CULTURE SYSTEM OF TREES
FRUIT PRODUCTION EFFICIENCY IN RELATION TO DENSITY OF PLANTING TREES

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KEY WORDS: varieties, rootstock, training system, period age of tree

ABSTRACT

The fruit-growing system is determined by the methods and technological tools by which is achieved using soil as a main source of production. The concept of fruit-growing system is used to integrate the relationships between the genetic characteristics of the soil with the technological and economic factors governing productivity. Before choosing the biological material, the planting distances and the crown form, the first and more important step is to define precisely the envisaged objectives. These objectives are very important whereas they depend on the yield and quality of fruit production on the surface unity in the dynamics during the operation. In this article we have studied the plant density and the productive potential of the plantation according to the geometric structure of the canopy. During the ontogenesis period the highest phytoproductivity was obtained at the distance of 4,5 - 5 m between row spacing and 2,5 - 3 m within row – spacing.

INTRODUCTION

The cultivation of fruit trees is based on the obtained results in the last decades of practical and theoretical researches carried out in major growing countries (Germany, Netherlands, Poland, Switzerland, France, and Italy) and in our country. Density of the trees evaluated from 400-600 trees 1970 years and has now reached around 1250-2500 per ha in our conditions and reaches the 3000-5000 tree per ha achieve and more in the Netherlands, Germany, Poland (J. W. Palmer, et al.,1989; A. Masseron, et al., 1990; V. Balan, 2007).

MATERIAL AND METHOD

In ontogenesis there were studied apples *cv Slava peremojtiam, Kalvili snow, Golden Delicious and Mantuaner* grafted on rootstock M4 and the utilization of the following apple tree spacing: 4,5 x 4,5 m, 5 x 4 m, 5,5 x 3,5 m, 5,5 x 3 m, 4 x 4 m, 4,5 x 3,5 m, 5 x 3 m, 4,5 x 3 m, 3,5 x 3,5 m, 4 x 3 m, 4,5 x 2,5 m. The rows were situated from north to south. The trees are formed on type of liberally rising fan-shaped espalier (palmetto). There were 24 apple trees in each variant. The experiences were repeated three times. At

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the basis of the studies are methodological indications for the establishment of orchards with high productive structures, the evidence and the control of the main indices of photosynthetic productivity, the study of the biological rotation in phytocenosis. Top soil of the fruit plantation was presented by powerful chernozem on light loam and was cultivated permanent and maintained by till field.

The calculations showed that the value of the potential production of the canopy, calculated according to the coefficient of volumetric density of lateral surface of the crown (N. V. Agafonov, 1983), gradually increases with decreasing crown height.

RESULTS AND DISCUSSION

Valuing the land of orchards in time, achieved by planting density is a major indicator for the growing trees. Although a high density of trees per hectare is an important index that characterize the culture, with the value of his interest information about the entry of fruit trees, and worsening of thicken the light mechanization work establishing and maintaining orchards.

This information is necessary because a high density of trees per hectare not automatically defines system (intensive or superintensiv) culture, for example, assortment does not match these systems.

Theoretically it is possible to obtain similar yields at different planting distances (Ghena, Braniste and Stanica, 2004) recommended for each species (Tab.1).

Table 1

Yields at different planting densities.

Planting distance, m		Trees per ha	Yields, kg/ha			
			20000	30000	40000	50000
Between rows	On row		Harvest, kg/tree			
	2	1125	17,8	26,7	35,6	44,4
4	1,5	1500	13,3	20,0	26,7	33,3
3,5	1,25	2057	9,7	14,6	19,4	24,3
3	1	3000	6,7	10,0	13,3	16,7
3	0,75	4000	5,0	7,5	10,0	12,5
2,5	0,75	4800	4,2	6,3	8,3	10,4
2,5	0,5	7200	2,8	4,2	5,6	6,9

Basically contradictory data obtained with this statement (Tab. 2).

