



Preparing the Gantry Field for PhytoOracle processing

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1 Field Preparation

The following steps must be completed prior to planting:

1. Shape raised beds
2. Set up sprinkler irrigation pipes, heads, gaskets, and filters
3. Inject subsurface drip irrigation tape
4. Place string and labeled stakes in the field

Note: These steps are carried out by Pauli lab members a few weeks before planting.

After completing these steps, the field will look like Figure 1.

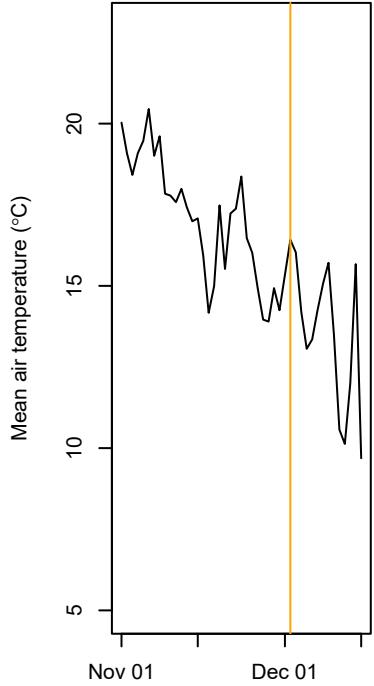


Figure 1: South gantry field with shaped raised beds, sprinkler irrigation, and strings and stakes.

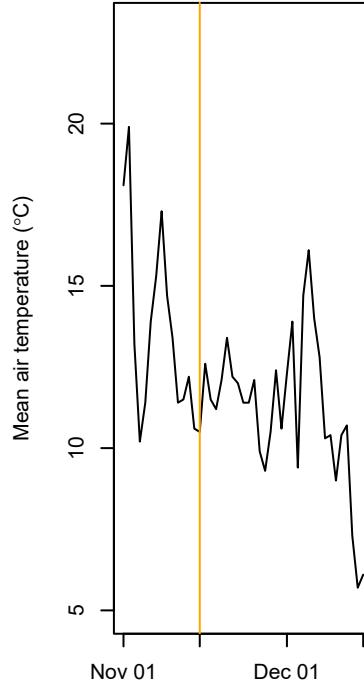
1.1 Planting

Lettuce planting generally occurs around Mid-November to early-December. The mean air temperature during this time has previously ranged from 10 °C to 22 °C.

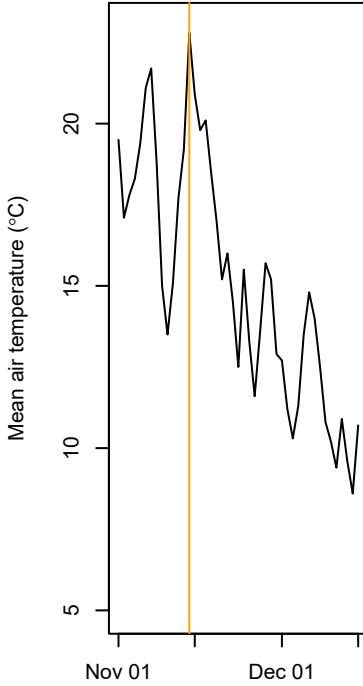
Season 13 planted 2021-12-02



Season 15 planted 2022-11-15



Season 17 planted 2023-11-14



1.1.1 Equipment

Planting is done by hand using Earthway garden seed planters (**Figure 2**). Lettuce seeds must be planted at a depth of 1/8 to 1/4 inch. At the bottom of the seed planter, there is an adjustable screw for setting the planting depth - make sure this is set to an acceptable depth. Also, make sure that the chain is not tangled, as it is meant to cover the soil after the planter penetrates the soil during planting.



Figure 2: Earthway garden seed planter.

The planters were modified by fitting them with funnels and tubing that allows the user to manually feed the small lettuce seeds instead of using the provided seed container/plates. Planting is carried out by members

of the Pauli, Arnold, and Michelmore labs. People are paired up: one person is responsible for planting the seeds, the other is responsible for ensuring the correct plot numbers are being planted and that the correct seed is provided to the person planting (**Figure 3**).



Figure 3: One person planting using the Earthway planter, while the other is responsible for ensuring correct plot numbers and handing the correct seed to the person planting.

