PRODUCTIVITY OF APPLE TREES IN V-SYSTEM ORCHARD

PRODUCTIVITATEA POMILOR DE MĂR ÎN STRUCTURA PLANTAŢIEI CU CORONAMENTUL ÎN DOUĂ PLANURI OBLICE (V)

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***Abstrac**t. A trial was established in the spring of 2004, one-year-old scab-resistant apple cultivars grafted on dwarfing M.9 rootstock, were planted in the Experimental Station "Criuleni" in central Republic of Moldova. Apple trees of the cultivar Generos and Florina were trained different crown, with trees leaned to 40^0 from vertical, each in an alternate direction down the row ("V" system). The experiment was designed as a randomized block with three replicates. Each plot consisted of ten trees. The site was drip irrigated. The higher value indices was obtained in the variant were trees was formation on V-palmette and angle of approximately 40^0 from vertical.*

Key words: scab-resistant, crown, cultivars, apple, rootstock.

***Rezumat.** Lotul experimental a fost înfiinţat în centrul Republicii Moldova la Staţiunea Didactică Experimentală „Criuleni" în primăvara anului 2004, cu pomi de măr în vârstă de un an, soiurile au o rezistenţă genetică la rapăn şi sunt altoite pe portaltoiul de vigoare slabă M9. Pomii de soiurile Generos şi Florina au fost conduşi după diferite forme de coroană, fiind înclinaţi la 40^0 faţă de verticală în direcţia intervalelor dintre rânduri formând un gard fructifer în formă de „V". Cea mai mare valoare a indicatorilor de creştere şi productivitate la unitatea de suprafaţă a fost obţinută în varianta unde pomii sunt conduşi după forma de coroană palmeta liber aplatizată, unghiul de înclinare al pomilor de la verticală fiind de circa 40^0.*

Cuvinte cheie:imun la boli, coroană, soiuri, măr, portaltoi

INTRODUCTION

In modern fruit growing, much attention has been given to controlling the balance between tree growth and fruit production in high-density plantings. Although dwarfing rootstocks are of prime importance for controlling the growth, cultural techniques as pruning and orchard design also have an influence on tree development (Babuc V. 2000). The planting system in an apple orchard is crucial for yield, fruit quality and profitability. The best way to increase early yield is to enhance planting. But these super spindle plantings have high investment costs and could not fulfil requirements with regard to sufficient yield and fruit quality. The new solution are open forms. The most popular V-shaped systems, recommended for fruit production, are V-system orchard (Cimpoieş Gh. 2000; Robinson, 2005). The open forms with slender elements allow optimum light interception and generate good yields with high fruit quality (Mika et al., 2000;

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Buler et al., 2004). The lower investment costs for the open systems with 2, 3 or 4 branch elements (Tatura) due to a reduced number of trees per hectare are advantageous as compared with the current spindle system in single rows. The somewhat higher costs for the support scaffold frame are a minor disadvantage (Buler Z., Mika A., 2004).

The aim of the present study was to compare the growth and yield of some tree training systems in an apple orchard in the central Republic of Moldova.

MATERIAL AND METHOD

The experiment was conducted at the Experimental Station "Criuleni" in central Republic of Moldova. Apples trees of the cultivars Generos and Florina grafted on dwarfing M.9 rootstock, was planted in spring 2004. The trees rows were aligned north-south.

The experiment was designed as a randomized block with three replicates. Each plot consisted of ten trees. The site was drip irrigated.

The experiment plots was divided in five variants:

- 1 variant (control) - one-line with vertical accommodation of trees and their formation as spindle. The scheme of planting 4 x 1,5 m (1666 trees per ha);
- 2 variant - two-plane V - figurative with formation of trees as a spindle andtheir inclination under a corner 40^0 in the opposite sides. The scheme of planting 4,5 x 1 m (2222 trees per ha);
- 3 variant - two-plane V - figurative with formation of trees as palmet system (central lider) and their inclination under a corner 40^0 in the opposite sides. The scheme of planting 4,5 x 1 m. (2222 trees per ha);
- 4 variant - two-plane V - figurative with formation of trees as palmet system (central lider), two trees in one place and an inclination in the opposite sides under a corner 40^0**.** The scheme of planting 4,5 x 1 m (4444 trees per ha);
- 5 variant - two-plane V - figurative with formation of trees on system Tatura. The scheme of planting 4,5 x 1 m (2222 trees per ha).

