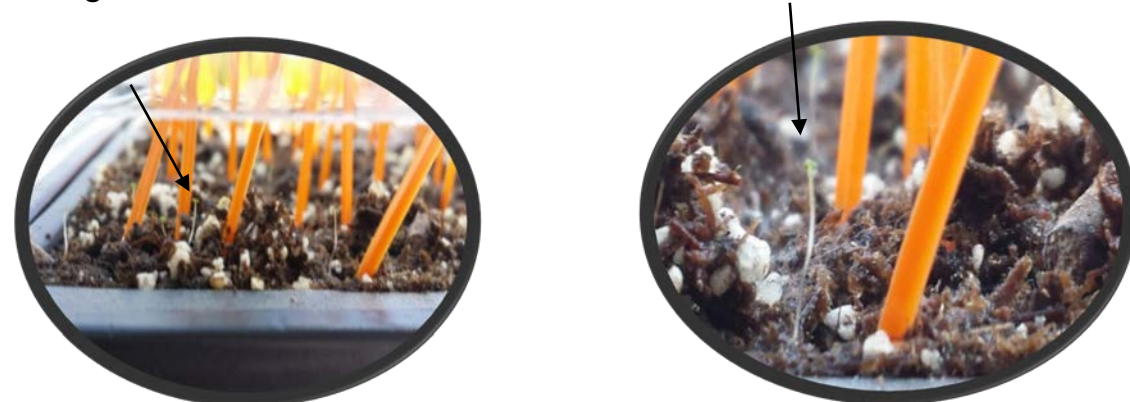


The Effects of Water Stress and Apical Auxin Receptor Coverage on Phototropism in *Arabidopsis thaliana*

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Growth Conditions

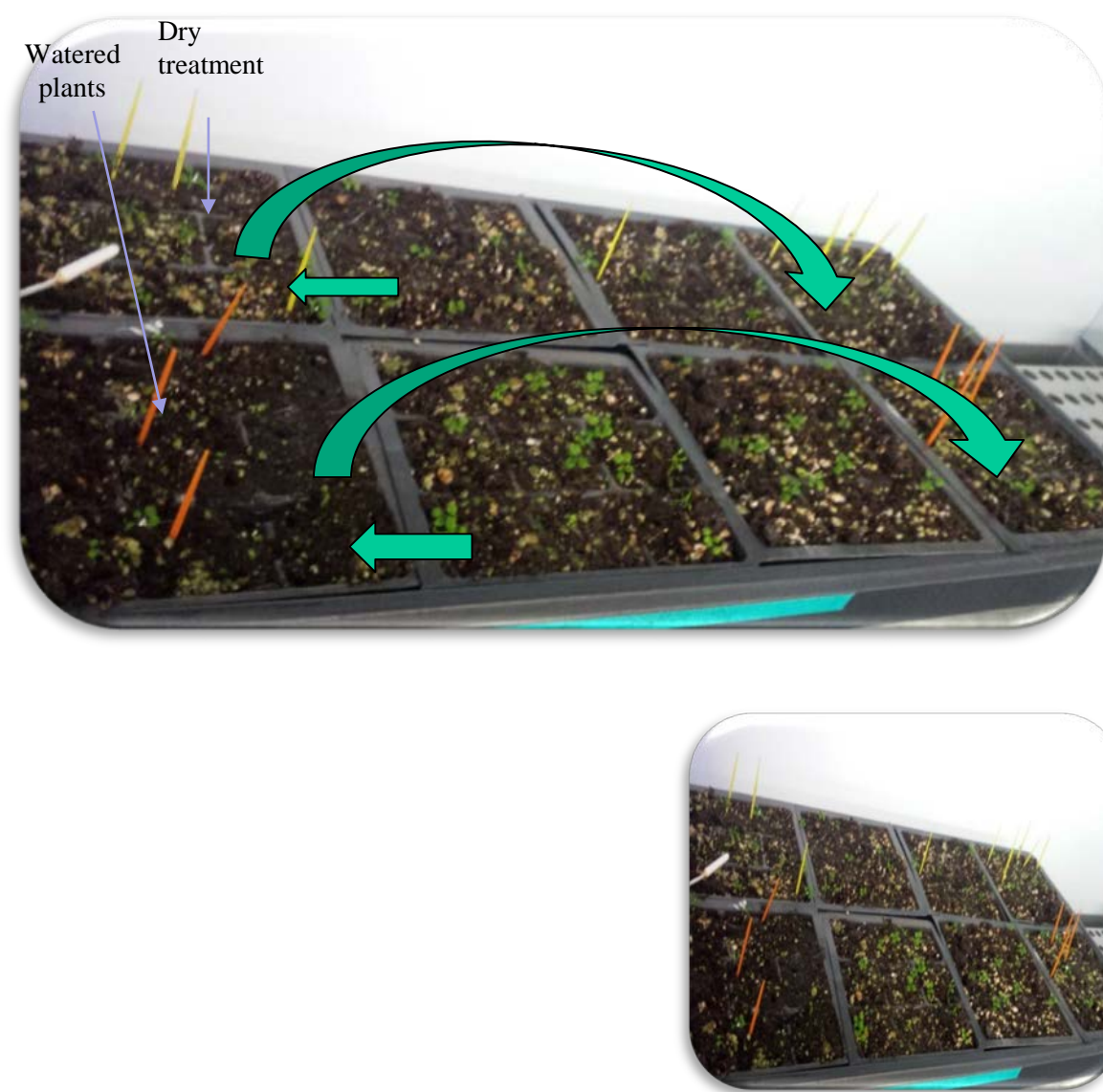
Growth of seedlings until they reached 4 true leaves:
 Day temp: 20°C Night temp: 18°C
 16hr light, 8hr dark



