Scientific Papers. Series B, Horticulture. Vol. LVIII, 2014
Print ISSN 2285-5653, CD-ROM ISSN 2285-5661, Online ISSN 2286-1580, ISSN-L 2285-5653

THE GROWTH AND FRUCTIFICATION OF CHERRY TREES DEPENDING ON CUTTING SYSTEMS

Valerian BĂLAN, Igor IVANOV

State Agrarian University of Moldova, Faculty of Horticulture, MD-2049, 42 Mircesti Street, Chisinau, Moldova

Corresponding author email: v.balan@uasm.md

Abstract

It were studied the growth and fruiting of sweet cherry trees (Cerasus avium L.) from cv. 'Valerii Cicalov' and cv. 'Record', grafted on mahaleb rootstock (Cerasus mahaleb Mill.) in relation with pruning system. The orchard was established in 2003 with planting distance of 6 x 5 m. The trees have been formed after natural ramification with high volume. The staggered pruning of semi skeleton branches was made during the vegetation period and complementary in wood for 3-4 years. This variant advantages the formation of semi skeleton and fruit branches, compared to pruning production during the dormancy period and vegetation period. The fruits harvested in 2012-2013 weight 20,1-33,4 kg/tree at 'Valerii Cicalov' cultivar and 18,9-26,4 kg/tree at 'Record'. The staggered cutting of semi skeleton branches during the vegetation period garnishes the crown with fruiting branches and provides an increase of fruits production with 32% to cv. 'Valerii Cicalov' and with 21% to cv. 'Record' comparing to pruning production during the dormand period (control).

Key words*: branches of fruit, cherry, growth branches, cutting reduction, variety*

INTRODUCTION

The continuous improvement process of pruning by introducing new technological sequences, boosts the existing crop technologies, but they require modeling to capitalize the biological potential of trees in the modern orchards.

The maintaining of branches after their formation at the necessary optimal volume to create an favorable report between the growing and fructification period, is achieved by implementing maintenance and fruiting pruning (Mitre et al., 2007; Balan, 2012).

To determine the optimal level of trees pruning it must be taken into account the biological characteristics of the cultivar, the reaction of the different types of prune. In other words, the level of maintenance and fruiting pruning degree is determined differently, depending on cultivar and pruning system. The rational pruning contributes to precocious fruit trees and obtain high and qualitative fruits, hastens the redemption of invested capital in plantation which increases the economic efficiency of the fruit growing (Balan et al., 2001; Simion et al., 2004).

The pruning of cherry in fruiting period involves improvement works of the light regime and ventilation, a limitation of height and horizontal branches extension.

The cutting is also applied to semi skeleton branches exceeding 4-5 years age, to obtain branches from buds with high biological potential, appropriated to differentiating the productive shoots each year with high value and high quality fruits (Budan and Gradinariu, 2000).

In order to identify some effective methods of maintenance and regeneration of cherry trees by applying the cutting reduction during the vegetation and dormancy period, in 2011 "Videx-Agro" company organized a practical research experience.

MATERIALS AND METHODS

The research was conducted in the cherry orchard (Cerasus avium L.) of "Vindex-Agro" company, planted in 2003 of the unincorporated village Malaieşti, Orhei district. The biological material was represented by cv. 'Valerii Cicalov' and cv. 'Record', grafted on the mahaleb seedlings (Cerasus mahaleb Mill.). The planting distance was of 6 x 5 m. The trees have been formed after the natural ramification improved with high volume. The crown consists of a basal level with 3 branches above

there are 3-4 embranchments inserted on the shaft spiral spaced at 35 cm one from each other.
To achieve the expected goal it were investigated the following variants:
V1 - cutting production (maintenance and fructification), during dormant period (control);
V2 - cutting production (maintenance and fructification), during the vegetation period;
V3 - staggered cutting of semi skeleton branches during the dormant period in wood for 3-5 years;
V4 - staggered cutting of branches during the vegetation period in wood for 3-5 years.
The experience was organized in randomized blocks; each variant includes four repetitions of each 8 trees. To record the effect of cutting reduction it were effectuated biometric measurements according to the methods used in horticulture. The average length of branches, number and density of fruiting formations determined from 3 typical trees, but the fruits were harvested from 32 trees using statistical methods of calculating (Мойсейченко et al., 1994). During the vegetation period, in the orchard it were made maintenance of soil and protection of plants as it is stipulated in the intensive technology culture of cherry.

RESULTS AND DISCUSSIONS

The regeneration cuttings become dominant for cherry since fruiting period and it is one of the main methods of growth control and load of fruit trees. (Stefano et al., 2009; Babuc 2012).

