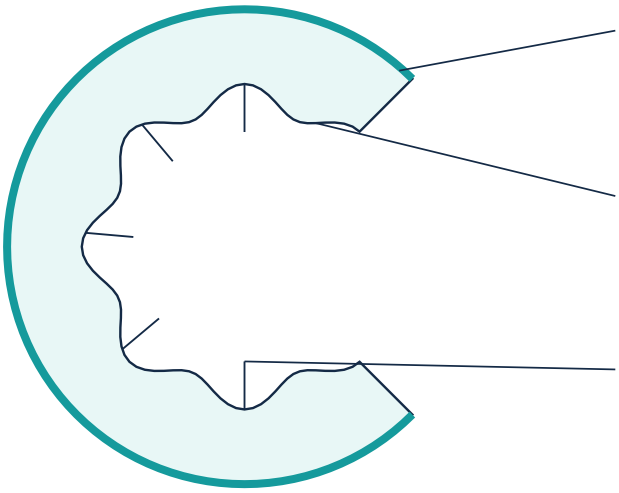
Rolled leaves shelter the stomata

Xerophytes are plants adapted to limited water availability. In a transverse section, connect the visible leaf structure to how it reduces transpiration, not just to the word adaptation.

1. ROLLED LEAF: MARRAM-GRASS MODEL



Thick outer cuticle

Reduces water loss through the exposed surface.

Enclosed inner surface

Shelters stomata from dry, moving air.

Inward-projecting hairs

Help retain a still, humid air layer.

Schematic transverse section, not to scale. Tissue details and individual stomata are omitted; in marram, stomata lie in pits on the inner surface. The opening is not sealed.

2. EXPLAIN WHY ROLLING HELPS

Rolling reduces the surface directly exposed to drying air and encloses the stomata. Water vapour builds up in the sheltered space, reducing the concentration difference between leaf air spaces and air immediately outside the stomata.

3. KEEP THE SURFACES STRAIGHT

The exposed outer surface of marram has a thick cuticle and no stomata; the stomata are on the inner surface. Do not draw a pore on the outside simply because that position is easier to label.

Different xerophytes have different combinations of features. Not every xerophyte has a rolled or hairy leaf.

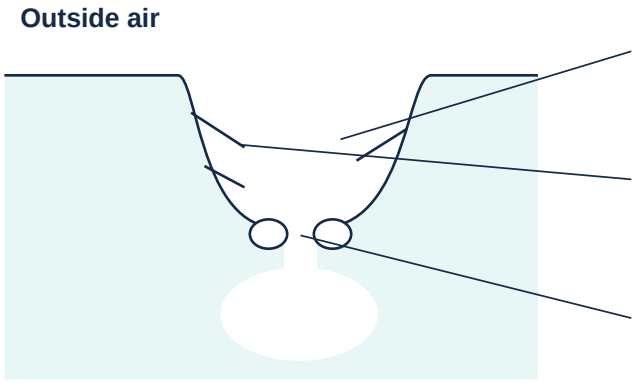
Marram features: Cambridge 9700 Paper 2 example candidate responses, Q2.

Scope: Cambridge Biology 9700 syllabus, section 7.2, outcome 5, p. 26.

Sunken stomata retain humid air

A sunken stoma lies below the surrounding epidermal surface. Its sheltered position and nearby hairs can reduce air movement, slowing the removal of water vapour.

1. ENLARGED PARTIAL TRANSVERSE SECTION



Sheltered depression

Air near the pore is less disturbed by wind.

Hairs on the epidermis

Help maintain a humid boundary layer.

Stomatal pore

Vapour diffuses out; it is not a water-filled hole.

Diagrammatic surface detail; the leaf interior is below. White space beneath the pore represents an internal air space. Real cell shapes must be copied from the specimen.

2. FOLLOW THE FULL CAUSAL LINK

Sunken pore or hairs -> less air movement -> humid air remains close to the stoma -> a smaller water-vapour concentration gradient -> slower net outward diffusion. The adaptation reduces water loss; it need not stop it.

3. THE CUTICLE WORKS DIFFERENTLY

A thick waxy cuticle forms a relatively impermeable barrier to water loss through the leaf surface. It does not work primarily by trapping humid air, and it is not a layer sealing across open stomatal pores.

4. REDUCED LEAVES ARE ANOTHER STRATEGY

Needle-like leaves or leaves reduced to spines can reduce exposed leaf area. Do not infer the whole leaf area from one small section alone. Water storage supports survival but is not, by itself, a mechanism that reduces transpiration.

Cuticle, hairs and reduced leaves: OpenStax Biology 2e, section 30.4.
Humidity and wind effects: USGS, Evapotranspiration and the Water Cycle.

Scope: Cambridge Biology 9700 syllabus, section 7.2, outcome 5, p. 26.

Turn a label into an explanation

An annotated drawing identifies a visible feature and explains its significance. Use the actual section to decide what to draw; these schematics are teaching models, not microscope observations.

1. FEATURE + MECHANISM + EFFECT

Thick cuticle	→ Less permeable surface	→ Less cuticular water loss
Hairs near stomata	→ Still, humid air retained	→ Slower vapour diffusion
Stomata inside a roll	→ Less exposure to dry wind	→ Reduced transpiration

2. DRAW THE SECTION YOU WERE GIVEN

Use a large drawing with clear, single outlines and correct relative proportions. Show the cuticle, epidermal contours, pits and hairs only where visible. For a low-power plan, draw tissue boundaries rather than inventing individual cells.

3. PLACE ANNOTATIONS PRECISELY

Use straight label lines that reach the named structure, do not cross each other, and stay clear of text. A line for a stoma must end at the pore, not at a hair or the empty centre of the rolled leaf.

4. CHECK THE BIOLOGY BEFORE FINISHING

Explain reduced water loss, not simply adaptation to dryness. Keep a route for gas exchange: carbon dioxide must still reach photosynthetic cells. Do not claim that all xerophytes have no stomata or lose no water.

Drawing and annotation requirements: Cambridge 9700 syllabus, practical assessment.

Scope: Cambridge Biology 9700 syllabus, section 7.2, outcome 5, p. 26.