TECHNICAL NOTES

U S Department of Agriculture Natural Resources Conservation Service

TN – Plant Materials – 6–1- Arizona November 2005

Use of Non-Dormant Cottonwood Poles for Riparian Revegetation

Abstract

The use of dormant poles for planting cottonwoods and willows is an established practice. However, in southern Arizona there is a narrow window of opportunity to plant dormant poles before they break dormancy. The objective of this study is to evaluate the survival and growth rates of non-dormant poles planted at three different dates. Planting dates were October 1991, November 1991, and July 1992. Planting stock included native Fremont cottonwood (Populus fremontii Wats.) and a hybrid black cottonwood (Populus nigra L.). Two diameter classes were evaluated, poles (>0.5 inches) and whips (<0.25 inches). Survival, over all treatments, was greater for the hybrid stock (86%) compared to native stock (68%). Fremont cottonwood, for both diameters, had greater survival for the November (100%) and October (80%) plantings compared to the July (25%) planting. Survival, based on diameter, was similar for all three planting dates. Only the native stock, for the October planting, had a lower survival rate for the whips. Average height for the Fremont cottonwood was very similar for the October and November plantings with little differences in height due to diameter classes. In general the whips had somewhat lower average heights compared to the poles except for the November planting where the whips were slightly taller, 14.1 feet to 13.9, respectively. Survival and growth was the lowest with the July planting for both species and size classes. Based on these results the window for planting cottonwood poles can be extended from October through January provided procedures for the proper care of planting stock and site selection are followed. Also, pole diameter had little effect on survival or growth rate for the October and November plantings. However, based on previous work and ease of handling it is still recommended that poles of > 0.5 inches in diameter be used for riparian pole plantings. This information can be applied to the conservation practices such as: Channel Bank Vegetation (322), Riparian Forest Buffer (391), Stream Habitat Improvement Management (395), Streambank and Shoreline Protection (580), Wetland Restoration (657), and Wetland Creation (658).

Introduction

The use of dormant poles for planting riparian trees is an established and effective practice. However, there is a narrow window of opportunity to select, harvest, and plant before poles break dormancy. In southern Arizona, depending on winter temperatures, the dormant period typically begins mid/late December through early February. Therefore you may have 30 to 60 days to conduct a dormant pole planting. Due to this narrow window many groups and or agencies may not be able to conduct their planned or desired number

of plantings. If a reasonable success rate can be achieved with non-dormant poles, then more riparian plantings could be conducted.

The objective of this study is to evaluate the survival and growth rate of non-dormant poles across three different planting dates using two species and two pole diameters.

Procedure

Planting stock included native Fremont cottonwood and a hybrid black cottonwood which were collected from existing planted stands at the Tucson Plant Materials Center. Side branches and leaves were removed from selected stock. Stock was typically six feet in length and then cut into two foot lengths. If needed the tops were removed to provide a consistent two foot long stock. This removes the apical or primary buds but the auxiliary buds develop into stems with one or more stems dominating, over time, to develop into the main stems. Half of the stock or poles had a minimum basal diameter of 0.5 inches. The remaining half consisted of whips with a maximum basal diameter of 0.25 inches. All stock was immediately planted in the field after removal from the source plant. The hybrid black cottonwood was included in the study for comparison purposes. Planting stock was not treated with rooting hormones, cut surfaces were not sealed, and the stock was not soaked prior to planting. No fertilizer or weed control treatments were applied to the study.

The planting was installed in field 6 border 2 at the Tucson Plant Materials Center. The planting plan consisted of two replications for each species. Each replication consisted of three different planting dates October, November, and July. Each treatment consisted of five poles planted three feet apart and five feet between the two treatments (planting date and diameter). Replications were five feet apart. A soil auger was used to dig holes 20 inches deep. Poles were planted 20 inches deep which left 3 to 4 inches of the pole above the soil.

Measurements included percent survival and feet of growth per year. The amount of irrigation water each year was recorded.

Results and Discussion

Table One lists measurements conducted in December 1991 for number of poles that sprouted with replications averaged together for each diameter class.

