

Plant Materials Technical Note - No. 1

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Plant Species with Rooting Ability from Live Hardwood Materials for use in Soil Bioengineering Techniques

Introduction

Choosing the best plant for soil bioengineering techniques can be extremely important. The correct plant will insure the required performance in any slope stabilization project. This Technical Note supports NRCS documents: Engineering Field Manual-Chapters 16 and 18, The Stream Corridor Restoration Handbook, and the National Employee Development Centers Soil Bioengineering course.

How to Use this Technical Note

The list of species is prepared to assist with selecting plants for use in the application of soil bioengineering techniques. The list may also function as a tool to indicate the performance of a species in a specific soil bioengineering technique in a specific region of the country. The Species List is organized alphabetically according to rooting ability of the species.

Table 1: *Species with very good to excellent rooting ability from live hardwood materials*

Table 2: *Species with fair to good rooting ability from live hardwood materials*

Table 3: *Species useful for the Caribbean Area and Hawaii*

Table 4: *Region of Adaptation Codes for Tables 1-3*

Tables 1-3 contain the following information:

- Scientific Name
- Common Name
- Cultivar or Ecotype
- Region of Adaptation
- Rooting Ability
- Soil Bioengineering Technique

Species Lists are not intended as recommendations of plants for specific projects. Consult with your NRCS state specialists for specifications for specific project recommendations.

Table 1: Species with very good to excellent rooting ability from live hardwood materials

Scientific Name	Common Name	Cultivar or Ecotype	Region of Adaptation	Rooting Ability	Soil Bioengineering Technique
<i>Oemleria cerasiformis</i>	Indian plum	local collections	9	very good	fascines, live stakes, brush mattress, brush layering, live cuttings
<i>Populus balsamifera</i>	balsam poplar	local collections	1, 2, 3, 4, 5, 8, 9, O, A	very good	live stakes, poles, live cuttings
<i>Populus balsamifera ssp trichocarpa</i>	black cottonwood	local collections	4, 8, 9, 0, A	very good	live stakes, poles, live cuttings
<i>Populus deltoides</i>	eastern cottonwood	local collections	1, 2, 3, 4, 5, 6, 7	very good	live stakes, poles, live cuttings
<i>Salix alaxensis</i>	feltleaf willow	local collections	A	very good	live stakes, poles, live cuttings
<i>Salix amygdaloides</i>	peachleaf willow	local collections	1, 2, 3, 4, 5, 6, 7, 8, 9	very good	live stakes, poles, posts, live cuttings
<i>Salix barclayi</i>	Barclay's willow	local collections	A	very good	live stakes, poles, posts, live cuttings
<i>Salix boothii</i>	booth willow	local collections	7, 8, 9, 0	excellent	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix brachycarpa</i>	barren ground willow	local collections	A	very good	live stakes, poles, posts, live cuttings
<i>Salix cottetii</i>	dwarf willow	Bankers	Introduced 1, 2, 3	very good	fascines, live stakes, brush mattress, brush layering, live cuttings
<i>Salix discolor</i>	pussy willow	local collections	1, 2, 3, 4, 9	very good	fascines, live stakes, poles, brush layering, live cuttings
<i>Salix drummondiana</i>	Drummond's willow	local collections	7, 8, 9, 0	very good	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix eriocephala</i>	Missouri River willow	local collections	7, 8, 9, 0	very good	fascines, live stakes, poles, brush layering, live cuttings
<i>Salix eriocephala spp. ligulifolia</i>	erect willow	Placer	9, 0*	excellent	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix sessilifolia Nutt.</i>	northwest sandbar willow	Multnomah	9*	excellent	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix sessilifolia Nutt.</i>	northwest sandbar willow	local collections	9	very good	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix geyeriana</i>	Geyer's willow	local collections	7, 8, 9, 0	very good	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix gooddingii</i>	Goodding's willow	local collections	6, 7, 8, 0	very good	live stakes, poles, posts, live cuttings
<i>Salix hookeriana</i>	hooker willow	Clatsop	9, 0*	excellent	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix hookeriana</i>	hooker willow	local collections	9, 0	very good	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix interior</i>	sandbar willow	Greenbank	1, 3, 4, 5	excellent	fascines, live stakes, poles, brush mattress, brush layering, live cuttings

