Build a Tree

Talk about the different parts of a tree whilst building one out of craft materials- Can you build a tree?

Last initially checked on 2022-02-09 by Sian Boughton (seb216@cam.ac.uk)) and doublechecked on 2022-02-09 by Conor Cafolla (ctc43@cam.ac.uk))

Tags

Plants

Standard (A standard CHaOS experiment, useable for all hands-on events.)

Biology

Active (Experiment has working equipment at the time of last update, and is available for events.)

Equipment Needed

- Hard straws
- Soft straws
- Pipe cleaners (pale and brown)
- Tissue paper disks
- Elastic bands
- Black fabric with velcro
- Selotape and scissors

Experiment Explanation

So I challenge you to build a tree from the bits and pieces I have here, now where are you going to start?

Trunk here we have two different kinds of straws and they transport two different kinds of things - what do trees need to transport around themselves? Firstly what do they need to get out of the soil? - water and minerals. And can you think of anything that the tree needs to transport down from the top of the tree to the roots? Or what gets made at/happens the top of the tree? - sugar or food/photosynthesis. The thicker straws are used for sucking up water, they have to be really thick and strong to stop the straws collapsing under the negative tension that pulls the water up from the soil.

Roots keep the tree upright, help it get nutrients and water out of the ground, have a different pattern/structure depending upon nutrient/water availability. If there is less of something important, that the tree really needs to grow and live, the roots will be longer and less furry (fewer root hairs and smaller surface area) to try and grow into a space with more of that nutrient. See picture of white lupin grown with (left) and without (right) phosphate.

Branches spread the leaves out to maximise sunlight captured, trying not to shade out own leaves below, supporting the canopy. Trees will grow with different branch patterns depending on their surroundings e.g. open field vs forest - see sketch of the white oak trees (Quercus alba, sketches by C. Holdrege). Shade avoidance; neighboring plants are detected by the proportion of red to far red light in the available light, red light gets depleted and the trees reduce branch production, growing taller to try and grow above their neighbors [if you have a child friendly way of explaining that other plants use up *some* of the light then please write it down!]

Leaves to capture the light! Needed for photosynthesis, making food (forming the base of the food chain - primary producer), different shapes have different benefits (sun vs shade leaves, needles vs broad leaves, we know a v.limited amount about the reason for the huge variation in broad leaf shape). Encourage the kids to think about what benefits different shapes have; drip tips - allowing water to run off the leaves quickly, so water doesn't pool and permit fungal growth; banana leaves - have non-branching veins so that in high winds the leaves rip and don't act as sails (causing the whole tree to up root) [n.b. bananas are technically herbs not trees as their trunk dies down to the ground at the end of each growing season] Could also talk about different tree types such as conifers (often evergreen) vs deciduous (seasonally shed their leaves)

Bark protects the transport straws/vessels within the trunk, insulates from heat/fire (cork bark), protects from insect damage and diseases.

Et voila! We have a tree!

Can talk about different tree shapes - conifers vs deciduous trees (e.g. snow collecting on branches and damaging them or sliding off) oaks/beeches tend to have taller and thinner canopies than those in mixed canopies.

Risk Assessment

Hazard: Pipe cleaners

Description: Sharp ended pipe cleaners may scratch.

Affected People: Anyone using materials

Before Mitigation: Likelihood: 4, Severity: 2, Overall: 8

Mitigation: Fold over the tips and warn children about scratches. Call first aider in event of incident.

After Mitigation: Likelihood: 2, Severity: 2, Overall: 4

Hazard: Pipe cleaners/straws

Description: Eyes may be poked if children are silly with the straws or pipe cleaners.

Affected People: Everybody

Before Mitigation: Likelihood: 3, Severity: 3, Overall: 9

Mitigation: Encourage children to be sensible with straws/pipe cleaners, ask them to leave if they are being silly. Call first aider in event of injuries.

After Mitigation: Likelihood: 2, Severity: 3, Overall: 6

Hazard: Elastic bands

Description: Elastic bands may be used as missiles or wound tightly round fingers, cutting off blood supply.

Affected People: Everybody

Before Mitigation: Likelihood: 3, Severity: 2, Overall: 6

Mitigation: Encourage children to be sensible with elastic bands, ask to leave if they won't. In case of injury call first aider.

After Mitigation: Likelihood: 2, Severity: 2, Overall: 4

Hazard: Straws

Description: Germ transfer from putting straws in mouths.

Affected People: Everybody

Before Mitigation: Likelihood: 2, Severity: 2, Overall: 4

Mitigation: Warn children not to put straws in mouths, dispose of any straws which have been eaten. Warn parents of the possibility of germ transfer if child has been eating straws.

After Mitigation: Likelihood: 1, Severity: 2, Overall: 2

Hazard: Scissors

Description: Possible cuts.

Affected People: Everybody

Before Mitigation: Likelihood: 3, Severity: 3, Overall: 9

Mitigation: Younger children should be accompanied by an adult. CHaOS volunteers to oversee carefully. Ensure kids are behaving sensibly at all times. Use safety scissors. Call a first aider to deal with any cuts.

After Mitigation: Likelihood: 2, Severity: 2, Overall: 4

Risk Assessment Check History

Check 1: 2016-02-12 - Sarah Wiseman (sw628@cam.ac.uk)), **Check 2**: 2016-02-12 - Charis Watkins (czrw2@cam.ac.uk))

Check 1: 2017-01-03 - Sarah Wiseman (sw628@cam.ac.uk)), **Check 2**: 2017-02-12 - Fiona Coventry (fiona.coventry@cantab.net))

Check 1: 2018-01-25 - Sarah Wiseman (sw628@cam.ac.uk)), **Check 2**: 2018-02-02 - Richard "Miffles" Mifsud (rwm41@cam.ac.uk))

Check 1: 2019-01-08 - Amanda Buckingham (abb53@cam.ac.uk)), **Check 2**: 2019-01-13 - Polly Hooton (prh43@cam.ac.uk))

Check 1: 2020-01-18 - Conor Cafolla (ctc43@cam.ac.uk)), **Check 2**: 2020-01-23 - Holly Smith (hs606@cam.ac.uk))

Check 1: 2020-12-28 - Bryony Yates (by250@cam.ac.uk)), **Check 2**: 2020-12-31 - Esmae Jemima Woods (ejw89@cam.ac.uk))

Check 1: 2022-02-09 - Sian Boughton (seb216@cam.ac.uk)), **Check 2**: 2022-02-09 - Conor Cafolla (ctc43@cam.ac.uk))