



PEI Soil & Crop Improvement Association

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Greenhouse Gas Mitigation Program for Canadian Agriculture

Agro Forestry Demonstrations

Agro forestry is new in this region; we are beginning to explore options that could provide an economic return to producers, improve the environment and also act as a carbon sink. Trees and shrubs, like traditional field crops, remove CO₂ from the air and store it as carbon in trunks, branches, leaves and roots. Agro forestry practices sequester carbon for many decades.

The dry solid matter of a tree or shrub is 50 % carbon and the carbon dioxide equivalent is 3.667 times the value of carbon in the tree. So every dry tonne of dry wood in the forest has removed 3.667 tonnes of carbon dioxide from the atmosphere.

Agro forestry, as we are defining it, involves afforestation as opposed to reforestation. Native and non-native trees and shrubs are being evaluated by the PEI Soil and Crop Improvement Association, Taking Charge Team and other partners. These demonstration sites have been supported by the Greenhouse Gas Mitigation Program through the Soil Conservation Council of Canada, three national industry groups and Agriculture and Agri-Food Canada.

Currently fourteen sites have been established as a start in agro forestry. Local business often exist to purchase and process of these products (preserves, fruit, nuts, lumber, nutraceuticals, pharmaceuticals, floral etc).

The Following parameters will be evaluated on some or all of these sites:

1. Survival rate and planting method
2. Carbon sequestration values
3. Insect and disease issues
4. Years to production (fruit, timber, nuts, wood products, etc.)
5. Production levels
6. Marketability
7. Financial returns



SITE 1: Evaluation of hybrid hazelnut with native beaked hazelnut **Cooperators: MacPhail Woods Forestry Project, Orwell**

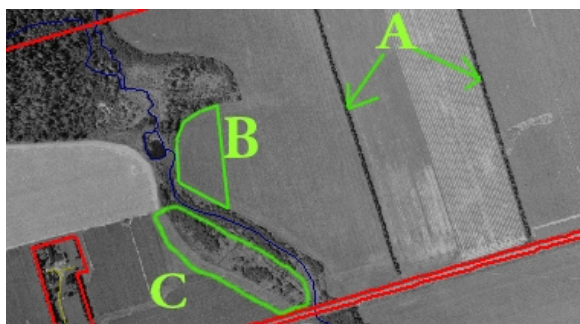


Native Beaked Hazelnut Shrub

This 2005 project was initiated to evaluate the native beaked hazelnut and hybrid dwarf hazelnut varieties to determine feasibility of producing hazelnuts under an organic system. The project was designed as a research project with 3 hybrid dwarf hazelnut varieties and a native beaked hazelnut. Shrubs will be evaluated for survival, vigor, growth and productivity.

**SITE 2: Hedgerows, afforestation and riparian zones - Wood Products and Biodiversity:
Cooperator: Eric C. Robinson Inc, Augustine Cove**

Over the past number of years Eric C. Robinson Inc has been establishing trees on a number of their farms. In the mid to late 80's they established about 9 miles of hedgerows. Recently Robinsons' purchased 2,100 tree seedlings, planting them into a nursery on the farm. The farm wanted to try tree species, although some are non-native, that might provide value for future generations. The species included Red Oak, Black Walnut, Butternut, Norway Spruce, Douglas Fir, White Pine, and Blue Spruce; these tree species have since been transplanted in 2003. Site preparation included micro site tillage and mulched with composted wood bark. The survival rate in the second year is estimated to be 80 to 90% for the hardwoods and 40 to 75% for the softwoods. They also have a number of riparian areas and other marginal areas that benefited from tree planting.



- A- 4,650 feet 2-row white spruce. When mature, these trees will sequester more than 225-tons of carbon**
- B- 1,800 hardwood and softwood species - afforestation on 2-acres**
- C- 2,742 larch and cedar seedlings planted in the riparian zone**

**SITE 3: Use of Native Fruit Shrubs in Agriculture for fruit, preserves, wine, etc.
Cooperators: MacPhail Woods Forestry Project, Orwell**



Mulching shrubs at planting

The feasibility of converting land from traditional agriculture to production of fruit from native shrubs is being investigated at Orwell. The project will look at three native shrubs - common elder , serviceberry , and chokecherry . Established in 2004, the project will evaluate native fruit bearing shrubs in combination with white clover in an organic system. After a period of time additional plants such as ostrich ferns (fiddle heads) and high value trees could be considered. Shrubs will be evaluated for vigor, growth and productivity. Once production is stabilized, fruit will be test marketed by local businesses to determine potential markets. In addition to the potential development of an industry based on organic fruit production from native shrubs, environmental benefits such an increased biodiversity and carbon sequestration can be demonstrated.

**SITE 4: Trees and shrubs on Diversion Terraces - Wood products, fruit, preserves, nuts, floral, etc.
Cooperators: Bedeque Bay Environmental Association and George Webster and family, Maple Plains**



Planting shrubs and trees on diversion terrace

A common soil conservation practices in potato production is to construct berms or diversion terraces. This 2005 project is examining the benefits or problems of growing native shrubs (highbush cranberry, beaked hazelnut and red osier dogwood) and trees (red oak, white birch and elm) on these berms. The survival, growth rate, effect on adjacent agricultural crops (potatoes, grain and hay), insect populations and level of carbon sequestration will be evaluated.