Scientific Name	Common Name	Cultivar or Ecotype	Region of Adaptation	Rooting Ability	Soil Bioengineering Technique
<i>Salix interior</i>	sandbar willow	local collections	1, 3, 4, 5	very good	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix laevigata</i>	red willow	local collections	7, 8, 9, 0	very good	live stakes, poles, live cuttings
<i>Salix lasiolepis</i>	arroyo willow	Rogue	9, 0	excellent	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix lasiolepis</i>	arroyo willow	local collections	6, 7, 8, 9, 0	very good	live stakes, poles, live cuttings
<i>Salix lemmonii</i>	Lemmon's willow	Palouse	8, 9, 0	very good	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix lemmonii</i>	Lemmon's willow	local collections	8, 9, 0	very good	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix ligulifolia</i>	strapleaf willow	local collections	8, 9, 0	very good	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix lucida ssp. lasiandra</i>	Pacific willow	local collections	7, 8, 9, 0, A	excellent	live stakes, poles, live cuttings
<i>Salix melanopsis</i>	coyote willow (green stem)	local collections	8, 9, 0	excellent	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix pentandra</i>	laurel willow	Aberdeen Selection	introduced 8, 9, 0	excellent	live stakes, poles, live cuttings
<i>Salix purpurea</i>	purpleosier willow	Streamco	Introduced 1, 2, 3	excellent	fascines, live stakes, brush mattress, brush layering, live cuttings
<i>Salix sericea</i>	silky willow	Riverbend Germplasm	1, 2, 3	excellent	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix sericea</i>	silky willow	local collections	1, 2, 3	very good	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix sitchensis</i>	Sitka willow	Plumas	9, 0*	very good	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix sitchensis</i>	Sitka willow	local collections	9, 0, A	very good	fascines, brush mattress, brush layer
<i>Sambucus nigra ssp. canadensis</i>	common elderberry	local collections	1, 2, 3, 4, 5, 6, 8, 0, A	very good	fascines, brush mattress, brush layering, live cuttings

Table 2: Species with fair to good rooting ability from live hardwood materials.

Scientific Name	Common Name	Cultivar or Ecotype	Region of Adaptation	Rooting Ability	Soil Bioengineering Technique
<i>Baccharis pilularis</i>	coyotebrush	local collections	7, 9, 0	fair	fascines, live stakes, brush mattress, brush layering, live cuttings
<i>Baccharis salicifolia</i>	Mule's fat	local collections	6, 7, 8, 0	fair	fascines, live stakes, brush mattress, brush layering, live cuttings
<i>Cephalanthus occidentalis</i>	common buttonbush	Keystone	1, 2, 3, 5, 6, 7, 0	good	brush mattress, live stakes, brush layering, fascines
<i>Cephalanthus occidentalis</i>	common buttonbush	local collections	1, 2, 3, 5, 6, 7, 0	fair	brush mattress, live stakes, brush layering, fascines
<i>Cornus amomum</i>	silky dogwood	Indigo	1, 2, 3, 4, 5, 6	good	fascines, live stakes, brush mattress, brush layering, live cuttings
<i>Cornus amomum</i>	silky dogwood	local collections	1, 2, 3, 4, 5, 6	fair	fascines, live stakes, brush mattress, brush layering, live cuttings
<i>Cornus sericea</i>	redosier dogwood	Ruby	1, 3, 4, 5, 7, 8, 9, 0, A	good	fascines, live stakes, brush mattress, brush layering, live cuttings
<i>Cornus sericea</i>	redosier dogwood	local collections	1, 3, 4, 5, 7, 8, 9, 0, A	fair	fascines, live stakes, brush mattress, brush layering, live cuttings
<i>Cornus sericea ssp occidentalis</i>	western redosier dogwood	Mason	9, 0*	good	fascines, live stakes, brush mattress, brush layering, live cuttings
<i>Cornus sericea ssp occidentalis</i>	western redosier dogwood	local collections	9, 0, A	good	fascines, live stakes, brush mattress, brush layering, live cuttings
<i>Lonicera involucrata</i>	black twinberry	local collections	3, 7, 8, 9, 0, A	good	live stakes, fascines, brush layering, live cuttings
<i>Oemleria cerasiformis</i>	Indian plum	local collections	9	very good	fascines, live stakes, brush mattress, brush layering, live cuttings
<i>Philadelphus lewisii</i>	Lewis' mock orange	local collections	9, 0	fair	fascines, live cuttings
<i>Physocarpus capitatus</i>	Pacific ninebark	local collections	9	fair	live stakes, fascines, brush layering, live cuttings
<i>Physocarpus opulifolius</i>	common ninebark	local collections	1, 2, 3, 4, 5	fair	fascines, brush mattress, brush layering, live cuttings
<i>Populus angustifolia</i>	narrowleaf cottonwood	local collections	4, 5, 6, 7, 8, 9, 0	fair	live stakes, poles, live cuttings
<i>Populus fremontii</i>	Fremont cottonwood	local collections	6, 7, 8, 0	fair	live stakes, poles, live cuttings
<i>Rubus spectabilis</i>	salmonberry	local collections	8, 9, 0	fair	fascines, live cuttings
<i>Salix alba</i>	white willow	local collections	1, 2, 3, 4	fair	live stakes, poles, posts, live cuttings
<i>Salix bebbiana</i>	Bebb willow	local collections	1, 3, 4, 5, 7, 8, 9, 0, A	fair	live stakes, poles, live cuttings
<i>Salix drummondiana</i>	Drummond's willow	Curlew	7, 8, 9, 0	good	fascines, live stakes, poles, brush mattress, brush layering, live cuttings

