GROW WITH THE FLOW

HYDROPONICS VERSUS SOIL

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RESEARCH QUESTION

What is the effect of kale's growth rate in a hydroponics system versus a soil system?

BACKGROUND INFORMATION

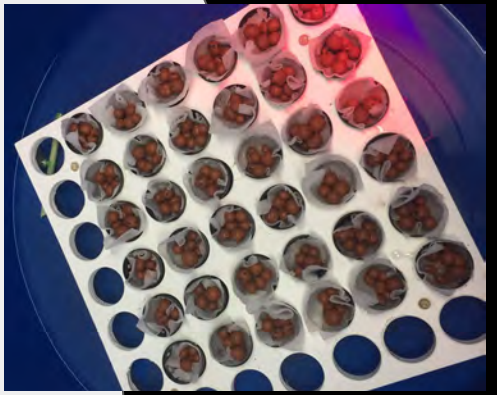
Terminology:

Hydroponics- Growing plants in a nutrient root medium

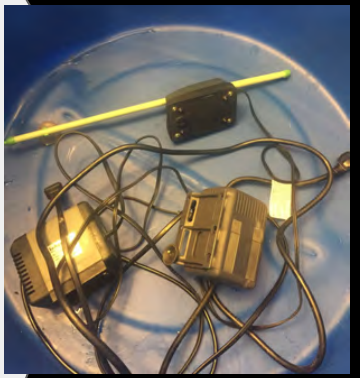
Airstone- a piece of limewood that diffuses air into water

Net pot- a tool used to anchor plants

Net pot tray- Floating contraption used to carry net pots



Hydroponics System

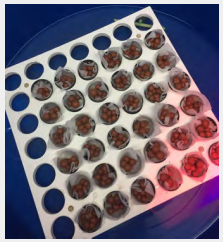


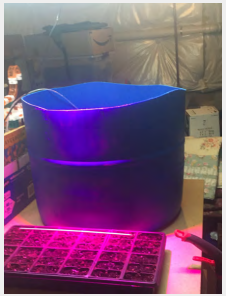
Airstone

VARIABLES

INDEPENDENT

- Method of growing





DEPENDENT

- Height of Kale

CONTROLS

- Light Amount
- Days Measured
- Days in between measuring
- Seed brand
- Water brand

HYPOTHESIS

If kale is grown in two different growing environments, hydroponics and soil, then hydroponics will be more efficient than soil. This is because when you perform hydroponics, you are controlling the nutrient intake, whereas when your growing plants in soil, you can’t control how many nutrients are in each pot.

MATERIALS

HYDROPONICS

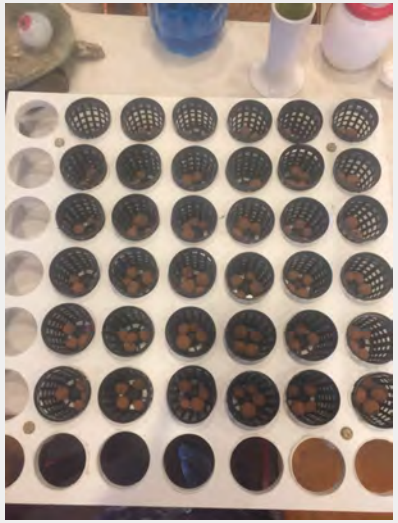
- 72 Kale seeds
- 36 Paper towels
- 36 net pots
- Expanding clay balls
- Airstone
- 30 gallon bucket
- UV/Growth light
- 11.35 L distilled water
- 15 ml nutrient soil
- Ruler
- 1 tsp
- Net pot tray

SOIL

- 72 Kale seeds
- 36 cell seeding plant tray
- UV/Growth Light
- ¼ cup
- 2.72 L distilled water
- Ruler
- Soil
- Liquid measuring cup

