

# A TYPE OF PEATLAND RECULTIVATION: CULTIVATION OF HIGHBUSH BLUEBERRIES AND LOWBUSH BLUEBERRIES

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This type of recultivation involves the transformation and adaptation of former peat extraction sites for cultivating large highbush blueberries (bilberries (*Vaccinium corymbosum*) or narrow-leaf blueberries (lowbush blueberries (*Vaccinium angustifolium* Aiton)).

The purpose of the real estate's use — land on which the main economic activity is agriculture, the type of land use — land under orchards.



Figure 2 Lowbush blueberry – berries (D.Siliņa)

Table 1 Conditions under which the recultivation scenario is possible

<b>The type of the top peat layer</b>	raised bog peat
<b>The thickness of the remaining decomposed or moderately decomposed peat layer</b>	> 0.5 m
<b>pH values of the top peat layer used</b>	For highbush blueberries pH 4.3 - 4.8, for lowbush blueberries pH 4.5 - 5.0
<b>Average groundwater level</b>	well-aerated soil with a groundwater level of 0.35 to 0.55 m
<b>Number of days per year when the area is flooded (days per year)</b>	0
<b>Degree of peat decomposition</b>	Low decomposed or medium decomposed



Figure 1 Lowbush blueberry field in autumn (D.Siliņa)



Figure 3 Blueberries with superficial watering (D.Siliņa)

Highbush blueberries are a 1.2 to 2-meter-tall bush, the first harvest is expected in the third year after planting. Low or narrow-leaved blueberries are a semi-bush up to 40 cm high, which begins to give harvest within 2-3 years after planting.

### Necessary conditions

The following must be evaluated when planning to establish blueberry plantations:

- Placement and functionality of the drainage system for the area to be restored, providing an average groundwater level in the plantation area on average of 0.35 - 0.55 m. It is necessary to be able to monitor the humidity regime with collecting ditches and gullies together;
- There are water bodies (ponds, fire pools, lakes) in the area to be restored or adjacent to it, or there is the possibility of creating water bodies with the required amount of water in the area.
- The area to be recultivated should not be flooded and there should be no accumulation of water.
- The condition of the field's surface, because it is important that the surface of the field to be planted is flat, without any depressions or hummocks. If the area intended for cultivating bush blueberries does not form a flat surface after the extraction of the peat, surface plating must be carried out by aligning the area of the field so that the surface slope does not exceed 2%. This is necessary in order to make it possible to protect crops against frost in the cultivation process, as well as to provide an appropriate humidity regime, which are the main factors influencing the amount of the expected harvest.

When planning the cultivation of bush blueberries, it should be foreseen that the remaining top layer of peat is made up of less decomposed raised bog type peat with a thickness of at least 0.5 m and a pH of 2.7-5.0. If in the planned field of the plantation, the natural soil pH level is not suitable for the successful implementation of the chosen restoration scenario, it is possible to perform field soil improvement, which will ensure the necessary growth conditions for the selected plants.

In peat extraction areas where peat extraction has been done historically and an overgrowth has formed, the area must be cleared from overgrowth before planting.

If stumps are fixed in the plantation area, the fields must be freed from stems.



Figure 4 Wetland blueberry type – Bluegold (D.Siliņa)

### Climate change

Low-bush blueberry plantations (seedlings), plantations completely cover the turfy surface of the land, which reduces CO<sub>2</sub> emissions. CO<sub>2</sub> emissions are also diminished in highbush blueberry plantations, especially when grasslands are cultivated between the bush rows. Additional emissions will only result from the use of mineral fertilizers.

The impact on GHG emissions has been assessed for a 30-year period following the implementation of the scenario, assuming that the scenario is introduced in an area where peat extraction has been discontinued recently and ground vegetation has not yet emerged, but the topsoil is formed by infertile raised bog peat. Following the introduction of the scenario, GHG emissions will be reduced by 0.1 tonnes CO<sub>2</sub> eq. ha<sup>-1</sup> per year compared to the initial situation. Total GHG emissions in this scenario over the calculation period corresponds to 6.2 tonnes of CO<sub>2</sub> eq. ha<sup>-1</sup> per year. The calculation of GHG emissions does not include emissions from fertilizers which, depending on the fertilizer doses used, can significantly increase N<sub>2</sub>O emissions from soil. These emissions are counted in the agricultural sector using a unified calculation method for converting the applied amount of fertilizer into direct and indirect N<sub>2</sub>O emissions.

The highbush or large blueberries are planted in furrows. The furrows are made with a 0.50 m rise and are 0.7 m wide. The distance between furrows is 3 m. The furrows are not formed by planting the narrow-leaf bush blueberries, they are planted in rows one after another with a distance of 0.2 m to 0.4 m from each other and 0.6-1.0 m between rows. When uniformly covering all fields, the recommended planting distances are 0.3 x 0.6 m or 0.3 x 1.0 m.

In both highbush and lowbush blueberry plantation areas, it is advisable to install irrigation systems — both surface (against frost) and drip irrigation. By creating an irrigation system it is possible to fight frost more efficiently, as well as with periods of prolonged drought, and significantly increasing the annual harvest. In order to install an irrigation system, next to the cultivation field of blueberries there should be a place for taking and storing water. The best way to do this is to drain the water from the blueberry fields to the water storage area during precipitation and, if necessary, to deliver the accumulated water through pumping and pipeline systems to the cultivation fields of blueberries.

It is advisable to install an anti-frost early warning system in the field of blueberries.

### Completion of restoration works

The requirements and technical solutions (restoration work) included in the extraction project for mineral resources or the restoration plan have been implemented in the territory and the peat extraction site is prepared for the planned land use after the completion of peat extraction. By fulfilling these conditions, the peat extractor has, for his part, performed the tasks foreseen in the extraction project for mineral resources: to prepare the area for restoration — the site is ready for the cultivation of blueberries. Further actions must be taken by the landowner.

### Signs indicating that a restoration scenario has been implemented

The collecting ditch system is working. The area is free from weeds and other plants. The area to be restored is evenly covered with large cranberry plants, yields are harvested and planted.

### Economic use

After the extraction of the peat, the territory is used for another type of land use, agricultural production, fruit and berry gardens are created. The former peat extraction site is engaged in economic activity that provides jobs and income.



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