

The Art of Bonsai

By Eugene Howell

Many bonsai hobbyists spend a majority of their “bonsai time” looking at, and working with, the trunks, branches and leaves of their trees. All too often these folks fail to keep in mind the fact that one third of the bonsai is not even visible and yet needs a good deal of thought and care placed in it. This, of course, is the root system. A healthy root system is critical to the general health and vigor of the tree, but since it is out of sight, it all too often is also out of mind. Most of us only think about the roots when it is time to re-pot, and then the thought process only encompasses whether the roots need to be trimmed.

The health of the root system is as important to the tree as any other part of it. Some would argue that there is no other part of the plant that is more important than the roots. It is here that all of the nutrients and water that are to be converted into food are absorbed into the plant. Here also is where the plant stores the great majority of its emergency ration of food and where the plant gets its ability to stay upright. A plant can get along without its leaves for many weeks and can easily survive when all its branches are removed (the typical way to initially handle a Ficus when turning it into a bonsai); yet remove too many roots from most plants and within just a few days you have nothing but firewood on your hands.

So let's spend some time discussing the roots and how to keep them healthy.

Several of the things that will be discussed have appeared in various articles during the past 2 years but, for the sake of a concise discussion, I want to pull them, along with new information, all together in this article.

You may remember that the root system of a tree in nature is actually larger than the canopy of the tree. It normally will extend two or three times further from the trunk than do the branches. There are two reasons for this. First the root system needs to be this large in order to find enough water and minerals for the tree and secondly, it provides the above-ground parts of the tree more stability and ability to withstand strong winds without blowing over.

The tree needs a constant supply of food and water to survive. These enter the tree through the root system. Dissolved minerals and water are absorbed, by osmosis, through the root hairs along the tips of each small root. These nutrients are carried up to the leaves where they are converted into complex carbohydrates, which are the food that the tree uses.

Each of the root hairs is actually only one meristem cell which has elongated to protrude a very few millimeters from the surface of the root. By osmosis, the dissolved minerals (called salts) are passed into the root hair and then, by fluid pressure, through the xylem layer all the way to the leaves.

One question that arises is “What causes the water and dissolved minerals to move into the root hairs?” The answer is one of simple chemistry. If there is an area with high salts (not sea salts, but dissolved minerals as discussed above) concentration and an adjacent one with low salts concentration, water (and its dissolved minerals) will move toward the area with higher salts content in an effort to dilute it. In the case of root hairs, the liquid inside each hair is of higher salts content than the water in the surrounding soil so the water moves into the root hair. This is the reason you never want to apply too much fertilizer to a plant. When this occurs, the salts content in the soil's water becomes higher than that in the root hairs and the liquid in the roots moves out into the soil. This causes the root hairs to die from lack of liquid. When this happens the plant can no longer intake water and the plant goes into water stress. If the situation is not corrected (assuming that too many root hairs and tiny roots have not been killed) quite quickly, the plant will die. If too many have been killed, the plant will not recover.

(To be continued next month)