FloraGro
Nutrient Solution

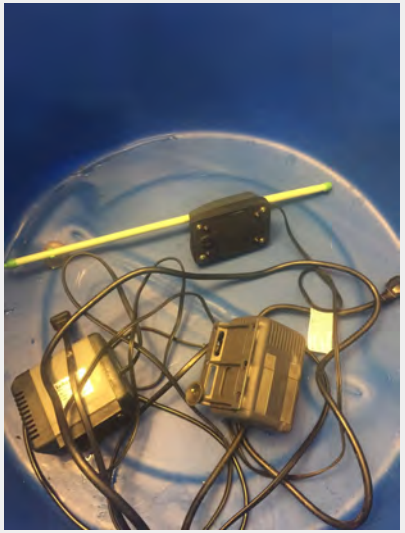
Hydroton
Expanding Clay Balls



Clay
balls
in net
pots

Net pots in net
pot trays

Airstone (bubbler)



Finished
net pot

PROCEDURE-FAILED ATTEMPT

1. Gather materials
2. Place 250 marigold seeds on three paper towels
3. Fold bottom up and Roll paper towels
4. Twist top
5. Secure with rubber band
6. Place in container
7. Wet the paper towel
8. Water every three days
9. Open paper towel onto a cookie tray
10. Cover with paper towels
11. Wet every three days

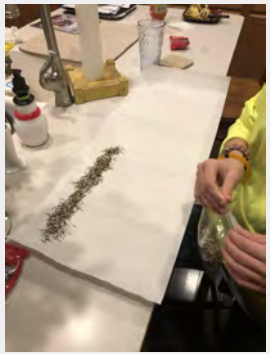
What Failed?

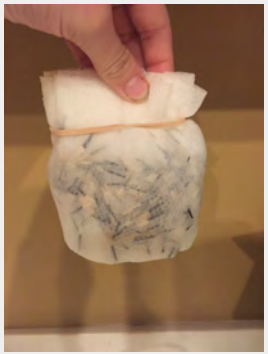
The seeds had dried out while it was not a day to water them.

After this I decided to switch to kale seeds and approach my project with a different attempt.

Materials:

- 6 paper towels
- Rubber band
- 250 marigold seeds
- Cookie sheet
- Water



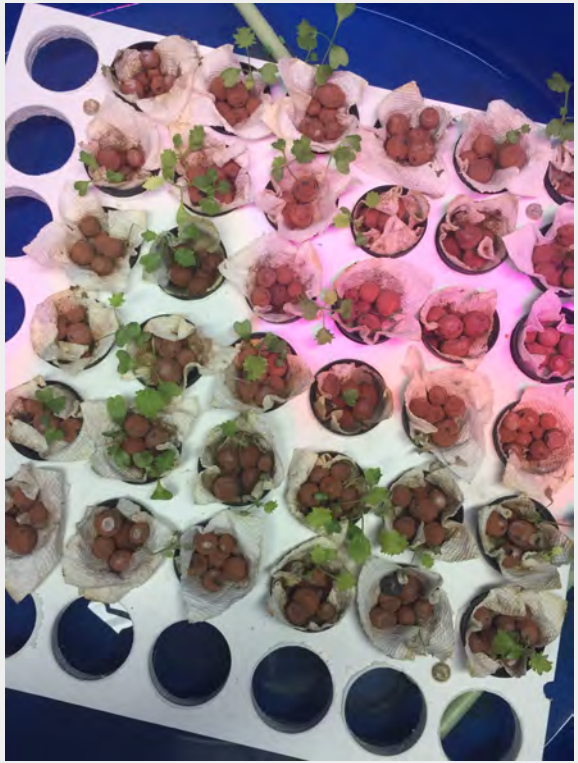


PROCEDURE-SUCCESSFUL ATTEMPT

1. Gather materials
2. Place 36 net pots in net pot tray
3. Fill each net pot with 5 clay balls
4. Cover balls with square paper towels
5. Place two seeds in each paper towel
6. Cover seeds with 3-4 clay balls
7. Fill bucket with 1 gallon of distilled water
8. Place net pot tray in water
9. Pour ¼ cup of soil in each cell of the seeding plant tray
10. Plant two kale seeds in each cell of soil
11. Water each cell ¼ cup of distilled water
12. Move both trays to your UV/Growth light
13. Starting from the next day, measure twice a week, water soil once a week, & add 1 tsp of nutrient solution to bucket every other day
14. Record and analyze data

