

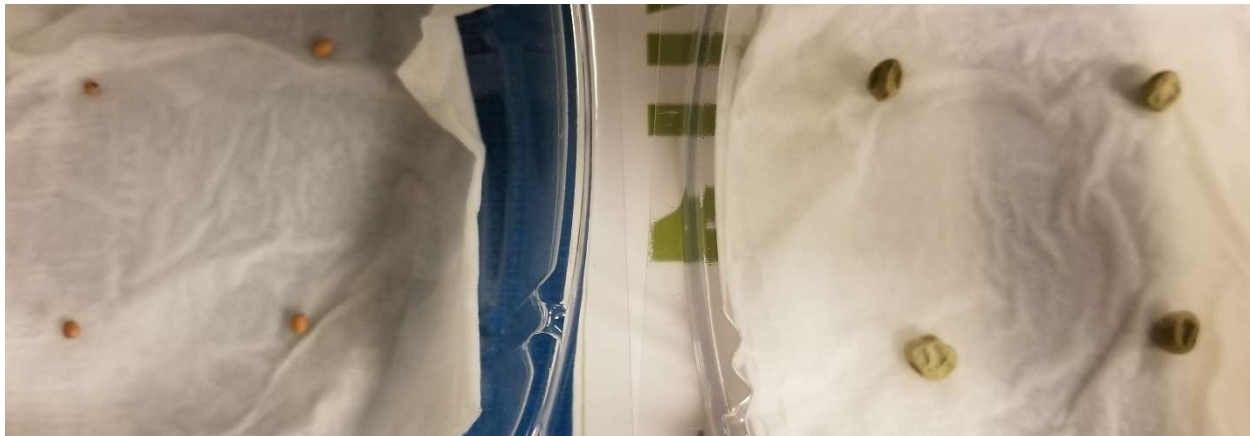
NOTE: Seeds were checked everyday for drying, mold and bacterial growth, and general health. For the purposes of time, no entries were made on certain days. The napkins/soil were also checked every day to make sure the plants had sufficient moisture. No hard and fast rule was used to determine if paper or soil was too dry or needed moisture. The medium was felt and judged accordingly. At no time was a pool of water present with the plants in the container. Neither was the container devoid of water at any time.

February 21, 2018 - 7:00 PM – (Time spent: 90 minutes setting up seed container and seeds, finding suitable place to keep them, taking pictures and making observations)