**SITE 5: Evaluation of serviceberry varieties on poorly drained agricultural land - Fruit, Preserves, etc.
Cooperators: Barry Clohossey, Nail Pond**



Serviceberry shrubs planted with plastic mulch

This 2005 project was initiated to evaluate two varieties of Saskatoon varieties from western Canada, and four species of service berry from New Brunswick and Prince Edward Island. Their vigor, flowering time, time to production and production levels will be evaluated. Fruit produced will then be test marketed through a local farm market. In addition, local blueberry producers are looking for a shrub/tree which flowers earlier than the native blueberry. This project will also monitor flowering times to determine if one or more are suitable to improve blueberry pollination.

**SITE 6: Evaluation of afforestation of poorly drained agricultural land - Wood products, Biodiversity
Cooperators: Ronnie and Rodney MacWilliams, Burton**



Land considered marginal for agricultural crop production now has the potential to be converted either to productive forests or a combination of forest/agricultural crops. This 2005 project was initiated to evaluate several native trees planted on poorly drained forage land to determine if tree production or a combination of tree/forage production was feasible. The native trees planted include apple, red maple, white ash, red oak, white birch, mountain ash, eastern larch, black spruce, white spruce, white cedar.

SITE 7 and 8: Under planting Ground Hemlock in different forest covers - Nutraceuticals

Ground Hemlock (*Taxus Canadensis*) is a slow growing shrub with flat needle like foliage that grows best in the shade. It has low spreading branches which are usually between 50 - 100 cm in length but may reach 200 cm or more. Two sites (one in Central PEI and in one in Eastern PEI) were established in 2005. In the central PEI site hemlock was planted under three different forest covers. One is mixed hardwood and softwood with low light level, one pure hardwood medium light level, and one mixed hardwood with high light condition). In eastern PEI Ground Hemlock was planted under two mixed hardwood covers with medium and low light conditions. Growth rate and productivity will be monitored.

**SITE 9: Evaluation of Dwarf Hybrid Hazelnuts on Steep Sloping Land
Cooperators: Don Northcott, Cornwall**

This 2006 project was initiated to evaluate the adaptation of dwarf hybrid hazelnuts to our climate, and specifically on steep sloping land in a conventional agricultural setting. There are 4-hybrid varieties in the treatments planted May of 2006. The plots will provide information on vigor, growth and length of time to productivity.

Hazelnuts are expected to grow 2 to 3 meters in height and 1 to 2 meters in diameter, bearing nuts in 3 to 5 years. Hybrid bush hazels are wind pollinated and form a multi-stemmed (10 to 30) bush. Hazelnuts have potential for commercial production.

SITE 10 and 11: Evaluation of White Pine and Pine Nuts under an Organic System

Cooperators: Garry Renkema, Wheatley River - Stewart MacRae, Ebenezer



Korean Pine Nuts



Swiss Stone Pine Nut Trees

This 2006 project was initiated to evaluate the adaptation of pine nuts to our climate in an organic system. There are 2-varieties of pine nuts in the treatments planted May of 2006; Swiss Stone and Korean Pine. Each site will have 3 treatments replicated 6 times. The plots will provide information on vigor, growth and survivability. Pine nut trees are expected to grow 11 meters in height, bearing productive nut crops in 18 to 20 years. Trees have been known to produce nuts for over 100 years. The pine cones are knocked off the tree and dried. Pine nuts will keep for several years under proper storage conditions. Pine nuts retail locally for \$48 per kg.

SITE 12: Evaluation of Chestnuts under PEI Conditions

Cooperators: Dan and Malcolm MacLean, Tyne Valley

This 2006 project was initiated to evaluate American Chestnut and Hybrid Chestnut. Also on the site are Red Oak and White Pine as guards. American Chestnut has been threatened throughout North America because of disease. The plots will provide information on vigor, growth and survivability.

SITE 13 and 14: Evaluation of Willows on PEI for Biomass Production and Riparian Protection.

Cooperators: Willard Waugh and Sons, Wilmot - Hans Hovingh and Hans Wilting, Meadowbank



Salix Viminalis (non-native Willow)

This 2006 project was launched with Agriculture and Agri Food Canada - PFRA Regional Services to evaluate the potential woody biomass production of willows in riparian areas, and how willows, trees and shrubs play a role in the riparian function. At both of these sites, plastic mulch was installed for weed control. Various native and non-native Willows, Red and Sugar Maples, American Elm, White Ash, Serviceberry, Chokecherry, Red Osier Dogwood, and Nine Bark were planted at these sites.

The project will evaluate harvesting (coppicing) Willows every 3-years and the effects it has in sequestering nutrients passing through the riparian area; and the biomass produced from the native and non-native Willows. It is expected that the willow planting can be coppiced 7-times. Harvesting machines are available that will either chip (modified corn chopper) or round bale the willows. On PEI there are a number of chip boilers in institutions, businesses and private homes. Cogeneration for electricity production is also a possibility.

Major financial support for this project provided by Canadian Biomass Innovation Network (CBIN).



The Soil Conservation
Council of Canada



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Agri-Food Canada

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