Facilitation of the Anaerobic Soil Disinfestation Pre-plant Soil Treatment for Strawberry and Caneberry Growers

DPR 2013/2014 PEST MANAGEMENT GRANT ALLIANCE GRANT PROGRAM

AWARDED TO FARM FUEL INC. AUGUST 2013

Purpose: Promote ASD through demonstration trials and educational outreach.

Organizations involved:

- Farm Fuel Inc.
- UCSC: Drs. Carol Shennan and Joji Muramoto
- Frontier Ag.
- UCCE: Mark Bolda and Oleg Daugovish
- PANNA
- Reiter Berry

Farm Fuel Inc.

Biodiesel from renewable oilseed crops

Development of products and methods that replace chemical pesticides on farms and home gardens

Farm consultation

Collaborative research

Anaerobic Soil Disinfestation

Biological, non-fumigant, pre-plant soil treatment to control soilborne plant pathogens

Project Details: 22 demonstration sites

- 20 one-acre sites
  - Divided between northern and southern California berry growing regions
  - All growers participating must be new to ASD and be conventional growers
  - Both strawberry and caneberry sites
- 2 twenty acre sites
  - One in Watsonville, one in Oxnard
  - Host growers were experienced ASD users
  - Demonstration of ASD on the large/ commercial scale
  - Host growers were asked to participate in follow-up educational events.

Project Details:

Materials/ Services provided by the grant:

- Rice bran (carbon source), delivered
- Grower consultation
- Three weeks of soil monitoring

Follow up questionnaire to growers

- Feedback from growers about ASD use and performance
- Details about application that are valuable to growers and research community

Educational opportunities for growers

- Pre and post demonstration events were held in both Watsonville and Ventura
  - Handouts with current ASD related research and project results in both English and Spanish
- Questionnaire results published as conclusive project report available to the public

Moving rice bran

Field preparation

Bed Preparation

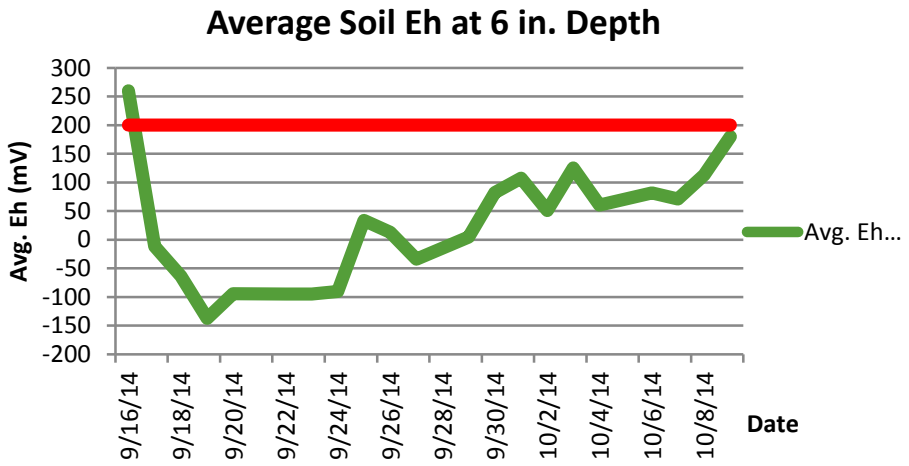
Finalizing beds

Application of drip irrigation lines and plastic mulch, burying plastic edges, tying off irrigation

Consultation and Monitoring

Consultant available throughout order, delivery, application, and monitoring process

- Sites were monitored daily for 21 days for moisture, anaerobic conditions (Eh in mVhrs), and temperature
  - 50,000 cumulative mVhrs is considered to be required for suppression of Verticillium wilt
- Daily irrigation recommendations were available to growers



5 week ASD treatment

Realistically, one can expect ~5 week plant-back for treatment application. (35 days from desired plant date). Example site establishment:

- Material application, incorporation into soil, listing beds, install drip tape, lay plastic mulch, seal mulch edges: 1wk (7 days from material spreading to start irrigation).
- From initial saturation irrigation maintain field capacity: 3wks, 21 days.
- Punch holes for planting and allow soil to re-aerate: 1wk, (~7 days).

