

TECHNICAL SOLUTIONS OF STRAWBERRY GROWING IN LATVIA

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Abstract. Under the conditions of the open market the farmers of the EU are looking for profitable kinds of products. The production of berry crops is not confined by quotas. Besides, the ecological indices of the imported berries raise deep doubt with the local consumers. About 3 – 4 thousand tons of commercial strawberries are sold in Latvia every year. As a rule, the mechanization level of strawberry growing on the farms of Latvia is not high, and this has a negative effect on the production profitability. The developed machines are successfully applied on the farms with the strawberry growing areas over 3 ha, which produce the bulk of the commercial berries.

Key words: strawberry growing, inter-row cultivation, mechanization.

Introduction

The production of the local perishable berries, particularly, strawberries is attractive in the aspect of guaranteed possibility to obtain high ecological and quality indices, the possibility to sell them just after their gathering and with rather low transportation costs. Due to the small areas of plantations the mechanization level of berry cultivation in Latvia is still low.

In recent years strawberry growing occupies a stable position in the horticultural areas; production technologies are being worked out, plant growing and selection, berry storage and processing developed. On individual farms the plantations have reached several tens of hectares. This increase in the area of plantations puts forward a problem of strawberry growing mechanization in the hope that strawberries will escape the fate of quince, which was grown, yet did not find market. The expansion of strawberry plantations changed their growing technologies too. An acquaintance with these technologies shows that there are as many technologies as the growers, each having its own advantages. 3 – 4 thousand tons of commodity strawberries are produced in Latvia every year with a yield of 3.2 – 3.6 t/ha.

Objects and methods

The object of these investigations are the technological variants of strawberry growing and some of the machines for the mechanization of individual operations (inter-row treatment, watering). The agrotechnical indices of the machines to be developed and compared were determined by standard methodology. The economical indices of the machines and technological variants were determined on the basis of the flow sheets by means of the applied programme *Excel*.

Results and discussion

As a rule, the mechanization of strawberry cultivation on the farms with a small amount of production (up to 0.4 – 0.7 ha) is not high. In this work we mainly oriented ourselves to the farms with the areas covered with strawberries up to 2 – 3 ha, which give the bulk of the commercial strawberries now. On large areas it is necessary to use special stationary sprinkling equipment and other expensive specialized machinery. The type of the machinery applied and the economical indices depend also on the production technology.

When laying out strawberry plantations, 61% of the costs in the total structure of costs fall on the operations of fertilizer and herbicide application, and soil preparation, and 39% on the planting of seedlings (Fig. 1). It is evident from Fig. 2 that the greater part of the costs is formed from the prices of the organic manure, seedlings and the notched film (lutrasil termoselect).

Therefore one should try to grow the plants alone. The approximate price of home-grown seedlings is 0.07 Euro/piece. The prices of the purchased seedlings reach even 0.2 Euro/piece. If the ratio of manure is increased by 60 t, the costs per 1 ha grow further by 450 Euro. An increase in the inter-row distance to 140 cm, in its turn, decreases the costs by 30%, but at the distance of 140 cm by 42% [1]. Most of the cultivation operations on a productive field go to inter-row loosening and manure

spreading. In order to grow early-ripe strawberries, additional expenses of about 1500 Euro/ha are needed (for the agrotechnical net).

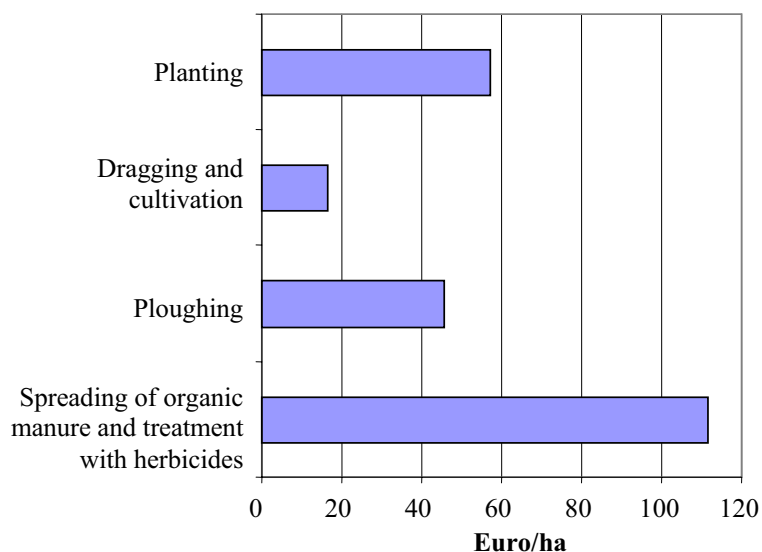


Fig. 1. The structure of the costs for laying out strawberry plantations with 140 cm inter-row