Soil & Hydroponics System

Setting Up the System



Hydroponics System

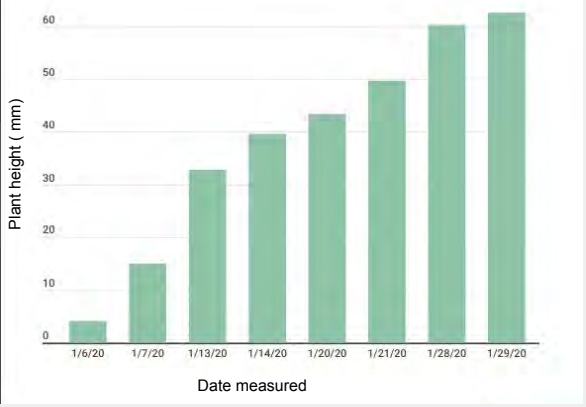
Specimen #	01/06/20	01/07/20	1/13/20	1/14/20	1/20/20	1/21/20	1/28/20	1/29/20
1A	9mm	1cm & 6mm	4cm	5cm & 1mm	5cm & 2mm	5cm & 7mm	6cm & 7mm	7cm & 2mm
1B	1cm & 9mm	1cm & 6mm	6cm	6 1/2	6cm & 7mm	7cm & 3mm	8cm & 1mm	8cm & 9mm
2A	2cm	2cm & 6mm	4 1/2 cm	5cm	5cm & 3mm	6cm	6cm & 6mm	7cm & 1mm
2B	not sprouted	not sprouted	not sprouted	2cm	3cm & 1mm	3cm & 8mm	4 1/2 cm	5cm & 6mm
3A	2cm	3cm	4 1/2 cm	5cm	5cm & 3mm	6cm & 1mm	7cm	7 1/2 cm
3B	1cm & 6mm	2cm & 1mm	4cm	5cm	5cm & 4mm	5cm & 8mm	6 1/2 cm	7cm & 3mm
4A	1cm & 8mm	3cm	5cm	5 1/2 cm	5cm & 6mm	5cm & 9mm	6cm & 7mm	7cm & 8mm
4B	2cm	2cm &1mm	5cm	5cm & 6mm	5cm & 7mm	6cm & 4mm	7cm & 3mm	8cm & 2mm
5A	3 1/2 cm	4 1/2 cm	6cm	7cm	7cm & 1mm	7 1/2 cm	8cm & 2mm	8cm & 9mm
5B	3 1/2 cm	3cm & 6mm	6cm	6 1/2 cm	6cm & 6mm	7cm	7 1/2 cm	8cm & 7mm
6A	4cm	5cm	8 1/2 cm	8cm & 9mm	9 1/2 cm	10cm	10cm & 7mm	11cm & 2mm
6B	1 1/2 cm	2 1/2 cm	8cm	9cm	9 1/2 cm	10cm	10cm & 4mm	11cm
7A	2 1/2 cm	3cm & 2mm	7cm	8 1/2 cm	8cm & 6mm	9cm & 1mm	9cm & 7mm	10cm & 3mm
7B	1cm & 8mm	2cm & 1mm	4cm & 2mm	5 1/2 cm	4 1/2cm	5cm	5cm & 6mm	6cm & 6mm
8A	2 1/2 cm	3cm	6cm	6 1/2 cm	7 1/2 cm	7cm & 9mm	8cm & 3mm	9cm
8B	2cm	2cm & 7mm	5cm	6cm	6cm & 3mm	7cm & 1mm	7cm & 8mm	8 1/2 cm
9A	2cm & 9mm	3 1/2 cm	6cm & 7mm	6 1/2 cm	7cm & 2mm	7cm & 8mm	8cm & 3mm	8cm & 9mm
9B	2cm & 1 mm	2 1/2 cm	5 1/2 cm	6cm & 9mm	7cm & 3mm	7cm & 9mm	8 1/2 cm	9cm & 4mm
10A	3 1/2 cm	4cm	7cm & 3mm	7cm & 7mm	7cm & 8mm	8cm & 3mm	8cm & 9mm	9 1/2 cm
10B	2 1/2 cm	3 1/2 cm	5cm & 6mm	5cm & 6mm	6cm	6 1/2 cm	7cm & 2mm	8cm
11A	1 1/2 cm	1cm & 9mm	5 1/2 cm	7cm	6cm & 7mm	7cm & 4mm	8cm & 2mm	9cm & 3mm
11B	2cm	2cm	6cm	6 1/2 cm	6cm & 6mm	7 1/2 cm	8cm & 4mm	9cm
