# OREI HT Research Assessment Report

**4/25/2019**

**UF PSREU in Citra, FL**

Table 1, Plot Key of Experimental Treatments in the High Tunnel Tomato Trial

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Treatments** | | | |
| **Cover Crop** | **None** | | **Iron Clay Cowpea**  100 lbs/acre | |
| **Fertilization** | **Solid fertilizer**  Natursafe 10-2-8 260 lbs N/acre TOTAL  50 lbs N/acre at transplanting Side dressing every two weeks | | **Liquid fertigation (5-1-1)** K2SO4 to match K with solid fertilizer rate | |
| **Compost** | **None** | **Cow manure**  10 tons/acre  16:1 (C:N) | **Vermicompost**  2.5 tons/acre 14:1 (C:N) | **Yard waste**  10 tons/acre  18:1 (C:N) |
| **Grafting** | **None**  Skyway tomato (Johnny’s) | | **Yes**  Tube grafting  Scion: Skyway tomato (Johnny’s) Rootstock: Estamino | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Plot** | **Fertilization** | **Compost** | **Grafting** |
| 1 | Solid fertilizer | Cow manure | Yes |
| 2 | Solid fertilizer | Cow manure | No |
| 3 | Solid fertilizer | none | No |
| 4 | Solid fertilizer | none | Yes |
| 5 | Solid fertilizer | Yard waste | No |
| 6 | Solid fertilizer | Yard waste | Yes |
| 7 | Solid fertilizer | Vermicompost | Yes |
| 8 | Solid fertilizer | Vermicompost | No |
| 9 | Liquid fertigation | none | No |
| 10 | Liquid fertigation | none | Yes |
| 11 | Liquid fertigation | Yard waste | No |
| 12 | Liquid fertigation | Yard waste | Yes |
| 13 | Liquid fertigation | Vermicompost | Yes |
| 14 | Liquid fertigation | Vermicompost | No |
| 15 | Liquid fertigation | Cow manure | Yes |
| 16 | Liquid fertigation | Cow manure | No |

*Note*. The HT experiment was a randomized complete block design with six blocks total. Blocks I, III and V were planted with a cover crop. Blocks II, IV and

VI were left fallow. The details of each treatment are listed above the plot key including specific product information. The plot key includes specific treatments in each plot that make up the experimental research design of the high tunnel tomato trial.

# High performance treatments:

* Liquid fertigation, no compost, grafted
  + Plot 10 (4 high performance choices, 2 low performance choices)
* Liquid fertigation, cow manure, not grafted
  + Plot 16 (4 high performance choices, 3 low performance choices)
* Liquid fertigation, yard waste, grafted
  + Plot 12 (3 high performance choices, no low performance choices)
* Liquid fertigation, cow manure, grafted
  + Plot 15 (3 high performance choices, 1 low performance choice)

# Low performance treatments:

* Solid fertilizer, no compost, not grafted
  + Plot 3 (5 low performance choices, no high performance choices)
* Liquid fertigation, cow manure, not grafted
  + Plot 16 (4 high performance choices, 3 low performance choices)
* Solid fertilizer, cow manure, not grafted
  + Plot 2 (3 low performance choices, no high performance choices)

*Pest and Disease Observations*

Table 5, Summary of Common Pest and Disease Observations for High and Low Performance Treatments

|  |  |  |
| --- | --- | --- |
| **Plot** | **Treatments** | **Pest and Disease Observations** |
| 2 | Solid fertilizer, cow manure, grafted | Pitting |
| 3 | Solid fertilizer, no compost, not grafted | Leaf discoloration |
| 10 | Liquid fertigation, no compost, grafted | Stink bug damage and sighting, white fuzz |
| 12 | Liquid fertigation, yard waste, grafted | Powdery mildew |
| 15 | Liquid fertigation, cow  manure, grafted | Leaf discoloration, powdery mildew |
| 16 | Liquid fertigation, cow manure, not grafted | Whitefly damage, powdery mildew |

*Note*. In general, pressure and damage from pests and diseases were high and observed across all plots regardless of performance quality.

