

## THE CHOICE OF MECHANISED MEANS AND ECONOMIC ASPECTS OF GROWING CULTIVATED CRANBERRIES

### Summary

The report presents a review of the cranberry growing ecological technologies applied in Latvia depending on the amount of production and its provision with adequate means of mechanisation. The costs are analysed for laying out plantations, the production of the products and the technical means for harvesting, as well as their payback at various volumes of output.

### Аннотация

В статье дан анализ применяемых в Латвии экологических технологий возделывания культивируемой клюквы и их выбор в зависимости от объемов производства и соответствующих технических средств. Проанализированы затраты на технику, обустройство посадок, возделывание и уборку клюквы и их окупаемость при различных объемах производства.

### Introduction

Growing the Canadian big-berry cranberries is recognised as one of the most perspective subbranches in agriculture. The main cranberry growing countries in the world are the USA and Canada where the harvested product is consumed in a fresh and processed way, mainly on the spot. The demand for cranberries and the products of their processing on the European market is still not satisfied.

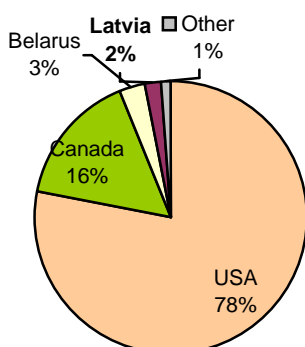


Fig. 1. Distribution of the amount of growing cultivated cranberries in the world

As it is obvious from Figure 1, Latvia is the only country of the European Union which grows cultivated cranberries to a considerable extent. This opens good prospects for the export of cranberries and the products of their processing. Since Latvia has sufficient areas, including cultivated peat bogs, – about 10 000 ha, growing cultivated cranberries is one of the non-traditional branches of agriculture in Latvia which becomes more and more popular.

### Methods

In order to determine the economic indices of the applied technologies and means of mechanisation by means of the applied programme Excel, flowcharts were treated and the data obtained during the field experiments and time-keeping.

Taking into consideration the fact that the machines and implements are used every year on the existing areas for a comparatively short period of time, it was assumed in the

calculations that their lifetime is 10 years. The degree of the weed extermination and other indices of the quality of work were evaluated according to the standard methodologies of agrotechnical assessment.

### Results

At the present time the cultivated cranberries are cultivated in Latvia on more than 40 farms of different sizes, most of which are joined into the Latvian Cranberry Growers' Association. As it is obvious from Figure 2, the small cranberry growers, who grow the berries mainly for domestic consumption, occupy about 2% of the areas whereas the farms with the plantations over 2 ha, who grow commodity products for the market, occupy about 90%, and are still developing. These farms cannot operate and develop successfully without appropriate means of mechanisation.

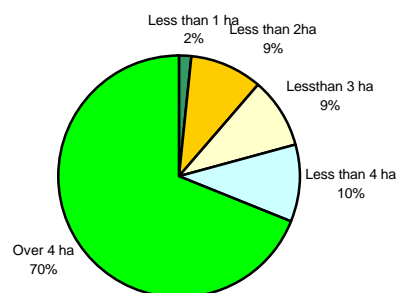


Fig. 2. Distribution of the cultivated cranberry plantations in Latvia by their size

Although most growers of the cultivated cranberries are joined into the Latvian Cranberry Growers' Association, the farms are scattered all over the territory of Latvia and the distances between them aggravate cooperation in the acquisition and use of the machinery.

Significant investments are necessary in order to lay out and extend the cranberry plantations, including the purchase of the planting material and its planting. By manual planting the consumption of the planting material is less but it requires considerable labour consumption in a comparatively short period of time in order to ensure adequate agrotechnical terms. The graph in Figure 3 indicates that

mechanised planting by scattering the planting material (tendrils) and digging them in by disks or soil cutters pays off already when the areas are not large though the consumption of the planting material is considerably greater (by manual planting – 0.4-0.6 t/ha, by scattering and mechanised introduction into soil – 2-2.5 t). On the farms which produce the planting material themselves by cutting the tendrils its consumption in order to extend the areas of plantations is not so significant, and the economic efficiency of mechanisation increases.