12A	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
12B	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
13A	not sprouted	not sprouted	not sprouted	1cm & 1mm	1cm & 3mm	2cm & 8mm	3 1/2 cm	4cm & 2mm
13B	2 1/2 cm	3cm	6cm	7cm	7cm & 7mm	8cm & 3mm	9cm	9 1/2 cm
14A	2 1/2 cm	3cm & 1mm	6m	6cm	6cm & 7mm	7cm & 4mm	8cm & 2mm	8cm & 9mm
14B	2cm & 2mm	3cm & 3 mm	6cm & 8mm	7cm	7mm	7 1/2 cm	8cm & 4mm	9cm
15A	1 1/2 cm	3cm & 8mm	6cm	6 1/2cm	3cm	3cm & 8mm	4cm & 8mm	5 1/2 cm
15B	2cm & 9mm	3cm	5cm	5 1/2cm	6cm	6cm & 7mm	7cm & 3mm	8cm
16A	2cm & 3mm	3cm	5cm & 1mm	5 1/2cm	6cm	6 1/2 cm	7cm & 1mm	7cm & 8mm
16B	1cm & 8mm	2cm	4cm & 2mm	4cm & 4mm	4cm & 9mm	5cm & 6mm	6cm & 4mm	7 1/2 cm
17A	2cm & 7mm	3cm	5cm & 8mm	6 1/2cm	6cm & 8mm	7cm & 1mm	7cm & 7mm	8cm & 4mm
17B	3cm	3cm	6cm	6 1/2 cm	6cm & 7mm	7cm & 2mm	8 1/2 cm	9cm & 2mm
18A	1 1/2 cm	1 1/2 cm	4cm & 4mm	5cm & 1mm	5 1/2 cm	6cm & 4mm	7cm & 3mm	8cm & 4mm
18B	2cm & 1mm	2 1/2 cm	7cm & 8mm	8 1/2cm	8cm & 2mm	8cm & 7mm	9 1/2 cm	10 cm & 6mm
19A	not sprouted	2c	8cm	8cm & 7mm	9 1/2 cm	10cm & 3mm	10cm & 8mm	11 1/2 cm
19B	1cm & 1mm	1cm & 3mm	6cm	7cm	7cm & 2mm	8 1/2 cm	9cm & 4mm	10cm
20A	3 1/2 cm	4cm & 3mm	7cm & 1mm	7cm & 1mm	7cm	7cm & 6mm	8 1/2 cm	9cm
20B	2 1/2 cm	2 1/2 cm	6cm	6cm	6cm	6cm & 8mm	7cm & 2mm	7cm & 8mm
21A	2cm & 1mm	2cm & 3mm	4 1/2 cm	6cm & 2mm	6 1/2 cm	7cm & 4mm	8 1/2 cm	9cm & 2mm
21B	2 1/2 cm	2cm & 6mm	5 1/2 cm	6cm	6cm & 2mm	6cm & 8mm	7cm & 8mm	8cm & 3mm
22A	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
22B	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
23A	3cm	3 1/2 cm	8cm & 1mm	8cm & 4mm	9cm	9 1/2 cm	10cm & 3mm	10cm & 7mm
23B	3cm & 8mm	4 1/2 cm	8cm & 6mm	8cm & 7mm	9cm	9cm & 8mm	10 1/2 cm	11cm & 2mm
24A	2 1/2 cm	2 1/2 cm	6cm	7cm & 1mm	7cm & 2mm	7cm & 6mm	8cm & 3mm	8cm & 7mm
