Living under the waves: what does it take?

Specialised roots and air spaces of *Posidonia* enable these flowering plants to colonise marine environments.

adaptation 1
staying put

Seagrasses grow on soft, unstable sediments such as sand. They rely on a network of roots and rhizomes to anchor them in place. Rhizomes also send out vertical shoots that allow seagrasses to expand over a large area. Roots and rhizomes account for up to 60% of seagrass biomass. These vast mats stabilise sediments and provide protection from waves and tides.

1. Suggest another anchoring structure found in terrestrial plants.

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adaptation 2
perfecting pollination

Seagrasses have the largest pollen grains of all angiosperms (flowering plants). The long, filamentous shape of these pollen grains is an adaptation for transport in water. Like all angiosperms, seagrasses rely on dispersal of pollen for sexual reproduction. Seagrass uses water and tides for pollination — this is known as hydrophilly. Long, thread-like pollen stay afloat for longer, increasing chances of pollination and fertilisation.

2. All aquatic plants pollinate through hydrophily. Suggest means of pollination used by terrestrial plants.

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adaptation 3
riding waves

Most seagrasses have long, flattened leaves that are thin and blade-like. Seagrass leaves contain strong, fibrous material and/or thick-celled walls, which provide support. These structures also provide flexibility required to avoid damage in dynamic marine environments.

3. Suggest another environment where flexibility in plant leaves may be advantageous.

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adaptation 4
soaking up gas

Unlike terrestrial plants, seagrass leaves lack stomata (pore-like structures used for transport of gases and water in and out of the plant). Seagrass leaves are covered in a very thin cuticle layer, comprised of cells that are strong and thick-walled, but extremely porous. This enables gas (carbon dioxide) to diffuse readily into seagrass leaves.

4. How do stomata control the exchange of gases in terrestrial plants?

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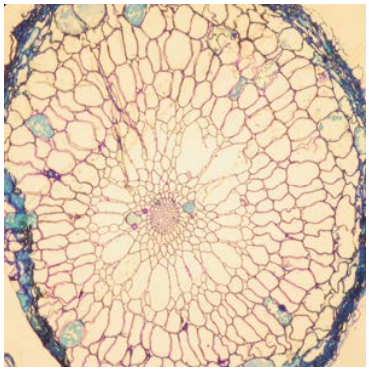

adaptation 5
moving gas around

Lacunae are distributed throughout seagrass plants, from shoot to root tip. Lacunae are an important structural adaptation for transport of gas around plants, and are used for photosynthesis and cellular respiration. Ocean sediments are often anoxic, which is a condition detrimental to cellular respiration in seagrass roots. Lacunae enable efficient transport of oxygen from leaves (where the concentration is high) to roots (where the concentration is low).

5. In the absence of lacunae, explain how most terrestrial plants transport gas across cell membranes.

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Seagrass photos by Renae Hovey, used by permission.

Cross section of seagrass root by John Statton, used by permission.