

Edexcel IAL Biology A Level

Core Practical 8

Determine the tensile strength of plant fibres.



Independent variable: The length of plant string used

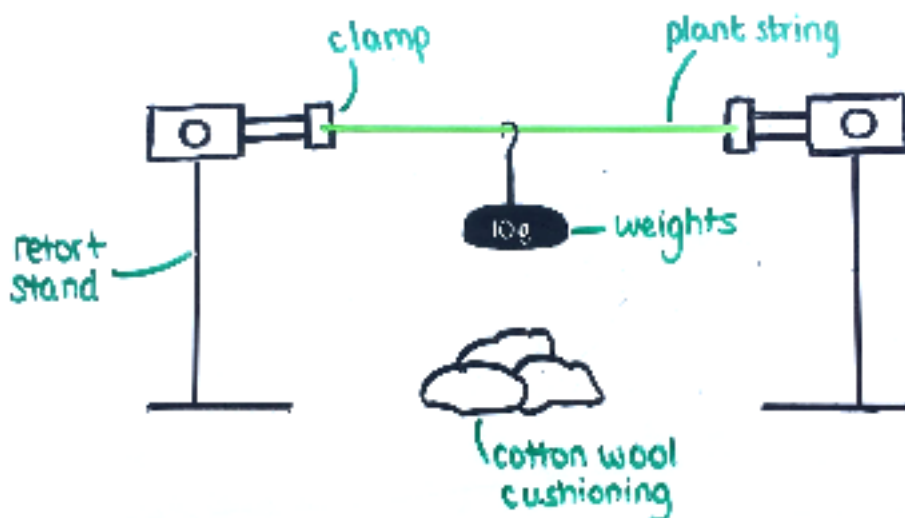
Dependent variable: The mass added before the string breaks

Equipment list

- Plant to test - stinging nettle stems or celery are good ones to use
- Cotton wool
- 2 retort stands with clamps
- Small weights - 10g is a good mass
- Chopping board or white tile
- Scalpel
- Gloves
- Ruler

Method

1. Use the scalpel to remove 9 fibrous strings from your plant sample, examining each one to check there are **no breakages** along its length and that its **diameter is even**.
2. On the chopping board or white tile use a ruler and scalpel to cut the 9 strings into three 10 cm, three 15 cm and three 20 cm lengths.
3. Set up the clamps and retorts as shown in the diagram with the first 10 cm string.
4. Ensure the string is properly secured with the cotton wool cushioning directly beneath it, then begin to add weights to the string, 10g at a time **until the string breaks**. Record the mass added in your results table.



5. Repeat step 4 with each of the other two 10 cm strings and calculate a mean mass added before the string breaks. Then repeat for the 15 cm and 20 cm lengths.
6. Plot a graph of your results.



Risk assessment

Risk	Hazard	Precaution
Plant samples	Potential allergic reaction	Wear gloves when handling Wash hands after the practical
Scalpel	Cuts from sharp edges	Take care when using, always use on a chopping board and carry on a white tile when transporting it around the lab Keep away from edge of desk
Weights	The accumulation of weights that fall when the string breaks could cause injury if it falls on any body parts	Only stack weights above the cotton wool padding and work on a clear workbench

Results table

String length (cm)	Piece 1 (g)	Piece 2 (g)	Piece 3 (g)	Mean mass added before the string broke (g)
10				
15				
20				

Conclusion

Different factors affecting the tensile strength of plants can also be investigated, such as comparing the strengths of plant fibres which have the same length but are from different species of plant. The strength of plant fibres is down to their **chemical composition**, such as the strong cellulose chains and links that form plant cell walls and the addition of chemicals like lignin which add strength and support to vessels in the vascular bundle.