24B	1cm & 8mm	2 cm	5cm	6 1/2 cm	6cm & 7mm	7 1/2 cm	8cm & 6mm	8cm & 9mm
25A	2cm & 3mm	2 1/2 cm	6cm & 8mm	7cm & 2mm	7cm & 8mm	8cm & 6mm	9cm & 2mm	9 1/2 cm
25B	3cm & 8mm	4 1/2 cm	7cm & 6mm	8cm	8 1/2 cm	9cm	9 1/2 cm	10cm
26A	2cm & 1mm	2cm & 6mm	6 1/2 cm	7 1/2 cm	7 1/2 cm	8cm & 1mm	9cm & 2mm	9cm & 8mm
26B	not sprouted	4mm	4cm & 6mm	5 1/2 cm	5 1/2 cm	6cm	7 1/2 cm	8cm & 4mm
27A	2 1/2 cm	3cm	7cm	8cm	8cm & 2mm	8cm & 8mm	9cm & 8mm	10cm
27B	2cm & 2mm	2 1/2 cm	5 1/2 cm	5cm & 6mm	6cm	6 1/2 cm	7cm & 2mm	7 1/2 cm
28A	2cm & 9mm	2 1/2 cm	5cm & 8mm	7cm	7cm & 1mm	7cm & 9mm	8cm & 4mm	8cm & 9mm
28B	2cm & 1mm	2cm & 2mm	6cm & 1mm	6cm & 7mm	7cm	7 1/2 cm	8cm & 6mm	9cm & 3mm
29A	1 1/2 cm	1 1/2 cm	4cm	4 1/2 cm	4 1/2 cm	5cm & 1mm	6 1/2 cm	7 1/2 cm
29B	2cm	2cm	5 1/2 cm	6cm	5cm & 8mm	6cm & 2mm	7cm & 1mm	8cm
30A	1cm & 6mm	2cm & 9mm	6cm	6cm	6cm	6 1/2 cm	7cm	7cm & 8mm
30B	not sprouted	1 1/2 cm	4 1/2cm	5cm	5cm	5cm & 8mm	6 1/2 cm	7 1/2 cm
31A	2cm & 6mm	3cm	9cm & 6mm	9 & 6mm	9cm & 6mm	10cm & 3mm	10cm & 7mm	11cm & 4mm
31B	3cm & 1mm	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
32A	2cm & 6mm	3cm	7cm & 1mm	7cm & 6mm	8cm	8 1/2 cm	9cm & 1mm	9cm & 9mm
32B	2cm & 8mm	3 1/2 cm	7cm & 2mm	8cm & 1mm	8cm	8cm & 7mm	9cm & 6mm	10cm & 3mm
33A	2cm & 8mm	2 1/2 cm	5cm & 7mm	6 1/2 cm	6cm & 6mm	7cm	7cm & 8mm	8cm & 2mm
33B	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
34A	2cm & 3mm	2cm & 6mm	7cm	7 1/2 cm	7cm & 7mm	8cm & 2mm	9cm	9cm & 8mm
34B	1cm & 9mm	3cm	5cm & 2mm	6 cm & 4mm	7cm	7 1/2 cm	8cm & 2mm	9cm
35A	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
35B	4 1/2 cm	5 1/2 cm	9cm & 3mm	10 cm	10 cm & 1mm	10 1/2 cm	11cm & 4mm	11cm & 9mm
36A	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
36B	1cm	1cm	4cm & 8mm	6cm & 7mm	6cm & 7mm	7cm & 2mm	8cm	8cm & 9mm