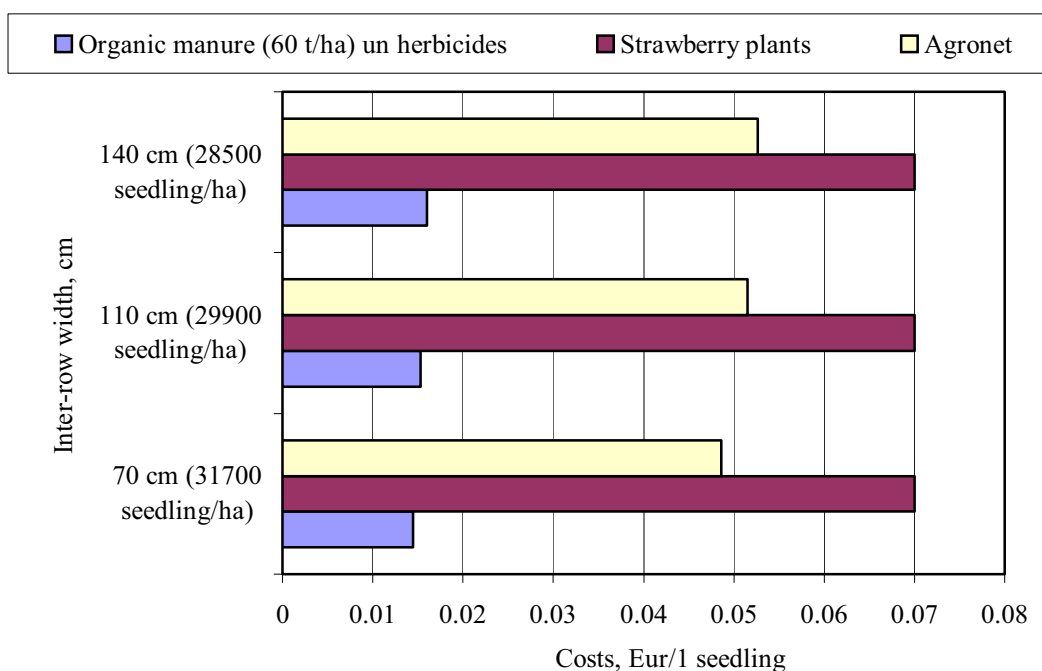


Fig. 2. The prices of the materials for laying out strawberry seedlings

Mechanized care about the strawberry seedlings (inter-row cultivation, watering, etc.) allows reduction of the need for manpower and raising the profitability of production.

There are several variants of technologies of the care about the strawberry seedlings with mechanical inter-row cultivation, with sowing grass in the inter-rows, using films to cover the inter-rows. The cost of the technology of covering the plantations with a polythene film is 29% of the total layout costs of the plantations and is the least profit-bearing. It is partly compensated only by the economy of cultivation operations and high-quality berries. For the time being the most widespread is the first variant.

If the technology of mechanical inter-row cultivation is applied, the main operations are watering, inter-row loosening, additional application of mineral fertilizers, and cutting of tendrils (the young

sprouts). To mechanize these operations, the Institute has developed a general-purpose cultivator (two variants), as well as a hitched up machine for watering. When using specialized machines, their annual load should be increased as well as cooperation is recommended in order to lower their amortization costs.

Both cultivators perform local application of mineral fertilizers. This provides a possibility to apply fertilisers much closer to the strawberry seedlings without fertilizing the inter-row spaces, decreasing the fertilizer application rate by 30% but producing the same effect, thus bringing clear saving. Inter-row loosening takes place together with fertilization and saves up labour. The cultivator sections are provided with disk knives for cutting tendrils. The trials on the farms showed that the degree of weed extermination and the loosening quality of soil by the developed cultivator meet the agrotechnical requirements.

For this purpose we have developed two cultivator designs – plant feeders KBZ-2 and KBZ-3 (Fig. 3).

