There are lots of reasons for leaves varying in shape and size, listed are just a few.

Water Retention: Plants living in dry condition are likely to have leaves with a small surface area that are often needle shaped in order to retain water. 90% of the water absorbed by a plant is lost through evaporation through the leaves.

Adaptation: Some plants have leaves shaped like slides, these are also slippery and insects unfortunate enough to land on them are likely to slip into a vat of water and digestive juices.

Protection: Some plants have needle shaped leaves for protection from predators, a good example are the coniferous trees in the arctic. Their leaves are shaped like spines to deter hungry animals. There's not much sunlight or rain in the arctic so every leaf is precious.

Getting rid of excess water: Plants “breath” through tiny stoma in their leaves, if these were to become clogged with water, the plant would effectively drown. Most leaves are shaped specially to allow water to run off them, with the veins in the leaves acting as gutters.

The leaves have different shapes depending on the physiological necessity of the tree according to the region on the earth. For example, the leaves of a tree in tropics have broad shape whereas the leaves of tree in a temperate region have conical shape so that the snow does not accumulate on the leaf.

The angles in leaves, for example, may play a role in how sunlight is intercepted. Sharp angles, the study notes, may reduce the amount of light that the leaf intercepts during the blaring midday sun. In effect, a sharp-angled leaf can shade itself.

Conversely, rounder leaves have “greater daily light interception and potentially greater carbon gain."

A leaf’s design must be open enough to capture sunlight for all-important photosynthesis. It also needs to make sure a leaf is shaped in a way that ensures the pores — called *stomatae* — can soak up enough carbon dioxide, which helps fuel that process.

And that’s where size plays a key role. Like solar panels, big leaves harvest as much sunlight as they can. Smaller leaves shun too much sun and focus on keeping bundled tight in the cold.

**Are the arrangements of leaves on a tree always the same?**

There are two basic arrangement patterns of leaves on a tree: "mono-layer" and "multi-layer". In a mono-layer arrangement the leaves are arrayed so that no leaf is above and, therefore, shading any other leaves of the tree. This is the leaf pattern seen in the shade dwelling under story trees like the dogwood. In a multi-layer arrangement there are leaves above and below other leaves on the tree. This is the pattern seen in trees which extend u into the upper stories of a forest canopy. The light-rich upper leaves (as previously mentioned) tend to be smaller and more lobed than the lower. This leaf shape facilitates heat loss and prevents extreme self-shading.

Top of Form

Bottom of Form

Plants face a strange predicament. While water and minerals are absorbed closer to the ground, light is available higher up from the ground. Forest floors are usually shaded by trees that are higher. A plant that is not tall and has to grow in shade, needs to capture as much sunlight as possible. Such plants develop fat roundish leaves. But it's not easy for the tall plants either. They have to transport water and minerals all the way from the ground to the leaves. The farther the veins that carry water go, the narrower they become. Such narrow viens can not form intricate network of viens. Tall plants therefore have narrower leaves with mostly straight viens.



As the plant grows, the leaves at the bottom of the plant become less effective as they are shaded by other leaves. The plant therefore lets go or sheds the lower leaves. So leaves need to be easily detachable. Leaves also need to be flexible and must bend easily to give way to passing wind. Otherwise wind force will probably uproot the tree. Therefore leaves are slender at the point they are attached to the stem, to make them flexible and easily detachable.



Big leaves also have the problem of tearing up in strong winds. Plants that have to survive windy places, like the coconut tree, develop cuts in their leaves so that air can pass through easily. Some such plants also have thread like leaves, like the pine tree.



Water is scarce in some places. Some plants that grow in drier places must grab and store as much water as possible when they can. Such plants have thicker leaves that store water. They also tend to have smaller leaves to avoid the stored water from evaporating too fast.
Even an abundance of water needs to be tackled. Plants that grow near or on water need to keep their leaves above water where they can have enough air and light. Such plants also have thicker leaves that have air pockets to keep them afloat.



Plants that grow in dry and cold places usually have thin leaves. Such leaves minimize water evaporation from the leaves. They also do not let ice/frost form easily on them, protecting the plant from damage.