

The Pack Leader Emerges

Nearly all plants develop both above and below ground. Above ground, the stems, leaves and eventually flowers establish the shape and form of the plant. They are the face of the plant – the part we recognise – but, unseen by us, the roots are equally as important.

Below ground, the roots must push through the soil, send out anchors to stabilise the plant, and search for food and water. However, the root system must have sugars to give it energy. Without the stems and leaves, the roots would starve and without the roots, the stems and leaves would not have adequate anchorage, water and soil nutrients to stay upright and produce leaves and secondary stems.

In the early life of a plant, it is the primary shoot's job to ensure sufficient energy is manufactured and it must do this as quickly as possible so it can compete for sunlight with all the other plants around it. To do this, in some plants, the first of the shoots to appear establishes dominance over all the others. It is, if you like, the pack leader.

As the dominant shoot apical meristem (SAM for short) pushes towards the light, it deposits little bundles of cells (secondary meristems) along the stem from which new leaves will emerge but, as they are yet undefined, they also have the potential to produce side shoots. A dominant SAM at the very tip of the main shoot, exerts control over a hormone that inhibits the growth of these new side shoots until it can reach up high enough to receive sufficient sunlight. Like any other pack leader, it is saying to the rest of its pack "No one gets to eat until I eat first".

When the dominant SAM draws away from the other potential branches, its hormonal influence over them weakens, they are allowed to break into growth and the plant produces branches with subordinate SAMs. Because of the influence of their pack leader, these branches develop low enough down the stem so they don't overshadow the dominant SAM and compete with it for light.

As the leaves above manufacture more sugars through photosynthesis the root is able to use these sugars to produce lateral roots below ground to feed the development of new branches and provide extra anchors. Just as some plants have a dominant SAM, so some plants have a dominant RAM. Where there is a dominant RAM, the root system consists of an autocratic, central tap root with subordinate, lateral branches. In plants with no dominant RAM, the root that first appeared from the seed withers away to be replaced by a democratic government of fibrous roots of equal importance. Whether the plant has a dominant tap root or a number of fibrous roots, these roots will, in turn, produce subordinate branches to further assist the plant in its search for water and nutrients.

In no other group of plants is the ever-dominant presence of the SAM pack leader more evident than in the trees. Looking at a tree, it is easy for us to see the dominant

stem with its bundle of leaves at the very top, always in the best position to achieve the most sunlight and the less dominant, branching stems arranged below.

But what happens when a plant loses its pack leader? Just like in any other pack, there are always leaders-in-waiting and for most plants, these leaders-in-waiting will be the SAMs in the next strongest position - in other words, the branches nearest the top. If the dominant tip of a plant is lost before there are any established branches below, new stems will develop very quickly at the next bundle of cells down, usually where there is already a set of leaves. If there are already branches, one or more of these branches establish dominance and grow faster with the new growth becoming more vertical.

In almost all cases, when the dominant shoot apical meristem is lost, the plant becomes bushier as one or more of the lower branches compete to achieve the top position. It is by understanding the phenomenon of apical dominance that we can solve a major gardening mystery – when and what to prune. Once you understand what the plant will do when you remove its pack leader, you will never be afraid to tackle pruning again.