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# DEVELOPMENT OF THE ABAVEGROUND PART OF APPLE TREE PLANTATION FOUNDED WITH „KNIP BAUM" TYPE

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**Keywords:** apple tree, orchard, variety, bioconstructive parameters, height of the trees, length of the crowns, "knip-baum" type

**Abstract:** The orchard was established in spring, 2004 with crowned apple trees of "KNIP BAUM" type. The distance of plantation is 3,25 x 1,25 m, the rootstock is M 9 and the studied varieties are Idared, Golden Delicious Reinders, Jonagold Decosta and Čampion.
It was established that the development of the apple trees into plantation depends greatly on the type of the planting material used at the foundation of the orchard. On the bioconstructive parameters of the apple tree plantation and the length of the trunk circumference influence the biological features of the variety and agrotechnic level used in the orchard. At the end of the fourth year after plantation, the apple trees have reached optimal bioconstructive parameters for such association variety/rootstock. The height of the trees under the study constituted 328-347 cm, and the length of the crowns was 170-177 cm. These parameters of the crown directly contribute to the optimal capitalization of the productive volume of the crown and the space of nutrition means to plantation.

## INTRODUCTION

The rhythm and absolute values of apple trees growth greatly characterizes the physiological condition of apple trees, their reaction to ecological and technological conditions of cultivation applied (2,4).

The apple trees grafted on dwarf rootstocks are very sensitive when there is lack of light, nutrition and other factors of vegetation because they have a relatively weak developed root system that is also fasciculate and superficially placed having concomitantly a crown with more reduced dimensions but with a light potential of productivity (5,6).

To pay attention when setting correctly the crown parameters to the specific features of reciprocal shadowing of apple tree rows. When the crown height is small, a part of light is not rationally used and does not reach the optimal productivity. In the case when the crowns are too big, the basal part of the neighbour row is shadowed and the obtained productivity is of poor quality (1,2,3,5).

To obtain a more productive volume of the crown, it is necessary to divide rationally on the central axle the vegetative macrostructure and the fruit bearing microstructure (3).

## MATERIALS AND METHODS

The studies made in 2004-2007 in the superintensive apple tree orchard of the firm "Codru-ST" Ltd., planted near village Rassvet, district of Straseni.

In spring 2004, on a surface of 4 ha, in the framework of a project financed by the government of Holland, it was established a demonstrative orchard. In the study were used crowned apple trees of "knip baum" type of the varieties: Idared, Golden Delicious Reinders,

Jonagold Decosta and Čampion, grafted on rootstock M 9. The distance of plantation is 3,25 x 1,25 m. The homologated variety Idared in Republic of Moldova served as a control variant.

The soil is seeded with grass at distances between the rows and the field is herbicided on the strips between the apple trees on the raw with a width of 1,2 m, the irrigation is through dripping. The additional fertilization has been calculated in conformity with the soil fertility and the foreseen yield.

The number of repetitions for each yield is 4. The number of apple trees in each repetition is 8. The place of repetitions is in blocks and of the evidence apple trees in each repetition is at random. Apple trees are lead after the structured axle system with the horizontalization of branches and shoots by their fixation with the help of support elements.

There were studied the bioconstructive parameters of the apple tree plantation and the length of the trunk circumference in the first four year after the plantation

## RESULTS AND DISCUSIONS

The researches made in the fruit-growing domain demonstrate that the optimization of fruit-growing plantation structure could be obtained only by using the associations variety /rootstock of weak vigour (3), planting the apple trees at a small distance and directing then according to the crown system with reduced volume (4).

The fruit-growing practice demonstrate that the main objective in young plantations means to have more rapid formation of crowns in optimal parameters the biologic features of the variety, the chosen distance of plantation and the intended form of the crown.