15 cm Box

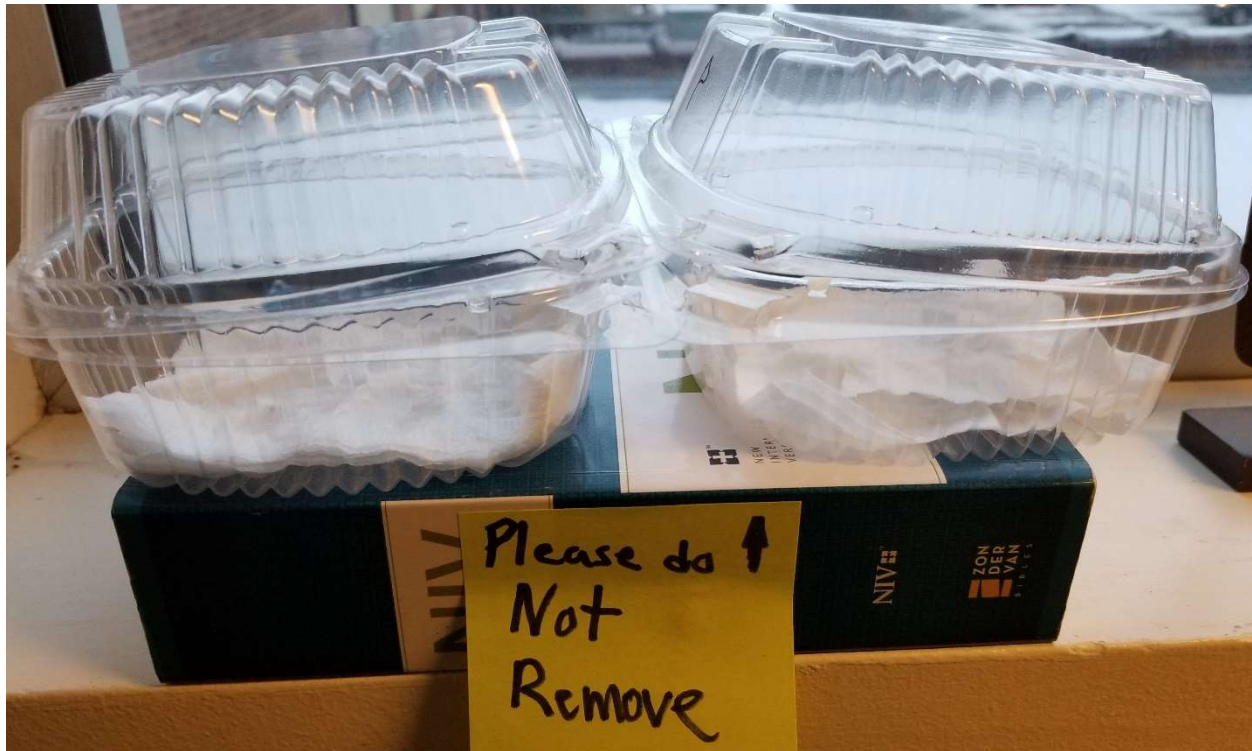
Seeds used: peas and radish seeds

Four seeds placed in two 15x15x9 cm containers between folded, moistened paper napkins. Napkins were wetted on both sides of the folds and sandwiched the seeds. Seeds began very hard. Peas were about 0.75 cm in diameter and were wrinkled. They were also a pale green color. Radish seeds were about 2 mm in diameter and were smooth and brown. Once they have sprouted, the seeds will be exposed to a fluorescent light bulb, which will be held about a foot away. Lids will be left open about a centimeter to prevent a greenhouse effect.



February 22, 2018 – 6:00 AM – (Time spent: 20 Minutes repositioning seeds, taking pictures and making observations.)

Seeds were kept in my dorm for the night. Part of the room dropped below freezing, but the water on the paper did not freeze. The peas were brought into the sunlight on a window sill. No change in seed appearance.



Supplemental – 10:30 AM – (Time spent: 20 Minutes watering seeds, taking pictures and making observations.)

No change. Parts of the napkin began to dry and turn white, so they were re-moistened to keep the seeds from drying. The napkins will be felt for moisture periodically and will be kept moist.

Supplemental – 6:45 PM – (Time spent: 20 Minutes setting up new lamp, taking pictures and making observations.)

The seeds have been moved into a closed closet in my room. They will be exposed to a Verilux HappyLight Liberty Full-Size 10K Light Therapy Lamp, which is designed to emit the spectrum of light emitted by the sun (“Verilux light boxes use a full spectrum light bulb that mimics daylight at 6,500K and provide a light intensity of 10,000 lux” according to the manufacturer). As it is kept in the closed closet and subjected to the lamplight for the duration of the night, the system will hopefully be kept at an appropriate temperature (about 65° Fahrenheit). Still there is no noticeable change in seeds’ appearance. The napkins remain moist.



February 23, 2018 – 12:30 PM – (Time spent: 30 Minutes taking pictures and making observations.)

Seeds were left exposed to the HappyLight overnight. The wardrobe remained at a reasonable temperature. The peas have swelled by about 10% and are less wrinkled, but they have not germinated. Radishes have begun to germinate. The shell has cracked, and a cream-white shoot has emerged. Seeds will be left under light indefinitely.



Supplemental – 7:45 PM – (Time spent: 30 Minutes taking pictures and making observations.)

