UNIVERSITY OF NEVADA, RENO
COOPERATIVE EXTENSION

Planting Bare Root Trees and Shrubs In Nevada.

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Planting bare root trees and shrubs is very economical. However, gardeners often feel that smaller bare root stock will not do as well as container plants. The opposite is usually true and with just a little understanding, establishing bare root plants in Nevada is successful and rewarding.

Availability: Deciduous landscape plants are available bare root through local nurseries and mail order catalogs. Small evergreens may be sold bare root; however, most evergreens are sold balled and burlapped or in containers. A wide variety of container stock is sold year-around; only a few bare root fruit species are available locally each spring. But, many landscape plants are available bare root through the mail. Commercial orchardists successfully plant bare root trees; landscaper contractors and home gardeners may do the same with many landscape plants.

Planning and Procuring: Bare root plants are planted in late winter when they are dormant and the ground is not frozen. Gardeners must plan carefully and place orders early to ensure that specific plants are available and arrive at the appropriate time for planting. Unusually rare horticultural specimens or very new cultivars are only available bare root through catalogs.

Planting Site Considerations and Preparations: Selecting the appropriate plant for the landscape site is critical to the plant's performance, health, and longevity. Consider the following:

- **Climatic conditions** limit species selection and landscape performance. Extreme cold and heat, low relative humidity, drought, and drying winds make growing many plants in Nevada impractical. Use plant guides available from Nevada Cooperative Extension and local libraries to choose adapted plants. West and south exposures, especially slopes, are most severe. North and east sides of buildings or slopes are less harsh for plants.
- **Soils** in Nevada restrict tree selection and growth. Nevada's soils are inorganic, alkaline (high pH), relatively shallow, and seasonally dry, except near watercourses and wetlands. Many are layered, often with impenetrable caliche, poorly drained and salty. Construction activities, vegetation removal, slope cuts or fills, compaction and toxic spills, make poor soils even worse for landscape trees and shrubs.

  Break up soil layers, caliche compacted soils with deep tillage or an auger before planting, especially where heavy construction equipment has compacted the site. Rip the soil with 18-24 inch long spikes spaced two to four feet on center behind a tractor or caterpillar. Rip in two directions. Identify and avoid underground service lines before ripping. Deep tillage improves water and air movement in soils, improving root growth and plant health.

  Roots of most plants die in compacted and waterlogged soils for lack of oxygen. **Do not plant where soils do not drain!** Surface and subsurface drains should be installed if soils pond water or are periodically waterlogged. Provide surface drainage by contouring the surface of the ground or installing a French drain to direct water away from wet areas. Subsurface drainage requires an understanding of soil types and soil water movement and is best engineered by a drainage professional.
- A **soil test** is suggested. Follow fertilizer and amendment recommendations from the lab before planting.
- **Incorporating organic matter**, three to four inches tilled eight to ten inches into the soil, improves soils both physically and nutritionally in Nevada. Do not amend just the planting hole. This creates a pot in the ground restricting root growth into the native soil. Instead, modify the entire landscape, or at least

a large portion of it where the roots will grow. Bare root stock may be planted directly into native soils without creating an interface which often forms between container or the balled and burlapped soil and the native soil. Interfaces form between two different soils because of dissimilar characteristics and wetting patterns and may become a substantial barrier to root growth.

- **Irrigation** of well-drained, sandy soils requires more frequent applications of water than heavier silts and clays. Seasonally, irrigations must also be adjusted with less water, applied less often during spring and fall compared to the long, windy, hot days of summer. Although hand watering or flood irrigation works, automated systems using sprinklers, spray stakes, bubblers and drip emitters are recommended for landscapes.

Bare root trees and shrubs are dug in late fall while dormant. They are inspected, trimmed, graded, bundled, and stored moist and cold until sold. They are shipped with their roots wrapped in moist wood shavings to prevent dehydration during transit. Care must be taken to avoid damage, disease and insect infestation, freezing temperatures, and dehydration from digging to landscape planting.

Evaluating the Stock: Upon receipt, inspect bare root stock. Make sure it is the species and grade ordered. Check the trunks, limbs and roots. Roots should be branched, alive, and free of diseases and insects. Do not accept plants with single, one-sided, j-shaped, kinked or girdling roots near the crown. Reject badly pot bound root systems with circling roots. Trees with these problems will fail: They often blow over after a few years or are easily stressed and never grow well. Stems and roots should be supple. Dehydrated or frozen shoots and roots are brittle and should not be accepted: The tissue is dead. Roots that are mushy or rotten usually have an off odor and the outer layer of the root easily slips off with a gentle tug. These are not acceptable. Return damaged or poorly developed plants to the sender.

