5. Growth and Development of the Wild Blueberry

INTRODUCTION

The lowbush blueberry is indigenous to North America. The principal producing regions are Québec, New Brunswick, Nova Scotia, Prince Edward Island and Maine. The plant belongs to the genus *Vaccinium* in the heath family (Ericaceae). Five species of wild blueberry grow in Canada, of which two colonize blueberry fields.

1. *Vaccinium angustifolium* Ait. (lowbush blueberry) (Figure 1): also known as the low sweet blueberry, this is the most common species in both forests and blueberry fields. The stems are glabrous (free of hairs). The fruit is blue and covered with a powdery pellicle called bloom. The fruit of the sub-species *nigrum* is black and shiny, not being covered with bloom. This species produces more fruit in the first crop year.

2. *Vaccinium myrtilloides* Michx. (sour-top blueberry) (Figure 2): this species is primarily found in forests. Its stems are pubescent (covered with hairs), and the plant is more ramose (branchy) than *V. angustifolium*. Like the latter however, its blue or black fruit is also covered with bloom. This species produces more fruit in the second crop year.

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*Figure 1. Vaccinium angustifolium* Ait.  
Source: Club Conseil Bleuet

*Figure 2. Vaccinium myrtilloides* Michx.  
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CONDITIONS FAVOURABLE TO DEVELOPMENT

The growth and development of wild blueberries depend very largely on environmental conditions. Soil, water, light and organic matter all play important roles in the productivity of the plant.

Soil
The lowbush blueberry prefers acid soils that are dry, well drained, aerated, sandy and often of the podzolic type. In Québec blueberry fields, soil pH can vary from 4.0 to 5.5, but the blueberry plant has optimal growth when pH is between 4.6 and 5.2.

Water
The lowbush blueberry is fairly well adapted to drought, easily surviving dry periods. Its rhizomes form an extensive network in the organic layer of soil, bearing numerous roots that can descend to a depth of a metre or more underground, enabling the plant to find the water and nutrients that are essential to its growth and development.

In a growth year, a long period of drought will cause new shoots to be small and weak, with fewer floral buds on each stem. In a crop year, lack of water will reduce the number of flowers per floral bud, greater numbers of young fruit will fall prematurely, and the fruit will be significantly smaller in size.

Light
In shady conditions, blueberry stems are shorter and weaker, with fewer floral buds. Through the weeks and months of long days, the blueberry plant produces green growth. When the daily photoperiod shortens, green growth ceases and the formation of leaf and floral buds begins.

Organic matter
Organic matter plays an important role in the soil’s ability to retain water and the availability of plant nutrients. Both plant growth and crop yield are directly related to the percentage of organic matter in the soil.

PLANT DEVELOPMENT

The wild blueberry plant starts out from a seed. The plant that arises from the germination of this seed is called the mother-plant. More than 95% of the blueberry’s biomass is in the top 15 centimetres of soil, with most of the roots being in the top 10 centimetres. The underground stems, which are called rhizomes (Figure 3), develop from the mother-plant around four years after germination. At that point, the aerial part of the plant is well established and the rhizomes grow outwards, in multiple directions and rather quickly. The rhizomes are important organs for vegetative reproduction and the storage of reserves.

Rhizomes
The rhizomes form an extensive network in the soil’s organic layer, bearing numerous roots. Fertilization, even short-term, promotes diameter growth in new rhizomes (Figure 4). It also stimulates budbreak and the appearance of buds on young rhizomes. Note that buds can develop both on aerial stems and on new rhizome shoots. The rhizome of the wild blueberry has the same structure as an aerial stem; it is in fact an underground stem whose appearance and functions have differentiated because of where it occurs.

Like the aerial part of the plant, the rhizomes go into dormancy in the winter, developing little if at all. Over the years, all of the stems from a given mother-plant and its rhizomes form a large patch called a clone, with each clone having...
distinct genetic characteristics. For effective pollination, a blueberry field must contain a large number of different clones.

**Reproduction and vegetative growth**

Pruning by mowing or burning allows the plants to regenerate before beginning the cycle of production. Pruning stimulates vegetative reproduction from the rhizome by causing buds to emerge from dormancy. This results in a greater density of aerial stems.

The plant continues to grow in height until around mid-July. When the days grow shorter, vegetative growth ceases, a process called aouting. It is indicated by the death of the stem’s apical bud, which then looks like a black dot (Figure 5). Next the process of bud development and differentiation begins, continuing until growth comes to an end in autumn. During the first year the plant only experiences vegetative or green growth, preparing it for the production of fruit in the second year.

**Leaf buds and floral buds**

Starting from the tip of the stem downwards, one after the other the buds begin to transform into floral buds. The longer the period between aouting and the onset of winter dormancy, the more buds will differentiate and the larger they will grow, with more flowers. While the number of floral buds can vary considerably, ultimately it depends on stem length: the longer the stem, the more floral buds there will be. When there is an average of 3 to 5 floral buds per stem in the first crop year, and 10 to 15 floral buds per stem in the second crop year (Figure 6), you can expect to have a good harvest. Though the number of buds in the second crop year is higher, the yield is generally lower. In effect, second-year buds bear fewer flowers and fruits because there is more plant tissue to be fed. The plants may be weakened by injuries, disease or insect infestations, which can reduce their nutrient reserves to the point of insufficiency.

In autumn, after the period of bud development, the different types of buds can be distinguished. Leaf buds are small and narrow, and are located at the base of the stem. Floral buds are rounder and much larger, and are found on the upper part of the stem (Figures 7a and 7b).
Dormancy
Throughout the period of bud differentiation, the blueberry plant transfers nutrients into its storage organ, the rhizome, and hardens off in preparation for winter. At the end of this stage, when temperatures are no longer favourable and the foliage reddens and falls, the plants enter dormancy. Throughout winter dormancy the plant remains relatively inactive, consuming only a small part of its reserves.

Production
Following the stage of winter dormancy, the plants draw on their reserves in order to resume growth. The floral buds swell, blooming 3 to 4 weeks later. Each bud produces a cluster with an average of 5 to 6 flowers (Figure 8). The flowers must be pollinated in order to produce fruit. The blueberry reproduces sexually by means of entomogamous cross pollination, i.e. pollination by insects bearing pollen from the flowers of a different clone.

Fruit
The fruit of the wild blueberry is a berry (Figure 9). Development of the fruit begins when the ovules are fertilized, continuing right up to harvest time. The size of the fruit varies depending on the vigour of the clone, the supply of water and the degree of pollination. Fruits with the greatest number of live seeds are generally the largest. The fruit gains most of its weight during the last 3 to 4 weeks before harvest. In optimal conditions, the weight increases by 10 to 15% each week. The average weight of a blueberry is 0.308 g. When the fruits change colour, they essentially stop growing in size but continue to develop flavour and sweetness for a number of days. The average weekly weight increases from 1 to 2 weeks after the beginning of harvest.
REFERENCES


