
Protection of Lowbush Blueberry Soils from Erosion

Background Information

Wild lowbush blueberries grow best in acid, infertile and well drained soils. Most of the blueberry soils in northeastern North America are derived from glacial till deposited during the last ice age. Soil textures range from sandy to very coarse, gravelly material, mixed with various amounts of organic matter and loam. These soils are subject to drought conditions since they generally contain low amounts of clay.

Lowbush blueberries establish themselves from seedlings and spread out into large clones by means of extensive rhizome systems. Rhizomes grow close to the soil surface, usually within the top 2 to 10 cm (1 to 4 in.). The fine fibrous roots that grow down from the rhizomes are fragile and are not tolerant of exposure to air and drought conditions.

Prior to the introduction of selective herbicides, lowbush blueberries co-existed with many other plant species in complex communities. Dominance of the blueberry was maintained by repeated pruning that destroyed all above ground plant material every second year. The rhizome system of the blueberry allowed it to develop new, vigorous shoots that formed the producing part of the plant. Other plants in these communities, especially grasses, grew amongst the blueberry stems and provided a solid mat of living and dead plant material. Consequently, the underlying soils were protected from the erosive forces of water, wind and frost. Soil loss through erosion occurred only where the system was disturbed by human activities such as land leveling.

Complex Blueberry Community

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Selective herbicides, first introduced in the early 1980's, released the blueberry from competition with other plants. The results were greater numbers of stems, more vigorous plant growth, more fruit buds and blossoms, and consequently, higher fruit production. Herbicides, particularly Velpar, have contributed a great deal to the rapid increases in blueberry yields that occurred during the 1980's. The use of herbicides has, on the other hand, also contributed to the processes of soil loss through erosion.

Dead plant material decays very slowly in lowbush blueberry fields due to the low soil pH (4.5-5.5) within the system. Therefore, several production cycles passed after the initial use of herbicides before the harmful effects of herbicides on blueberry soils were evident. As the plant materials that held soil were gradually decayed, the soil particles that they protected were exposed to the erosive forces of falling rain and runoff water. Soil erosion in blueberry fields occurs as a result of rainfall and runoff water moving fine soil particles away from blueberry plants and depositing them in another, lower area of the field, often a ditch. The blueberry root system does not hold fine soil particles well.

Gravely area

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The first signs of soil erosion in blueberry fields occurred in bare spots among the clones, often demonstrated by the appearance of areas with increased amounts of gravel. These bare spots gradually enlarged, until blueberry rhizomes and roots, particularly at the edges of clones, became exposed. Once exposed to the elements, blueberry roots and rhizomes quickly dessicate and die. As clones continue to die back from eroded areas, fewer stems remain to flower and fruit production decreases.

Eroded area

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The effects of soil erosion are most evident in Nova Scotia and Maine, the areas where intensive use of selective herbicides first occurred. Most of the commercial fields observed in a 1993 survey exhibited signs of serious erosion. Steeply sloping fields were most severely affected, but significant losses were also observed on level fields. Casual observations of fields throughout the region in 1994 and 1995 suggest that erosion problems are less severe in New Brunswick and Prince Edward Island than in Nova Scotia.

Methods to Decrease Erosion

There are no easy solutions to the problem of soil erosion in lowbush blueberries, but several suggestions can be offered. Producers and managers may choose to follow some combination of these suggestions:

- **Reduce or eliminate herbicide applications:**
  - avoid applying herbicide to bare areas among blueberry clones, especially on steep slopes, so that the growth of weedy species will help hold soil particles and maintain the soil structure.
  - reduce the frequency of herbicide applications to allow regrowth of weeds; these and their remains will continue to hold soil particles after future herbicide applications.
  - reduce herbicide rates to allow some weeds to grow among the blueberries and to hold soil particles.
- **Use companion plants among the blueberries to hold soil particles:**
  - preliminary studies on the use of low growing species of plants for soil erosion control suggest living plants as ground cover among the

- In Nova Scotia, experimental mulches include the blueberry waste materials that remain after cleaning of the fruit at the plants, as well as mulches developed by composting blueberry waste, carrots and onion wastes at Oxford. Blueberry wastes have been used successfully at Wyvern, Farmington Mountain, Pigeon Hill and Lynn Mountain to decrease or prevent further soil losses from eroding fields. All the material, except the compost, comes untreated from the processing plant and may help spread insects and diseases; further study is required to determine potential problems.

  blueberries will help hold soil particles. The best possible plants would be easily managed species that could be seeded into bare spots among blueberry clones. Further study is required to determine potential species, timing of planting and herbicide control, before specific recommendations can be made.

- **Manage surface run-off:**
  - avoid spraying roadsides, ditches and natural water courses that are particularly sensitive to erosion from run-off.
  - in the long term, develop and implement a plan to control surface run-off from individual fields.

- **Use mulches to cover bare areas:**
  - mulches are organic materials that cover the surface area of the soil and protect soil particles from the effects of rainfall and water runoff.
  - We have experimented with several types of mulch when planting select clones and after land leveling operations; some types are more useful and persistent than others. The most common materials available in Nova Scotia are sawdust, wood shavings, wood chips and straw, but others, such as fish-waste, seaweed and composted materials are available in local areas. These materials can be used alone or in some combination. The depth of application is usually 5 -10 cm (2 - 4 inches), but depends upon the nature of the material.

Mulches to Prevent Erosion

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