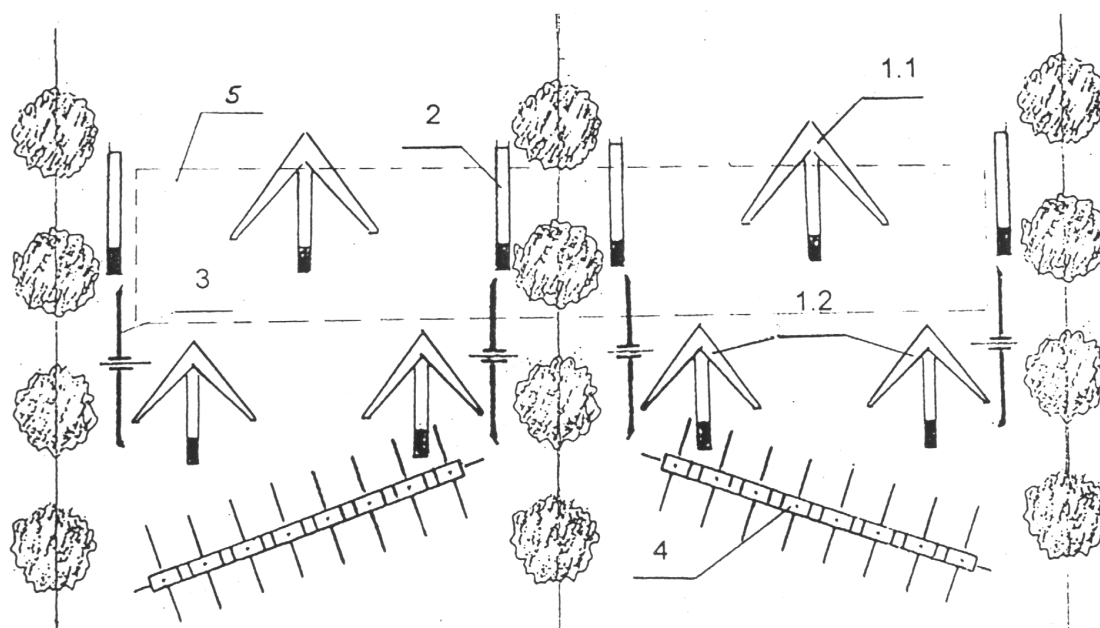


Fig. 3. Arrangement of the operating tools of the cultivator for strawberry cultivation:

1 – pointed cutting tines; 2 – a chisel-shaped tine (when mineral fertilizers are applied, it is replaced by a share); 3 – a disk knife; 4 – a rotary loosener; 5 – the place for the container of mineral fertilizers

Table 1 presents the technical characteristics of these aggregates.

Table 1. Technical characteristics of cultivators-plant feeders KBZ-2 and KBZ-3

Characteristics	KBZ-2	KBZ-3
Aggregate	T-25	T-40, MTZ
Number of cultivated furrows	2	3
Depth of cultivation	8 – 10 cm	8 – 10 cm
Volume of the mineral fertiliser container	60 l	60 – 120 l
Inter-row distance	70 – 140 cm	70 – 140 cm
Notes	Rocky soils	Rocky soils

A hitched up machine for watering with a reservoir of 2.5 m³ is efficient for comparatively small areas of plantations – approximately up to 2.5 – 3 ha. On large areas stationary watering systems are used.

The methods of strawberry watering are studied in greater detail in one of the previous works [2].

Mechanized harvesting of strawberries is in reality not practiced; however there are possibilities to use small-size tractors and trailers for filling the containers with berries.

Conclusion

1. The production of the local strawberries is attractive in the aspect of guaranteed possibility to obtain high ecological and quality indices, the possibility to sell them just after their gathering and with rather low transportation costs.
2. There is a little difference (within the range of 3 – 4%) in the total production costs between various technologies, except the technology with polythene covering where they are higher by 35%. The agronet (a notched film “lutrasil termoselect”) application for growing early-ripe strawberries requires additional expenses of 1500 Euro/ha.
3. Mechanized care after the strawberry seedlings (inter-row cultivation, watering, etc.) allow reduction of the need for manpower and raising the production profitability. The use of a special strawberry cultivator cuts the total production costs by 3.5%, but the local application of mineral fertilizers allows reducing the application rate by 30%.

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