From research undertaken that resulted in cumulative production per hectare and tree until the 17th age planting of differences in production is very high. The highest cumulative production per tree (398.2 - 419.2 kg) in Golden Delicious variety was obtained in variants 4.5 x 4.5 m, 5 x 4 m and 5.5 x 3.5 m and the smallest (254.4 - 256, 9kg) - at distances of planting 3.5 x 3.5 m and 4 x 3 m. But calculated per hectare, the highest productivity was recorded at planting distances of 5 x 3 m, 4.5 x 3.5 m, 4.5 x3 m, 4.5 x 2.5 m as constituted 228.0 - 241.8 t/ha and less (196,3-209,6 t / ha) - with variations on longer distances planting.

Analysis of data submitted believe that in the early years of fruit-bearing tree on yields were close between all the tested variants, and later noted that at small distances were obtained with the lowest yields. In the first years of fructification they have obtained higher yields per hectare in variants with a greater number of trees to the surface, but later variants with a higher density of trees per hectare were exceeded by those who had a fewer trees per hectare. Given the development of varieties of trees in *Golden Delicious, Slava pobediteleam* and *Kalvili snow*, grafted on rootstock M4, after 16-17 years of growth and production as well as the possibilities for mechanization of the work can be emphasized that the geometric structure and internal a canopy distances optimized by planting 4.5 x 3.5 m, 5 x 3 m, 4.5 x 3 m is the more rational management and more productive.

Table 2

Influence of planting distance on the stage of the fructification age of the variety *Golden Delicious* apple, grafted on the M4.

Planting distance, m	Annual average on the stages by years of vegetation						Totalled production by 4 -17 years of vegetation		
	Growth and fruit-bearing		Fruit-bearing and growth		Fruit-bearing				
	kg/tree	t/ha	kg/tree	t/ha	kg/tree	t/ha	kg/tree	t/ha	Deferens to ha
4.5x4.5	17,9	8.8	38.2	18.8	35.9	17.7	398.2	196.3	-23.4
5x4	18.0	9.0	37.8	18.9	39.2	19.6	419.2	209.6	-10.1
5.5x3.5	18.3	9.5	36.9	19.1	36.4	18.9	402.3	208.8	-10.9
5.5x3	18.0	10.9	33.7	20.4	31.8	19.3	366.2	221.9	2.2
4x4	16.6	10.4	33.5	20.9	31.7	19.8	358.7	224.2	4.5
4.5x3.5	17.3	11.0	33.3	21.1	31.3	19.9	359.1	228.0	8.3
5x3	16.9	11.2	33.5	22.3	32.3	21.5	363.1	241.8	22.1
4.5x3	16.7	12.4	29.7	22.0	26.8	19.8	319.7	236.6	16.9
3.5x3.5	15.8	12.9	26.1	21.3	17.4	14.2	254.4	207.6	-12.1
4x3	15.1	12.7	25.3	21.1	18.8	15.7	256.1	213.3	-6.4
4.5x2.5	14.7	13.0	24.3	21.6	20.2	17.9	256.9	228.1	8.4
M	16.8	11.1	32.0	20.7	29.3	18.6	341.3	219.7	-

In general intensive plantations trees system include trees grafted on rootstocks of force middle, with the iron crown or small globule volume with 600-1250 per ha which will produce yields of 20-30 t / ha.

For superintensive plantations often used the simple planting in rows with 2500-3800 per ha. Typically, trees are driven into the globule forms with very low volume and

grafted onto rootstocks of weak force (V. Babuc, A. Croitoru, 2008; A. Peşteanu, 2008; V. Balan, R. Şaganian, 2008).

CONCLUZION

Apple tree due to a very large range of rootstocks and even different varieties of force enables the use of all of offers the possibility of the use of our systems of culture, allowing the adaptation of the orchard to soils less fertile or to different systems of management of tree crown.

For rising of the labour productivity systems they are chosen of simple management with a high degree of mechanization of work and culture of low stature of trees, which allow fully exploit the manual work (cut trees, and harvesting fruit space out). Such a system can be highlighted by the constantly relations between the species, rootstock, the management of crown, crown shape and distance of planting.

Modern fruit growing production involves the crown with simple lines in a vertical plane up to 2.5 m in height allowing the rationalization of work cutting, harvesting, maintenance of soil and orchard with lower costs.

Adaptation of some forms of crown less bulky, more systematized, with a structure as to increase production of fruit.

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