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EVALUATION OF ORGANIZATION AND ECONOMICS OF REGIONAL APPLE ORCHARD

Abstract:
In our research we examined an apple orchard trained to intensive canopy forms from work organizational and economic aspects. We determined the organizational tasks and also the worktime demand of orchard planting by using norms. In our model calculations we tried to evaluate how far the profitability of production can be increased by enhancing its intensively. We calculated the operational norms of the production using the appropriate methods: handwork norm by workday survey and machine norm by Working-process-cyclic time method. It can be stated, that intensive apple production is characterized by low profitability. The high historical cost, the payback period is extremely long, the rate of returns is very unfavourable, the low annual income determines weak profitability. In our calculations we tried to evaluate how far the profitability of production can be increased by enhancing its intensively. It can be concluded, that beyond a certain level, enhancing intensively spoils the profitability of the orchard, thus – according to our calculations - selecting the greater distance production method is the favourable option.

Keywords:
regional products, work organization, economic evaluation

INTRODUCTION

In Hungary, among the fruit species, apple has been produced in the largest quantities for decades. Up to present days, this sector of horticultural production went through fundamental economic changes and even crises (Ferencz et al., 2009). During our accession to the European Union, it is an excessively important objective for us to develop the whole fruit – and primarily the apple – sector to the level of the EU (Gonda, 2005). By shaping intensive orchards, the most important goals to achieve are: rapid spatial development of the canopy, early fruit bearing, controlling canopy height, spatial stability of the canopy and setting long-time productivity. Slender spindle canopy form is most prevalently used in newly planted orchards (Soltész, 2007). Its application is – depending on soil and ecological characteristics, rootstock and variety vigour – more or less successful. For studying the possibilities of enhanced growth-reduction, early fruit-bearing and great production potential we conducted experimental observations on a less known and used canopy form; the SX spindle. This canopy form enables the production on very short tree distances. But how far is it profitable to reduce tree distance? To answer the question, we needed to conduct some economical studies (Nótári et al., 2009).

MATERIAL AND METHOD

Description of SX spindle canopy form. This canopy form is widely spread in France, but rarely used in Hungary. The virus-free, highly-bud apple trees on M9 rootstocks, were planted 1.5×3 and – on the experimental field 0,75×3 m tree distances. The one-year sapling was bent and tied at 75 cm under horizontal level towards the dominating wind-direction. The expected

effect of bending down is to inhibit the strong growth of the upper shoots. A fully developed SX spindle has three stairs, which are separated by empty parts. Fruits are very close to the central lead, so a better nutritional supply will better reduce vertical growth. To upkeep the SX spindle canopy form with this extremely low tree distance, support system, irrigation and intensive caring technology is needed, which significantly raises production costs.

Methods of economy. To evaluate the aspects of decision-making, we conducted the Capital cost, productive period of the orchard, average net income, playback period, the profitability of the investment, the rate of returns

Methods of work organization. The handwork norm by workday survey, the machine norm by Process-cyclic time method were calculated.

RESULTS AND DISCUSSION

Historical cost of the orchard with 1,5m and 0.75m tree distance are shown at Table1. and Table2.

Table 1: Historical cost calculation (2006-2010)

Operation	Wages + taxes and rates (Euro)	Contri-butory services (Euro)	Costs of materials used (Eoro)	Total (Euro)
Soil preparation		340	888	1228
Planting	933,24	30	5331,2	6294,44
Support system	1260	110	2150	3520
Trickling irrigation system	15	30	5200	5380
Caring operations				
1. year	313,24	320	320	953,24
2. year	403,12	320	585,6	1308,72
3. year	469,76	320	585,6	1375,36
4. year	546,48	320	320	1186,48
Caring operations (1-4 years)	1732,6	1280	1811,2	4823,8
Other costs:				1548,82
Total costs:	4075,84	1790	15380,4	22795,1
Value of by-products:	4 tons x 240 Euro/ton			960
Historical cost:				21835,1

Source: own calculation

To calculate average net income we divided the costs into yield-related (variable) and area-related (fix) expenses. We considered costs related to fertilizing, irrigation and harvesting as variable costs. Pruning, soil cultivation and plant protection were attributed as area-related costs.

