Cooperative Extension University of California Ventura County

Landscape Notes

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DEEP PLANTING KILLS!

I am amazed at how the simplest of procedures or practices can go so wrong. For the green industry, the best example of this is planting. The act of putting green in the ground is our business. We do this. The problem is, we often do it wrong, carelessly, or without regard for the outcome—dead plants! A consultant friend has often expressed how deep planting and covering the root ball with native fill are the most common mistakes he sees. I have to agree--landscape plants die at the hand of man more than from all the diseases and insects combined. There are various incorrect ways to plant a tree, such as adding too much organic matter to the backfill, installing a dry root ball and then not irrigating after planting, or adding too much fertilizer to the backfill. The practice I want to cover in this article is planting too deeply. The problem continues despite research about planting that recommends correct planting depths. Unfortunately, planting depth is often ignored when plants are installed in landscapes.

Deep planting can result in death of woody and non-woody or herbaceous plants either because they rot (in moisture-saturated soils, see photo at right) or because they dry out. In either case, the symptoms are similar: wilting, sunscald or burnt leaves (necrotic tissues in the middle of the leaf), lack of growth, leaf drop, and eventually, necrosis of leaves, shoots and branches (all above ground parts). Irrigation usually does not improve symptoms because by the time they are noticed the plant has already been harmed beyond repair.

Root balls placed below grade cause several problems during establishment. Since native soil surrounds the root ball, there is an immediate problem with an interface between the two soil textures. Most container media are “light” to promote drainage characteristics necessary for container culture. When these soil-free media are planted in soil which is of a much finer texture, the resulting interface does not allow water to enter the root ball. Water must completely saturate the surrounding soil before it will cross the interface (Harris et al., 1999). As the plant draws down its container media moisture, the root ball desiccates beyond the permanent wilting point and the plant dies. This process is extreme in plants that are grown in peat-based media because the peat moss can become quite hydrophobic as it dries and then the interface issues are exacerbated. Special care should be taken with azaleas, rhododendrons or other acid loving plants grown in peat moss-based media to plant them at or above grade so the media itself is exposed to irrigations.

Acid loving plants are not special in their needs for

water, immediate irrigation is required for all newly installed plants. Installing the plant at or above grade (if only ½-1 inch) will prevent excessive drying of the root ball. It is however, very important that the root ball itself is irrigated frequently in the first month of establishment not just the surrounding soil. Newly planted nursery stock does not absorb water from landscape soil, only from its own rootball. Until roots grow into the native soil, the plant must be irrigated to keep its rootball moist.

Not all installers get planting depths wrong at the start. When the plants are first installed, everything looks good. The problem is sometimes related to the amount of digging used to make the planting hole. If the hole is dug too deep, and soil added back to bring the final grade to level, the plant can slump as water settles it. Soil will wash in from the sides covering the root ball and sealing it from future irrigations.

Deeply planted woody plants are subject to diseases. The area where the roots of a plant join its main stem is the root collar. This area is very metabolically active and requires oxygen. In some cases, the stem above the root collar is green and photosynthesizes. Acer japonicum the Japanese maple has a clearly demarcated root collar region (see photo, right). Soil goes on the brown part and the green part should remain above ground. When the main stem is buried, the plant is predisposed to attack from canker forming fungi or other plant pathogens that can girdle the stem, killing it and all that grows above it.

It is quite clear from the literature that there is a strong species effect to the tolerance (or lack of tolerance) to deep planting. In a study of red maple and Yoshino cherry, only 50% of cherries survived deep planting, while there were no significant losses of maple to deep planting practices (Wells, et al., 2006). Arnold and others, 2007, found that green ash (Fraxinus pennsylvanica) was more tolerant to below-grade installation than golden rain tree (Koelreuteria bipinnata). In the same paper by Arnold et al., they showed that mulching can make deep planting worse. When trees planted below grade were mulched, mortality levels increased. Mulching is still a great thing to do when the root ball is at or especially above grade, just make sure the texture of the mulch is coarser than the root ball media.

If plants survive deep planting, there can be other consequences. Wells and others 2006, showed that red maple (Acer rubrum) had increased numbers of girdling roots the deeper they were planted. When planted 6 inches below grade trees had 48% of their trunk encircled by girdling roots, when planted 12 inches below grade 71% of the trunk was affected.

Not all researchers found that soil over the root ball is detrimental. Gilman and Grabosky, 2004, found that if irrigation is plentiful (over an inch of applied water), trees survived and were less stressed three months later. Although planting depth did not impact growth of Southern live oaks, the study was relatively short term (7 months). I have also found

in my own study of landscape shrubs that deep planting of five different genera of shrubs were not affected by planting depths of up to 4 inches below grade. The limitation of these studies is that they are short term. Over longer periods, disease and greater periods of hypoxia during high rainfall seasons may have cumulative detrimental effects not seen in the establishment phase of growth. When studied for three years, Arnold and others

(2007), found that planting slightly above grade (3 in) improved growth of oleander and sycamore, while planting slightly below grade (3in) was harmful to all tested plants.

The story for palm trees also needs to be told. Palms are intentionally planted below grade more than any other kinds of plants. There is a strong desire by clients to have the meristems all at the same height giving a uniform look. This is achieved not by buying the same size palms, but by varying the planting depth. Because the industry often plants palms in sand, it is felt that palms will tolerate this treatment. Also, since the root initiation zone of a palm can ascend its trunk, somewhat deeper planting is often successful. The problem comes when sand filled pits are surrounded by clay native soils and irrigation is frequent. The sand pit fills partially or completely with water and the palm rots. Broschat (1995), found that when Phoenix roebelini (pygmy date palms) were planted deeply, both growth and survival were significantly reduced. Our current recommendation is to plant palms with their root initiation zones at grade.

Sometimes installers, architects or other experts recommend using PVC aeration tubes to allow deep planting and prevent hypoxia. Although few studies have examined aeration tubes, MacDonald and others (2004), found that buried aeration tubing did not increase oxygen diffusion rates when compacted fill soil was placed over the tubing. There are no research-based recommendations for the use of tree tubes that I know of. Other excuses for deep planting such as planting cocktails of growth stimulants, root activators, or fungicides are also not a good idea, and if they contain pesticides may be unlawfully applied for this use. The final word is simple, plant at or slightly above grade and everything will be ok!

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