How Different Types of Soil with Moon Regolith Affect the Growth of Beans

Team Name: Science Sisters Team #: 12869 Challenge Division: Elementary

Experimental Parameters

For our experiment we planted beans because beans pull nitrogen from the air. Our **independent variables** are two pots of 50% moon regolith and 50% seed starter; two pots of 50% moon regolith and 50% garden soil; and two pots of 50% moon regolith and 50% worm compost with live worms. We chose seed starter and garden soil because they are healthy for plants, and we chose worm compost with live worms because it is also healthy, and the worms could break up the moon regolith. Our **dependent variable** is how high the bean plants grow. Our **controls** are two pots of 100% moon regolith and two pots of 100% garden soil. We have **controlled for** moisture level, the same grow lights, the same pots, and the same plant (beans).

Project Hypothesis

Our **hypothesis** is that the pots 9 and 10 with 50% moon regolith and 50% worm compost with worms will grow the tallest; the pots 5 and 6 with 50% moon regolith and 50% seed starter will grow the second tallest; the control pots 3 and 4 with 100% garden soil will grow the third tallest; pots 7 and 8 with 50% moon regolith and 50% garden soil will grow the fourth tallest and the control pots 1 and 2 with 100% moon regolith will grow the shortest.

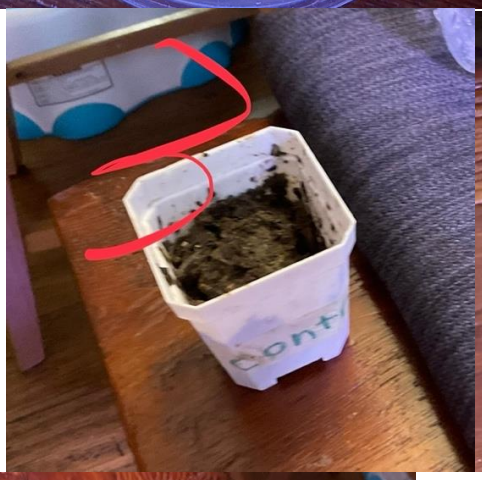
Experimental Design and Procedures

We planted the beans in three-inch pots which are placed on a heating mat until they sprout. When they sprout, we move them to a grow light. The pots have holes in the bottom, so we put the pots in cups to collect the water, which will be reused. The pots have caps to stop the water from evaporating which will be removed when the plants start to hit the cap. Every day we check the height and the moisture level of the beans. We made a graph to show the results.

Results

The first part of our hypothesis was correct; pots 9 and 10 which had 50% worm compost with worms and 50% moon regolith grew the tallest with a height of 13.5 and 11cm. We think this is because the worms added nutrients to the soil and broke up the soil making it easier for the roots to push through. Our hypothesis about pots 7 and 8 which had 50% garden soil and 50% moon regolith was incorrect; they grew the second tallest at heights of 10.5 and 9cm. Our hypothesis about pots 6 and 7 which had 50% seed starter and 50% moon regolith was incorrect; they grew the third tallest at heights of 7.5 and 9cm. Control pot 1 with 100% moon regolith sprouted but got stuck at 1 cm. We think that it got stuck because the moon regolith hardened, and the cotyledon could not break through the compacted regolith. Control pot 2 with 100% moon regolith sprouted and reached a height of 9cm. We think the seed in pot 2 was planted closer to the surface so it had a chance to break through before the regolith hardened. Our hypothesis about control pots 3 and 4 which had 100% garden soil did not sprout. We replanted them at week 4 but the new seeds still did not sprout. We do not why especially since 50% garden soil and 50% moon regolith did sprout. Our guess is that at least one seed was a dud, and the garden soil was too dense to push through. Perhaps the moon regolith helped the plants grow by making the soil less dense.

