Pollination Issues with Three Northern Berry Plants for Newfoundland & Labrador

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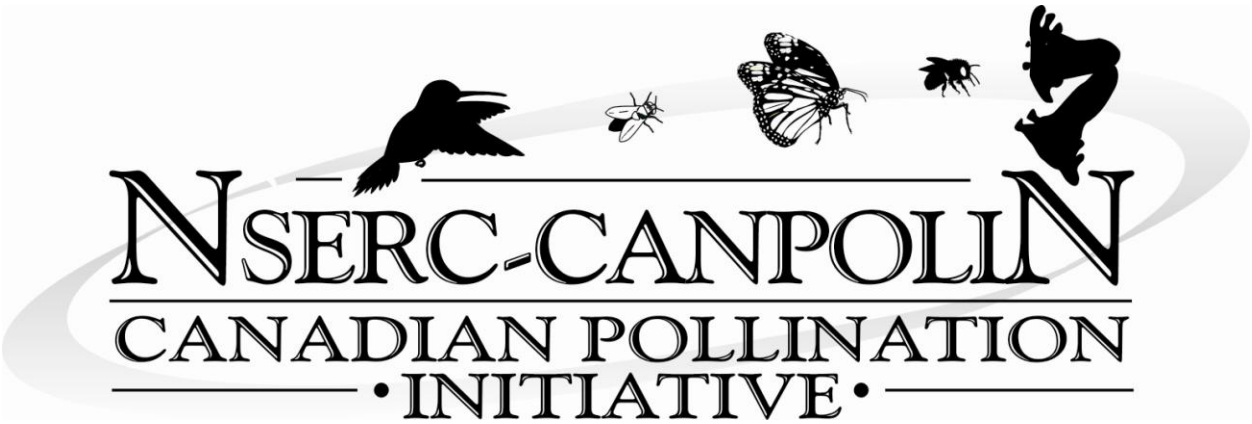

Crowberry or Blackberry; *Empetrum nigrum* L. (Empetraceae)

This species is described as dioecious, with the majority of flowers being male. The sex ratio of the plants is not known. The male plant's pink flowers have three stamens and the vestige of a pistil. The female plant's purple flowers have a short style with a black, shiny stigma with six to nine lobes (rays) about 2mm in diameter. The stigmatic exudate may contain sugar. Unisexual flowers are also known to occur. It has been suggested that pollination can be by wind and by insects (flies) but bees (*Colletes* and *Andrena*) have also been observed visiting the flowers.

Partridgeberry or Lignonberry; *Vaccinium vitis-idaea* L. (Ericaceae)

Sometimes *Vaccinium vitis-idea* is called crowberry. *V. vitis-idea* is pollinated in the same way as lowbush blueberry, but possibly with minor differences. Plants in northern Labrador have smaller flowers than those elsewhere to the south, but the situation in southern Labrador needs investigating. The flowers are described as having stigmas and anthers that are sexually functional at the same time (homogamous), or with stigmas that are receptive before the pollen is shed from the anthers (protogynous). Although the pollination mechanism of the larger flowers of southern regions is considered to rely on insects, especially bumblebees, old literature suggests that the smaller flowers can be self-pollinating. In some populations, the flowers of some plants, or the plants themselves, may be functionally male by suppression of the development of the pistil (if this situation describes the functional sex of whole plants, i.e. hermaphrodite plants and male plants, it would be highly unusual in the world of flowering plants).

Partridgeberry is also the common name for *Gaultheria procumbens* (Ericaeae) and *Mitchella repens* (Rubiaceae). *G. procumbens* has floral structure like that of low-bush blueberry. *M. repens'* flowers are quite different from those of *G. procumbens*, they are white and produced in pairs. Each flower has four petals that are extensions of the tubular and hairy calyx. There is a central pistil and four stamens, but the flowers come in two forms. One form is with its pistil longer than the stamens (so-called pin form), and the other has the sexual parts reversed in relative length (thrum form). This dimorphism can prevent autogamous pollen transfer.

Bakeapple or Cloudberry; *Rubus chamaemorus* L. (Rosacea)

This species is dioecious. The flowers are open bowls that allow many insects to visit. However, the flowers produce, at most, minute amounts of nectar. The flowers of male plants provide pollen to floral visitors, and the flowers of female plants provide small amounts of "false-pollen". The species can be thought of as cryptically dieocious. Depending on locality the sex ratio of the populations can range from being exclusively male to mixed. The most commonly seen pollinators are flies, especially flower-flies (Diptera:Syrphidae). Recent studies by Brown and McNeill are from the north shore of the St. Lawrence River, QC.

What needs to be done:

Task	*E. nigrum*	*V. vitis-idaea*	*R. chamaemorus*
A. 1. flower visitor survey	Survey what insects are visiting the flowers, noting their identifications to "form species" that relate to specimens in A. 2. (below). Try to find patches of flowers that can be used for standard surveys (insects by form species seen on X number of flowers in Y square metres in Z minutes at various times during the day). If possible, make notations by sex or functional sex of the flowers (probably difficult to do)		
A. 2. flower visitor collections	Collect, kill, and pin to make a collection of insects associated with the flowers for general reference ("form species"), and later for detailed taxonomic identifications		
A. 3. observations	Make observations of the behaviours of the insects by form species on the flowers: taking nectar, taking pollen, resting, buzzing, hanging upside-down, mating, etc. Are the insects visiting the flowers dusted with, or carrying pollen?		
B. 1. floral form	Check to get to know the different forms of the flowers by sex	Check to see if there are flowers of different forms, suppressed pistils, smaller flowers, correlations, etc.	Check to get to know the different forms of the flowers by sex
B. 2. drawings	Make your own drawings of the flowers, being sure to include a scale bar for size. Make notes that may relate to pollination mechanisms, sexual expression, etc. on your drawings		
B. 3. preserved material	Preserve flowers of each sex from 10 plants each in FAA for later examination in the laboratory and by microscopy	Preserve flowers of each type (floral form) from as many plants as are thought to be representative in FAA for later examination in the laboratory and by microscopy	Preserve flowers of each sex from 10 plants each in FAA for later examination in the laboratory and by microscopy
C. sex/gender ratios			
C. 1. flowers in populations	counts of male and female flowers	watch for flowers with suppressed stigma development; count for ratio of hermaphrodite flowers vs. functionally male flowers	counts of male and female flowers
C. 2. plants in populations	when plants are thought to be isolated individuals, note sex and count	check plants with flowers with suppressed stigma development to see if the whole plant shows the same characteristic	when plants are thought to be isolated individuals, note sex and count
D. Experiments	bag female flowers in mesh bags to test for wind pollination	bag flowers in mesh bags to test for self-pollination potential	none needed