

PTMC Jr. Final Project Report: Growing Radishes in Lunar Simulant

Team Name: Lunar Radish Growers

Background/Reasoning

Radishes were chosen due to their fast-growing nature, typically ready for harvest within 20–30 days, aligning with the 8-week grow period. Our experiment aimed to investigate the impact of varying soil compositions and amendments on radish growth in lunar regolith simulant, simulating lunar farming conditions.

Hypothesis

We hypothesized that radishes grown in a mixture of 50% lunar simulant and 50% earth soil with additional compost and bone meal would exhibit the best growth in terms of sprout count, plant height, and leaf development compared to other compositions.

Independent Variable

- Soil composition: Varying percents of lunar simulant, earth soil, compost, and bone meal.

Dependent Variable

- Plant growth, measured by:
 - Sprout count
 - Plant height
 - Leaf count and condition
 - Radish formation (presence and size)

Controls/Constants

- Light: 12-hour day/night cycle using grow lights.
- Water: 1 ounce every 3 days (increased after Week 7 to address wilting).
- Temperature: room temperature.
- Seeds: Same radish variety.

Procedures

1. Setup:

- Prepared six pots with the following compositions:

- **Pot 1 (Control):** 100% earth soil
- **Pot 2:** 75% lunar simulant, 15% earth soil, 10% earthworm casings, 1 cup compost, 1 tablespoon bone meal
- **Pot 3:** 75% lunar simulant, 15% earth soil, 10% earthworm casings (no compost or bone meal)
- **Pot 4:** 50% lunar simulant, 40% earth soil, 10% earthworm casings, 1 cup compost, 1 tablespoon bone meal
- **Pot 5:** 50% lunar simulant, 40% earth soil, 10% earthworm casings (no compost or bone meal)
- **Pot 6:** 100% lunar simulant

2. Planting:

Planted 3 radish seeds in each pot. Thinned to the healthiest sprout post-germination.

3. Measurements:

Monitored weekly for:

- Sprout count
- Plant height
- Leaf count
- Radish formation

4. Adjustments:

Increased watering post-Thanksgiving break due to wilting.

Data Collection

PLANT THE MOON

#	OBSERVATIONS	WEEK	SPROUTS	HEIGHT	CHANGES
1	No growth noticed. Watering one ounce every 3 days	1	0	n/a	n/a
2	No growth noticed. Watering one ounce every 3 days	1	0	n/a	n/a
3	No growth noticed. Watering one ounce every 3 days	1	0	n/a	n/a
4	No growth noticed. Watering one ounce every 3 days	1	0	n/a	n/a
5	No growth noticed. Watering one ounce every 3 days	1	0	n/a	n/a
6	No growth noticed. Watering one ounce every 3 days	1	0	n/a	n/a
1	100% Earth soil started getting sprouts in week 2.	2	4	3cm	none
2	no growth	2	0	n/a	n/a
3	3 sprouts. Only corner without sprouts is back right corner.	2	3	1cm	n/a
4	no growth	2	0	n/a	n/a
5	One sprout in back right corner	2	1	1cm	n/a

PLANT THE MOON

#	OBSERVATIONS	WEEK	SPROUTS	HEIGHT	CHANGES
6	no growth	2	0	n/a	n/a
1	All four sprouts are continuing to grow and more leaves are developing.	3	4	4cm	no
2	Week 3 and we still see no growth. We repotted this pot.	3	0	n/a	yes
3	Still has 3 sprouts. Leaves are continuing to develop but stem growth has not increased.	3	3	1cm	no
4	Week 3 and we still see no growth. We repotted this pot.	3	0	n/a	yes
5	Still only has one sprout but it is growing taller and more leaves.	3	1	2.5 cm	no
6	Week 3 and we still see no growth. We repotted this pot.	3	0	n/a	yes
1	Some leaves are starting to die and fall off.	4	4	5cm	no
2	no growth since repot	4	0	n/a	no
3	stem growth is very low. More leaves are continuing to develop	4	3	1cm	no
4	no growth since repot	4	0	n/a	no

PLANT THE MOON

#	OBSERVATIONS	WEEK	SPROUTS	HEIGHT	CHANGES
5	growth continueing	4	1	3cm	no
6	no growth since repot	4	0	n/a	no
1	Plants are continuing to grow but still noticing leaves dying and falling off.	5	3	5.5cm	no
2	3 sprouts have emerged since regrowth	5	3	1.5cm	no
3	No new growth and 2 of the plants are starting to wilt. Leaves on tallest plant are turning yellow.	5	3	1cm	no
4	5 small sprouts have emerged since repotting	5	5	1cm	no
5	1 taller sprout is still growing and 2 small sprouts emerged this week.	5	3	5cm	no
6	One small sprout has emerged this week.	5	1	.5 cm	no
1	No change from week 5. Note: Small leaves, tall stems	6	3	5.5cm	no
2	3 sprouts with multiple stemming leaves.	6	3	3.5	no
3	3 sprouts, stem growth increasing but still shorter than other pots but large leaves.	6	3	2cm	no

PLANT THE MOON

#	OBSERVATIONS	WEEK	SPROUTS	HEIGHT	CHANGES
4	5 sprouts each with 3+ leaves per stem.	6	5	2cm	no
5	1 tall sprout with 2 leaves and 2 smaller sprouts. One of the smaller sprouts stems off with two sections.	6	3	5cm	no
6	1 small sprout. Died over the weekend... adding water to see if it springs back up	6	1	0cm	no
1	Thanksgiving break... we did not take measurements over break. When we returned from break, all plants were wilted so we will water double this week.	7			double watering
2		7			no
3		7			no
4		7			no
5		7			no
6		7			no
1	no radishes developed	8	3	5.8cm	no
2	no radishes developed	8	3	4cm	no

[illegible]

Analysis

- **Best Growth:** Pot 5 demonstrated the tallest height (6 cm), but Pot 4 had the highest sprout count by Week 2. However, no radishes formed in any pot.
 - **Amendments:** Pots with compost and bone meal (Pots 2 and 4) showed healthier leaves and better sprouting compared to those without.
 - **Challenges:** Watering inconsistencies during Thanksgiving break led to wilting, impacting final growth outcomes.
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Conclusions

Our hypothesis was partially supported. While Pot 5 achieved the best height, the lack of radish formation suggests that even the best soil amendments were insufficient for radish development in lunar simulant. Nutrient adding appears critical but needs further refinement.

Future Considerations

- Test additional amendments to improve nutrient availability.
 - Experiment with more consistent watering schedules to prevent stress.
 - Explore different crops better suited to low-nutrient conditions.
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Reflection

This experiment highlighted the complexities of growing crops in simulated lunar soil. The most surprising discovery was the difference in sprouting between pots with and without amendments. Our study contributes to understanding the challenges of lunar agriculture and the importance of soil amendments for future missions.