Hypothesis

Arabidopsis thaliana that is watered regularly will show signs of phototropism towards the blue light while *A. thaliana* that is water deprived will not exhibit phototropism. Those plants which have their auxin receptors covered will not exhibit phototropism both with regular watering and water deprivation.

Rotation Diagram



Abstract

Arabidopsis thaliana was first grown in the environmental chamber. The water tray and soil were kept moist for all plants as seedlings. They were kept in 16 hours light and 8 hours of dark condition until they developed 4 true leaves. At this point, watering of one group of plants ceased to create a water stressed environment for this group. The other group continued to receive regular watering via hydrobubbles (the watering tray was kept dry). Select individuals' apical meristems were covered with white out in order to block the auxin receptors (a total of 10 would be examined during the experiment). The two groups were then added to a secluded area where they were provided with blue light positioned on the left side for 16 hours a day. Each day the plants were rotated, the set of plants in front from each treatment (dry and watered) faced the light, during the rotation the two groups closest to the light were moved to the back, the next two being moved forward (as seen below). Every day for the regularly watered treatment every checked, hydrobubbles were used water in order to maintain a slow release of water to the plants (shown as the pink spheres in some of the images). The angle of 10 covered and 10 uncovered plants was measured at 3 different dates during the experiment to see the effects of water stress and auxin receptor coverage on phototropism.

Treatments

16hrs of blue light and 8hrs of dark

	Watered Regularly	Water Deprived
Covered Meristem (Auxin Receptors)	5 plants	5 plants
Uncovered Meristem (Auxin Receptors)	5 plants	5 plants

Results

Figure 1: Phototropism in watered plants versus dry treatment plants. October 16, 2014