Table 2: Historical cost calculation in case of 0,75 m tree distance (2006-2010)

Operation	Wages +taxes and rates (Euro)	Contri-butory services (Euro)	Cost of materia ls used (Euro)	Total (Euro)
Soil preparation		340	888	1228
Planting	1013	30	10658	11701
Support system	1260	110	2150	3520
Trickling irrigation system	150	30	5200	5380
Caring operations				
1. year	547	320	320	1187
2. year	727	320	854	1901
3. year	860	320	854	3088
4. year	1013	320	320	1653
Caring operations (1-4 years)	3147	1280	2349	8429
Other costs				2117
Total costs:				26881
- Value of by-products:	8 tons x 240 Euro/t			1920
Historical cost:				28800

Source: own calculation

Annual technology costs of apple produced on trees with SX spindle canopy form is shown at Table 3. Tables 4-5 consist the distribution of costs.

Table 3: Annual technology costs of apple produced on trees with SX spindle canopy form

Category	1,5 m tree distance	0,75 m tree distance
	Costs (Euro)	
Cost of materials used	1268	1268
Wages	1100	1767
Taxes and rates	418	671
Depreciation	1238	1656
Contributory services	900	940
Total costs:	4924	6302

Source: own calculation

Table 4: Variable and fix costs at 35 t/ha yield (tree distance:1,5 m)

Costs	Costs of materials	Wages	Taxes and rates	Depreci-ation	Contributo ry services	Total (Euro)
Fix costs	600	633	241	1238	500	3212
Variable costs	19	13	5		11	49

Table 5: Variable and fix costs at 45 t/ha yield (tree distance:0,75 m)

Costs	Costs of materials	Wages	Taxes and rates	Depreci-ation	Contributory services	Total (Euro)
Fix costs	600	1167	443	1656	500	4366
Variable costs	19	13	5		10	47

Source: own calculation

The profit calculation at 1,5m and 0.75m tree distance are are shown at Table 6. and Table 7.

Table 6: Profit calculation at 1,5 m tree distance

Produc-tive years	Yield t/ha	Fix cost Euro/ha	Variable cost Euro/ha	Total cost Euro	Sales revenue Euro	Profit Euro
1. year	20	3212	978	4190	4800	610
2. year	25	3212	1223	4435	6000	1565
3. year	30	3212	1467	4679	7200	2521
Total:				13304	18000	4696

Source: own calculation
Average net profit: 4696/3 years = 1565 Euro /year.

Table 7. Income calculation at 0,75 m tree distance

Produc-tive years	Yield t/ha	Fix cost Euro/ha	Variable cost Euro/ha	Total cost Euro	Sales revenue Euro	Profit Euro
1. year	30	4 366	1 417	5 784	7 200	1 416
2. year	35	4366	1 654	6 020	8 400	2 380
3. year	40	4 366	1 890	6 256	9 600	3 344
Total:				18 059	25 200	7 141

Source: own calculation
Average net profit: 7140/3 years = 2380 Euro /year.

Economic analysis of the investment

The tested culture was compared with a model plantation with 0.75 tree distance. The economic analysis of the investment – based on static indicators – is shown at Table 8.

Table 8: Economic analysis of the investment by static indicators

Category	1.5m tree distance	0.75 m tree distance
Average net income	1 565.45 Euro	2 380.18 Euro
Payback period	14 years	12 years
Profitability of investment	7.2 %	8.3 %
Rate of returns	1.6	1.8

Source: own calculation

CONCLUSION

- Intensive apple production can also be characterized by low profitability in Hungary.
- Due to the high historical cost. the payback period is extremely long. the rate of returns is very unfavourable. the low annual income determines weak profitability.
- Returns differed only slightly in the two cases. however the profitability of the higher investment value orchard was found to be minimally greater.
- It can be concluded. that beyond a certain level. enhancing intensivity spoils the profitability of the orchard. thus – according to our calculations - selecting the greater distance production method is the favourable option.

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