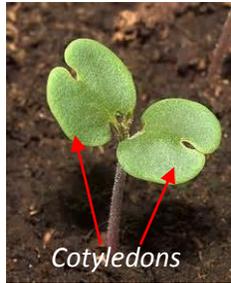


### Dicot or Monocot? How to Tell the Difference

Flowering plants are divided into two groups - monocots and dicots. Recognizing which of these two groups a plant belongs to is a great time saver when you are out in the field trying to identify a plant using a key.



The names of these groups are derived from the number of cotyledons or seed leaves that the embryonic seedling has within its seed. A monocot, which is an abbreviation for monocotyledon, will have only one cotyledon and a dicot, or dicotyledon, will have two cotyledons. However, this distinction will not help you when you are trying to determine which group a plant belongs to if it is no longer a seedling. And, sometimes it doesn't even help if you are looking at a seedling, because many plants do not bring their cotyledon(s) above the soil surface when they germinate as the seedling shown to the left did.

Here are some key features to look for to determine whether a plant is a monocot or a dicot.

Leaves of dicots have veins that are branched. Sometimes the veins branch out on either side of the leaf from a middle vein, in an arrangement resembling a feather (pinnate arrangement) shown in the picture below left.



Other dicots have veins that branch out from a single vein, like fingers on a hand (palmate arrangement) shown in the picture to the right. Monocots have veins that are parallel to one another as shown in the picture below right. However, this does not mean that all



monocots have narrow grass-like leaves. Arrowhead (left) is a monocot. Because the leaves have lobes that hang downwards, it almost looks like the veins branch out in the same manner as described for palmate veins. However, if you look closely, you can see that all the veins originate at the base of the leaf and are parallel to each other in each lobe of the leaf.



If your plant is flowering, you can tell if it is a monocot or dicot by the number of petals and other flower parts.

Monocots have flower parts in threes or multiples of threes as shown in the flowers to the left. Dicots have flower parts in multiples of fours or fives like the five-petaled dicot flower pictured to the right.





If you want to dig a little, dicots have a taproot system, with one large root at the base of the plant and smaller roots that branch out from it as shown on the plants pictured to the left. The taproot was the first root that emerged from the seed, which is known as the radicle. Monocots have a root system that is composed of a network of fibrous roots as shown in the picture to the right. These roots all arose from the stem of the plant and are called adventitious roots.



Also, woody trees that are not gymnosperms (pine, cedar, cypress, etc.) are dicots. Their stems have a layer of actively growing cells between the bark and the wood known as the cambium that allows the stem to grow laterally and increase trunk diameter. This is what creates the annual growth rings in the wood as shown in the in the cross-section of a tree trunk pictured to the left. You don't have to cut the tree down to see growth rings, because there is cambium in the branches as well that also allows

them to grow in diameter. Some monocots, like palms, may have hardened stems, but their trunks do not have a cambium layer and are not capable of outward stem growth like woody dicots. As you can see in the picture to the right, there are no annual growth rings in the cross-section of palm trunk.



There are other features that can distinguish a monocot from a dicot, however, these are generally only visible at the microscopic level. If you wish to find out what these anatomical differences are, type in monocot vs. dicot in any search engine and you will find multiple references that provide these details.