Is the global warming the death for the roots?

Gymnasium Laufental/Thierstein Class 1B

Part 1: Introduction

Roots are an essential part of a plant. They have a thin outer layer so they can absorb the water and the minerals that are solute in the water. The gathering of water and mineral nutriments happens in the root hairs. One root hair can only survive several days.

The root hairs near the surface also collect dew water. But don't mix dew water with guttation drops, which are produced by the plant itself.

Guttation is a process that comes from the roots, which push fluidity - with mostly sugar, minerals and sodium - to the top of the leaves. This is an ability that have only higher plants. They do guttation at night when no transpiration is taken place or when the air humidity is too high to absorb even more water from the plant.

References: 1. Uni Düsseldorf
http://www.uniduesseldorf.de/MathNat/Biologie/Didaktik/Wasserhaushalt/dateien/3_transp/2_fern/dateien/3_wurzel.html ; Monday 4th May, 11:29

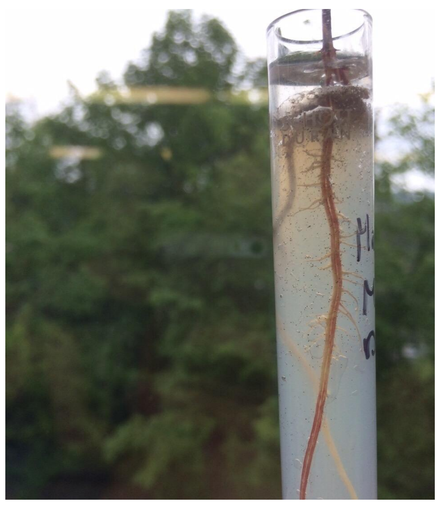
2. Wikipedia
http://de.wikipedia.org/wiki/Guttation ;
Monday, 4th May, 14:57

Part 3: Design of our experiment

We wanted to see the influence of salty water for roots of different plants.
We put seed of corn, bush bean and cat grass into salty water and into normal water. After a day we take them out and plant them into a pot filled with agar-agar. Half of the agar-agar pots we water with salty water. The lever of salinity was like the one in the sea, 3.5%.
We measured the size and the weight of the seeds, the size of the roots and finally the weight of the roots.

Bill of materials

- seeds: -cat grass 12x
  -bush beans 12x
  -maize 12x
- plants from outdoor
- petri dish 36x
- beaker glass: - 50ml 36x
  - 250ml 6x
- yoghurt glass 150ml 12x
- plastic pot: - little 18x
  - big 2x
- salt
- water
- agar-agar
- flower soil



Part 4: Data collection, processing and presenting

Seeds in the ground

Freshwater

	04.05.	05.05.	08.05.	12.05.
Cat grass 1	6.5cm	12cm	20.5cm	23cm
Cat grass 2	5cm	10cm	20cm	22.5cm
Cat grass 3	11.5cm	16cm	21.5cm	24cm
Bush bean 1	0cm	0cm	0cm	0cm
Bush bean 2	0cm	0cm	0cm	0cm
Bush bean 3	0cm	0cm	0cm	0cm
Corn 1	0.7cm	4cm	11cm	17cm
Corn 2	0.5cm	4.5cm	13cm	18.5cm
Corn 3	1.2cm	4cm	14cm	25cm

Saltwater

04.05.: None of the seeds has grown.