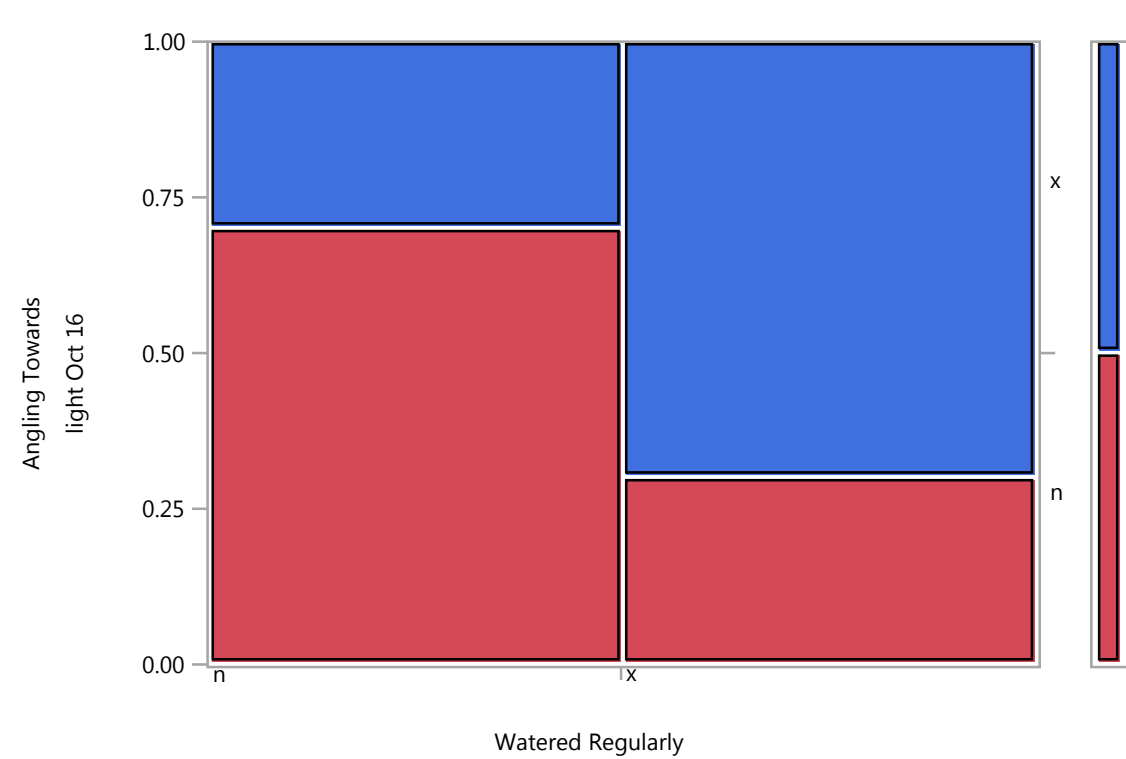


Figure 2: Phototropism in watered plants versus dry treatment plants. October 28, 2014