Scientific Name	Common Name	Cultivar or Ecotype	Region of Adaptation	Rooting Ability	Soil Bioengineering Technique
<i>Salix drummondiana</i>	Drummond's willow	local collections	7, 8, 9, 0	fair	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix exigua</i>	coyote willow	Silvar	6, 7, 8, 9, 0, A	good	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix exigua sp interior</i>	sandbar willow (grey stem)	local collections	6, 7, 8, 9	fair	fascines, live cuttings, poles, brush mattress, brush layering,
<i>Salix humilis</i>	prairie willow	local collections	1, 2, 3, 4, 5, 6	fair	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix lucida</i>	shining willow	local collections	1, 3, 4, 5, 7, 8, 9, 0, A	fair	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix lutea</i>	yellow willow	local collections	4, 5, 7, 8, 9, 0	fair	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix nigra</i>	black willow	local collections	1, 2, 3, 5, 6	fair	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix planifolia</i>	plainleaf willow	local collections	1, 3, 4, 5, 7, 8, 9, 0, A	fair	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Salix prolixa</i>	Mackenzie's willow	local collections	8, 9, 0, A	fair	live stakes, poles, live cuttings
<i>Salix scouleriana</i>	Scouler's willow	local collections	9, 0	fair	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Sambucus racemosa</i>	red elderberry	local collections	9	fair	brush layering, live cuttings
<i>Spiraea douglasii</i>	Douglas spirea	Bashaw	9*	fair	fascines, brush mattress, brush layering, live cuttings
<i>Spiraea douglasii</i>	Douglas spirea	local collections	0, 9	fair	fascines, brush mattress, brush layering, live cuttings
<i>Symphoricarpos albus</i>	common snowberry	local collections	9	fair	fascines, brush mattress, brush layering, live cuttings

