
Lowbush Blueberry Fact Sheet

Pollinating Wild Lowbush Blueberries in Nova Scotia

Introduction

Pollination is simply the transfer of pollen from the male (stamen) to the female (pistil) part of the flower, in order to fertilize the embryonic egg and begin the process of developing an embryo that becomes the seed (Fig. 1a). Fertilization causes processes to initiate that result in the formation of a fruit, which in the case of the wild blueberry (*Vaccinium angustifolium* Ait.) is the berry. The final size of the fruit is determined in part by the number of viable seeds that develop within the ovary. Optimum production of the blueberry requires successful pollination and development of most of the flowers (60-70%). Pollination in wild blueberries is dependent upon a biotic agent, a pollinator. Bees are the most important blueberry pollinators (Fig. 1 b).

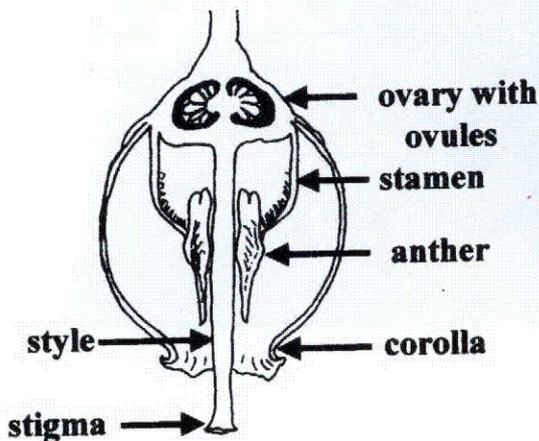


Fig. 1. a) parts of a blueberry flower (adapted from Vander Kloet, 1988).
b) a pollinator on wild blueberry flowers

The size, shape, and downward facing aspect of the wild blueberry flower (Figure 1) means that pollen transfer can only be accomplished by flower visiting insects. In the process of acquiring pollen, nectar, or both, an insect gets pollen from one blueberry on its body. When it moves to another flower, the pollen from the first flower is deposited onto the stigma (the sticky tip of the pistil) of the second flower. If the pollen and stigma are compatible, the pollen grain germinates and develops a pollen tube that grows down the style to the ovary, where the nucleus of the pollen fertilizes an ovule or egg nucleus (Fig 1 a). This forms an embryo, which becomes the new seed. Several viable seeds are required in each ovary in order to stimulate the development of the ovary wall which becomes the actual berry.

Very shortly after fertilization the ovary wall will begin to develop, and the corolla (the basal ring of white petals) drops, resulting in a small green berry (Fig 2), which is considered a “set” fruit. Successful pollination in a commercial blueberry field can be determined early in the season by the number of set berries. Poor fruit set is indicated by a number of “pinheads”, or flower ovaries that do not enlarge, but remain on the stems (Fig 2).

