

## Stem Cuttings for Riparian Restoration

Stem cuttings are mature, dormant segments of woody plants that can grow into new individuals and are commonly used in riparian restoration projects to stabilize banks, absorb sediments and nutrients, slow down floodwater, enhance wildlife habitat, and provide other functions. Successfully establishing stem cuttings requires proper methods of harvesting, storing, and planting. These methods are described in this factsheet.



**Figure 1. This willow cutting has put on significant growth just a few months after planting in Clearwater County, AB.**

### Selecting Stem Cuttings

In Alberta, the best species to select stem cuttings from are willow (*Salix spp.*), red osier dogwood (*Cornus sericea*), plains cottonwood (*Populus deltoides*), and balsam poplar (*Populus balsamifera*), as these will root with the highest rates of success when planted<sup>1</sup> (Darris, 2002; Hoag 2007).

The minimum recommended diameter for stem cuttings is 2cm. Stem cutting lengths are typically around 1m, but may range from 0.4m to 5m or more, depending on the site. Consider the following factors when deciding on cutting length:

1. **Depth of water table.** Cuttings should be long enough to reach the water table when planted, so longer cuttings are often used in more upland areas (i.e. the bank and terrace zones)
2. **Height of surrounding vegetation.** The tops of cuttings should not be shaded out by surrounding vegetation when planted
3. **Height of high water level.** The tops of cuttings should be above the annual high-water level when planted
4. **Desired speed of establishment.** Larger cuttings will provide more rapid bank stabilization and erosion control

When considering these factors, **keep in mind that ideally at least ¾ of the cutting should be in the ground when planted**, with at least 3-4 buds aboveground (Hoag, 2007).

<sup>1</sup> Common snowberry (*Symphoricarpos albus*), currants (*Ribes spp.*) and red elderberry (*Sambucus racemosa*) may also root with moderate success when field planted in favourable conditions (Darris, 2002).

Furthermore, it is important to take cuttings from healthy stem material, avoiding stems that are rigid or easily breakable, abnormally light, or are covered in lichen. Scratching away a bit of bark from the stem can reveal whether the stem wood is green and thus alive (Figure 2). Also avoid using the tips of stems for cuttings, as these have relatively low energy reserves (Hoag, 2007).



**Figure 2. Scratching away the bark of this willow stem reveals green underneath, indicating that the stem is alive.**

### **Timing**

The best time to harvest stem cuttings is during the “dormant season” – that is, when the “donor” plants are without green leaves. Stem cuttings harvested during this time transpire less water and consequently are less likely to dry out. Planting also should occur during the dormant season but when the ground is thawed – in Alberta this is a short window of time, typically in April or October.

Harvesting and planting stem cuttings from actively growing donor plants in the spring or summer is possible with reduced success, provided the cuttings are planted within 1-3 days of harvest with their rooting ends soaking for that period.