RESULT AND DISCUSSIONS

The length and number of branches included in the annual aggregate length of their overall growth potential and is building upon the trees later. Annual branches mostly evolving new branches bearing young, physiologically active and productive. It supersedes these three branches spread over the years have exploited four years and have largely exhausted (Gh. Cimpoieş 2000).

Up to the seventh year after planting, vegetative growth, yield were affected by cultivar and plant density. Although 'Florina' trees grew stronger than 'Generos'. Trunk growth was negatively related to plant density (table 1). In 2009, when the trees came into bearing, there is a significant decrease in the amount of average annual increases both in variety and variety Florina as general for all variants studied.

This is because much of the nutrients consumed the fruit bud differentiation, growth and ripening of fruit, etc. Whatever the form of trunk diameter for the variety Florina crown was higher than the trees of the genus Generos.

Table 1

The growth indices and trunk diameter an apple-tree, Rootstock M9

Variants	Annual average length of shoots, cm		Annual length of shoots, m		Trunk diameter, cm	
	2009	2010	2009	2010	2009	2010
Generos variety						
Variant1 (c)	24	47	15,12	20,9	6,4	6,9
Variant2	23	51	16,72	39,5	4,8	5,1
Variant3	30	49	17,10	26,7	5,0	5,1
Variant4	24	48	13,20	15,8	4,3	4,7
Variant5	29	47	16,30	26,2	5,3	5,8
Florina variety						
Variant1 (c)	31	39	47,95	42,1	6,6	6,9
Variant2	34	41	30,22	50,5	4,8	5,6
Variant3	30	42	40,58	49,9	5,4	6,1
Variant4	27	37	22,7	28,1	5,0	6
Variant5	35	37	33,03	44,1	5,5	6,3

Table 2

Productivity of apple trees in the V-system orchard. Rootstock M9

Variants	Fruit production, q / ha			Cumulative yield, 2008-2010 q / ha	Average yield, 2008-2010 q / ha	In % of control, %
	2008	2009	2010			
Generos variety						
Variant1 (c)	190	161	380	731	244	100
Variant2	262	189	404	855	285	117
Variant3	227	208	477	912	304	125
Variant4	277	118	413	808	269	110
Variant5	246	195	142	583	194	80
Florina variety						
Variant1 (c)	178	229	296	703	234	100
Variant2	162	232	318	712	237	101
Variant3	186	281	320	738	246	104
Variant4	238	313	274	825	275	116
Variant5	161	254	240	678	226	97

Analysis of fruit production (table 2) in the last three years of research, it was found that the highest values recorded in the canopy of solitary plantations in two oblique planes. Within this structure of the plantation, led by palmet system, tapering due to spatial position, were allowed to obtain higher yields of fruit. Slightly lower production was led by Tatura fruit trees, because the crown imposed as a large number of cuts.

The variety Generos most production was obtained in variant 3, where trees are led by palmet system (central lider) trees were being inclined at 40^0. Ear to the

variety Florina highest values were obtained in variant 4 where), two trees in one place and an inclination in the opposite sides under a corner 40^0.

CONCLUSIONS

1. In the variants studied, more effective is the canopy structure in two oblique planes, led the palmet system. Small area of nutrition and vegetative macrostructure oblique position helped establish the balance between growth and fructification.

2. Tatura in planting trees after cutting the canopy solitary tapering in two planes, due to the higher cut in the first years after planting, reduced production during the study. As a result, production of fruit plantation in this structure is less effective.

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