Figure 1. Branches from spigots at cv 'Valerii Cicalov' in the 4th leaf

These cuttings can be made during the dormant period as well as during the vegetation period, having the advantage of reducing tree vigor and training of young semi skeleton items distributed, proportionally, uniformly in adapted system ramification. (Donica, 2005).
The number of branches formed from dormant buds differs on shortened branches age (Figure 1). Based on the results, it we observed that staggered cutting causes the rejuvenation of the ramifications.
The forming of spigots and sequenced cutting of semi skeleton branches cause favorable conditions to form well developed sprout and subsequently they hold fruit formations, they contribute at the growth of cherry tree productivity and fruit quality.
Forming spigots on wood for 3-4 years gave results, having from 4-6 sprouts for cv. 'Valerii Cicalov' and 2-3 sprouts for 'Record'.
Depending on the position and spigot length in ramification, it forms 3-4 sprouts unevenly distributed. In some case they were formed on mother skeleton branch and not on the sprout. The sprouts in the age of 5 years for cv. 'Record' did not form sprouts.
The results prove that the staggered cutting of semi skeleton branches during the vegetation period in wood for 3-5 years (V4), favor the formation of fertile branches and younger semi skeleton compared to the staggered cutting of semi skeleton branches during the dormant period in wood for 3-5 years (V3) and cutting production during the dormancy (V1) and during vegetation (V2) period (Balan and Ivanov, 2012).
The average length and total annual branches for cherry tree were influenced by the studied factors.
The presented data shows that the annual branches length formed on the spigot from bugs is correlated with the age and their number. So, older spigot, fewer formed sprouts; if the length of these are bigger then it is due to the location and to the nutrition.
Analyzing the growth of annual branches on the spigot, it can be mentioned that the average length of annual branches on the spigot for cv 'Valerii Cicalov' was between 43 cm and 61 cm in 2012 and 33 cm till 50 cm in 2013.
For cv. 'Record' the values of annual increases on the spigots were situated between 22 cm and 50 cm (Figure 2).

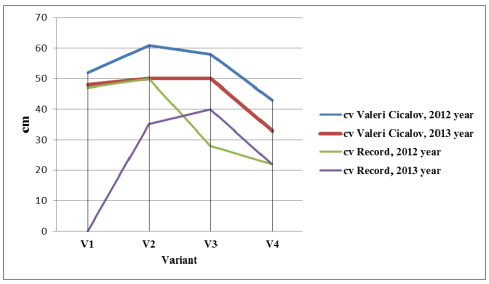

Figure 2. Average length of annual branches on the spigot according to cutting system

The summed length of annual branches formed from bugs was influenced significantly by the cultivar and by the pruning system. In the first year, after cutting, trees for cv 'Valerii Cicalov' the summed length of annual branches in V3 were of 2,21 m/spigot but the trees of the same cultivar pruned during vegetation period (V4) the value of this index was reduced, constituting 1,55 m/spigot (Figure 3). The lower values were recorded in the cultivar where cuts were applied during the dormant period. In 2013 the summed length of annual branches for cv 'Valerii Cicalov' also differ according to the cutiing system and it was from 0,96 m/spigot till 1,66 m/spigot. Irrespective of the cutting system the summed length of annual branches from cv 'Record' has lower values than cv 'Valerii Cicalov' and varied from 47 cm/spigot in V3 at cutting reduction in wood for 5 years. In 2012, were of 150 cm/spigot in V2 at cutting reduction in wood for 4 years. In 2013 the increases were of 67 cm.

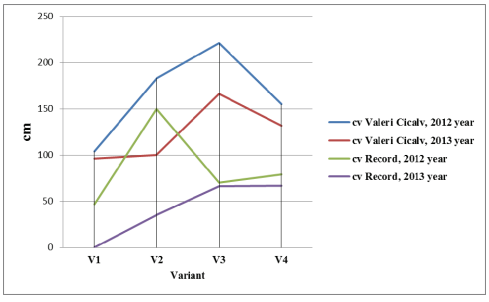

Figure 3. Summed length of annual branches on the spigot according to cutting system

The trees ability to generate quantitative and qualitative fruits is close related to the length of annual increases which is determined by environmental factors, soil and plantation maintenance.

The number of fruits formations, formed on spigot branches varies depending on the system and cutting period (fig. 4, 5). We observe at both cultivars a considerable increase of the number of fruit formations in 2013 to 2012. This is due to the age of the branch on the spigot. The number of spur bunches varied from 29 in 2012 till 367 in 2013. Conducting the sequenced cutting as well as the procedures for maintenance of ramification during the vegetation period contributed positively to the filing of fruit branches formations. Cv 'Record' characterized by slower growth compared to cv. 'Valerii Cicalov', generated also a lower number of fruit formation, having the values from 12 in 2012 till 247 spurs in 2013 in V3.

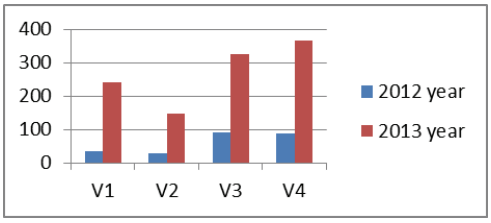

Figure 4. Number of fruit formation for cv 'Valerii Cicalov' on the spigot formed branches, according to cutting system

The strategic direction of this study is directed towards the exploitation of growth potential of trees according to fruiting potential of each cultivar. To obtain high, qualitative and stable yields, it is necessary to maintain the physiological balance among branches of different age and the filling with floral buds.