SOIL-GROWN PLANTS

Speciment #	1/6/20	1/7/20	1/13/20	1/14/20	1/20/20	1/21/20	1/28/20	1/29/20
1A	not sprouted	2 1/2 cm	5cm	5 1/2cm	6cm	6cm & 7mm	7cm & 9mm	8cm & 4mm
1B	not sprouted	Not sprouted	not sprouted	7mm	1cm	1 1/2 cm	3cm	3cm & 8mm
2A	1cm	2cm & 6mm	3cm	4 1/2 cm	4cm & 7mm	5cm & 3mm	6 1/2 cm	7cm & 1mm
2B	2cm	3cm & 8mm	5 1/2 cm	6cm & 1mm	6 1/2 cm	7cm & 2mm	7cm & 9mm	8cm & 2mm
3A	not sprouted	Not sprouted	1 1/2 cm	4cm	4cm & 1mm	5cm	6 1/2 cm	7cm & 3mm
3B	1 1/2 cm	2cm & 7mm	4 1/2 cm	5cm	5cm & 2mm	5cm & 7mm	6cm & 9mm	8cm & 2mm
4A	not sprouted	Not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
4B	1cm & 8mm	2 1/2 cm	5 1/2 cm	6cm	6cm & 3mm	7cm & 6mm	8cm & 9mm	9 1/2 cm
5A	not sprouted	Not sprouted	3cm	3 1/2 cm	3cm & 8mm	4cm & 2mm	5cm	5cm & 6mm
5B	not sprouted	1cm	5 1/2 cm	6 1/2 cm	7cm	7cm & 9mm	8 1/2 cm	9cm & 3mm
6A	2cm	3cm	5cm	5cm & 2mm	5 1/2 cm	6cm & 8mm	7cm & 8mm	8cm & 4mm
6B	1cm & 7mm	3cm	4 1/2 cm	4cm & 6mm	5cm & 2mm	6cm & 3mm	7cm & 3mm	8cm & 8mm
7A	not sprouted	Not sprouted	not sprouted	1 1/2 cm	2cm	3 1/2 cm	5cm	5cm & 9mm
7B	not sprouted	4cm	5cm	5 1/2 cm	5cm & 8mm	6cm & 4mm	7cm & 2mm	7cm & 7mm
8A	not sprouted	Not sprouted	3cm	3 1/2 cm	3cm & 6mm	4cm & 9mm	5cm & 4mm	6cm
8B	1 1/2 cm	2cm & 6mm	4 1/2 cm	5 1/2 cm	6cm	7cm & 2mm	7cm & 9mm	8 1/2 cm
9A	3cm	3cm & 8mm	6cm	6 1/2 cm	7cm & 3mm	7cm & 7mm	8cm & 7mm	9cm & 3mm
9B	2cm	3cm & 7mm	6cm	6 1/2 cm	7cm & 4mm	7cm & 6mm	8cm & 3mm	9 1/2 cm
10A	not sprouted	Not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
10B	not sprouted	Not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
11A	1 1/2 cm	2cm	4cm	4cm & 4mm	4cm & 7mm	5 1/2 cm	6cm & 4mm	7cm & 3mm
11B	2mm	3cm	4cm & 2mm	4cm & 6mm	4cm & 8mm	5cm & 3mm	6 1/2 cm	7cm & 1mm
12A	1 1/2 cm	2cm & 9mm	4 1/2 cm	5cm	5 1/2 cm	6cm & 4mm	7cm & 2mm	8cm & 4mm
12B	1 1/2 cm	2cm & 9mm	5cm & 3mm	5cm & 7mm	6cm & 3mm	7cm & 8mm	8cm & 6mm	9cm & 2mm
13A	not sprouted	Not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
13B	not sprouted	Not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
14A	not sprouted	3cm & 1mm	5cm & 3mm	5cm & 6mm	6cm & 4mm	7cm & 2mm	8cm	9cm
14B	not sprouted	3cm & 1mm	5cm & 2mm	5cm 1/2 cm	6cm & 1mm	6cm & 8mm	7 1/2 cm	8cm & 4mm
15A	not sprouted	Not sprouted	3cm & 8mm	4cm & 3mm	5cm	5 1/2 cm	6cm & 8mm	7cm & 6mm
15B	not sprouted	Not sprouted	2 1/2 cm	3cm	3 1/2 cm	4cm & 2mm	5cm & 3mm	6cm
16A	not sprouted	Not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
16B	not sprouted	2cm & 4mm	5cm	5cm & 4mm	5cm & 8mm	6cm & 4mm	7cm & 1mm	7cm & 9mm
17A	not sprouted	Not sprouted	4cm	4 1/2 cm	5cm & 3mm	6cm & 7mm	7 1/2 cm	8cm & 3mm
17B	not sprouted	2cm & 8mm	5cm & 3mm	5cm & 9mm	6cm & 7mm	7cm & 3mm	8cm & 7mm	9cm
18A	2cm	3cm & 4mm	6cm	6cm & 7mm	7cm & 3mm	8cm & 1mm	8 1/2 cm	9cm & 1mm
18B	2cm	3cm & 1mm	5cm & 6mm	6cm & 1mm	6cm & 9mm	7cm & 6mm	8cm & 7mm	9cm & 3mm
19A	not sprouted	Not sprouted	6cm & 1mm	6cm & 9mm	7cm & 4mm	7cm & 9mm	8cm & 7mm	9 1/2 cm