Week 2 Photos



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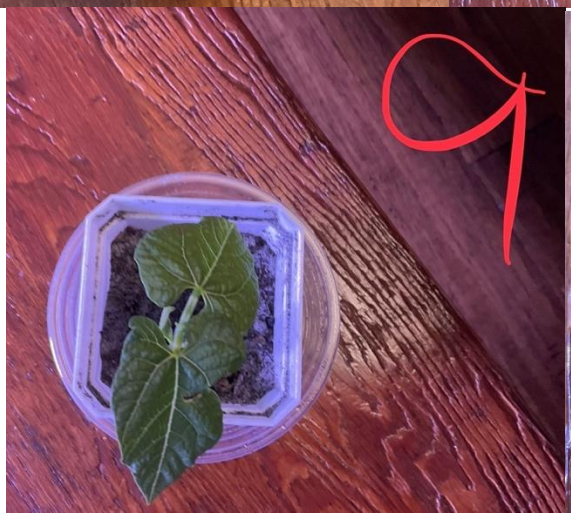
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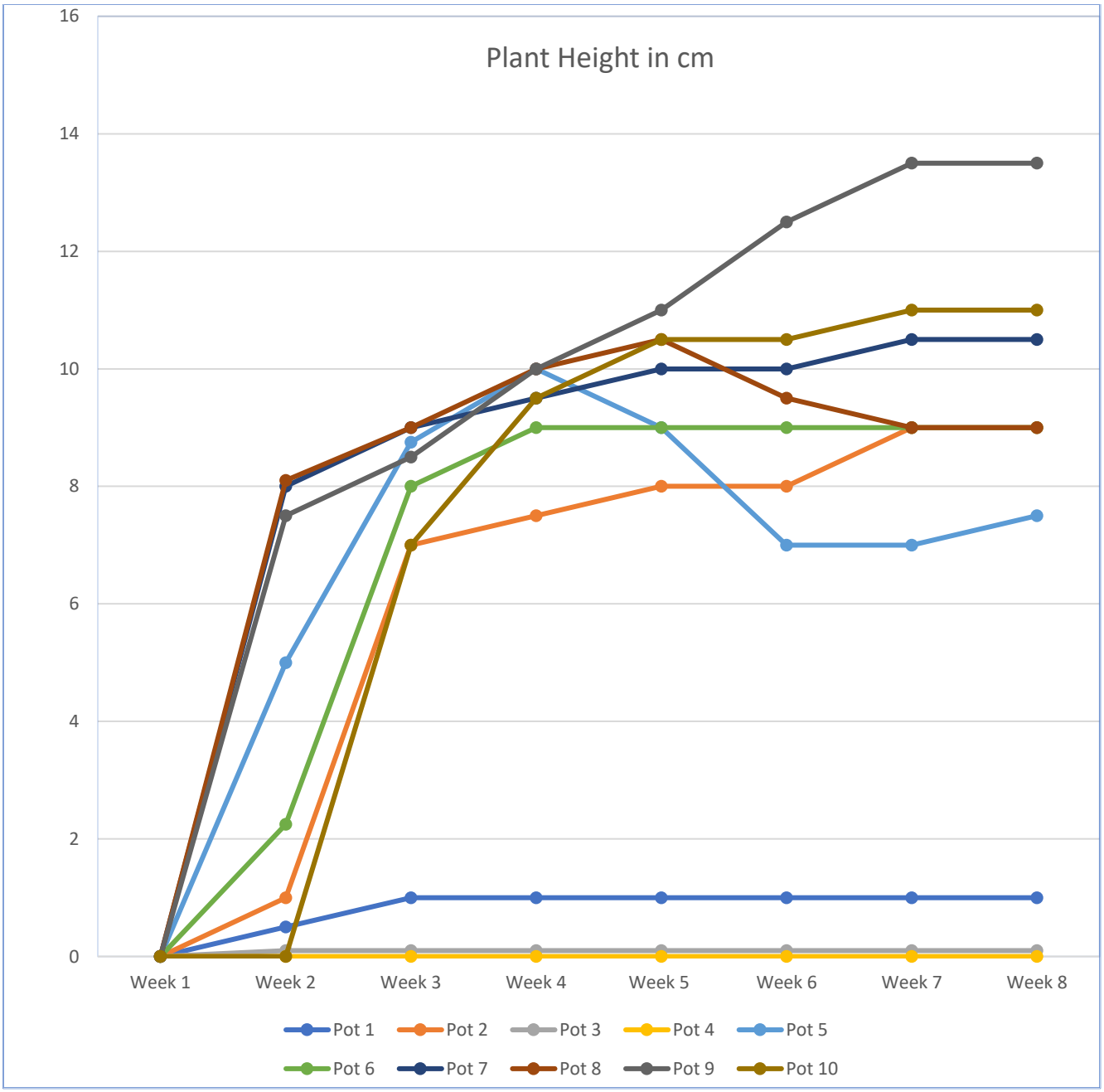

Grow Pot Setup

Pot	1 Control	2 Control	3 Control	4 Control	5	6	7	8	9	10
Soil & Amendments	100% Moon Regolith	100% Moon Regolith	100% Garden Soil	100% Garden Soil	50% Moon Regolith & 50% Seed Starter	50% Moon Regolith & 50% Seed Starter	50% Moon Regolith & 50% Garden Soil	50% Moon Regolith & 50% Garden Soil	50% Moon Regolith & 50% Worm Compost w/ Worms	50% Moon Regolith & 50% Worm Compost w/ Worms
Crop	Bean	Bean	Bean	Bean	Bean	Bean	Bean	Bean	Bean	Bean

Chart of Plant Growth in Centimeters

	Pot 1	Pot 2	Pot 3	Pot 4	Pot 5	Pot 6	Pot 7	Pot 8	Pot 9	Pot 10
Week 1	0	0	0	0	0	0	0	0	0	0
Week 2	0.5	1	0.1	0	5	2.25	8	8.1	7.5	0
Week 3	1	7	0.1	0	8.75	8	9	9	8.5	7
Week 4	1	7.5	0.1	0	10	9	9.5	10	10	9.5
Week 5	1	8	0.1	0	9	9	10	10.5	11	10.5
Week 6	1	8	0.1	0	7	9	10	9.5	12.5	10.5
Week 7	1	9	0.1	0	7	9	10.5	9	13.5	11
Week 8	1	9	0.1	0	7.5	9	10.5	9	13.5	11