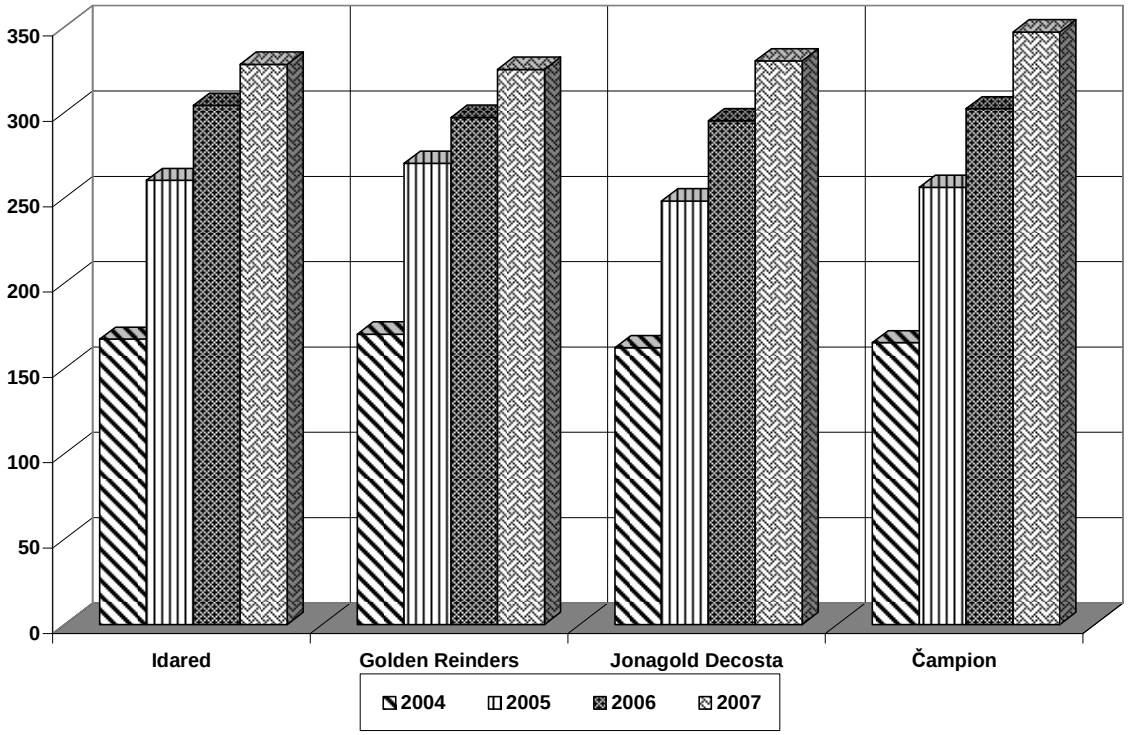


Figure 1

The apple trees height in the plantation founded with planting material of „knip-baum" type, cm

Because at the foundation of the apple tree plantation was used planting material of „knip-baum" type, crowned from sylleptic shoots, the height of trees at plantation constituted 154-161 cm and the breadth of the crown was 98-110 cm.

In the first year of plantation (2004 year), the height of the trees at the varieties taken into the study constituted 162-170 cm, and the crown breath was 112-123 cm (Figure 1, 2).

This non-significant increase of the bioconstructive parameters of the plantation is explained there by apple trees development in the first period that happened duet o the accumulated reserve substances in the root system and later of those from the soil.