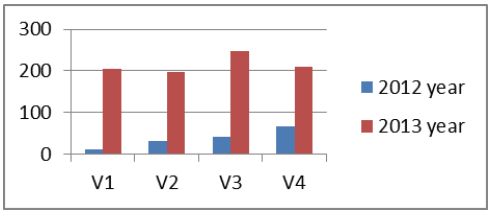

Figure 5. Number of fruit formation for cv 'Record' on the spigot formed branches, according to cutting system

Over time, the fructification cutting led to the creation of differences between the growth and formation of spurs because spurs bring fruits 8-12 years but medium and long branches have a slow evolution.

The carried research (Table 1) revealed that the fruit harvest was influenced by the system and

period of cutting trees. In 2012 the fruit harvest for cv 'Valerii Cicalov' was 20,1-23,4 kg/tree but for cv 'Record' of 18,9-22,3 kg/tree. In 2013 it was an increase of fruit harvest in V4 where was applied the sequenced cutting of semi skeleton branches during the vegetation period, having 33,4 kg/tree or more than 32% in V1. Cv. 'Record' is less receptive at applied cutting it had a lower increase of fruit quantities but the quality of these fruits is net superior. The difference between control (V1) and sequenced cutting version of semiskelet branches during vegetation period (V4) for cv. 'Record' in 2013 is 21,1%.

The productivity of cherry trees increases significantly compared to the control so for cv. 'Valerii Cicalov' as well as for cv. 'Record' in V4 where it was applied the staggered cutting of semi skeleton branches during vegetation period. In 2012-2013 the cherry yield was about 9,46 t/ha for cv. 'Valerii Cicalov' and 7,52 t/ha for cv. 'Record'.

Table 1. The harvest of cherry trees depending on cultivar and cutting system

Cutting system	Productivity kg/tree		Productivity t/ha	
	2012 year	2013 year	2012 year	2013 year
cv Valerii Cicalov				
V1	20,1	25,3	6,69	8,42
V2	22,7	27,9	7,56	9,29
V3	21,8	30,2	7,26	10,06
V4	23,4	33,4	7,79	11,1
M	22,0	29,2	7,33	9,72
cv Record				
V1	20,1	21,8	6,69	7,26
V2	22,3	23,7	7,42	7,89
V3	19,2	25,7	6,39	8,56
V4	18,9	26,4	6,29	8,79
M	20,1	24,4	6,70	8,13

CONCLUSIONS

The capacity to form sprout on the spigot is bigger when the reductive branches are made on wood of 3-4 years. Older is the wood less is the number of the sprout formed. Staggered cutting of semi skeleton branches during vegetation period provides the garnishing of the semi skeleton with medium and vigorous length fruit branches.

The cuttings will be made during the harvest or after harvest. The large wounds will be disinfected with $CuSO_4$ solution and then they are protected with mastic.

The fruit harvest in 2012-2013 was of 20,1-33,4 kg/tree for cv. 'Valerii Cicalov' and 18,9-26,4 kg/tree for cv. 'Record'.

Staggered cutting of semi skeleton branches during vegetation period favors the garnishing of semi skeleton with fruit branches, having an increase of the fruits about 32% for cv. 'Valerii Cicalov' and about 21% for cv 'Record' compared to productive cutting during the dormant period.

REFERENCES

Babuc V., 2012. Pomicultură. Tipografia Centrală, Chişinău.

Balan V., 2012. Perspective în cultura cireşului. Pomicultura, viticultura şi Vinificaţia Moldovei. Chişinău, nr. 2 p. 7.

Balan V., Cimpoieş Gh., Barbăroşie, M., 2001. Pomicultură. Chişinău.

Balan V., Ivanov I., 2012. Parameters cherry trees in function of variety and cutting method system. Annals of the university of Craiova, p. 114 - 119.

Budan S., Grădinariu G., 2000. Cireşul. Editura Ion Ionescu de la Brad, Iaşi.

Donică Il., Ceban E., Rapcea M., Donică, A., 2005. Cultura cireşului. Chişinău.

Lugli S., Grandi M., Losciale P., Quartieri, M., Laghezza L., Sansavini S., 2009. Efficienza dei portinnesti nanizzanti del ciliegio negii impianti ad alta densita. Frutticultura e di ortofloricoltura 5. Anno LXXI - N. 5 – Maggio, p. 36-47.

Mitre V., Mitre I., 2007. Orientări noi în cultura cireşului. Agricultură-ştiinţa şi practica. Bucureşti, nr.1-2, p. 61-62.

Simon G., Hrotko K., Magyar L., 2004. Fruit quality of sweet cherry cultivars grafted on four different rootstocks. Int. Journal of Hort. Sci. 10, 3, p. 59-62.