Small irregularities or damage to roots may be trimmed off. In fact, following prolonged storage, light pruning of the roots, removing less than 15 percent of the root volume, stimulates root growth for many species. Do not remove too many fine absorbing roots or growth and development will be slowed.

Handling and Storage: Without soil around the roots, bare root stock is light weight and easily handled. Carefully handle the unprotected roots to prevent damage. Keep the roots moist, but not soggy, free of contamination and do not allow them to freeze.

Before planting bare root plants stick their roots in water for several hours, even over night, but not more than 12 to 18 hours. This hydrates the tissue for a better start.

After removing them from the water avoid exposing the roots to drying conditions, direct sunlight or wind, and freezing temperatures. Consider the wind chill factor. Exposed roots may be frozen by cold winter winds or wind in a pickup truck traveling just 25 mph to the planting site. Protect the roots. Cover them up and keep them moist!

Small stock may be carried to the planting site in a jelly roll. This is made by placing the roots in a row half way across a length of wet burlap or scrap cloth one to two feet wide and several feet long. Then fold the bottom half of the wrap over the roots and role the whole together. Keep the roll loose to remove the small trees without unraveling the roll or damaging the roots.

Cover roots of plants held a few days to a week with moist peat or burlap. Store them in an unheated shed or outside on the north side of a building. Attempt to mimic the cold, moist nursery storage conditions. Refrigerated storage is ideal, but usually not available. Keeping them cold and moist prevents premature root and bud growth.

Plants held for several weeks must be heeled in. Plow or shovel an east-west trench into moist soil. Lay a row of the bare root trees on the ground with their roots in the trench and their trunks facing the sun to the south. Do not face the trees to the north or use a north-south trench. This exposes the trunks to direct sunlight which dries out the bark causing cracks and death. Lightly cover and pack the roots with soil and then lay a second row on top of the first. Repeat the covering and packing until the roots are covered (healed in) with six inches or more of soil. Heeled in stock may be kept for several months during the dormant season until planting. In very cold environments, place more soil over the roots or cover the whole root bed with mulch for additional protection.

Planting Season: Bare root plants must be planted while the shoots are dormant, before buds break and the leaves begin to grow. Roots do not go dormant as the shoots do: They grow when planted out, soil temperatures are above freezing, and soil moisture is available. Early season planting allows the roots time to grow before the demand for water by the leaves becomes great. Otherwise, the demand for water and the inability of the roots to meet the demand during hot, dry or windy weather would dehydrate the plant, killing it. Late winter is best for planting bare root stock - February, March and April in northern Nevada, except at high elevations, then plant in April and May. In southern Nevada, plant December through February fifteenth. Unfortunately, bare root stock is dug in late fall and is not always available early in the season. Be sure to specify when you want the plants delivered when ordering.

Prepare the planting hole only after the site has been properly readied, and an adapted plant has been selected and cared for as described previously. Make the hole large enough to accommodate the root system. If the hole is dug deeper than necessary, fill it back with soil and lightly tamp the soil in place. Otherwise, after rains or irrigation the plant will settle deeper into the hole and water will accumulate about the crown waterlogging the plant and

causing crown and root rots, which kill trees and shrubs. Do not dig when the ground is wet. It should only be moist. Digging in wet soils slicks the sides of the hole, especially in silt and clay soils, which creates a barrier to roots trying to grow beyond the hole. Scarify or rough up any slicked surfaces inside the hole with a shovel before placing the plant in the hole.

☞**Never put gravel or coarse sand in the bottom of a hole for any reason!** It **impairs** drainage and creates a saturated root zone promoting root diseases and water stress. Make sure there are no impediments to normal drainage like hardpans or restrictive soil layers. **Do not plant into soils that do not drain!** It is wise to dig the hole, fill it with water and then six to eight hours later fill it to a mark and measure the rate of water loss over two or three hours. If it does not lose one half inch of water per hour it may be necessary to install a drainage system. Without adequate drainage, plants fail, sometimes immediately, often only after years.