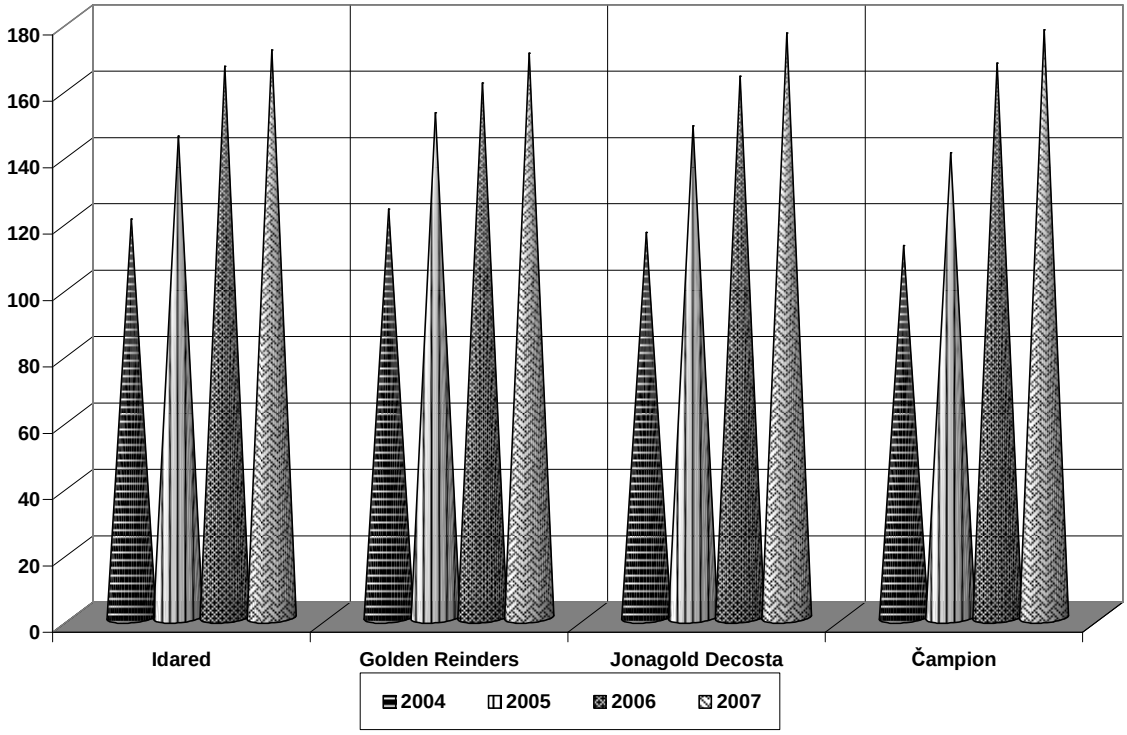


Figure 2

The crown width in the apple tree plantation founded with planting material of „knip-baum" type, cm

In the second year after plantation, it was registered an essential increase of the bioconstructive parameters. At the varieties taken into the study the height of the apple trees increased with 86-100 cm and the breath of the crowns-with 25-32 cm. The greatest values were registered et the variety Golden Reinders, where the height of the trees constituted 270 cm, and the crown breadth was 152 cm. Then, according to the biological features of the assortment, follow the variety Idared with the heigh of the tree of 260 cm and the breath of the crown of 145 cm and the varieties Jonagold Decosta and Čampion with the height of the trees of 248-256 cm and the breath of the crowns of 140-148 cm.

In 2006 the exposed regularity is maintained from the previous year. At the end of the fourth year after the plantation, the apple trees reached optimal bioconstructive parameters, for study was 328-347 cm, and the breadth of the crown was 170-177 cm.

The investigations made demonstrate that the rhythm of growth of the young apple trees increases the bioconstructive parameters of the crown and contributes directly to the optimal capitalization of the productive volume of the crown and spare of nutrition offered to each apple tree.

The researches made by Gh. Cimpoieş (2000) in the central zone of the country in the fruit-growing plantations of apple trees with a distance between the rows of 4,0 m and a width of the crown of 2,0 m. The calculated height of the fruit hedge is 3,7 m.

In the case when the distance between the rows is 3,25-3,5m, the height of the trees has to be of 3,0-3,2 m, and the width of the crown is 1,5-1,8 m. At the base of crown are formed 3-4 secondary branch with a length of 40-45 cm, and above on the central axle are formed more branches of 1-3 years.

The length of the trunk circumference is one of the most stable indexes that rather precisely reflect the genetic potential of the varieties and the fruit tree reaction at the ecological and agrotehnical conditions.

The investigation made (fig. 3) demonstrate that the length of the trunk circumference of the varieties taken into the study in 2004 constituted 2,4-7,7 cm. In 2005 the mentioned index of the varieties taken into the study had increased to 10,1-11,4 cm, and in 2006 it constituted 11,8-13,3 cm. In 2007 the length of trunk circumference at the variety Idared variety constituted 14,3 cm, at Golden Reinders variety was 14,5 cm, at Jonagold Decosta variety was 15,0 cm and Čampion variety was 16,5 cm.