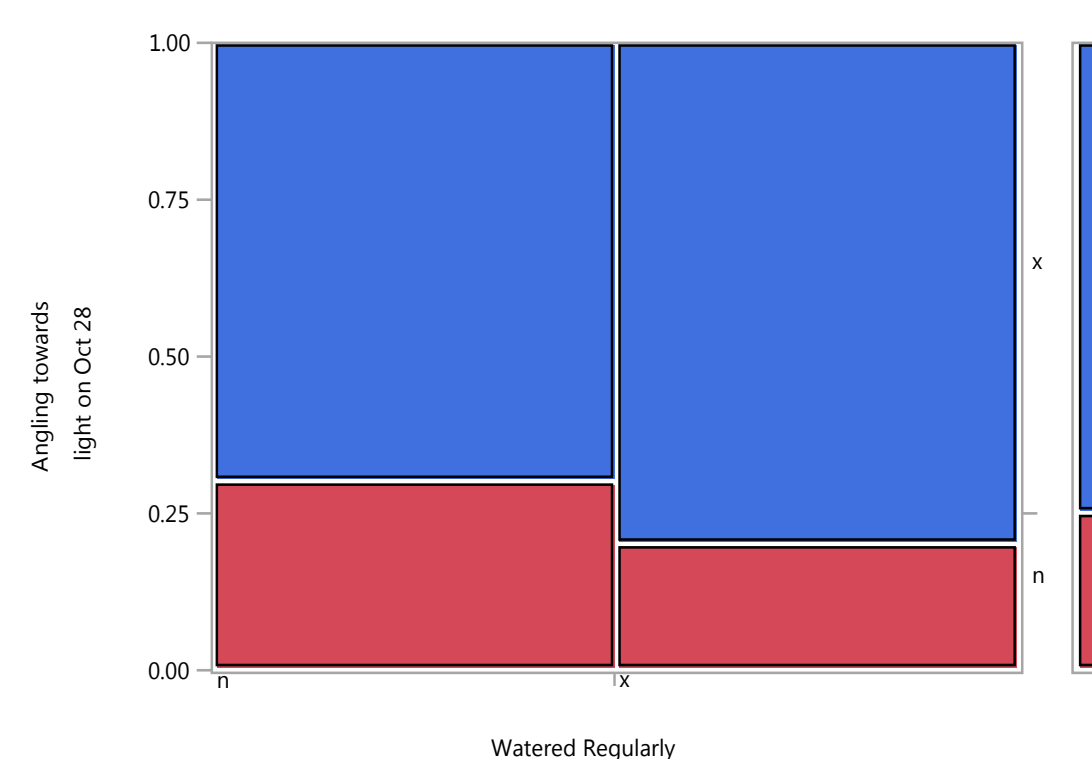
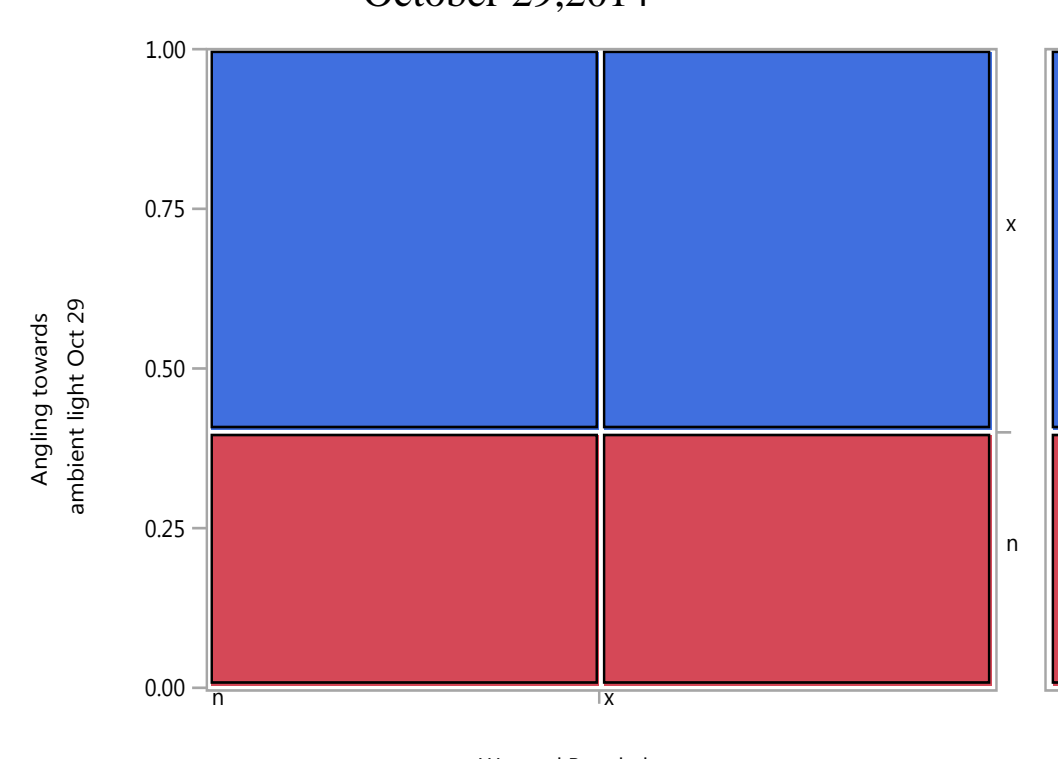