One of the peas looks like it's about to split. It is almost entirely smooth. Radishes continue to progress. There appears to be some sort of curved shoot coming out, with a piece remaining inside, perhaps for nutrition. One of the radish seeds was dropped on the ground. It was found, blown off, and returned. Hopefully it will not be preyed on by mold or bacteria. The radish napkin was re-moistened, as it was beginning to dry. The plants will be exposed continuously to the lamplight.



February 24, 2018 – 9:45 AM – (Time spent: 20 Minutes taking pictures and making observations.)

By now, the peas are mostly smooth. Two of them have germinated. One looks like it is about to. The Radishes continue to develop. One seed's radicle has developed hairs and attached itself to the napkin so that it cannot be moved. I have moved the other seeds so that their roots can attach themselves likewise.



February 25, 2018 – 10:30 AM – (Time spent: 25 Minutes taking pictures and making observations.)

All seeds have germinated. The peas have sprouted and are beginning to lighten from their original green color. The radish radicles have begun developing into hairy roots, and very small (about 3-4 mm), fat leaves are clearly visible, attached to the root by a short (half a centimeter), purple stem.



Supplemental – 6:30 PM – (Time spent: 30 minutes taking pictures and making observations.)

Small, light green shoots have appeared on two of the peas and the radicles continue to elongate. The radishes show about 4 miniscule leaves. I have left them uncovered and exposed to the lamplight to increase photosynthesis. The radishes have almost completely outgrown their seed shells.



February 26, 2018 – 9:00 PM – (Time spent: 30 Minutes taking pictures and making observations.)

By now, the Radishes are growing straight up, their stems being about 1.5 cm in length. Four leaves are present. The peas are beginning to sprout, and the longest root is about 4.5 cm. The pea shoots are progressing comparatively slowly.



February 27, 2018 – 11:30 AM – (Time spent: 45 Minutes taking pictures and making observations.)

Black spots have begun to appear on the napkin and pea seeds, as well as the radish napkin. Some of the pea shells are browning as well. I'm a little worried that some kind of mold or bacteria colonies are appearing. The Radish stems have grown to about 2 cm, their roots having grown up to about 3-4 cm. the radicles of the peas have grown up to about 5 cm as well, and are developing very fine hairs, about 1 mm long. It is notable that at this point, the peas have grown by about 20% in size since the beginning of the project. The pea napkin has been remoistened to keep it from drying up.



Supplemental – 6:30 PM – (Time spent: 45 Minutes changing out napkins, moving seeds, taking pictures and making observations.)

The Plants have been moved to a fresh, moistened napkin to hinder mold growth, though mold is still present on some of the peas. To keep the radish roots intact, I had to cut the original napkin around the roots and move it onto the new napkin.



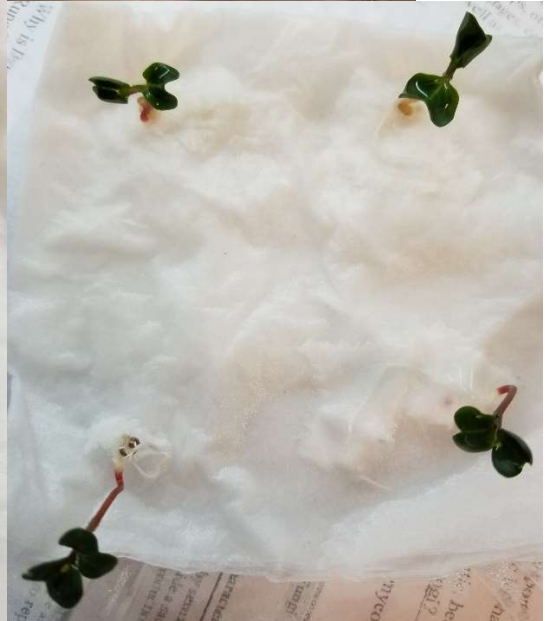


At this point, the leaves have differentiated into two pairs,

February 28, 2018 – 7:15 PM – (Time spent: 60 Minutes watering and draining new soil, transferring seeds to new soil, taking pictures and making observations.)