Educational Events- Watsonville

Pre and Post Educational events (Spanish translation available)

- Held at UCCE Watsonville, 50-60 people in attendance
- Pre-project event topics: current science (Shennan), tips for successful application (Muramoto), commercial availability (FFI, Winslow), video of event available in English and Spanish on FFI website
- Post-project event topics: challenges facing berry industry (Bolda), current science (Shennan), application updates (Muramoto), commercial application/ project results (FFI, Winslow), practical application Q&A (grower)

Educational Events- Southern California

Pre and Post Educational events (Spanish translation available)

- Pre-project event held in Oxnard, topics: current science (Shennan), tips for successful application (Muramoto), commercial availability (FFI, Winslow)
- Post-project event held at the Hansen Research Farm as part of NASGA meeting. Topics: current science (Daugovish), application updates (Muramoto), commercial application/ project results (FFI, Winslow), practical application Q&A (grower)

Both events included handouts from each speaker (including Spanish translation when available)

Demonstration Results (FFI)

*In 2013, even with low to no anaerobic soil conditions measured, several of these growers reported net return gains of $2,000-3,500/acre over their standard un-treated practices

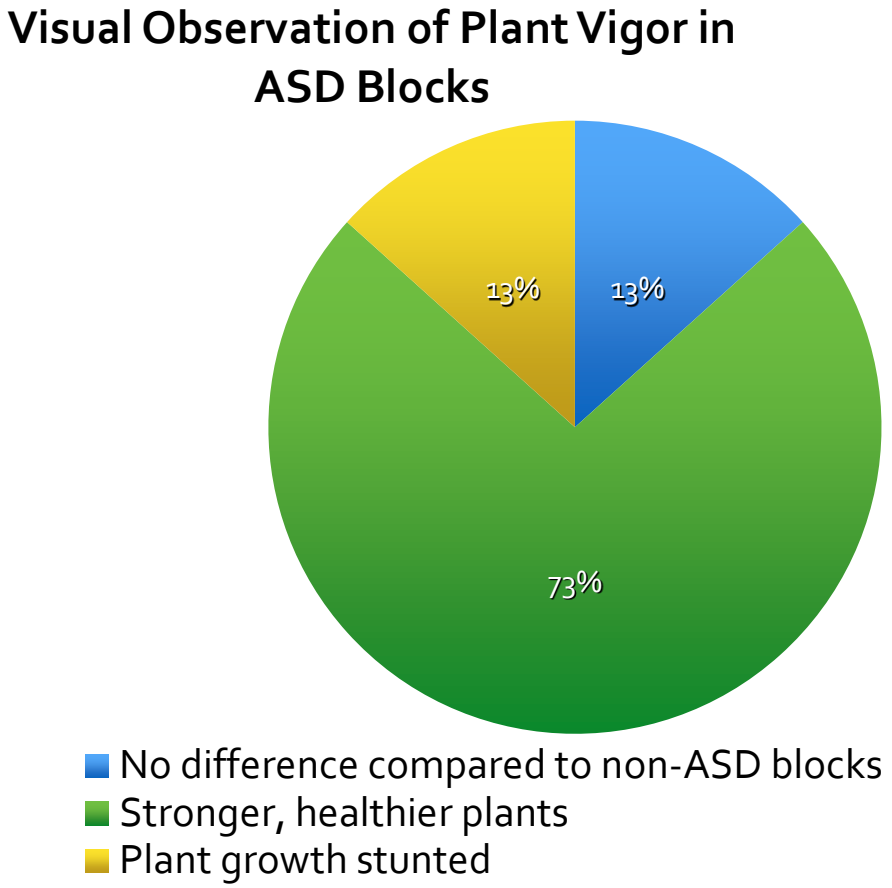
				Anaerobic Conditions During 21days of Irrigation (n=22)		
	% of 2013 Grant Growers to use ASD in 2014	Broadcasted Rice Bran (number of growers)	Bed-top roto-tiller bed shaper (number of growers)	Strong (>50,000)	Mild (>25,000)	Weak*(<25, 000)
Southern California	90	10	1	7	2	2
Northern California	60	8	3	2	3	6
Percent of total n=22	**68**	**82**	**18**	**41**	**23**	**36**

Questionnaire results

Questions ranged from detailed field prep, application, and irrigation timing questions to opinions on the practicalities of ASD and future adoption.