*Cover Crops*

Two participants reported using cover crops in their high tunnel and they both use buckwheat as part of their cover crop system. Two participants reported they do not use cover crops in the high tunnel because it is too labor

intensive. There were two participants that reported using a tarp as an alternative method instead of planting a cover crop. One participant plans to use buckwheat as the cover crop in their high tunnel in the future. A probe was asked about whether the speed of growth plays into the decision of what cover crop to

use. One participant commented that the choice of buckwheat as the cover crop was chosen based off its fast growth.

*Compost*

Two participants mentioned using plant-based compost. Worm compost was also mentioned by two participants. The use of peat moss as part of a compost regime was mentioned by two participants. Two participants commented about incorporating biochar into their compost. This incited a conversation among the participants about the cost of biochar being high, although participants mentioned having positive results using it. It was also noted that the use of biochar is fairly new in organic production systems.

*Grafting*

Only one participant commented that they previously grafted their own tomatoes. They stopped doing it themselves because it was too challenging and started buying their grafted tomatoes from a commercial seller. Now they purchase the grafted tomatoes unofficially from another local farmer in Florida because there are more Florida specific beneficials in the rootstalk compared to the commercial seller and the timeline works better.

*Fertilization*

One participant reported mixing fertilizers to make a spray as part of their management regime. Another participant commented that they use kelp and sometimes a liquid fish fertilizer on their operation. A third participant commented

that they would now consider using liquid fertigation after assessing the tomatoes.

*Recommendations for Future Research*

* Keep:
  + liquid fertigation as treatment
  + comparing different compost regimes
* Add:
  + Biochar incorporated in compost
  + Comparing different trellising methods for tomatoes (e.g., lower and lean v. stake and string methods)
  + Comparing different landscape fabric methods (e.g., burning holes in the fabric and planting directly in the holes v. keeping the fabric in the walkways more or leaving the ground bare)
  + Comparing soil solarization plastic (e.g., clear v. black)
  + End of season yield over time
  + Assessing flavor of tomatoes

# Discussion

Throughout the facilitated discussion, some participants made comments about the performance quality of treatments they did not choose as being part of their two high performance or low performance choices. This is expected due to the nature of discussion, although there were more comments made about the performance quality being low in general for all treatments overall. For example, there were more participants that commented about the liquid fertigation, no compost and grafted treatment (plot 10) not performing well than chose that as their low performance choice. Even treatments that were chosen as being high performing had evidence of pest and disease damage or had average size fruit, for example. The two highest performing treatments also had multiple participants that chose them as their low performance treatment, while the treatments chosen by participants as low performance did not have nearly as many participants picking them as their high-performance choice or made positive observations about them. Pest and disease pressure came into the conversation about overall treatment desirability before the participants were asked to comment about that topic specifically. This points to a lot of pest and disease pressure overall in the high tunnel, although pest and disease pressure is a topic not mutually exclusive to tomato fruit vigor and quality (the first topic of the facilitated discussion). Overall, the comments seemed more definitive in the minds of the participants about the low performance qualities of the treatments,

while the positive qualities of the treatments seemed more confounded to participants.

There was not any apparent treatment choice trend by block. This may indicate that the participants did not observe a treatment effect due to the presence of a cover crop or the block being left fallow. Liquid fertigation was the most prominent postitive treatment effect that stood out. One of the participants mentioned being interested in using liquid fertigation as a treatment after making their observations in the high tunnel. The severity of the pest and disease pressure may also have confounded the participants’ ability to observe a treatment effect in the high tunnel. Also, there was an additional discussion planned about weed pressure, although none of the participants made any significant weed observations. This is due to weeds being controlled in the management of the project. Participants were split on use of cover crops and this did not come up in the future research discussion. Grafting also did not come up in the final recommendation for future research discussion, although it was a common desirable treatment effect according to the treatment choices made by participants. Also, only one participant commented on using grafted tomatoes in their high tunnel. Therefore, cover crops and grafting were topics that the participants did not show considerable interest in having more information about via research from the discussion.