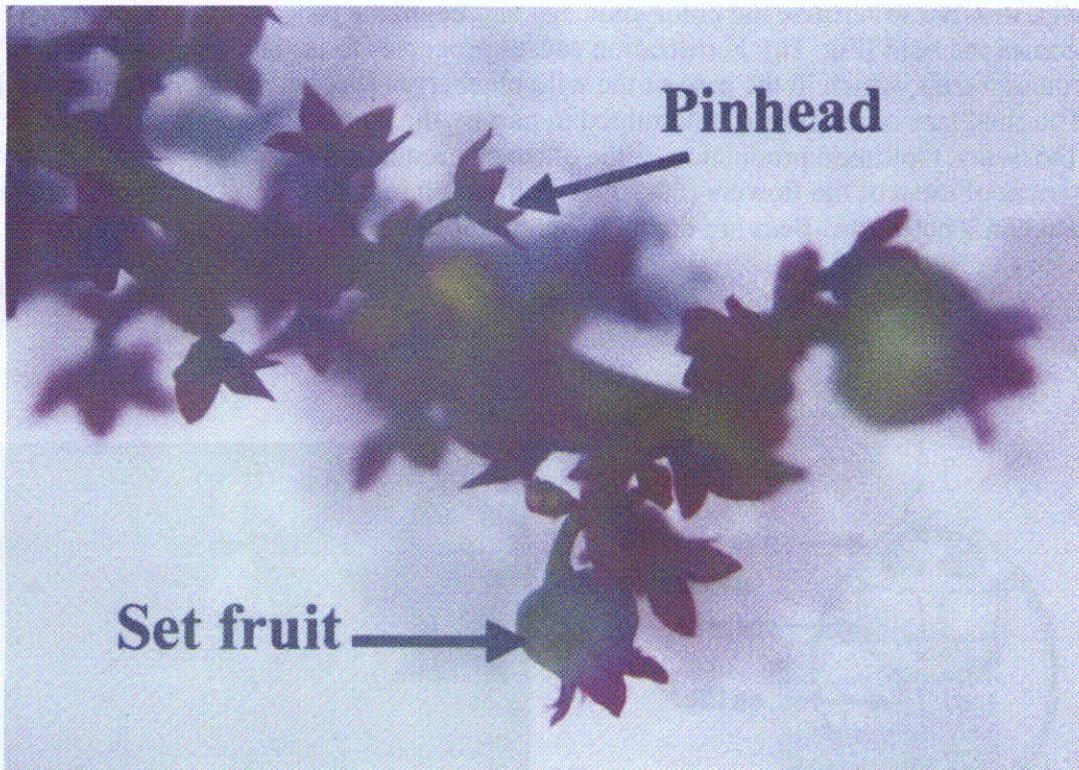


Fig. 2 A blueberry stem with set fruit and pinheads.



Factors Affecting Pollination in Wild blueberry Fields

Successful pollination in wild blueberry fields requires a combination of factors.

1) Genetic factors.

Pollen usually must be transferred from flowers on one clone to another because wild blueberries are self incompatible. To have successful pollination, pollen must be transported from clones that are compatible with the ones receiving the pollen. This is not a problem in most blueberry fields, as many variable clones are found in every field. There will, however, be clones within fields that produce very little fruit because they were pollinated with incompatible pollen, or because they are male biased pollen producing clones. Other clones produce very large fruit loads. Many pollinators, particularly native pollinators such as the bumble bee, tend to move quickly from clone to clone, and thus promote successful pollination.

2) Weather factors.

Pollination success in any particular wild blueberry field is influenced by weather during the bloom period. The most successful pollination occurs during seasons with considerable periods of warm sunny days that allow pollinators to work at their optimum rates. Poorer pollination will result in years where much of the weather is cold and damp during flowering, and also when frost events during the bloom damage or kill buds and blossoms. In some years, a single frost at the critical time may reduce potential crops significantly.

3) Pollinator types and numbers.

Generally, native pollinators, particularly bumble bees and digger bees (*Andrena* spp.), a type of native solitary bee, are the most efficient pollinators of wild blueberries. Native bee populations are not always sufficient to adequately pollinate the higher numbers of flowers present in today's blueberry fields, especially since the introduction of selective herbicides in the 1980's. Producers routinely employ the services of managed pollinators, particularly the honey bee (*Apis mellifera*) and the alfalfa leafcutter bee (*Megachile rotunda*), to supplement the activities of native pollinators and to ensure the highest possible pollination success in commercial fields.





Improving Pollination Success in Commercial Wild Blueberry Fields

Historically, fruit set in blueberries has been relatively low, often with less than 50% of the blossoms becoming viable berries. Small fields that are surrounded by vegetation such as mixed forests may have higher fruit sets in some years because of relatively large numbers of native insects present in the areas surrounding them, and protection from adverse weather conditions such as frost and heavy winds. Large fields, on the other hand, have fewer native insects, especially in the central areas well away from native vegetation. There are also suggestions that the present monoculture management of the wild blueberry, including use of pesticides, may further reduce native pollinator populations. Finally, natural climatic conditions contribute to yearly fluctuations in pollinator populations from year to year. In effect, it appears that native pollinator populations are no longer adequate to ensure adequate pollination of present day wild blueberry fields.

Pollination success can be improved by (a) encouraging native pollinator populations by removing fewer weeds and by improving pollinator habitats around the fields, and by (b) introducing managed pollinators to supplement the native pollinators. At present, the most commonly used managed pollinators are the honey bee and the alfalfa leafcutter bee.

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