The peas are brown and all but one have leafy shoots growing out of the seed. The longest has a 6 cm radicle, the shortest is about 2 cm. the pea sprouts are about 1 cm in length and have a j-curve. The radish stems have grown to about 3 cm, and the roots have begun to branch significantly. I decided to move them to soil. To transfer, I watered the soil thoroughly, and then poured the excess water to one side and absorbed it with tissues and napkins. Then, I dug a ditch to put the seeds and/or roots into, burying them beneath about a centimeter of soil. the radishes' sprouts were peaking up through the soil, but the peas are only near the surface, though I expect that they will be able to poke up though the soil in a day or two. They will be left uncovered under the lamplight.







March 3, 2018 – 12:00 PM – (Time spent: 45 Minutes taking pictures and making observations.)

The peas have grown about 3 cm above the soil. I estimate they have about eight leaves that are growing at different points along the stem, but they are tightly packed together. The radishes have grown their stalks about 3 cm above the soil, with branching leaf stems, probably part of the leaves themselves, which are 2 cm long and leaves 1 cm wide and 1-2 cm broad. These leaves and stems are curved and meet the light purple plant stem at a dark ring. All of the radishes appear to be growing another leaf structure out of the stem between the initial two leaves. Similarly, the Radishes have grown in the direction of the lamplight the leaves themselves are curved. I am going to rotate the boxes 180 degrees per day to counteract this curving.



March 4, 2018 – 7:30 PM – (Time spent: 45 Minutes taking pictures and making observations.)

The peas are still about 3 cm above the soil, but their leaves are beginning to open away from each other, instead of cluster together. The leaves are folded in half, and are about half a centimeter wide, folded. There also appear to be branches of leaves growing from the stem. The

radishes have stems that are about 3.5 cm long, and leaf stems that are about 2 cm long. The leaves are 1-2 cm broad, and over a centimeter long. Most are fairly flat, but a few are curled. The radish stems have curved notably so that the shoots are pointed in the direction of the lamp.



March 5, 2018 – 10:00 PM – (Time spent: 20 Minutes taking pictures and making observations.)

All the peas have grown into two separate leaf shoots, the radishes' third leaf shoot continues to grow, being nearly a centimeter long, with a fourth shoot behind.