1.1.2 Potential Issues During Planting

In past years, the tubing that feeds the seeds into the ground have gotten pinched or otherwise clogged. In these cases, entire columns were inadequately planted - the seed did not make it into the seed line of the expected plot. When this happens, Drs. Duke Pauli and Maria José Truco are notified. The plots within the specific column/s are noted. If seed is not immediately available, Dr. Maria José Truco sends it from Davis, California.

1.2 Ground Control Points

The raw data collected by the Field Scanalyzer has a high level of misalignment of images and point clouds. To mitigate this error, a high number of ground control points (GCPs) are placed in the field. These GCPs include: - White plastic bucket lids, four columns into the field on both east and west ends - Umbrella holders with grey metal bucket lids, trench between four and five columns into the field on both east and west ends
Each range contains a single white plastic bucket lid and two umbrella holders with grey metal bucket lids in the following arrangement:

1.3 Thinning

Thinning is a very important part of the field trial. The planters often result in clusters of seeds germinating close to each other. Thinning is conducted in two phases:

- Phase 1: Thin the plots into 10 plant clusters
- Phase 2: Thin the plots into 10 individual plants



Figure 4: Your caption goes here

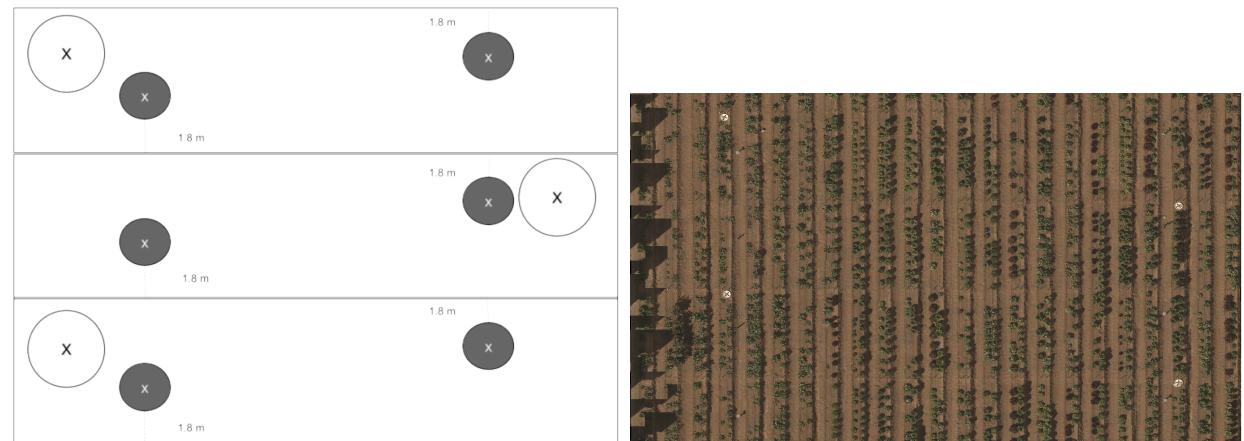


Figure 5: Your caption goes here

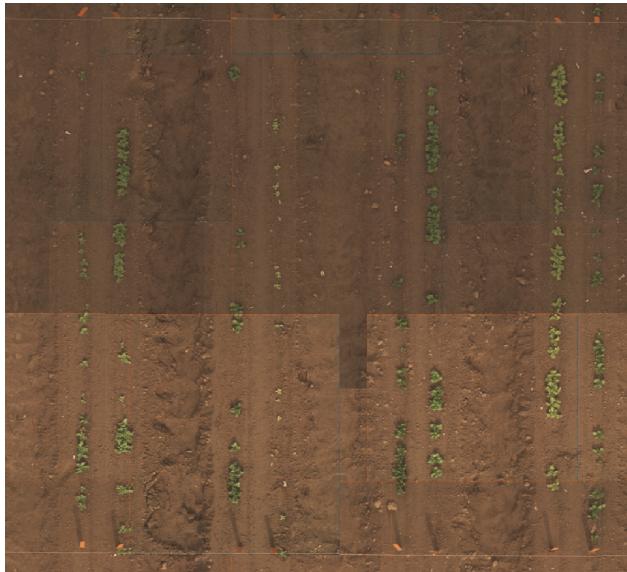


Figure 6: Plants after Phase 1 of thinning.



Figure 7: Plants after Phase 2 of thinning.

The 10 individual plants resulting from Phase 2 should be equidistant. The equidistant placement reduces any overlap with neighboring plants. This is an important step as the goal with the Field Scanalyzer data is to phenotype each plant individually. The farther plants are, the easier it is to individually phenotype them.