Spread the roots of plants without a tap root over and around a firm cone of soil in the bottom of the hole and backfill with soil from the hole, Figure 1. Gently work the soil throughout the root system. Plants with tap roots should be placed in a hole without a cone of soil in the bottom, Figure 2. In both cases, the hole must accommodate the roots and the plant should be placed only deeply enough to

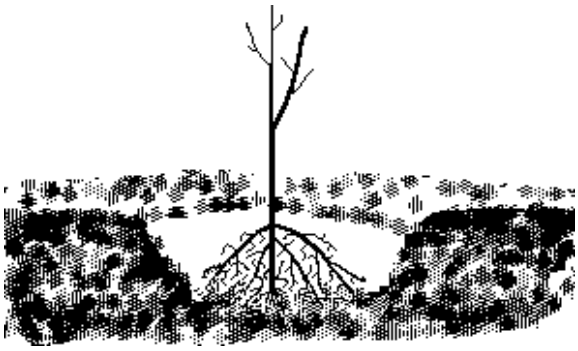

Fig. 2 Bare root stock with a tap root should be planted in native soils as shown without a mound of soil in the hole.

hold the root system securely in the ground. Look on the trunk for the soil mark or bark color change left by the soil it was growing in before it was dug. Establish the plant to grade at this height, even slightly higher on heavy clay or silty soils, but not more than an inch. Always water the transplant while backfilling the hole or immediately thereafter to settle the soil about the roots. If the plant's crown settles below grade and water will obviously collect about its base raise it with a shovel or by gently pulling on the trunk while lightly tamping soil about the roots. Place mulch over the root zone to prevent drying of the soil and dehydration of the top of the root system. Do not expose the top of the roots to harsh environments. Planting the tree too

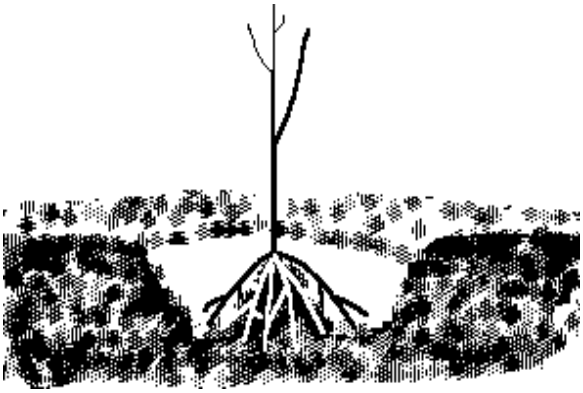

Fig. 1. Spread the roots of bare root stock over a compacted mound of soil as shown and backfill with native soil. Allow adequate space for the roots.

high or low may create stress leading to poor growth and eventually death.

. If not done previously or if working about the hole has compacted the soil around the planting till eight to ten inches deep around the planting site in at least a three, but preferably a four to six foot circle. This loosens the soil and allows the roots easier access to a larger volume of soil, which improves both root and shoot growth. Stay away from the roots of newly planted trees.

Face the crook of budded or grafted trees into the afternoon sun. The crook at the union will then be self-shading, Figure 3. The bark on the southwest side of grafted trunks is desiccated by heat and drying from the sun directly striking the face of the union.

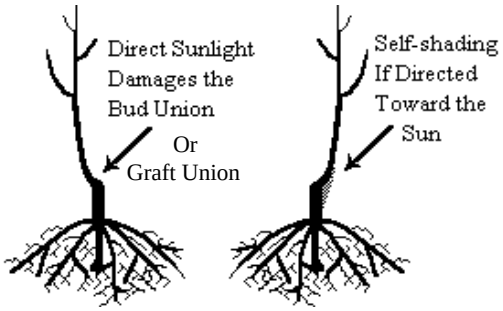

Fig. 3. Face the crook into the sun to prevent damage to the bark at the union.

❁ **Fertilizers** are best applied when the initial soil preparation is done, especially if phosphorus, potassium, iron, zinc, sulfur or gypsum are called for in the recommendations. Half strength nitrogen applications may be broadcast over the ground and irrigated into the soil at planting. Six to eight weeks after planting make a second application of nitrogen, except in the heat of summer. Broadcast two tablespoons of a low analysis (less than 20% N), quick release nitrogen fertilizer in a three foot circle around the base of the plant. Then water it into the soil. This will stimulate growth. Slow release products of nitrogen may be incorporated into the back fill as well as fertilizer tabs placed into the holes at planting. Follow labeled directions.