The weed control begins already with agrotechnical methods when the field is prepared for planting. After the cranberries have reached a certain plant density, they can partly overwhelm the weeds themselves. The tall weeds are exterminated with the use of application (touch) method by applying herbicides (roundup and analogs) on their leaves. If the areas are not large and there are few tall weeds, a manual applicator can be used. On larger areas an applicator is used with a rotary roll, which is approximately 2 m long, continuously wetted with the herbicide liquid. It is used with a machine which is drawn by human power or an internal combustion engine.

It can be seen from the graph in Figure 4 that the use of a self-propelled applicator becomes economically profitable when the areas exceed 7 ha, yet this facilitates the hard work and prevents the drops of herbicides from entering the soil when the applicator stops at the ends of the field, etc.

During the vegetation period periodic additional fertilization is required by sprinkling the nutrient solution and, possibly, the plant protection measures by sprinkling or dusting pesticides. For small areas manually operated sprinklers are used which are carried on the operator's

back, for larger areas – portable or tractor mounted, engine operated sprayers.

It appears from the graph in Figure 5 that the lowest costs, even for comparatively large areas, are when a manual sprayer is used. However it should be taken into account when choosing a method that the work with a tractor mounted sprayer is less dangerous for the operator's health.

Every year cranberries develop tendrils, which are about half a metre long and on which no berries appear. At the beginning of summer, before the plants put forth berries, the tendrils should be cut off and the plants combed. Cutting tendrils eases the harvest of berries and makes it easier to perform the other operations of plant cultivation. Cutting without combing leaves 30% of the tendrils. The selling price of tendrils – the planting material is 1500 Ls/t (2150 Euro/t), therefore their cutting and collecting is profitable even at higher costs.

The graph shows that, due to the great labour consumption, the cutting of tendrils by hand tools is possible only on small areas of plantations. The use of two separate machines – a comb and a cutter needs two passes, which may have a negative effect on the harvest. Unless the tendrils are cut off and combed, no harvesting of berries is possible by a combine harvester.

It pays off to use a self-propelled cranberry harvester (combine) in spite of its cost (the combine harvester costs approximately 5000 euro) even on small areas. When the berries are gathered by hand, the work is dragged out for an unreasonably long time, and they are affected by weather conditions, which results in the losses of the yield. The problems – the combine is not available in the Latvian market, it needs preparation of the plantations – combing and cutting.

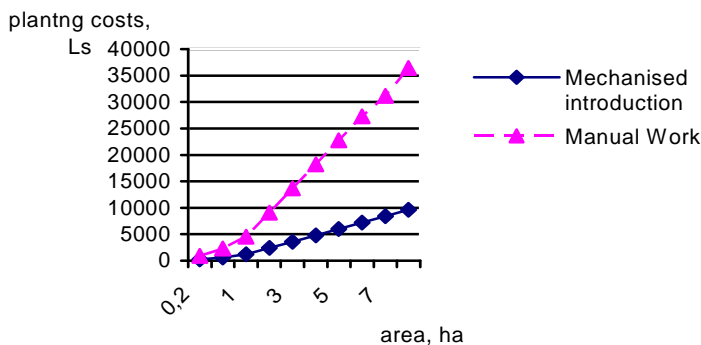


Fig. 3. The planting costs, including the consumption of the planting material (1Ls=0,7 Euro)

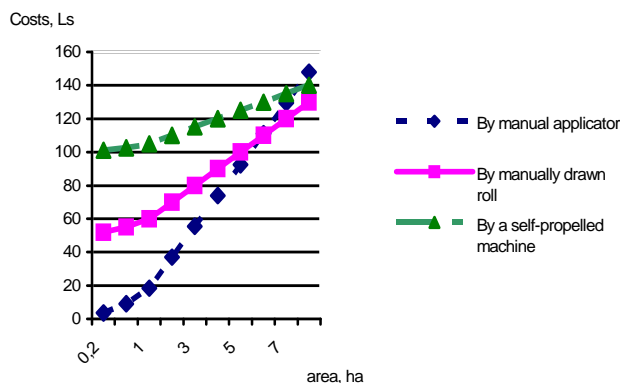


Fig. 4. The extermination costs of tall weeds depend on the use of application (touch) method

