



Handling of Poplar and Willow Cuttings Part 2: Transportation and Planting



INTRODUCTION

Poplars (e.g. *Populus balsamifera*) and willows (*Salix spp*) grow across a wide range of site and environmental conditions, including soils with sub-optimal pH and salinity. Both poplars and willows are early successional species that are among the first and fastest growing woody species to colonize sites following natural or human disturbances. These characteristics are useful for reforestation projects, and have been adapted for land reclamation strategies for altered oil and gas landscapes in western Canada (Isebrands et al., 2014) (Figure 1). These species can be propagated by placing cuttings directly in the ground, if appropriate handling techniques are implemented.

The technical notes on “Handling of Poplar and Willow Cuttings” are divided into two parts. Part 1 addresses collection, storage and pre-planting preparation of cuttings and can be accessed on the Centre for Boreal Research’s website nait.ca/borealresearch. Part 2 focuses on transportation and planting of cuttings.



Figure 1. Field establishment of willow cuttings.



FIVE STEPS TO ESTABLISHING CUTTINGS

1. Collection (part 1)
2. Storage (part 1)
3. Pre-planting preparation (part 1)
4. Transportation (part 2)
5. Planting (part 2)

STEP 4: TRANSPORTATION

Implementing proper transportation will significantly increase cutting vigor and survival, avoiding poor outplanting results and potential establishment failure in the field.

Cuttings should be transported in a cool (maximum 4°C/ 39°F) environment protected from sunlight and wind. Transport of cuttings should use polyethylene-lined boxes or sealed polyethylene bags and, ideally, a refrigerated van (commonly used by seedling planting operations), or alternatively a covered pick-up truck. If a refrigerated van is not available for storage, to help prevent root formation and bud break, keep the cuttings (1) in tall shade, (2) covered with a reflective tarp, and (3) near water or in a depression where cold air will pool at night.

Prior to transportation, cuttings should be inspected daily. It is not recommended to plant cuttings that show rooting or bud breaking. If cuttings start rooting before planting, the roots will most likely be sheared off or damaged. Similarly, if the buds break and the leaves flush before planting, stem moisture and stored carbohydrates will be depleted. Once the buds break, transpiration will begin, as will water demands on the tissues that absorb water. Too much demand with little supply will cause desiccation and lead to mortality.

STEP 5: PLANTING

Cuttings should be planted in early spring as soon as the soil has thawed. Delaying planting into summer is not recommended due to reduced soil moisture, shortened growing period and increased heat stress.

Establishment success of planted cuttings depends on adequate site preparation (Keddy & Sidders), helping to facilitate development of adequate root systems, and this requires a continuous supply of water and oxygen (Figures 2 and 3). Sites that have been heavily compacted, for example, will need to be de-compacted to provide adequate drainage and thus oxygen to the cutting (see Technical Note #3 Tilling Compacted Soils with RipPlows).

The following planting conditions will help ensure successful establishment of cuttings:



Figure 2. Planted balsam poplar cutting in the first growing season.



Figure 3. Planted willow cutting in the first growing season.



SOIL CONTACT

Continuous soil contact is required and achieved by:

- Pushing the cutting directly into the soil to the specified depth
- Creating a pilot hole which has a smaller diameter than the cutting and then pushing the cutting into it
- Backfilling a planting hole with a shovel or planting bar
- Filling the hole with a slurry to eliminate any air pockets

ADEQUATE MOISTURE

- The dry-season water table should not be greater than 1.5 m below the surface (Caplan et al., 2013).
- If cuttings are planted in coarse-textured soils, the water table should not be deeper than 1 m below the surface.
- Where possible, cuttings should extend 10 to 15 cm below the anticipated lowest seasonal water table position (Lezberg & Giordanengo, 2008) i.e. if the anticipated lowest water table position is 30 cm below the surface, plant the cuttings to a depth of 40 to 45 cm below the surface.

ADEQUATE OXYGEN

To ensure adequate oxygen to the roots, the soil must be well aerated. This can be achieved through site preparation, but sometimes “microsite preparation” is necessary. Friable soil around the rooting zone of the cutting will allow for good oxygen supply and root expansion into the soil. Site preparation can be used to enhance surface soil physical properties, for example, by reducing compaction and improving soil porosity. Refer to Technical Notes #3 and #23 on site preparation.

PLANTING DEPTH

Cuttings should be planted to at least half of their length, but preferably 75% to encourage the correct root-to-shoot ratio (Holzworth & Batchelor, 1984). If 1 m cuttings are used, the cuttings should to be planted at a depth of 0.75 m.

PLANTING IMPLEMENTS

1. **Planting shovels** work well with smaller cuttings and low compaction sites and have the advantage of allowing the planter to create zones around the cutting into which roots can expand.
2. **Rebar** has been used to create pilot holes in the soil to facilitate establishment of larger-diameter cuttings while maintaining continuous contact with the soil. The idea here is to make a hole of a smaller diameter than the diameter of the cutting.



3. **Planting bars** (Polster, 2002) have been developed and refined to facilitate larger diameter cuttings (Figure 4). However, the holes need to be backfilled to ensure continuous contact with the soil and to eliminate air pockets. The use of soil slurries has been suggested and used for this purpose.
4. **Augers** are an option used to create holes in compacted or clay soils, without further compacting the site. Larger diameter holes can be made and then the cutting back-filled with organic material or topsoil (Lezberg & Giordanengo, 2008).



Figure 4. Planting bars used for planting cuttings (David Polster).

POST-PLANTING VEGETATION MANAGEMENT

Typically, reclaimed sites are extensively managed, but often require substantial mechanical site preparation to aid in planting and in controlling competing vegetation. Post-planting vegetation management methods must be selected based on the desired plant community, existing weed populations on- and off-site, site conditions and regulatory requirements. For more information view Technical Notes # 7, 8 and 9.

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