

Recovery of Capital Investment in the Superintensive Apple-Tree Orchard Depending on Slender Spindle Crown Formation

Vasile BABUC, Ananie PESTEANU, Alexandru CROITOR

Faculty of Horticulture, State Agrarian University of Moldova
Mircest str. 48, Chisinau, Republic of Moldova; v.babuc@uasvm.md

Abstract. Capital investments retrieval in apple superintensive orchards is greatly determined by the productivity of cultivated varieties and trees growing system. The investigations were made in the orchard „Codru-ST” Ltd. Founded in 2000 with bench-graftings on rootstock M 9 of the varieties Gala Must, Golden Reinders and Idared. The distance between rows is 4,0 m and that in the row is 1,0 m. There were studied 4 variants of crown formation. The highest yield in the first two years of fructification at the varieties under the study was registered at the variant V2 - 50,04-58,44 t/ha. Respectively, in variant mentioned the capital investments at foundation, keeping up the plantation and value of production were very high. Capital investments retrieval took place at all the variants under the study, but the greatest value was registered at pruning's minimalization of crown formation and designing of 2 provisional branches.

Keywords: varieties, slender spindle crown, recovery, capital investment, provisional, branches.

INTRODUCTION

Fruit-growing development program in the Republic of Moldova until 2020 provides for the establishment of 100 thousand hectares of modern orchards and increasing global production of fruits to 998 thousand tons. Apple-tree handles up to 40% of orchards including superintensive type and 60% of fruit (Balan et al., 2008).

Considerable capital investment recovery in the superintensive apple-tree orchards is largely determined by performance varieties and tree training system (Licznar-Malanczuk, 2004; Pesteanu, 2008).

In Moldova is recommended and applied in the superintensive apple-tree orchards improved slender spindle tree training system, provides structuring crown primarily by relatively severe cuts, especially the shortening of the transfer side parting and oriented horizontally. This attenuates the entry of trees on economic growth and harvest of fruit (Pesteanu, 2005).

In this regard improvement of slender spindle type crown formation in sight of stepping up the entry of the trees on economic growth, rapid growth of the crop of fruit and recovery of capital investments in the superintensive apple-tree orchards is a current problem in fruit-growing development (Pesteanu, 2008).

MATERIALS AND METHODS

Experimental plot is located in the orchard „Codru-ST” Ltd. Planting was conducted in spring 2000 with the bulk grafting on the rootstock M9 of Must Gala, Golden Reinders,

Idared varieties. Distances between rows – 4.0 m, and between trees in row 1.0 m - 2500 trees ha. In 2000 vegetation grafts reached about 120 cm which allowed initiation of slender spindle crown formation in four variants.

Variante 1. (control) - as recommended in force: the trunk of the trees with 50 - 55 cm and well-developed vertical few zigzag shaped axis; 3-4 frameworks 40 - 50 cm short with inclination angles of about 60° to the vertical; the frameworks and above the axis at intervals of 20 cm are uniformly located radially fruit-bearing branches, horizontal oriented predominantly through lateral transfer side parting cuts, after fructification fruit-bearing branches is to renew the cycle of 3 - 4 years.

Variante 2. Crown bioconstructive base as in the control variant completed with: rational minimizing of the degree of training cuts, placement above the crown of the provisional frameworks alternatively horizontalized fixed on espalier onto the row direction that gradually shortens after fructification stage, transferring them into fruit branches; forced horizontalization of vertically growing scions and branches into the free end of the crown to transfer into fruit branches.

Variante 3. Formation of a crone is made as in variante 2 routing the fruit-bearing branches to horizontal position through lateral transfer side parting cuts.

Variante 4. Formation of a crone basically is made as in variante 2 with the renovation of branches by division fruit-bearing to obtain scions from sleeping buds.

Plantation productivity was established in the harvesting period (2003-2004 years) for all variants taken into the study. Capital investments recovery were made by determining real expenses when was established fruit growing plantation. The cost for planting material, supporting elements, system of irrigation and the price by selling fruits have corresponded in that year with the real prices of the market from the Republic Moldova.

