ASD, then summer plastic replaced with black plastic mulch just prior to planting. Crop finished with black mulch.

Timeline	
Establishment and Solarization (ASD)	July 9
Fumigation (half rate)	August 27-29
Re-tarped (Black)	September 21
Planted	October 9
First Harvest	December 3

Photo 2. Aug 27-29 - Chemical fumigant application.

Table 1

		Plant Growth - Dec 17				
		Root Wt (g)		Plant Wt (g)	# Leaf	# Flower
Clear Tarp	ASD	2.0	a-e	52.2	43.4	0.6
	Pic 60 - 150 lb ai/a	1.9	a-f	63.3	48.7	0.3
	K-PAM - 32 gal/a	2.1	a-d	55.1	46.2	0.7
	Non-Inoculated	2.2	a-d	66.5	39.5	0.4
	Standard Practice	1.4	f	41.6	40.2	0.8
Black Tarp	ASD	2.2	abc	65.0	37.6	0.4
	Pic 60 - 150 lb ai/a	1.9	b-f	52.5	40.4	0.4
	K-PAM - 32 gal/a	2.5	a	60.8	51.0	0.5
	Non-Inoculated	1.8	c-f	56.1	37.4	0.4
	Standard Practice	1.6	def	44.7	37.6	0.3

*Standard practice: Pic-Chlor 60 and KPAM

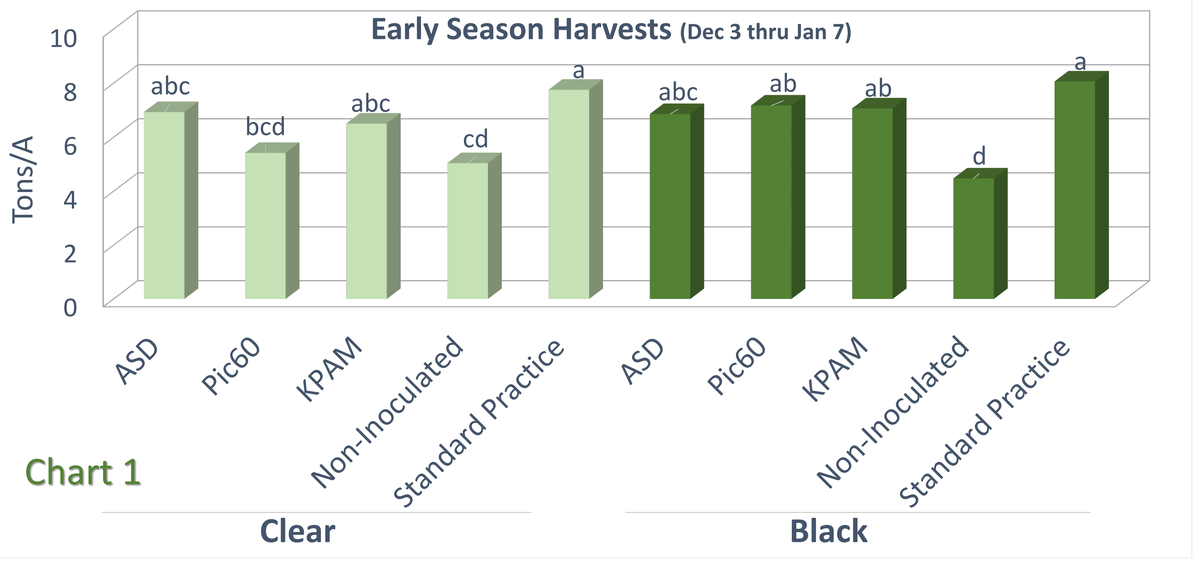

Chart 1

Table 2

		CFUs/g	Nematode (NSD)		
		Macrophomina (Sept 23)	Stunt (Sept 13)	Root Knot (Sept 13)	Sting (Oct 12)
Clear Tarp	ASD	25.0	2.3	6.5	1.5
	Pic 60 - 150 lb ai/a	3.0	0.0	0.0	0.0
	K-PAM - 32 gal/a	12.0	0.0	0.0	0.5
	Non-Inoculated	14.0	2.0	0.0	1.5
Black Tarp	ASD	6.8	0.0	0.0	1.0
	Pic 60 - 150 lb ai/a	4.0	0.0	0.0	0.3
	K-PAM - 32 gal/a	17.3	0.0	0.0	3.0
	Non-Inoculated	39.8	1.3	3.8	3.3