19B	not sprouted	Not sprouted	4cm & 4mm	5cm	5cm & 7mm	6 1/2 cm	7cm & 3mm	8cm & 2mm
20A	1/2 cm	6mm	2cm	2cm & 8mm	3cm & 4mm	4cm & 3mm	5cm	5cm & 9mm
20B	8mm	9mm	2 1/2cm	3cm & 3mm	4 1/2 cm	5cm & 4mm	6cm & 1mm	6cm & 9mm
21A	not sprouted	Not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
21B	not sprouted	Not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
22A	not sprouted	1cm & 7mm	2cm & 9mm	3 1/2 cm	4cm & 6mm	5cm & 8mm	6 1/2 cm	7cm
22B	6mm	2cm	4 1/2 cm	5cm	5cm & 4mm	6cm & 2mm	7cm	7cm & 9mm
23A	not sprouted	1cm & 4mm	2 1/2 cm	3cm	4cm & 2mm	5cm & 6mm	6cm & 8mm	7 1/2 cm
23B	7mm	2cm	3cm & 9mm	4cm & 7mm	5cm & 3mm	5cm & 8mm	6cm & 7mm	7cm & 6mm
24A	not sprouted	3cm & 3mm	6 1/2 cm	7cm & 8mm	8 1/2cm	9cm	9cm & 8mm	10 1/2 cm
24B	not sprouted	1 1/2 cm	4cm	4cm & 7mm	5cm & 4mm	6cm & 1mm	7cm	8cm
25A	not sprouted	Not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
25B	not sprouted	Not sprouted	5 1/2 cm	6cm & 1mm	7cm	7 1/2 cm	8cm & 4mm	9cm
26A	not sprouted	Not sprouted	5cm & 6mm	6cm & 3mm	7cm & 1mm	7cm & 7mm	8 1/2 cm	9cm
26B	not sprouted	Not sprouted	4cm & 7mm	5cm & 6mm	6cm & 4mm	7cm	7cm & 9mm	8cm & 7mm
27A	not sprouted	1cm & 7mm	3cm & 1mm	4cm & 6mm	5 1/2 cm	6cm & 3mm	7cm	7cm & 8mm
27B	7mm	2cm & 6mm	4 1/2 cm	5cm & 7mm	6cm & 2mm	7cm & 1mm	7cm & 9mm	8cm & 4mm
28A	not sprouted	Not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
28B	not sprouted	Not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
29A	not sprouted	Not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
29B	not sprouted	Not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
30A	not sprouted	2 1/2 cm	5cm & 1mm	6cm	6cm & 8mm	7cm & 4mm	8cm	8 1/2 cm
30B	not sprouted	3 1/2 cm	4cm & 1mm	5cm & 3mm	5cm & 6mm	6cm & 3mm	7cm & 3mm	8cm
30A	not sprouted	2 1/2 cm	5cm & 1mm	6cm	6cm & 8mm	7cm & 4mm	8cm	8 1/2 cm
30B	not sprouted	3 1/2 cm	4cm & 1mm	5cm & 3mm	5cm & 6mm	6cm & 3mm	7cm & 3mm	8cm
31A	not sprouted	Not sprouted	1cm	1cm & 9mm	2cm & 6mm	3cm & 8mm	4 1/2 cm	5cm & 6mm
31B	8mm	2cm & 3mm	3cm & 9mm	4cm & 3mm	4cm & 8mm	5 1/2 cm	6cm & 3mm	7cm & 4mm
32A	not sprouted	9mm	3cm & 6mm	4cm & 8mm	5cm & 9mm	6cm & 7mm	7cm & 8mm	8 1/2 cm
32B	1cm	2cm & 3mm	4cm	4cm & 6mm	5cm & 3mm	6cm	6 1/2 cm	7cm & 8mm
33A	not sprouted	3cm & 1mm	4 1/2 cm	5cm & 4mm	6 1/2 cm	7cm & 3mm	7cm & 8mm	8cm & 7mm
33B	not sprouted	2cm & 7mm	4cm & 6mm	5cm & 8mm	6cm & 6mm	7cm & 4mm	8cm	8cm & 6mm
34A	not sprouted	Not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
34B	1cm & 1mm	2 cm & 4mm	5cm & 2mm	5cm & 6mm	6cm & 3mm	7cm & 8mm	8 1/2 cm	9cm & 3mm
35A	not sprouted	Not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
35B	not sprouted	2 cm & 3mm	4 1/2 cm	5cm & 8mm	6cm & 4mm	7cm & 4mm	8cm	8 1/2 cm
36A	not sprouted	Not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted	not sprouted
36B	not sprouted	4 1/2 cm	6cm	6cm & 7mm	7cm & 3mm	8cm	8cm & 9mm	9 1/2 cm

