



ECO-BUFFERS

Photo Credit: Ben Russell

Agroforestry fact sheet #5

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What is an Eco-Buffer?

Eco-Buffers are dense, diverse plantings of perennial species (i.e., trees and shrubs and flowering herbs) designed to mimic natural forest habitat. When established on farm, these stands diversify the landscape, bringing with them an assortment of environmental benefits. Building habitat and biodiversity strengthens a farm's resilience to disturbance, whether physical, (through increased shelter) or biological (in the form of passive pest management, or pollination services). Eco-buffers can be purposefully connected as wildlife corridors, in turn creating larger and more resilient ecosystems. These benefits, or "ecosystem services" can support all types of agricultural operations while fostering healthy, biodiverse environment.

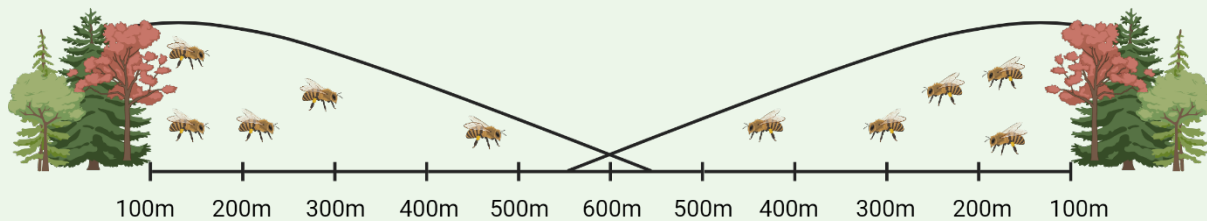


Fig.1 Pollinator density decreases with distance from eco-buffer or other natural habitat (Adapted from Wonneck 2017)

A significant benefit of establishing eco-buffers is the potential for increased pollination services from native species, especially in perennial systems. Cultivating a diverse, robust and constant supply of flowering plants will support a productive community of pollinators near your operation, reducing reliance on imported honeybees while supporting native species. As seen in fig 1., Pollinators (and other beneficial insect species) have limited ranges, highlighting the loss of ecosystem services as fields are expanded and amalgamated. Extra consideration must be given when choosing flowering plants to prevent competition while the crop is in flower (e.g. early flowering serviceberry can attract native pollinators prior to many perennial crops blossoming, or Highbush Cranberry as a late June flowering option).

Pollinating species are not the only types of insects that benefit from expanded native habitat. Natural pest suppression is one of the most important ecosystem services to agriculture, estimated at over \$5 Billion annually in Canada alone. Wasps, damselflies, beetles, and other parasitoid or predatory insects establish and overwinter at significantly higher numbers in native marginal habitats as opposed to cropland. These species can act as "natural enemies" of common crop pests, opportunistically consuming destructive insects like aphids, caterpillars, and their larva. Although primarily carnivorous, most predatory insects supplement their diets with plant resources (such as pollen, sap, or nectar) and can be required during various life stages. Keeping a diverse mix of native flowering species nearby ensures beneficial insects, birds, and other predators can maintain populations year-round.

Fundamental Eco-Buffer Design

Eco-buffers can be established much like a hedgerow would, having many of the same functions (reduce wind speeds, protect infrastructure, shelter livestock,) and considerations (soil type, orientation, infrastructure limitations etc.). Eco-buffers, however, require a more prescriptive focus on planting native species, expanding habitat and fostering biodiversity. As a result, eco-buffers are more dense than other types of agroforestry initiatives, resulting in a layered structure with varying heights and characteristics (growth rate, flowering period, fruit production etc). They usually require a higher degree of planning and maintenance for the first few years, however once established can become more self-sustaining than non-native and/or monocultured stands.

General Guidelines

Eco-buffer design is adaptable to suit a variety of situations and landscapes to best protect biodiversity. For example, interior rows can be removed from the basic 5-row design to create a narrower 3 - or 4-row design when required. Spacing can also vary based on design and species selection, with Eco-buffer plantings typically spaced closer than traditional hedgerows/windbreaks. On average, between-row spacing for Eco-buffers are around 2-2.5 meters, and within-row spacing at approx. 1 meter. Although flexible in design, some basic principles to consider when designing Eco-buffers include:

Trees

- One long-lived tree for every 6th plant
- Both fast and slow growing species
- 10-20 meters tall at maturity

Shrubs

- A minimum of 4-5 shrub species
- 1-5 meters tall at maturity
- Taller shrubs are planted in interior rows
- Shorter flowering species on outside rows

Funding for the establishment of Eco-buffers is available through the Agriculture Stewardship Program with compulsory enrollment in the Alternative Land Use Services program (ALUS).

For more information on how agroforestry can be implemented on your farm, see the remaining series of agro-forestry fact sheets or contact the Department of Agriculture at DeptAg@gov.pe.ca or 1-866-PEI FARM.

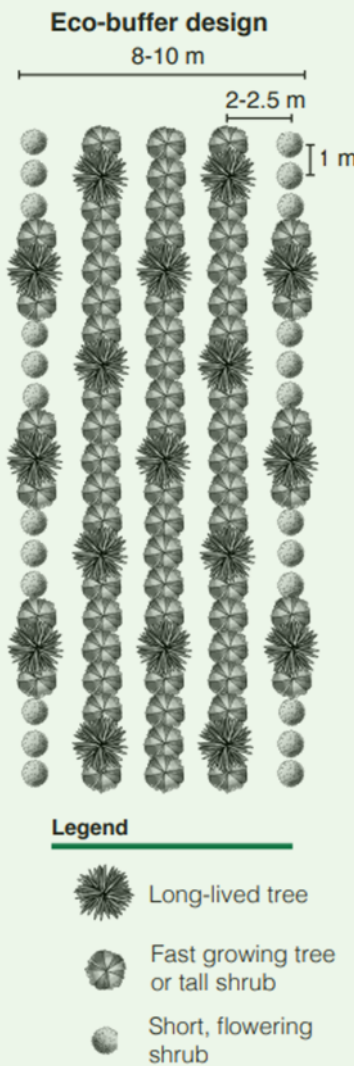


Fig. 2. Example Eco-Buffer design (AAFC)

Not Just for the Birds



Like other agro-forestry initiatives, tree and shrub plantings can diversify the farm's offerings and income streams. Fruit bearing species don't need to only feed wildlife, species such as elderberry and hazelnut can be integrated and harvested as a potential crop or value-added product ingredient. Having a higher diversity of tree species also allows for selective harvesting of timber to be implemented with less destruction to the habitat. Faster growing species (such as poplar, spruce) can be selectively harvested, allowing slower growing species (oak, maple) to fill in. By attempting to mimic natural succession through diverse eco-buffers, a long-term return in investment is possible without having to establish a new planting from scratch.

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Figures created in BioRender.com unless otherwise specified.