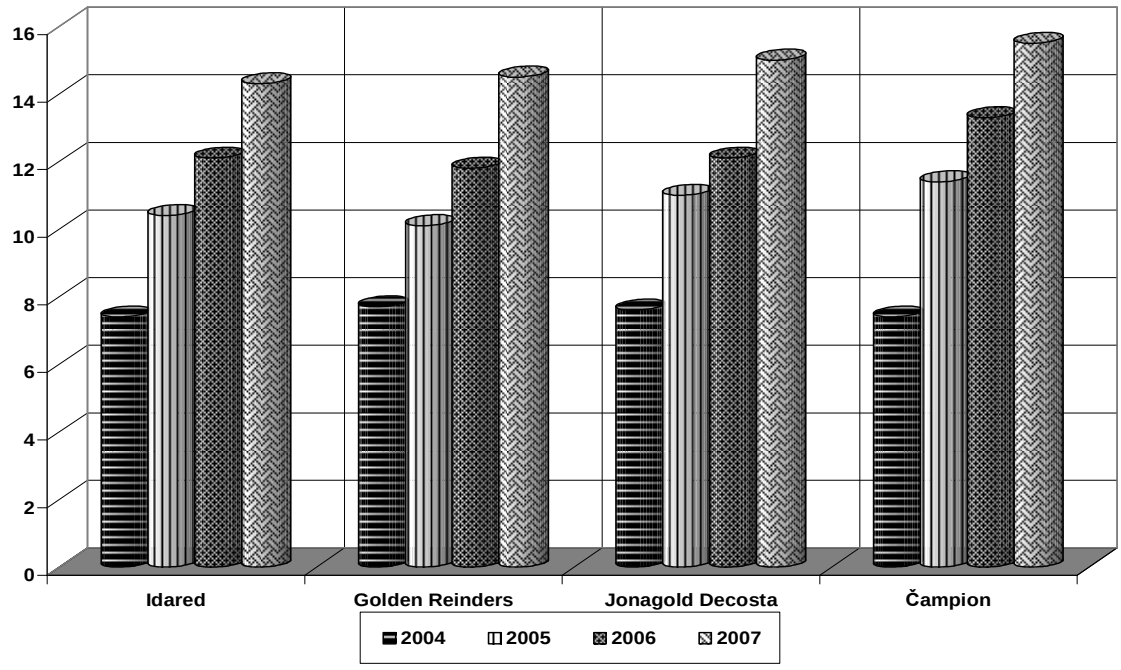


Figure 3

The length of the trunk circumference of the tree in the apple tree plantation founded with planting material of „knip-baum" type, cm

The greatest growth of length of the trunk circumference during the researches made (fig. 4) has been obtained at the variety Čampion and its index was 8,9 cm. The lowest values were obtained at the varieties Golden Reinders (6,8 cm) and Idared (6,9 cm). At the variety Jonagold Decosta the length of the trunk circumference constituted 7,4 cm.

The researches made demonstrate that the development of the apple tree trunk depends on its age, biological features of the variety and the agrotehnical level maintained in the plantation during the entire period of vegetation.

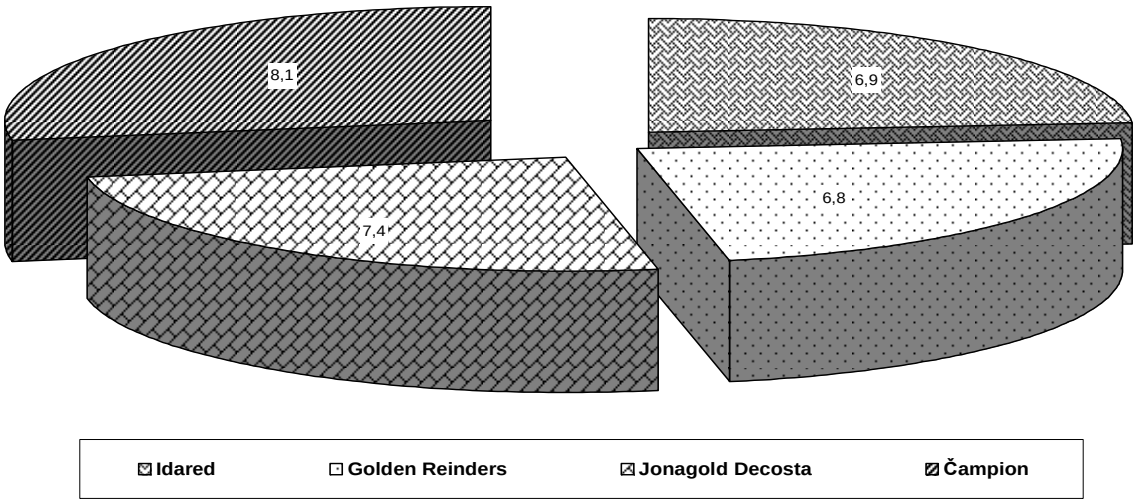


Figure 4
The length growth of trunk circumference of the trees in the apple tree plantation founded with planting material of „knip-baum" type, cm

## CONCLUSIONS

- At the end of the forth year after the plantation the orchard with planting material of „knip-baum" the bioconstructive parameters of crown are characteristic to apple trees grafted on the rootstock M9 when the height of the varieties taken into the study constituted 328 - 347 cm and the width of the crown was 170 - 177 cm.
- The length of the trunk circumference of the apple trees depends on the biological features of the variety and the agrotehnical level maintained in the plantation. Thus, the diameter of the trunk through which circulates the sap from roots to the leaves and vice-versa, has essential influence on apple tree growth and fructification

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