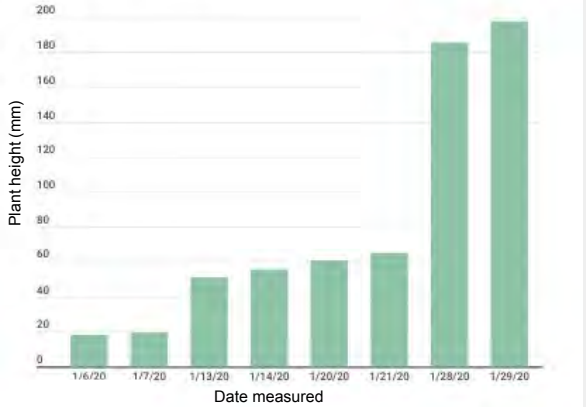
Hydroponically-Grown Plants

Hydroponics

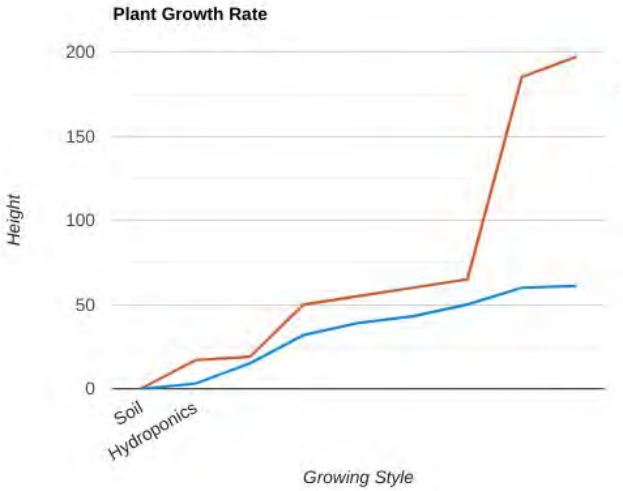


- Shows the increase in the growth of the hydroponically-grown plants over the course of 4 weeks

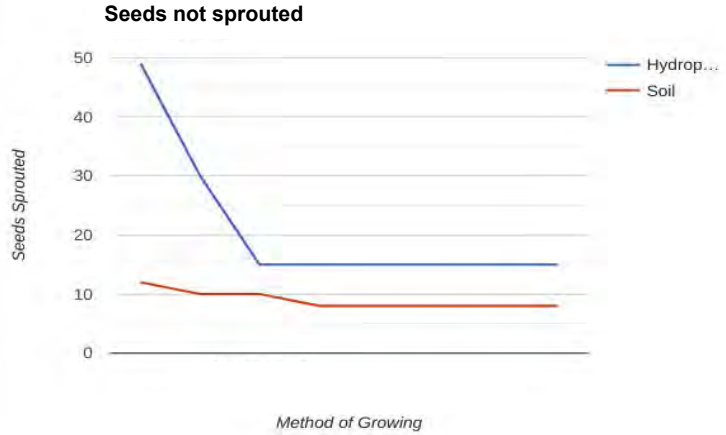
Soil



- Shows the increase in the growth of the soil-grown plants over the course of 4 weeks



- Shows the difference in the growing rates of the two methods



- Shows how many seeds didn’t sprout in each method

CONCLUSION

- Hypothesis was wrong
- The air stone circulates the nutrients and water
- Nutrient intake in each plant hard to control
- There were times when the leaves would break off
- Measure from the bottom of stem to top
- What would happen if there was no airstone
- Soil is more efficient than hydroponics
- This could help a landscaper or gardener

Thank you for listening, any questions?

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