Figure 3: Phototropism in watered plants versus dry treatment plants. October 29, 2014



Legend A:
 x- Watered plants
 n- Dry treatment plants

Date & Treatment	P- Value
October 16, 2014 Dry Vs. watered treatment	0.0736
October 28, 2014 Dry Vs. watered treatment	0.6056
October 29, 2014 Dry Vs. watered treatment	1.0000
October 16, 2014 Uncovered Vs. covered meristem	0.0736
October 28, 2014 Uncovered Vs. covered meristem	0.1213
October 29, 2014 Uncovered Vs. covered meristem	0.0679

Figure 4: Phototropism in watered plants covered meristem versus uncovered meristem. October 16, 2014

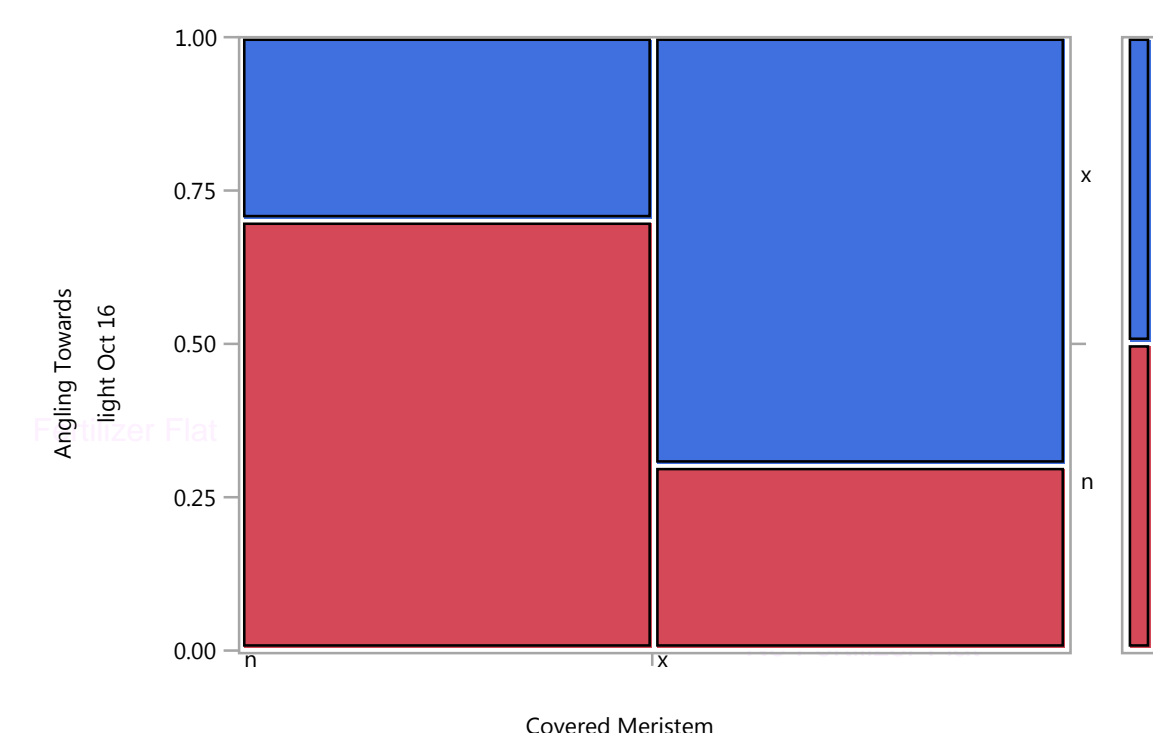


Figure 5: Phototropism in watered plants covered meristem versus uncovered meristem. October 28, 2014

