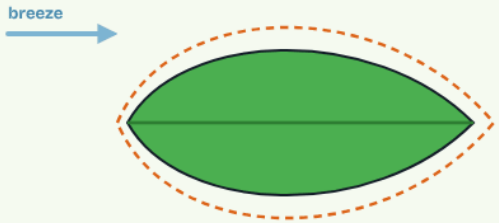
That is why

Why do leaves have different shapes?

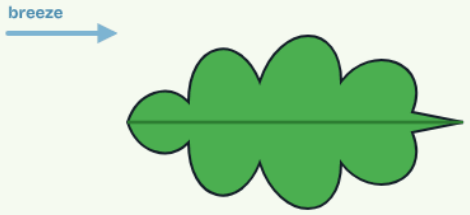
Size, lobes and teeth change how a leaf trades heat, water and gas with the air, so shapes follow climate and light.

A The still-air blanket

Every leaf is wrapped in a thin layer of still air, the boundary layer. Heat, water vapour and CO_2 have to cross it.



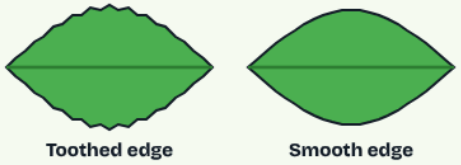
Big, smooth leaf
thick layer:
runs warmer



Lobed or narrow
thinner layer:
sheds heat faster

What counts is the effective width: how far air travels across the leaf. Deep lobes make a big leaf behave like several small ones.

B Teeth and climate





In colder climates, more woody plants have toothed leaves; in warm climates, smooth edges are more common.

1 A head start in spring

Teeth often photosynthesise more in the first weeks of the season.

2 Faster sap flow

Teeth may speed water to young leaves in a short summer.

C Water and light

1 Wet places: big leaves

Leaf size tends to rise with available water, as in rainforests.

2 Dry, sunny places: small

Smaller leaves stay cooler and lose less water in hot, dry conditions.

3 Sun and shade leaves

On one tree, outer sun leaves are often smaller, thicker and more deeply notched than shade leaves inside.

Shape also depends on support and veins: no single rule explains every leaf.

A leaf shape is a compromise between heat, water and light.

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