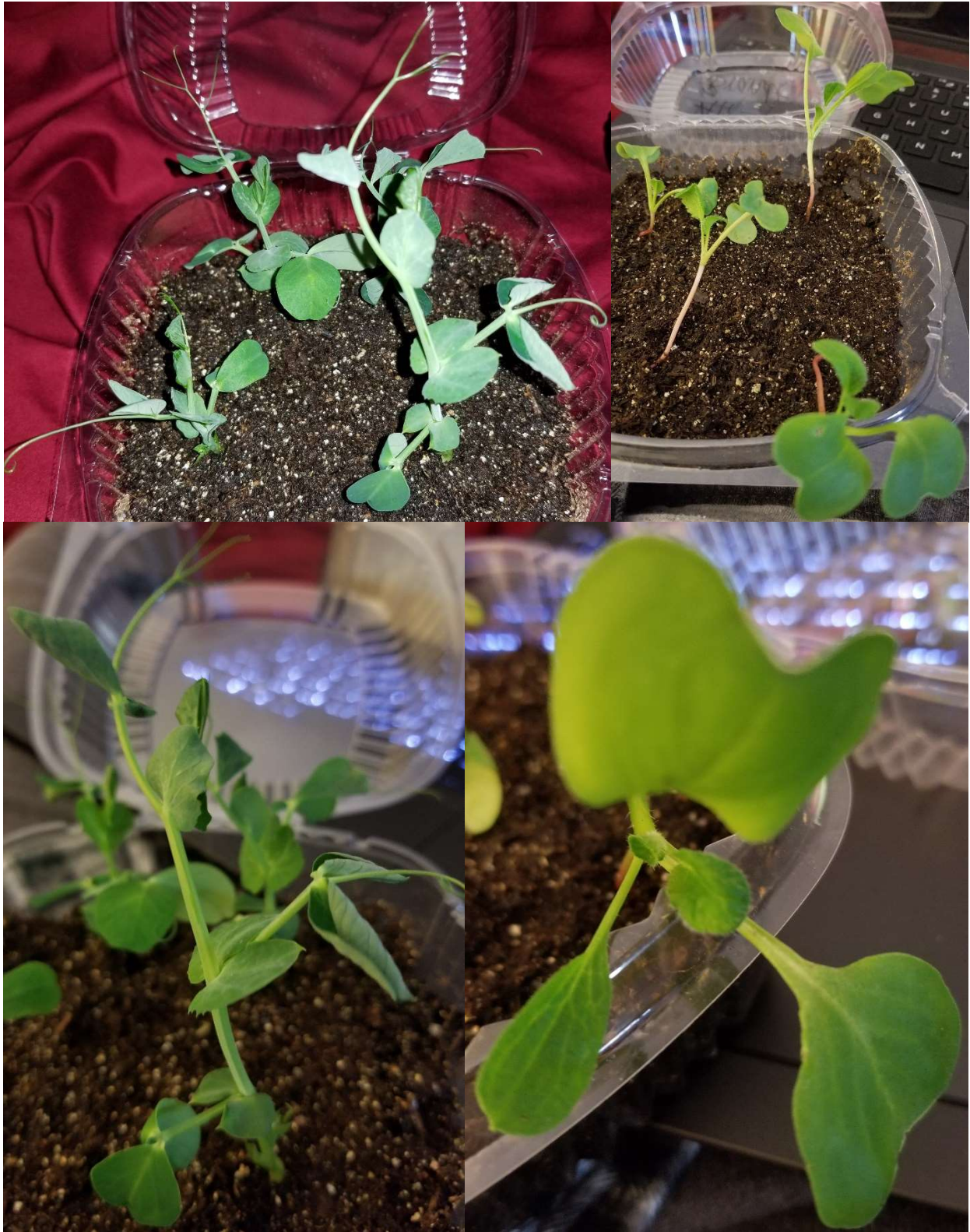
March 8, 2018 – 3:00 PM – (Time spent: 45 Minutes taking pictures and making observations.)

The pea plants have grown to up to 8 cm and have begun branching. Their leaves are over a centimeter broad. The number of leaves is about 7 leaves per plant. The radish seeds have grown up to around 6 cm, with leaves that are over 2 cm broad. The second set of radish leaves are fuzzier than the initial two, which are very smooth. The new leaves are also oval shaped, contrasting the original heart shaped leaves.



March 10, 2018 – 11:15 AM – (Time spent: 30 Minutes taking pictures and making observations.)

The tallest pea plant is now about 13 cm tall and has multiple branches with leaves. The radish plants are about 8 cm tall and have leaves growing successively from the center of the stem. The pea stems are growing straight up, while the radishes are notably slumped over in the direction of the light, though the seeds are likely still relatively healthy.



(Additional time spent proofreading and editing: 3 hours on March 10, 2018.)

Total time spent:

Date	Time (min)
2.21.2018	90
2.22.2018	20
S.	20
S.	20
2.23.2018	30
S.	30
2.24.2018	20
2.25.2018	25
S.	30
2.26.2018	30
2.27.2018	45
S.	45
2.28.2018	60
3.3.2018	45
3.4.2018	45
3.5.2018	20
3.8.2018	45
3.10.2018	30
3.11.2018	180
Time (min)	620
Time (hrs)	10.33333