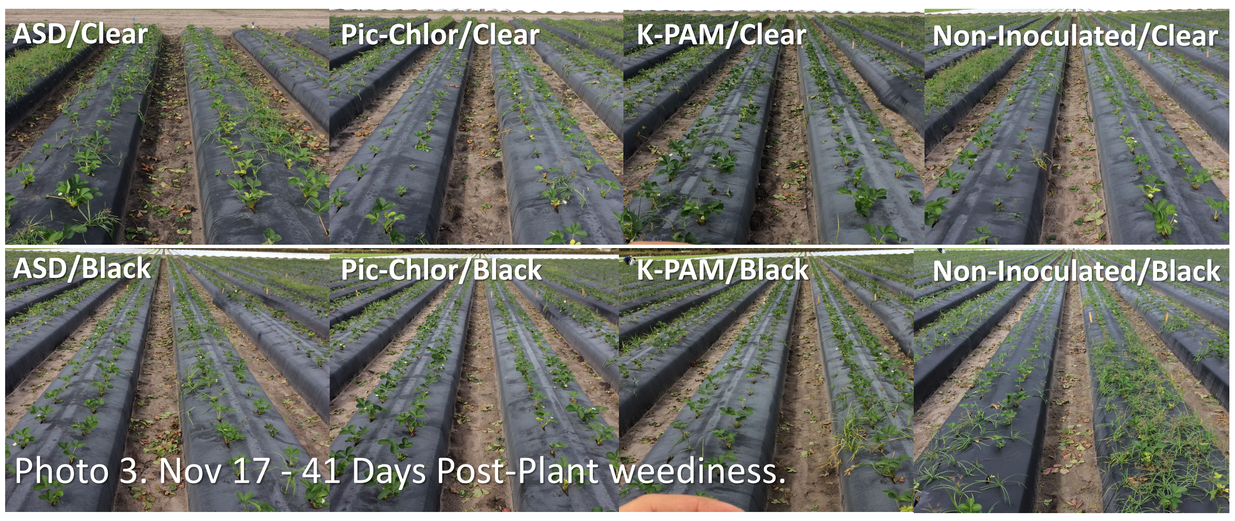

Photo 3. Nov 17 - 41 Days Post-Plant weediness.

Table 3 **Average Nutsedge Weight (g/Plot) – September 8**

Clear Tarp	ASD	93.98	Black Tarp	ASD	30.98
	Pic 60 - 150 lb ai/a	0.2		Pic 60 - 150 lb ai/a	0.88
	K-PAM – 32 gal/a	5.2		K-PAM – 32 gal/a	21.65
	Non-Inoculated	2.15		Non-Inoculated	51.56

Summary of Findings To-Date

1. This preliminary study and early season results are insufficient to fully evaluate treatment effects on soil borne pest management (Table 2) and total potential yields. Full season results will be available June 2022.
2. Clear plastic mulch used was damaged by warm soil fumigation which may underestimate the potential efficacy of fumigants applied during solarization (Data not shown).
3. Early season plant growth and root development were numerically improved by solarization except in the K-PAM treatments (Table 1).
4. Nutsedge control was generally superior with solarized chemical fumigation, but ASD performed better under black plastic compared to clear over summer months (Photo & Table 3).
5. Total early season fruit yields (7 harvests) were similar among treatments, but lowest for non-inoculated solarized plots.
6. Conventional grower practice yields were highest overall, although ASD + Solarization was also high yielding (Chart 1).

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