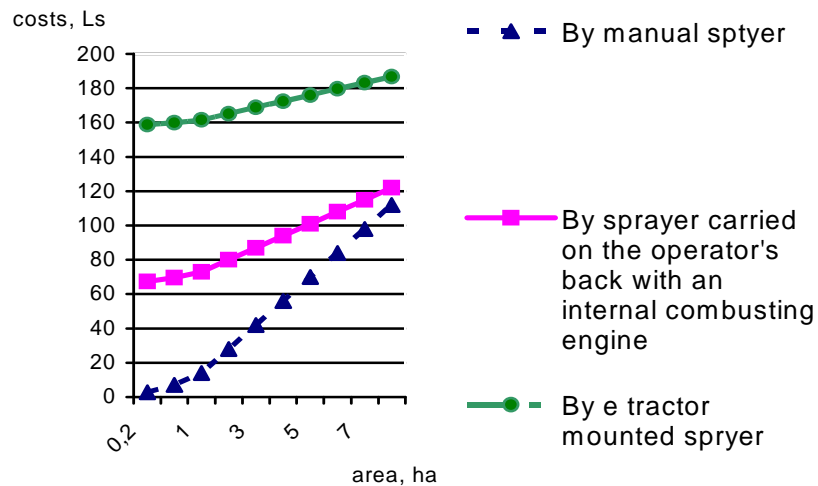


Fig. 5. Costs of spraying (fertilization and pest control) of the plantations (1Ls=0,7 Euro)

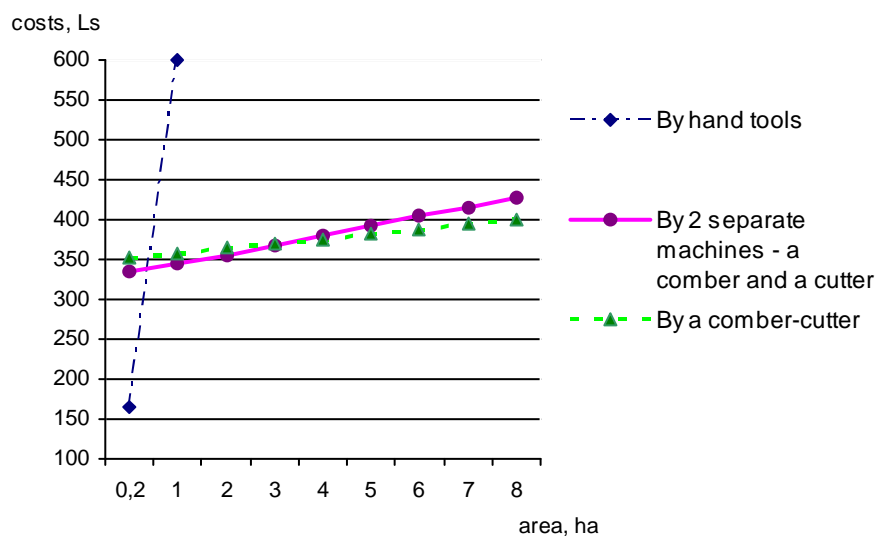


Fig. 6. Costs of combing, cutting and collecting tendrils (1Ls=0,7 Euro)

## Conclusions

1. In Latvia growing cultivated cranberries is a perspective; it has good prospects for its development.
2. The areas of cranberry plantations in Latvia continue to increase.
3. Several operations, including planting, combing and cutting of tendrils and harvesting of berries should be mechanised even on small areas – 0.2 – 0.5 ha.
4. Machines for the harvesting of berries, combing and cutting of tendrils are not available in the Latvian market. It is necessary to organise designing and making of the equipment that is adapted to the Latvian conditions.

## Literature

- [1] Бергс Ю., Миелаце Б., Иванов С. Исследование и разработка системы машин для возделывания культивируемой клюквы. // International Scientific Conference „Agricultural Engineering Problems”. Proceedings. June 2-3, 2005. Jelgava: LLU, 2005. p. 47-50.