Table 3: Species useful for the Caribbean Area and Hawaii

Scientific Name	Common Name	Cultivar or Ecotype	Region of Adaptation	Rooting Ability	Soil Bioengineering Technique
<i>Batis maritima</i>	Barilla, Saltwort	local collections	C, H	good	brush mattress, brush layering, live cuttings
<i>Bucida buceras</i>	úcar, gregre	local collections	C	fair	live stakes, poles, live cuttings
<i>Bursera simaruba</i>	almácigo, turpentine tree	local collections	C	good	live stakes, poles, live cuttings
<i>Clusia rosea</i>	Cupey	local collections	C, H	good	live stakes, poles, live cuttings
<i>Commelina ssp.</i>	cihítre	local collections	C	good	brush mattress, brush layering, live cuttings
<i>Cordia sebestenea</i>	vomitel, geiger tree	local collections	C, H	fair	live stakes, poles, live cuttings
<i>Cordyline terminalis</i>	Ti	local collections	H	good	cutting, poles, live stakes
<i>Erythrina poeppigiana</i>	Bucayo, bucare, mountain immortale	local collections	C, H	good	live stakes, poles, live cuttings
<i>Erythrina variegata</i>	Tall Erythrina	Tropic Coral	H	good	cutting, poles, live stakes
<i>Glyricidia sepium</i>	Mata ratón, Glyricidia	local collections	C, H	good	live stakes, poles, live cuttings
<i>Hibiscus spp.</i>	Hibiscos	local collections	C, H	good	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Hymenocallis caribaea</i>	Lirio blanco, Spyder lilly	local collections	C	fair	brush mattress, brush layering, live cuttings
<i>Lagerstroemia indica</i>	astromelia	local collections	C	good	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Mangrove species</i>	(Rhizophora, Avicenia, Conocarpus)	local collections	C, H	good	live stakes, poles, live cuttings
<i>Nicolaia elatior</i>	Flor de cera, Torch ginger	local collections	C	fair	brush mattress, brush layering, live cuttings
<i>Pictetia aculeata</i>	Fustic	local collections	C	fair	fascines, live stakes, poles, brush mattress, brush layering, live cuttings
<i>Polyscias guifoylei</i>	Panax	local collections	H	good	live cuttings, poles, live stakes
<i>Rhoeo spathacea</i>	Sanguinaria	local collections	C, H	good	brush mattress, brush layering, live cuttings
<i>Sansevieria hyacinthoides</i>	Lengua de chucho, sweet Sansevieria	local collections	C	good	brush mattress, brush layering, live cuttings
<i>Sphagneticola trilobata</i>	Margarita, Bay Biscayne creeping oxeye	local collections	C	fair	brush mattress, brush layering, live cuttings
<i>Zingiber spp.</i>	Jengibre, Ginger	local collections	C, H	fair	fascines, live stakes, poles, brush mattress, brush layering, live cuttings

Table 4: Region or Adaptation Codes for Tables 1-3

Codes	Region
1	Northeast (ME, NH, VT, MA, CT, RI, NY, PA, NJ, DE, MD, VA, OH , WV, KY)
2	Southeast (NC, SC, GA, FL, TN, AL, MS, LA, AR)
3	North Central (MO, IA, MN, MI, WI, IL, IN)
4	North Plains (ND, SD, MT eastern, WY eastern)
5	Central Plains (NE, KS, CO eastern)
6	South Plains (TX, OK)
7	Southwest (AZ, NM)
8	Intermountain (NV, UT, CO western)
9	Northwest (WA, OR, ID, MT western, WY western)
0	California
A	Alaska
C	Caribbean
H	Hawaii
*	(Adaptation limited to an area west of the Cascades in OR and WA and northwest CA)

Glossary

Brush Layering: Live hardwood material (usually dormant) laid in a crisscross fashion in a gently sloped soil bench. The soil bench is usually part of successive lifts of soil.

Brush Mattress: Live hardwood material (usually dormant) laid in a crisscross fashion and staked down on a slope in combination with live stakes and live fascines. Soil is placed over and tamped in and around the stems.

Fascines: Live hardwood material (usually dormant) made into sausage-like bundles tied together. Length and diameter of a fascine is dependent on usage.

Live Cuttings: Live hardwood material (usually dormant) of woody shrub and tree species.

Live Stakes: Live hardwood material (usually dormant) of woody species cut to specified lengths depending on soil and site conditions.

Poles: Live main stem hardwood material (usually dormant) of woody shrub and/or tree species with apical bud in tack.

Soil Bioengineering: A system of living plant materials used as structural components. Live hardwood material (usually dormant) of woody shrub and tree species use to repair slope failures and to increase slope stability. The live hardwood materials serve as primary structural components, drain and barriers to earth movement.

References

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There may be other plant species that perform well in soil bioengineering techniques. If you know of a species that is not listed, please contact David W. Burgdorf, Plant Materials Specialist, for consideration of its addition to the list.

Prepared By: David W. Burgdorf
Plant Materials Specialist
Natural Resources Conservation Service
East Lansing, MI 48823
dave.burgdorf@mi.usda.gov
517-641-7831

Contributors: Christopher Miller, Plant Materials Specialist, NRCS, New Jersey
Stoney Wright, PMC Manager, Alaska Dept. of Natural Resources, Alaska
Carlos E. Morganti, Plant Materials Specialist, NRCS, Puerto Rico
Dale Darris, PMC Conservation Agronomist, NRCS, Oregon
Chris Hoag, PMC Wetland Plant Ecologist, NRCS, Idaho
Glenn Sakamoto, PMC Manager, NRCS, Hawaii
Rose Lake Plant Materials Center, East Lansing, MI

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For More Information:

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