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BOTANIST



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SMART
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STRATEGIES!
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SURPRISES
GUARANTEED!



Plant roots can be very long indeed. One species of wild fig in South Africa plunges its roots 120 metres deep into the ground just to find water.

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SURPRISES
GUARANTEED!



When the leaves of an apple tree are attacked by winter moth caterpillars, they **send odours into the air** that attract great tit birds, which are very fond of these caterpillars. A great way to get rid of them!

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SURPRISES
GUARANTEED!



A liana vine in the rainforests of Argentina and Chile can **change its shape, size and colour**, just like a chameleon. Its leaves mimic those of the other plants it is climbing. A clever way to slip under the radar!

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SURPRISES
GUARANTEED!



Common beech trees appear to be able to **differentiate between their own seeds and those of neighbouring beeches**. While they cover seeds from other beech trees with their roots, they make room for their own seeds using their roots so they can germinate.

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SURPRISES
GUARANTEED!



A Japanese scientist placed electrodes on a tree trunk and noticed the tree **reacted to an approaching earthquake**. This could help people get out of their homes in time!

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SURPRISES
GUARANTEED!



*Neottia
nidus-avis*

Through photosynthesis, most plants convert sunlight into nutritional energy. But some plants, like bird's-nest orchid, can't do that, so instead **they use fungi to get the nutrients they need**.

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SURPRISES
GUARANTEED!



Mosse

Tundra soil is in a deep freeze for much of the year, yet more than **2,000 smaller plant species manage to live there**, including grasses, mosses, lichens, fungi and shrubs.

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SURPRISES
GUARANTEED!



The tallest tree in the world is a redwood, which are part of the conifer family. This gentle giant lives in a forest on the Pacific coast of the United States of America and measures 112 metres tall.

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PROTECTION STRATEGIES



It's not the wind that twists the branches of a tree. It's the tree that makes **branches grow that way by orienting them** so they're less affected by gusts of wind!

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PROTECTION STRATEGIES



Cypress trees can **protect themselves from forest fires** thanks to the very large amounts of water they store in their scales. As a result, cypress trees take seven times longer to catch fire than pines.

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PROTECTION STRATEGIES



Atriplex canescens, a species of shrub from the American drylands, is **resistant to salty desert soil**. It even uses the salt to absorb the tiny amount of moisture in the soil.

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PROTECTION STRATEGIES



Mimosa pudica **very quickly closes its leaves** when an insect or human hand touches it. However, they don't react when the wind or drops of rain shake their leaves.

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PROTECTION STRATEGIES



Aloe

In times of drought, plants can reduce the amount of water they lose through evapotranspiration **by closing their stomata**, all the little holes under their leaves.

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PROTECTION STRATEGIES



Cork oak

Certain trees, like the olive or cork oak, protect themselves from the sun's powerful rays **by producing a thick bark**. This way, the heat can't penetrate as much and they lose less water through evaporation! How clever!

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PROTECTION STRATEGIES



Cactus

Pyracantha

Herbivorous animals love grazing. That's why some plants protect themselves with **thorns or quills** tightly attached to their stems or leaves! Very off-putting!

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PROTECTION STRATEGIES



Silene acaulis

Edelweiss

To protect themselves from the cold in polar regions or high up in the mountains, some plants can **form a type of cushion**, like *Silene acaulis*, while others **cover themselves in downy hairs**, like Edelweiss.

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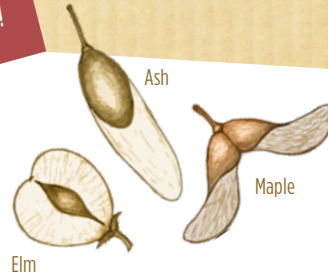
REPRODUCTION STRATEGIES!



The *Hydnora africana* plant grows underground. Only one flower pokes out through the soil. It gives off an odour of excrement that attracts insects, especially beetles, which then pollinate it.

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REPRODUCTION STRATEGIES!



Some plants use the wind to spread their seeds. Birch, ash, elm and maple trees all use a wing-shaped membrane to transport them through the air.

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REPRODUCTION STRATEGIES!



To reproduce, plants sometimes have to rely on a single species of insect. For example, because of the shape of their flowers, one orchid from Madagascar can only be pollinated by a species of butterfly with a very long proboscis, or trunk.

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REPRODUCTION STRATEGIES!



Rhinoceros and elephants eat baobab fruit but aren't able to digest the seeds. Those seeds then germinate after being expelled in their droppings. Some seeds can only germinate if their shells have been softened by the juices of an animal's digestive system, whether that's mammals, birds, reptiles, fish...