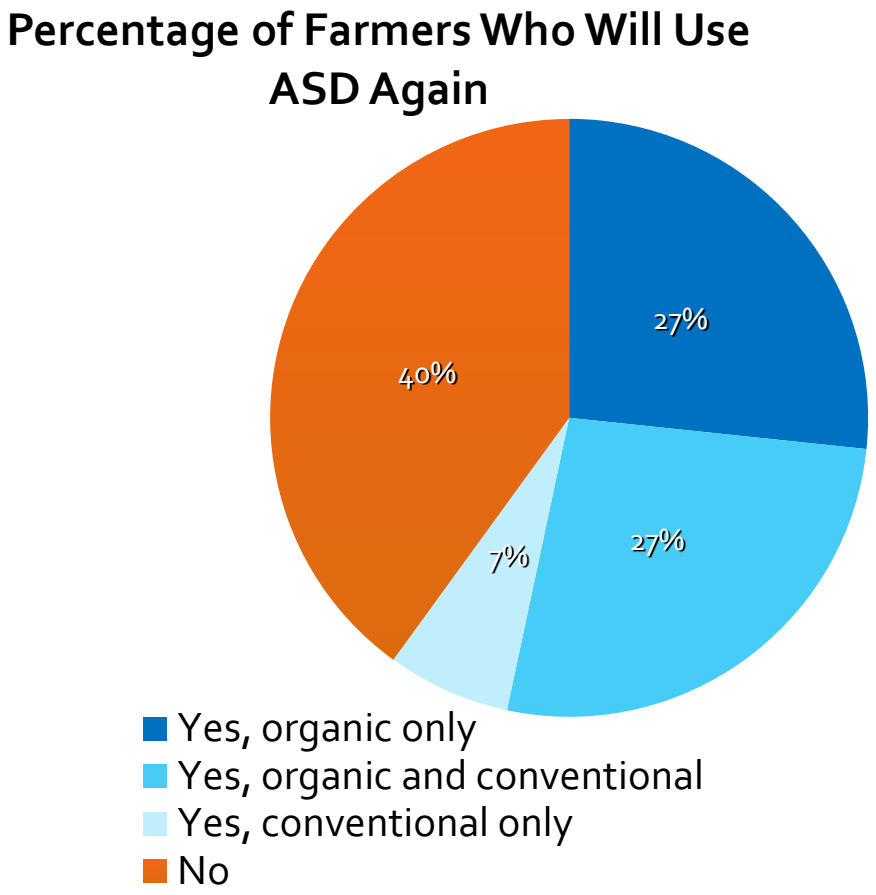
Raw data from questionnaires will be made available to researchers and policy makers (participants will be kept anonymous).

Questionnaire results: Benefits to using ASD



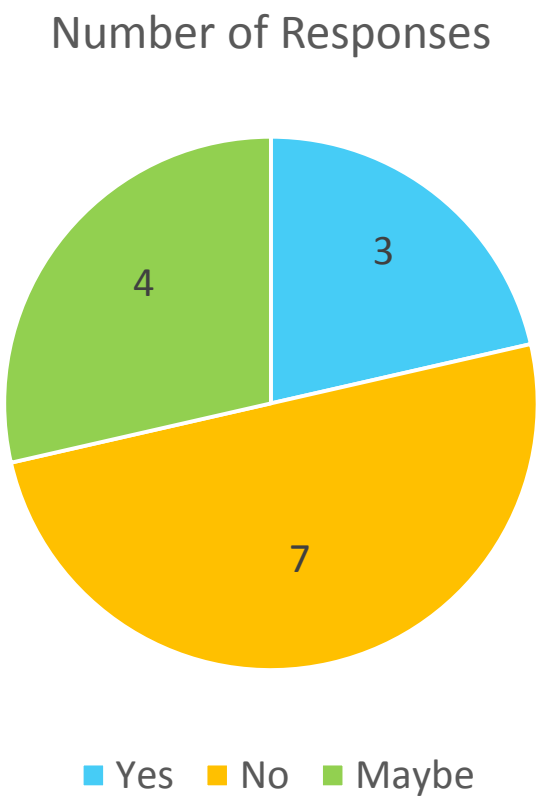
- Stronger plants: healthier, stronger root, less salt stress
- Better yield
  - Couple days early harvest
- Disease control
- Added nitrogen
- Did not lose production to buffer zones

Questionnaire results: Drawbacks to using ASD



- Application costs
  - High cost per acre
  - Increased labor hours
- Difficulty of application
  - Less flexible timing
- Increased water
  - More mildew

Questionnaire results: Will ASD replace fumigation?



- "No" Responses included reasons such as:
  - Challenges of incorporation into heavy clay soil
  - Lack of weed control
  - Problems with rotational crops (partners expect fumigation)
- One "Yes" response was followed by comment about benefits of replacing fumigants with ASD for the sake of neighbors (grower is in an increasingly urban area)

How to Improve (from grower comments):

- New carbon sources/ Decrease price
- Streamline application and timing
- More guidelines on disease control

Future work to promote ASD adoption as an industry standard

More affordable carbon sources

Focus on better disease management through ASD

- Education

More streamlined application procedures with an emphasis on efficiency to reduce labor costs

Research and demonstrations in other crops

Challenges to the Project

Grower Cooperation

Site Acquisition

Management/ Time

Many Thanks

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