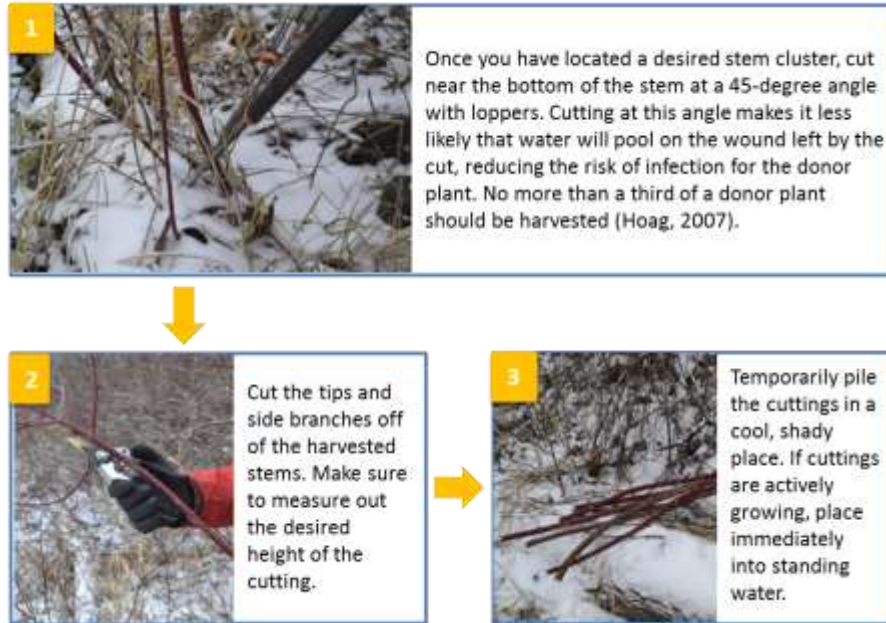
### **Harvesting**

The first step to harvesting is to select a suitable harvesting site. Choose one that has a healthy stand of the desired species, is close to your planting site, and can be legally accessed (contact Alberta Environment and Parks before harvesting cuttings from public land, <http://aep.alberta.ca/>).

Once you have chosen a harvesting site, the next step is to assemble necessary equipment. This equipment includes:

- Work gloves
- Rubber boots or at least closed toed shoes
- Eye protection (for navigating dense willow stands)
- Loppers;
- Pruning saw;
- Hand pruners or a machete;
- Commercial stretch-wrap, bale twine, or large zip ties to tie bundles of cuttings together if transporting them;
- If cuttings are actively growing and there is no standing water on site, 5 gallon buckets filled with water may be used for soaking.

Once you are at the site with your equipment, harvesting can begin using the technique shown in the flow chart on the following page.



## Storing

Actively growing cuttings may be planted up to 3 days after harvest, as long as their rooting ends are kept soaking in water. Dormant cuttings can be stored for far longer – up to 6 months under the right conditions (Crowder, 2005).

To store dormant cuttings, wrap them into manageable bundles using bale twine, zip ties or stretch wrap. For future reference, it is advisable to mark each bundle with flagging tape, and record the species and harvesting date and location.



**Figure 3. Snow caches, such as this one, are an easy way to store cuttings until planting.**

Bundles of dormant stock must be placed in cold storage (between -5 and 4°C; colder is preferred<sup>2</sup>) or a “snow cache” over winter (Tilley and John, 2012). Snow caches should be located in fairly shaded areas where cuttings can be evenly buried with at least two feet of snow (Figure 3). Covering snow caches with reflective insulated tarps helps maintain cool temperatures.

When the soil is thawed and ready for planting, remove cuttings from cold storage and completely soak them in water for two to fourteen days (Darris 2006; Hoag 2007). Plant cuttings directly after they have finished soaking.

## Planting

Stem cuttings are typically planted in riparian areas along the edges of streams, rivers, lakes, wetlands, and other water bodies. Care should be taken to plant the stem cuttings **right-side**

<sup>2</sup> Note that dormant cuttings can only be stored for 2-3 months if temperatures are above freezing (i.e. 0-4°C) (Tilley and John, 2012).

**up**, to a depth where their bottom can reach the water table and their aboveground portion has at least 3 buds that are not overly shaded by surrounding vegetation. As mentioned above, ideally **at least ¾ of the cutting should be buried underground.**

Planting cuttings to this depth can be challenging, and a metal rod or bar (e.g. piece of rebar, crowbar, or custom-made planting bar) is often required to make pilot holes for the cuttings (Figure 4). When planting into a pilot hole, ensure that the soil is packed tightly around the cutting, as air pockets can dry it out.



**Figure 4. Examples of different custom-made planting bars.**

## Maintenance

If planted at the beginning of the growing season, cuttings should produce leaves within a month. Monitor regularly, particularly during droughts or after flooding events. Survival rates will improve if, for at least the first couple of years, cuttings are protected from livestock and wildlife (e.g. beaver, deer, vole, etc.), irrigated during dry periods, and weeded regularly.

## References

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- Darris, D.C., 2002. Ability of Pacific Northwest native shrubs to root from hardwood cuttings (with summary of propagation methods for 22 species). Plant Materials Technical Note No. 30. Portland, OR: USDA-Natural Resources Conservation Service.
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**All photos were taken by AWES.**