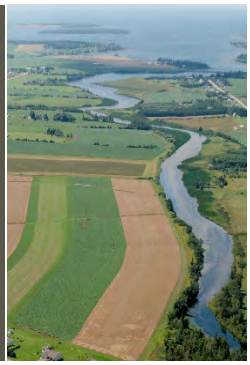
in this fact sheet

Willow Buffers



Did you Know?

Willow buffers are a proven conservation practice in North America!

They Work

Well designed and maintained willow buffers help keep sediment, fertilizers, pesticides and other pollutants from streams and rivers.

Buffers work best when incorporated into systems that include supporting practices such as nutrient management.

Research has shown that properly established riparian zone vegetation removes up to 90 % of the unused nitrogen leaving the field.

Why Willows

Rapid and extensive root development through the soil profile

- *Effective nutrient filter*
- *Stabilizes soil*

Coppice ability

- *Regrowth following cutting maintains plants in a juvenile state with high nutrient demand*

Active growth from early spring to late summer

- *Rapid site occupancy*
- *Long period of nutrient uptake*

Dense canopy

- *Creates heavy shade and natural weed control, eliminating the need for herbicides once the crop is established*

Willows and Carbon Removal

Why do we want carbon removal

Carbon is composed of carbon dioxide, the most common greenhouse gas. Storing or sequestering carbon in trees helps reduce the amount of carbon dioxide in the atmosphere. One ton of stored carbon is equivalent to 3.67 tons of carbon dioxide

Willow buffers remove carbon dioxide

One solution for balancing the carbon cycle is to increase the growth of perennial vegetation such as grass, shrubs and trees. Willow riparian buffers can be a part of the solution. These buffers provide an option not only for carbon storage but also reducing the flow of nutrients into PEI creeks and rivers.

*For every kilometer of willow buffer planted in PEI approximately **35 tons of CO2 is absorbed annually!***

It takes time for willows to produce most intended functions

Farmers should not expect immediate results. As every site is different, the level of impacts will aslo differ from site to site.

A well planned and manged willow buffer will provide benefits for years and decades into the future

Expected Benefits

Environmental Benefits

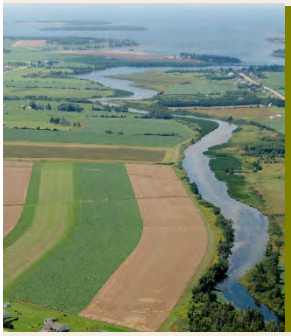
- *Reduces the amount of sediment, excess nutrients, pesticides and other pollutants entrering streams*
- *Exports nutrient from the riparian zone*
- *Helps Stabilize stream banks and shorelines through root absortion*
- *Removes carbon dioxide from atmosphere and stores it as carbon*

Practical Benefits

- *Provides opportunities for income from biomass and decorative floral materials.*
- *Creates a highly visible sign of good stewardship.*
- *Keeps farm machinery away from steep banks.*
- *Provides a barrier against dust, odor, pesticide pollution.*
- *Adds scenic beauty to the landscape.*
- *Provides habitat for important pollinator species.*

Willow Buffer Agronomics

Focus on sites with little or no natural riparian vegetation



Willows will grow on most PEI agricultural soils

Ideally slopes should be less than 7 percent

Tractor access to the buffer site is important for biomass harvest

Establish buffers on grassland or previously cropped land

Site Preparation

Preferably begin site preparation in fall prior to planting.

Prepare planting row using tillage to make a uniform seedbed to a depth of 25cm.

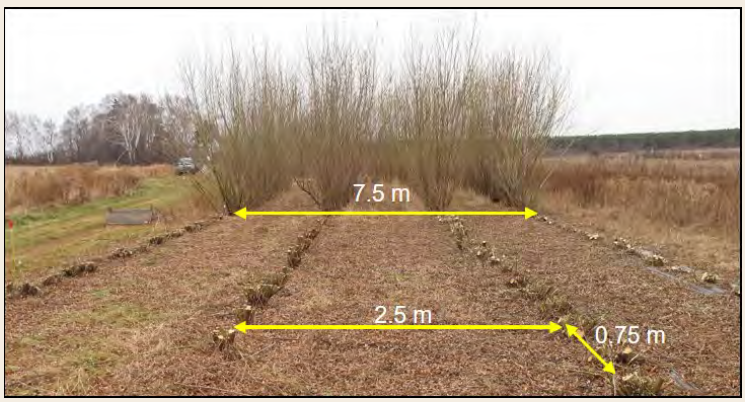
Apply UV resistant 2.0 mil plastic mulch (1.1 m wide) in the fall using a mulch applicator.

Plant material and planting

Use 25 cm long hardwood cuttings of the following locally tested willow cultivars:

viminalis '5027',
miyabeana 'Sx64',
miyabeana 'Sx67
sachalinensis 'Sx61'

Hand plant in plastic mulch at a density of 5,300 stems/ha (0.75m x 2.5m) in late May to early June



How to make hardwood cuttings

Take cuttings before buds burst in the spring. The best rooting success is from cuttings that are from previous years growth.

Cutting diameter should be as large as possible. Best diameters are 0.5-1.5cm. Cuttings should be 25 to 30cm long.

Willows have root primordia up and down the entire stem, so roots will grow out of both the nodes and internodes.

Cutting material should be stored in a refrigerated unit at -2 to -4°C prior to planting

Tips to keep your buffer in top form

- inspect annually and after major storms or snowmelt
- limit farm vehicles, livestock, or excessive pedestrian traffic
- minimize use of fertilizers, pesticides and other chemicals
- trim grass to control weeds, delay mowing until July to consider the needs of nesting birds and waterfowl
- reduce or eliminate noxious weeds

Willow Harvest...

Harvest on a 3 year cycle in late fall after leaf drop. For maximum riparian protection harvest biomass the year following potato production

Willow can be harvested mechanically. In PEI a tractor and modified sugar cane harvester has been used to cut willow in buffers.

Plants quickly regrow from the remaining roots and cut stumps after each harvest, a practice called coppicing. A willow buffer can produce seven or more harvests over 20 years with limited maintenance.

Nutrient removal with biomass harvest

A one hectare willow buffer (approximately 1 km long) removes about 250 kg of nitrogen in the first harvest and 300 kg in each subsequent harvest.

Seven harvest cycles are possible before the buffer needs to be replanted. This means that over 22 years, more than two tonnes of nitrogen would be removed from the site over the life of the buffer.

Harvesting biomass from a one hectare buffer could provide up to 45 dry tonnes of harvested chips for home heating - this is equivalent to 540 GJ of energy

In PEI, willow yields about 15 to 16 dry tonnes of biomass per hectare per year!

Three year old Viminalis '5027'

Who we are

The East Prince Agri-Environment Association is a group of 12 farm families that came together in 2015 to explore ways of building a more sustainable and environmentally-friendly agriculture industry.

The Association and its partners, Kensington North Watershed Association and PEI Wildlife Federation are spearheading a five year project on the beneficial environmental effects of planting willow trees along river banks. The project will see willows planted on 12 riparian sites across Prince Edward Island.

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