❁ **Post plant irrigation** is required. This prevents water stress and shock after planting, and ensures the survivability of plants in droughty Great Basin soils. Over watering or under watering a plant immediately following planting is detrimental. Roots die in either case. The question is how much water to apply and how often. Ideally the root zone of the site will be kept moist, but not saturated. Sandy soils dry out quickly, while silts and clays hold water longer. Check the soil moisture level ten to twelve inches deep with a shovel or soil probe to determine if an irrigation is required. Consider storms and the season of the year when irrigating. During winter it may not be necessary to irrigate or only infrequently at best, and then only when the ground is not frozen. Spring and fall require more frequent waterings, while in summer weekly applications, in greater quantities may be necessary.

✂ **Pruning** bare root stock at planting is not recommended. The concept of "balancing the top with the bottom of the plant" is an attempt to avoid excessive demand for water by the leaves in order to prevent stress and poor root growth. In fact, if properly planted, roots will have become established before peak demand for water occurs. If the planting has been delayed or warm, drying climatic conditions occur, then selectively thin out some of the minor limbs, but do not round over or head back the crown. Plant hormones that stimulate root growth are produced in the terminal bud of branches and removing all the terminal buds will inhibit root growth. Likewise, removing too much foliage can slow the growth of roots by reducing photosynthesis, the plant's source of energy required to grow new roots.

❁ **Staking** small stock is not warranted or desirable. Bare root evergreens may require staking in windy sites because of their increased wind resistance. Stake as low as possible down the trunk with a flexible, unabrasive tie. Cut the stakes off below the lowest limbs of deciduous trees to avoid damaging the branches. Set the stakes outside the root ball so as not to harm the roots and place them at right angles to the prevailing wind to prevent trunk damage. Remove the stakes at the end of the first growing season.

❁ **Tree shelters**, light-colored, translucent, double-walled plastic tubes, about four inches in diameter and available in several lengths, are used to establish trees. The tube is slipped over the transplant and tied to a stake driven in at the side of the tube. This small "greenhouse" modifies temperatures, moisture and carbon dioxide levels around the tree. Growth and survival of many species is improved. The shelters protect trees from animals, winter sun, herbicide sprays, string trimmers, and mowers. They work well on erosion control sites, in public and private landscapes, and with little or no reported vandalism. Pest problems have been minimal within the shelters, with the exception of occasional aphid outbreaks.

There are mixed results using tree shelters in soils and climates similar to those of the Great Basin. Evergreens have faired poorly, and although deciduous plants grew tall, many had very flexible trunks and much smaller root systems compared to trees grown outside the shelters. They have the greatest promise in providing protection from animals - rodents, rabbits, dear and antelope.

❁ **Provide Bark protection** to deciduous trees planted in Nevada. Low winter sun strikes trunks nearly straight on and heats the bark above air temperature. At night, temperatures plunge, often below freezing. This daily cycling occurs while relative humidities are low and conditions are windy. Consequently, bark on the southwest sides of trunks dries out and dies.

Southwest bark death is preventable. Choose thick-barked trees for the harshest sites. Avoid thin-barked trees - cherry, hawthorn, plum, pear, etc. Select trees with self shading limbs low on the trunk. The leafless, twiggy shade provides some bark protection. Any shade reduces or prevents bark damage. Wrapping trunks prevents sun damage, but care must be taken to remove or adjust the wraps periodically to prevent their girdling the trunk. White, expandable, breathable wraps are available and work well. Remove the wrap after the canopy is large enough to shade the trunk. Painting the trunk with white **latex** paint, diluted 50:50 with water, reflects the suns rays. Unfortunately, white trunks are not very pleasing to look at in landscapes. Do not use oil base paint, it will damage the trunk.

❁ **Vertebrate pests** such as voles, rabbits, gophers, deer and beavers are seldom a problem for landscape trees. However, in transition zones between urban and rural or native areas damage may be severe. Make plans and take preventive actions accordingly. Plastic or metal mesh cages provide protection from small mammals. Burrowing pests may be trapped below ground. Tree shelters may work well against both small and large animals. Animal repellents which have a bitter flavor or are spicy hot can be placed in the planting hole and/or sprayed on the plant.

❁ **Pest management** during establishment may be necessary. Select resistant species or cultivars, keep the site free of weeds, insects and diseases, and avoid mistakes in management that cause tree stress. Positively identify the pest, then apply appropriate controls.

Planting bare root stock in Nevada is very economical. Success depends upon proper plant selection, landscape design, planting dormant plants correctly in late winter, and providing correct post planting care.