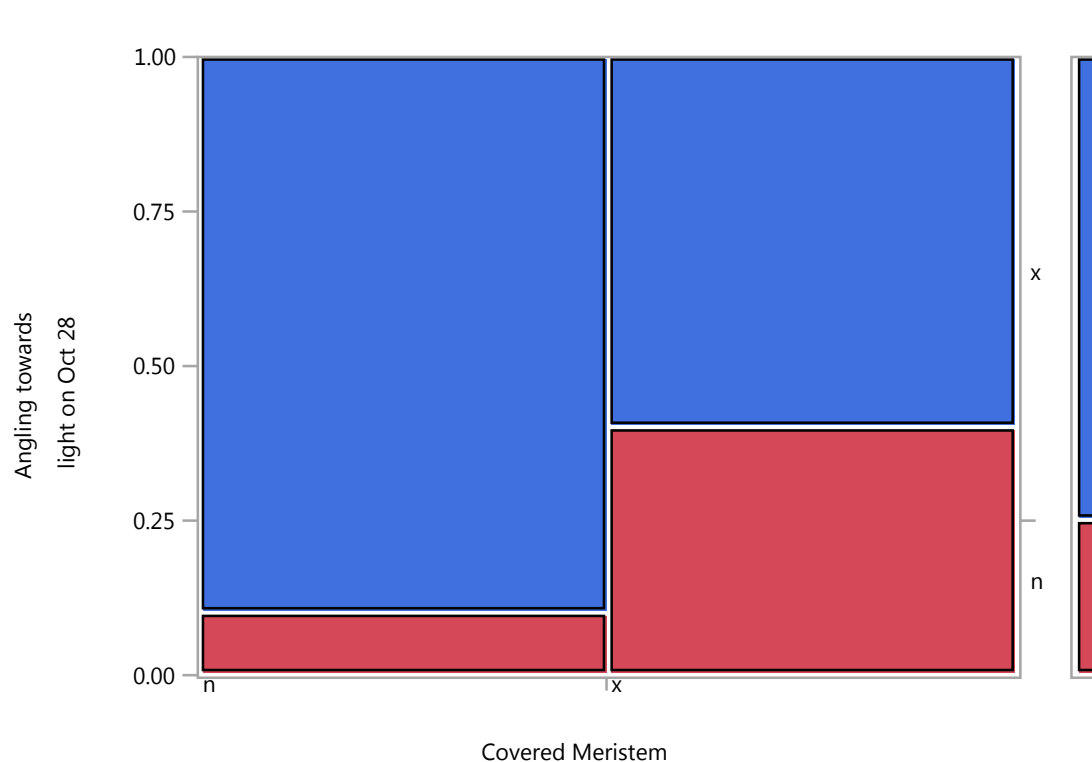
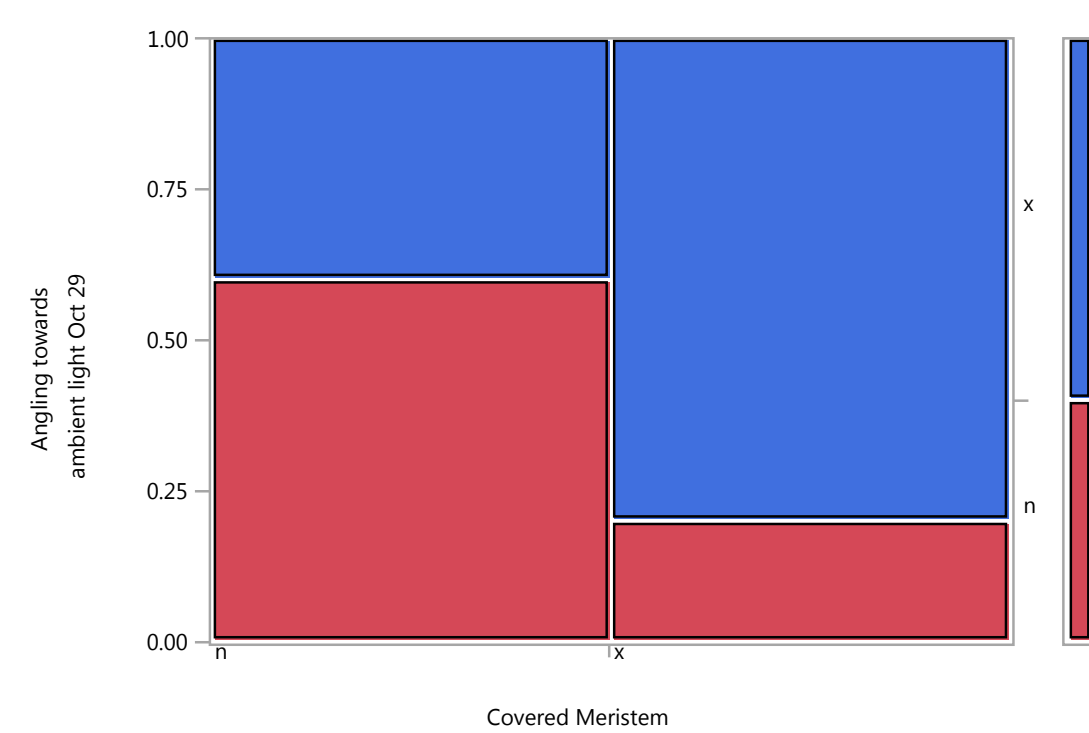
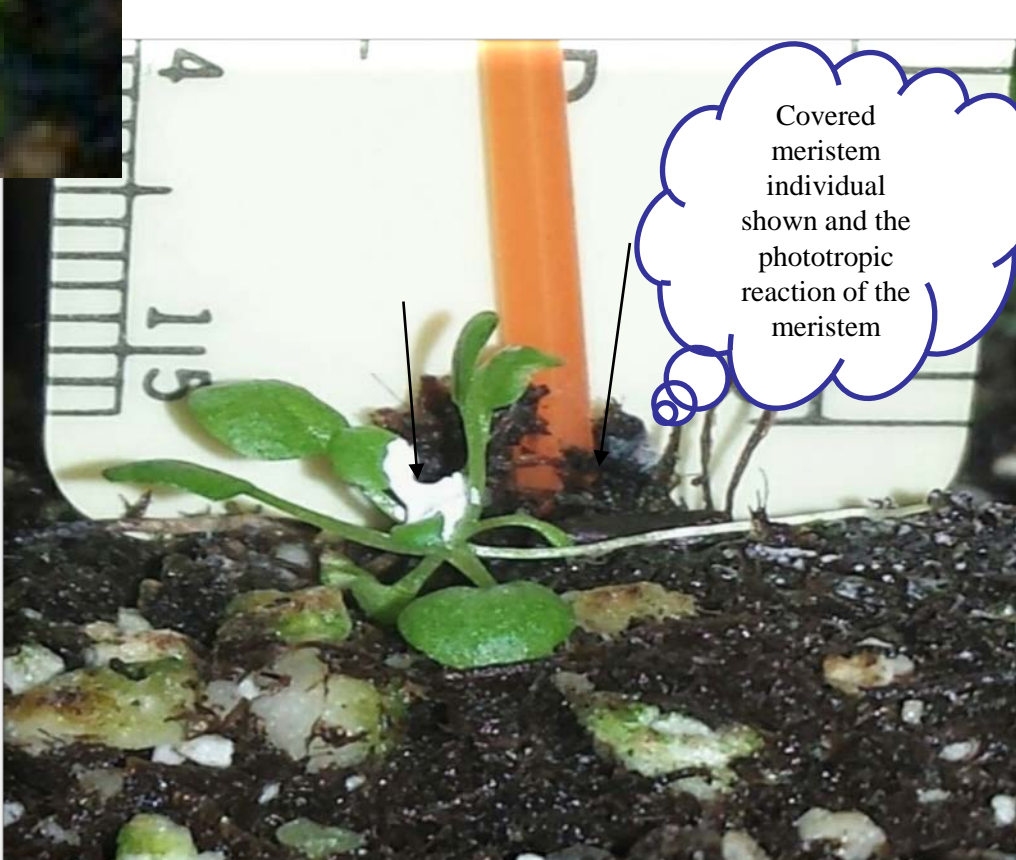
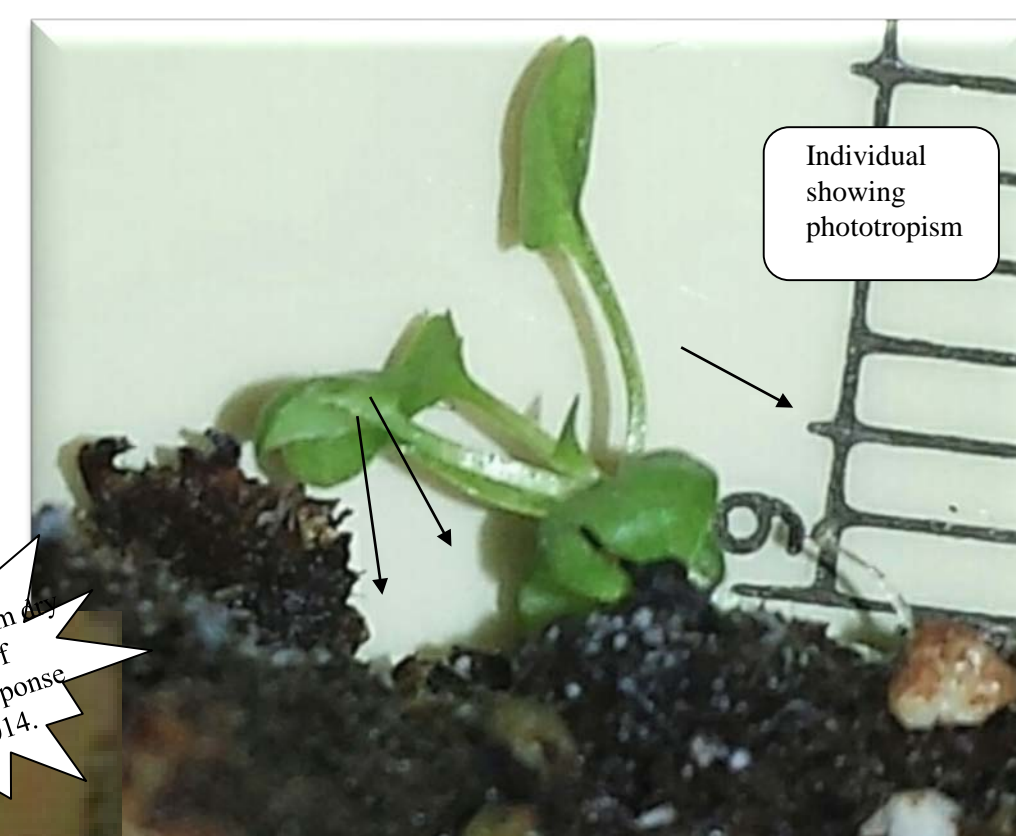


Figure 6: Phototropism in watered plants covered meristem versus uncovered meristem. Oct 29, 2014



Legend B :
 x- covered meristem
 n- Uncovered meristem



Conclusions

- The hypothesis was falsified to an extent since the plants with covered auxin receptors still showed phototropic response in some individuals under both the dry and wet treatments. There was a noticeable difference between the individuals that did not possess the covered meristem and were watered regularly.
- As seen in the probability values table the results of the experiment were not significant. Additional data, a larger group of plant may, in future experiments, produce more significant results as a trend was seen during the first two days of inspections as the plants without covered meristems angled more than the plants with the covered meristems.
- In future research a substitute to white out may be used in order to better determine the sensitivity of the plants to the covered receptors. The plants may have shown acclimation to the covered receptors and grew in a way that exposed them again as their growth progressed.
- The last examination may show an overcompensation in the covered meristem group as they showed more of a phototropic response as the plants without the covered meristem as seen in figure 6.
- The plants that were placed in the water stress showed acclimation to the stress as seen in figure 2 and 3. They were able to show phototropic response as much as the watered individuals by the conclusion of the experiment reflected in figure 3.

Acknowledgements

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