



Levelling Land in Wild Blueberry Fields

Introduction

Since the early nineteen eighties, research aimed at lowering production costs for wild blueberries has resulted in the development of new technologies like flail mowing and mechanized harvesting. These technologies will be adopted as long as their results compare favourably with those of older techniques like burning and manual harvesting and are cost effective. While the cost of the new technologies can limit their uptake, field conditions such as the presence of stumps, stones, hummocks and knolls have limited the mechanization of blueberry production.

Objectives

Land leveling in wild blueberry fields refers to improving sites in order to

- Facilitate work with machinery and minimize mechanical breakdowns.
- Ensure a more uniform spread of pesticides and fertilizer.
- Improve the working speed of agricultural operations.
- Prepare the ground for the mechanization of pruning and harvest.
- Reduce production costs.
- Improve profitability of the farm business.
- Reduce the problems caused by labour shortages in certain regions.

The Process of Land Levelling:

Land levelling in a blueberry field consists of:

- Removing stumps whose location and size interfere with mowing and harvesting;
- Removing rocks, stones and stone walls;
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- Flattening knolls and filling in the ruts or hollows which impede the operation of machinery over the land;
- Flattening the embankments formed during the construction of firebreaks.

Points to Consider During Land Levelling

- Land levelling of wild blueberry fields should always be done when the plants are approaching dormancy, that is, around the first autumn frosts or before regrowth in the spring. Consideration should be given to the degree of leveling required when determining the most appropriate time to level the field.
- Land levelling should not be done when soil moisture is low. Avoid working the field in periods of drought as this may cause injury to the rhizomes and may cause the disturbed rhizomes to dry out.
- Land levelling should be avoided under wet conditions, since it will lead to soil compaction. In addition, the movement of heavy machinery could result in significant damage to the field.
- Land leveling should be planned in such a way as to minimize the impact on the density of plants and the percentage of field cover.
- It is best to wait a few years after clearing operations before leveling land since the removal of large newly cut stumps causes damage to a sizeable area around the stumps. Two crop cycles would be a suitable waiting time, The time lapse would provide an opportunity to control the hardwood regrowth and make the stumps easier to pull. In recent years, excavators and forest mulchers have become very popular land clearing equipment and removing or mulching of the stumps is done immediately following land clearing operations.
- In order to avoid soil erosion, steep slopes should not be left bare by land levelling.
- When using equipment with tracks, it is important to avoid sharp turns as these actions may break the soil surface unnecessarily. Sharp turns should be limited to roads and fire-breaks.

Machinery and Equipment for Land Levelling

Bulldozers

This type of machinery is not recommended. While this equipment will do an excellent job land leveling or removing stumps, the damage it does to plants is generally severe. Use of bulldozers should be limited to pulling other pieces of equipments rollers.

Backhoe

Backhoes and track hoes can do excellent work removing stumps and rocks, filling holes and levelling small bumps without too much damage to the field. This work, however, is slow because of the time required to adjust the stabilizers.

Excavators

The preferred method of land leveling involves the use of excavators. They are used primarily to level the knolls and hollows, and remove the stones from old fields. The technique consists of plunging the bucket under the knolls, spreading out the soil underneath, and leveling the soil surface by tamping. An experienced operator will do approximately 1 acre per day, depending on

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the nature of the field. An experienced operator can level a rough field without resorting to filling the holes where rocks and stumps were removed. If the work is well done, there will be minimal damage to the plants.

An excavator works more rapidly than a backhoe and can work in a range of 360°. In very rough fields with deep soils, this is the most appropriate method for land levelling. In these circumstances, a bucket with teeth is required to avoid excessive damage to the blueberry plants. It is a good method if the density of stumps is not too high.

Excavators are also used for “tracking”. Tracking consist of running the tracks on top of the blueberry field, moving one track width at a time. In this manner, the excavator tracks can travel over the entire surface of the blueberry field and level knolls and depression at the same time. However, this technique is quite expensive.



Farm tractors equipped with a stump remover and a bucket

This method was commonly used on fields for the removal of small stumps and the filling of holes. Once the stumps are taken out, the sod is put back in place and the stumps are removed from the field.

Rototillers

Some growers have used this method to untangle rhizomes in order to facilitate levelling. The method is mostly used in situations where a small portion of the field is covered with knolls and hollows. The technique is acceptable as long as the rhizomes are not pulverized, less rhizome damages occurs if teeth are removed from the tiller. This technology is destructive and should be limited to small areas with deep soils, and performed late in the season. The soil should be moist, and rolled after the treatment.

Disking, dragging and rolling

This technique was used historically in southern N.B., but has been displaced by excavator technology. The method consists of passing a disc through the field in order to loosen the soil, and then dragging and rolling the field level. The technique is very destructive and fields take two or more cycles to recover. According to a few growers' observations, this method may diminish the survival of bunchberry by breaking up the plant and/or by making it more susceptible to herbicide action.

H-beam:

Several growers have used this method to finish levelling. It is acceptable for this purpose, and will allow for the removal of small stumps that have not been removed by other methods. Extensive

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use of this technique will result in a lot of damage to plants, because several passes with an H-beam scrapes the organic matter layer and exposes rhizomes to dry summer air and the intense cold of winter.

Rollers

Rolling is useful for flattening fields which have been disturbed by other levelling activities, but is not effective unless the stand has been disturbed by another means. In southern New Brunswick, fall levelled fields are often rolled the next spring. This helps to compensate for a frost heaving which usually occurs over the winter months. Excessive rolling will compact a soil, (as evidenced by the short plants which emerge after frequent rolling). Rolling should be limited to a maximum of two cycles after leveling. The use of vibrating rollers alone for leveling is not very effective, unless other equipment is used to untangle the rhizomes. This method can be time-consuming and costly.

Flail mowers

Some growers use flail mowers as a method to level their fields. The danger in excessive use of this method is that it can damage rhizomes if the blades enter the soil too deeply and disturb the plants. The use of flail mowers should be limited to pruning.

Root rakes

Root rakes are normally used to remove debris and stumps during agricultural land clearing. In wild blueberry fields, they can be useful for wind-rowing the larger pieces of debris which might interfere during mowing and harvesting. The root rake can be used in finishing land leveling.

Conclusion

Proper land levelling should make mechanization of production possible, while causing minimal damage to the wild blueberry plants. If land leveling activities result in significant reduction in plant density, the crop may take several cycles to recover and may be severely compromised. **The most common error that occurs in land leveling activities is not the choice of machinery, but rather the misuse of the machinery.**

For more information and to discuss land leveling option for particular fields, please contact the New Brunswick Department of Agriculture, Aquaculture and Fisheries.