RESULTS AND DISCUSSIONS

Capital investment for the establishment of 1 ha of orchard, calculated with prices at that time, is about 75132 lei, including: 25000 lei cost material of the bench-graftings; 22500 lei for the drip irrigation; 15000 lei espalier installing and 11924 lei other expenses.

The volume of investments for the maintenance of 1 ha young orchard is about 66484 lei, including by years: 2000 - 11924 lei to the grow from mass grafting one year crowned trees; 2001 - trees crowning start - 9394 lei; 2002 - 9724 lei 2003 entry of the trees on economic fructification - 17281 lei; 2004 - 18161 lei.

The amount of capital investment for the establishment and care of 1 ha young orchard for varieties and variations, taken in the study, are 141018 - 142026 lei in variante 1 and 142684 – 144226 lei in variante 2. In variants 3 and 4 the amount of capital investment does not differ essentially from variante 2.

Least significant difference on investment for varieties and variants of formation taken in the study arrive, in substance, from the harvesting costs of the fruit quantity difference (tab.1).

Varieties of trees and variants taken in the study entered the economic fructification in the third year (2003) from the initiation of crown training. Harvest was higher in variante 2 with average per 1 tree of 11.21 kilograms at Gala Must variety, 13.23 kilograms at Golden Reinders variety and 10.13 kg at Idared variety.

Calculated to 1 ha apple harvest is: 28.01 t, 33.07 t and 25.32 t in 2003 year and 27.82 t, 25.37 t and 24.72 in 2004 year.

In the 2003 - 2004 years apples harvest, taken in the study, is 55.83 t / ha, 58.44 t / ha and 50.04 t / ha prevailing the control variant by 8.14 - 9.64 t / ha or 19-21%.

Revenue from sales of apple production in the years 2003 - 2004, calculated at the price of 3500 lei / t, in variant 2 reaches 188405 lei / ha in Gala Must variety, 204540 lei / ha in Golden Reinders variety and 175140 lei / ha to Idared variety.

The amounts shown ensure the recovery of capital investment at 136%, 142% and 123%. In the control these indices have values of 114%, 120% and 104%, or with 16-22% lower.

Given that grafts care investment to get, in the orchard in 2000, one year grafted trees without parting in the crown area, reach 11924 lei / ha which added to the cost of plant grafting – 25000 lei, make 36924 lei. This amount does not differ essentially from the cost of a year trees produced in the nursery.

Thus becomes annoying orchard establishment with mass grafting compared to the planting of one year trees, produced in the nursery. The availability of sufficient financial resources allow planting of orchard with two years trees crowned in a nursery, which enter economic fructification one year prior to those of one year uncrowned and contributes to faster recovery of capital investment.

Tab. 1

Capital investments recovery in apple tree superintensive orchards according to the type of tree crown formation.

Variant of crown formation	Cumulated yield, 2003-2004 years, t/ha	Capital investments, 2000-2004, lei/ha	Value production, 2003-2004, lei/ha	Capital investments recovery in 2004, %
Gala Must variety				
V ₁	46.22	141616	161770	114
V ₂	55.83	143940	188405	130
V ₃	51.84	143140	181440	127
V ₄	51.22	143016	179270	125
Golden Reinders variety				
V ₁	48.80	142026	170800	120
V ₂	58.44	144226	204540	142
V ₃	56.60	143886	198100	137
V ₄	52.17	142980	182595	128
Idared variety				
V ₁	41.90	141018	146650	104
V ₂	50.04	142684	175.14	123
V ₃	47.55	142146	166.425	117
V ₄	46.44	142030	162540	114

CONCLUSIONS

Using varieties of performance and slender spindle type crown structuring with: minimizing the extent of cutting, the formation of two provisional frameworks; forced horizontalization into the free space of the crown of scions and branches with vertical growth contribute to expedite the trees entry in economic fructification, fruit growth harvest, considerable recovery of capital investment, increase economic efficiency of production in the superintensive apple-tree orchard.

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