



Fact Sheet 97-09

Lynn Zonge, Hydrologist
Jason Davison, Area Plant and Soil Specialist
Sherman Swanson, State Range Specialist

Introduction

Riparian vegetation growing along the edges of streams, creeks, and rivers is critical for controlling erosion and providing wildlife habitat. This vegetation includes grasses, forbes, and woody plants such as willows and aspen. Willows are among the most common woody plants found in riparian areas. They are an important source of food and cover for wildlife. Their roots hold the stream banks in place and provide a place for fish to hide. They also provide shade to help reduce stream temperatures.

Many riparian areas would benefit from more willows. Improving management practices such as grazing often results in more willows but on some riparian areas willows must be planted. Planting willows can be an effective technique to quickly reestablish new populations. However, it requires a lot of hand labor which can be expensive. Consequently, volunteers are often used to assist in willow planting projects. Volunteers, however, are normally available for a limited time and are oftentimes inexperienced. This fact sheet provides some tips which are proven to increase the chances of successfully collecting and planting willows.

Collecting and Preparing the Cuttings

In order to sprout and then grow, willow cuttings must be collected when they are dormant. Normally once the leaves have fallen from the plant and the nighttime temperatures are consistently below freezing, i.e. late fall, winter, early spring, they are dormant enough to be collected for cuttings. Cuttings collected in late spring may have already broken dormancy despite the lack of leaves and should not be used.

Willow cuttings should be taken from plants growing in riparian areas similar to those where they will be planted. Often cuttings can be obtained on nearby streams or on different portions of the same stream where they will be planted. If that is not possible, select willow species that normally grow in riparian areas. Riparian species have pre-formed root tissue in the stems that sprouts quickly. Upland type willows do not have this feature and may not sprout.

The cuttings should be about as big around as a thumb, two feet long, and taken from the base of the stems. These large diameter cuttings survive better because more food is stored in the stem. Long cuttings have a greater rooting surface and more food storage than short ones. Cuttings taken from the base of a stem root easier because they have more root tissue, and develop earlier than those taken from the top of the stems.

To avoid planting the cuttings upside down, cut the bottoms at a steep angle and the tops flat. All the cuttings should be stripped of long branches to avoid excess drying before transplants have developed enough roots.

The cuttings should be stored in bundles placed in plastic bags. They can also be stored in moist peat moss or sand. They can be stored at or below freezing temperatures for up to eight months before planting. Freezing temperatures reduce the chance of damage from disease, molds and insects. The plants which were used to supply the cuttings must be hardened to freezing temperatures before the cuttings are frozen in storage. That normally means the cuttings should not be gathered before November if they are to be stored frozen. If collected in early spring, they can be stored as described above and stored outside in a shady location. If collected in spring and not frozen they should be planted as soon as possible.

Planting Recommendations

The most important factor to willow cutting survival is adequate soil moisture throughout the season. The best way to ensure adequate soil moisture is to plant the cuttings with their bases at or near the level of the normal water table. Research has demonstrated that willow cutting survival drops dramatically when the bases are planted more than two feet above the normal water table level. The cuttings should be planted as soon as the ground has thawed and the spring high water period has passed. Often the high water levels of the spring runoff prevent planting the cuttings close enough to the normal edge of the stream to reach this level.

The edge of the water at the base of the stream bank is generally the best location to plant willow cuttings. However, plantings may fail if the bank is unstable. If the bank is eroding and falling into the stream, other stabilizing structures may hold the bank until the willows become established. Sometimes more than one row helps protect against erosion.

Willow cuttings should be soaked in water before planting. About seven to ten days before planting, place the cuttings in buckets and fill them with water. The water should be deep enough to cover the bottom half of the cuttings. It needs to be changed every two days as roots need oxygen to develop. Roots grow best if the water is about 60 degrees Fahrenheit. Do not soak the cuttings too long as the roots will overdevelop and break off when the cuttings are planted. After soaking, keep cuttings moist and out of direct sunlight till planting.

The best survival and growth occurs when the ground cover of other vegetation is less than five percent. Competition from other plants growing on the banks can prevent the cuttings from growing successfully. If the vegetation cover is excessive it should be cut back or removed before willow planting is attempted. If the vegetation cover is high it may be easier to move the planting location to one with less competition. Planting after a flood may offer many bare areas with little competition.

Cuttings should be buried to at least one-half their length or deeper when possible. In loose or gravelly soil, a steel rod can help poke the hole. Spacing depends on budget, supply of cuttings, length of stream to be planted and objectives. Planting in groups is better than spacing individual cuttings several feet apart. Tamping with a foot ensures good soil contact. It is not unusual to lose up to one-half of the cuttings planted. Group plantings increase the chance of a willow colony getting started. Established willows increase rapidly by sprouting and widely spaced colonies can spread over large areas.

Management

Newly planted willows should be protected from grazing and other disturbances for at least three years. Once tall enough to escape browsing, livestock use should be managed to avoid removing too much current year's growth. Generally, season-long or late season (midsummer until the leaves fall), livestock grazing is less desirable for willows than early season or short-term, mid-season use.

Conclusion

Planting willow cuttings can greatly speed the recovery and protection of riparian areas that depend on woody plants. This method is somewhat labor intensive and several techniques can greatly improve success rates. The techniques outlined in this fact sheet are inexpensive and easy when compared to the labor involved in the actual planting process. Using these simple suggestions related to timing, cutting preparation, planting location, and depth will pay big dividends in the form of successful willow plantings.

Additional Resources About This Subject

Acarid, R.E. 1975. Improvement of mountain meadows in Nevada. USDI-BLM Res. Rep. ARS, Reno, Nev.

Conroy, S.D. and T.J. Svejcar. 1991. Willow planting success as influenced by site factors and cattle grazing in northeastern California. *J. Range Manage.* 44(1):59-63.

DeBano, L.F. and B.H. Heede. 1987. Enhancement of riparian ecosystems with channel structures. *Water Resources Bull.* Vol. 23, No. 3 pp. 463-470.

McCluskey, D.C., J. Brown, D. Baornholdt, Don Duff and A.H. Winward. 1983. Willow planting for riparian habitat improvement. USDI-BLM, Tech Note 363. 21 pages.

Platts, W.S., C. Armour, and others. 1987. Methods of evaluating riparian habitats with applications to management. USDA-FS Gen. Tech. Rep. INT221. Intermountain For. and Range Exp. Sta., Ogden, Utah.

York, J.C. 1985. Dormant stub planting techniques, p. 513-514. In: R.R. Johnson, C.D. Ziebell and others (ed.) *Riparian Ecosystems and their management: reconciling conflicting uses.* First North American Riparian Conf.; proc.; 1985 April 16-18; Tucson, AZ USDA-FS Gen. Tech. Rep. RM120. Rocky Mtn. For. And Range Exp. Sta., Fort Collins, Co.

UNIVERSITY OF NEVADA RENO	The University of Nevada, Reno is an Equal Opportunity/Affirmative Action employer and does not discriminate on the basis of race, color, religion, sex, age, creed, national origin, veteran status, physical or mental disability, or sexual orientation, in any program or activity it operates. The University of Nevada employs only United States citizens and those aliens lawfully authorized to work in the United States.
---------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------