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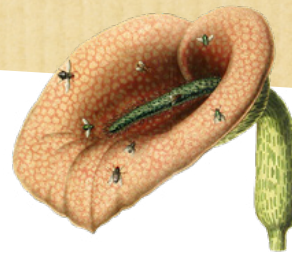
REPRODUCTION STRATEGIES!



Underwater flowering plants produce pollen, too. It gets transported by sea currents and small crustaceans or aquatic worms.

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REPRODUCTION STRATEGIES!



A plant from the Mediterranean islands known as the 'little fly-eating dragon', or even the 'dead horse arum', gives off a pronounced smell of carrion to attract flies to pollinate it. It can even raise its own temperature by 10°C to better diffuse its... 'perfume'!

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REPRODUCTION STRATEGIES!



Indian-strawberry

Some plants grow stems around themselves on the surface of the soil in order to grow their offspring. These quickly form dense clumps where other plants have difficulty taking root. This is known as 'vegetative' reproduction (which means you don't need seeds!).

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REPRODUCTION STRATEGIES!



Some species reproduce better after forest fires. The cones from Aleppo pine trees can retain their ripe seeds until a fire has passed through. Once the fire is gone, they're released and can germinate before any other species, meaning the Aleppo pine can recolonise all the burnt space.

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RECORDS



Ginkgo biloba is one of the oldest species of tree in the world. They've been around for over 200 million years.

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RECORDS



The *Welwitschia* lives in the coastal deserts of Namibia. They're capable of going 5 years without a single drop of water and can live anywhere between 1,000 and 2,000 years!

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RECORDS



Conifers live until they're very, very old. Some pine trees in California are 5,000 years old. **One spruce tree in Sweden** is known to be 9,550 years old. All these trees live in cold, dry climates.

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RECORDS



All *Lomatia tasmania* have been identical for over 43,000 years. This Tasmanian shrub can only reproduce by division: a piece of branch falls to the ground, takes root and forms a new stem, making it genetically identical to all the others before it.

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RECORDS



The heaviest fruit comes from a tree native to Asia, the **Jackfruit**. It can weigh between 15–40 kg!

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RECORDS



The **North American aspen** reproduces either using its seeds or through sprouts from its root system, which can go on to form large forests. Using this method, a single individual tree has managed to produce a 43 hectare forest in the United States.

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RECORDS



Flowers of the titan arum found in Sumatra can grow to be over 2 metres tall and weigh up to 70 kg. Several years pass between each flowering and last just a few days.

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RECORDS



The smallest known flowering plant is a duckweed native to Brazil, *Wolffia arrhiza*, which measures between 0.5–1 mm. Its flower is half the size of its leaves, so it's a good idea to take a magnifying glass if you're going out to find it!

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SMART PLANTS



Some insectivorous plants grow sensitive hairs on their leaves. If an insect touches one of these hairs, the plant doesn't respond, but if it feels another touch within around 20 seconds, **the leaf quickly folds over the insect.**

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SMART PLANTS



Researchers have observed the roots of a pea plant growing towards a buried pipe where water was constantly circulating, **as if they were listening** out for what they needed.

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SMART PLANTS



Male wild bees are *Ophrys* pollinators. To attract the males, the flowers **take on the appearance and smell of female bees.**

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SMART PLANTS



Passiflora is a type of flowering vine that uses its tendrils to hang on. **Its 'memory' has been documented** by an experiment. If you move the support they're trying to cling onto 3 times in a row just 5 cm to the right, by the 4th time, they'll anticipate the movement and project their tendrils 5 cm further to the right to compensate.

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SMART PLANTS



When several pots of the same family of plants are placed side by side, **their leaves will orient themselves in different directions in order to share the light.** But when the species are different, the plants will compete and orient their leaves without a thought for the others.

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SMART PLANTS



In South Africa, antelopes have been found dead after grazing on the leaves of an acacia tree. Veterinarians found the animals had been poisoned by a substance present in the leaves. Indeed, because the tree had been grazed too often, it **produced a poison to defend itself.**

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SMART PLANTS



Trees communicate with each other, both in the ground and in the air. By releasing chemical signals, like specific odours, they can warn each other of any attacks that might be taking place, for example. Trees that are further away from an attack can therefore better prepare themselves.

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SMART PLANTS



Certain types of soil fungi create networks with plant roots to form mycorrhizae. These networks mean nutrients (food) can be exchanged between fungi and plants.

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