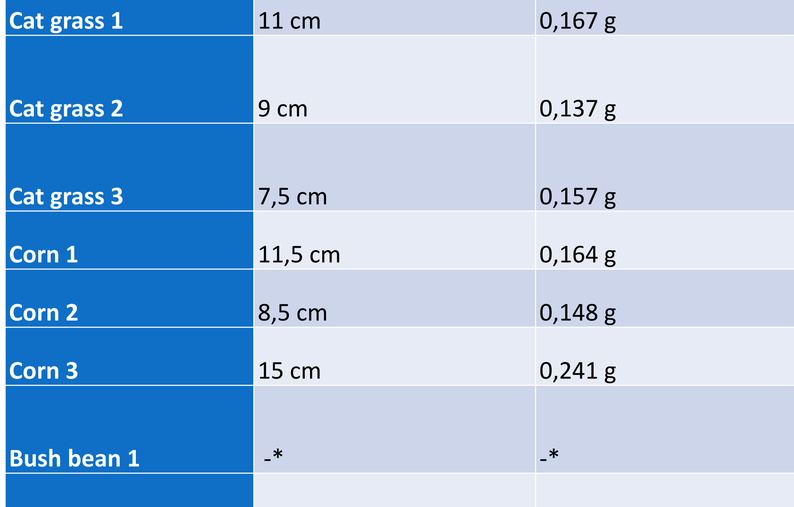
05.05.: None of the seeds has grown.

08.05.: None of the seeds has grown.

12.05.: None of the seeds has grown.

The grown roots

Plant	Length	Weight
Cat grass 1	11 cm	0,167 g
Cat grass 2	9 cm	0,137 g
Cat grass 3	7,5 cm	0,157 g
Corn 1	11,5 cm	0,164 g
Corn 2	8,5 cm	0,148 g
Corn 3	15 cm	0,241 g
Bush bean 1	-*	-*
Bush bean 2	-*	-*
Bush bean 3	-*	-*
*: didn't grow		



Part 5: Conclusion, discussion and evaluation

Results

The plants in the salty water wilt very fast. The seed in the salty water absorbed a bit water anyway, because there wasn't water in the seeds before, but not enough that the plants can grow. Our bush beans also didn't grow in the normal water but the others did. They grew fast and without problems.

Interpretation

By the already existing plants the osmosis detracted the water out of the seeds and roofs because the salinity outside was bigger than inside. Therefore the plants didn't get water and they dried-out. We can't exactly say why the seeds absorbed a bit from the water. For an interpretation of the seeds we need more time to do more experiments.

Evaluation

We wanted to measure how the roots react to saltwater (because of the rising sea level). For that we watered the seeds with saltwater and compared them with freshwater. We set the seeds in earth and in agar-agar. The size of the plants we measured all one to four days. At last we scaled the length and the weight from the roots. We used for measuring them a ruler or a set square and a scale (in a 1000th part of gram accurate).

Weaknesses:

- We set the seeds in agar-agar to see the roots but sadly nothing at all has grown and it started to form fungi.
- The scale changed quite often the notification whereby possibly some variations developed in area of a 1000th part.
- In the measurements with the ruler/set square there could be as well variations (maximum 5mm) because we have read it with the eyes.
- Some plants had several and various big leaves whereby it could be that we used at different day's different leaves to measure the height. Besides it could be that we didn't scale every time at the same starting point.
- Not all plants had the same amount of light because we kept them in a box.

But these weaknesses have no influence at our result because the distinction between the plants in freshwater and saltwater is essential bigger than the variation in the measurement.

Improving the investigation

The first try with the Agar and the salt didn't work.

The second try with the seeds in the earth only said that they grow up in normal water but don't grow up in saltwater.

The same with the plants which were already alive. The plants in normal water survived and the plants in saltwater died.

What we can do:

We can do the experiment with different salt quantities.

Or with plants which have different kinds of roots for example Aerenchyma.

Or in different grounds which maybe absorb the salt water differently like sand.

Additional experiment

We took different plants from our school-garden and put one of every type in both pots. We flooded the healthier plants with salty water (35g of salt per litre) and the others with normal water. In the following days we compared the two projections and asserted that all the plants which we flooded with salty water dried-out.

For this experiment we needed shovels, potting compost, two pots, different types of plants from our school-garden, salty and normal water.

Our weakness was or is that we don't exactly know the names of all our plants and that we hadn't a variety of plants.