TABLE ONE

Replication	Planting Date	Diameter (in)	No. sprouted	
			Native	Hybrid
1 & 2	October	>0.5	10/100%	10/100%
1 & 2	October	<0.25	6/60%	10/100%
1 & 2	November	>0.5	10/100%	10/100%
1 & 2	November	<0.25	10/100%	10/100%

Poles were planted on October 17, 1991, and November 13, 1991. Poles began sprouting within 2 to 3 weeks after installation for both planting dates. The 1991 winter was mild with little observed damage to the foliage of the growing poles. Foliage remained green until late December when most leaves turned yellow and fell from the poles by the middle of January. Survival was 100 percent for all stock except the Fremont cottonwood planting of whips where only 6 out of 10 sprouted. This lower survival was due to mechanical damage as well as some herbivory. Growth was minimal for the fall of 1991 therefore, no height measurements were conducted. Four irrigations were applied, August to November, for a total application of 19 inches of water in 1991.

The average low temperature, recorded at the Tucson Plant Materials Center, was 57°F for October and 44°F for November, 1991. November recorded only one day (11/24) of 32°F. The average low temperature for December was 42°F. December had 3 days (2nd, 3rd, and 4th) of freezing temperatures with a low of 29°F recorded on the 3rd. The average low temperature for January 1992 was 39°F with a low of 28°F recorded on the 15th. February, 1992 did not have any freezing temperatures.

Table Two lists height measurements taken on June 19, 1992, for the October and November 1991 planting. Replications one and two were averaged together for each diameter class.

TABLE TWO

Replication	Planting Date	Diameter (in)	Average HT (ft)	
			Native	Hybrid
1 & 2	October	>0.5	5.2	4.3
1 & 2	October	<0.25	4.9	3.2
1 & 2	November	>0.5	5.6	3.8
1 & 2	November	<0.25	5.3	3.7

Observations, as well as the data above, show that Fremont cottonwood had greater growth than the hybrid stock. Five irrigations were applied, February to June, for a total application of 25 inches of water prior to the summer planting.

The 1992 summer planting was installed on July 31, 1992. Table Three lists the number of poles sprouting measured on August 20, 1992.

Table Three

Replication	Planting Date	Diameter (in)	No. sprouted	
			Native	Hybrid
1 & 2	July	>0.5	7/70%	6/60%
1 & 2	July	<0.25	5/50%	6/60%

As expected, growth and survival was greatly reduced for this planting period. The poles were much slower to sprout new leaves and did not exhibit much growth. It is assumed that the stems did not have the energy reserves to promote or stimulate buds for rapid root and shoot development during this time period. Four irrigations were applied after the

summer planting from August to October for a total water application of 15 inches. Nine irrigations were applied in 1992, starting in February and ending in October, for a total application of 40 inches of water. All irrigations were scheduled based on soil moisture monitoring using the 'feel' method.

Final evaluations for survival and growth were conducted in December and are shown in Table Four.

Table Four

Replications	Planting Date	Diameter (in)	% Survival		Ave. Ht. (ft)	
			Native	Hybrid	Native	Hybrid
1 & 2	October	>0.5	100	90	13.7	12.9
1 & 2	October	<0.25	60	100	12.0	10.1
1 & 2	November	>0.5	100	100	13.9	10.5
1 & 2	November	<0.25	100	90	14.1	11.8
1 & 2	July	>0.5	30	90	1.6	1.8
1 & 2	July	<0.25	20	50	0.7	1.5

Percent survival was highest for the October and November plantings, generally at 90 to 100 percent. Growth, measured as average height, was very similar between the October and November plantings with the native stock growing two to three feet taller than the hybrid stock. Height, based on pole diameter, was found to be greater for the whips compared to the poles in for the November planting but slightly less for the October planting. The July planting had the lowest survival as well as the lowest height. These poles remained alive but exhibited poor growth even one year after planting.

Conclusions

Based on these limited results it appears that conducting pole planting as early as October or November can be successful. Good survival rates, as well as excellent growth rates, can be expected from non-dormant pole plantings. These results have not been verified through field trials, but the potential to extend the season for pole plantings is plausible. Even though these results indicate pole diameter has little effect on survival and growth it is recommended that, for ease of handling and planting, poles of > 0.5 inches should be used. As with any planting, follow the procedures for the proper care of planting stock and site selection. This information can be applied to the conservation practices such as: Channel Bank Vegetation (322), Riparian Forest Buffer (391), Stream Habitat Improvement Management (395), Streambank and Shoreline Protection (580), Wetland Restoration (657), and Wetland Creation (658).

Contributors

Bruce Munda, Plant Resource Specialist, Tucson Plant Materials Center, Tucson, Arizona
Chris Hoag, Wetland Plant Ecologist, Aberdeen Plant Materials Center, Aberdeen, Idaho
Steve Smarik, Environmental Coordinator, Arizona State Office, Phoenix, Arizona