



Growth manifestations and morphological characteristics of offspring of hybridization of blackthorn /*Prunus spinosa*/ with representatives of *Prunus domestica*

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Abstract

The pomological characteristics of leaves, fruits and size were studied of trees of offspring of crossings of Blackthorn with: /1/ Green Renclod, /2/ Yellow Ablanshka plum and /3/ Topalka. Hybridization was conducted by Prof. Micho Balev. The power of influence of parental forms was studied over the inheritance of examined indicators for the offspring. Studies were conducted in the period of finished growth of trees. Maternal form had a height of 1.9m. Paternal forms - Green Renclod, Yellow Ablashka and Topalka had the following heights: 7.4, 5.5, 5.9m and trunk circumference: 108, 47, 48cm. In the first combination, the height of trees from the offspring in most cases was 6-7m, and the trunk circumference was 60-80cm. In the second and third crossings, the following plant height was predominant, respectively: 4.5-5.5m and 4,3-6,3m, and trunk circumference was: 50-70cm and 60-86cm. All plants from the offspring for all three combinations had great growth vigour, as in relation to the values of the main parameters of that indicator they got closer to the paternal forms. The same tendency was also found in the inheritance of leaf sizes - i.e. a stronger influence of the paternal parent. For all offspring of the plants, fruits had blue colouring. In relation to weight of fruits, they took an intermediate position of the parents with a slight approaching to the parental forms. In the first combination, a greater share of the studied plants had a fruit weight 10-14g, and in the second one - 9-11g. A smaller weight had fruits of plants from the combination Blackthorn X Topalka, as almost half of them had a weight from 5 to 9g.

Keywords: plum, cultivars, interspecies hybridization, genetics

Introduction

For the importance of remote hybridization it is sufficient to note that the main culture species *Prunus domestica* has a hybrid origin obtained by the species *P. cerasifera* and *P. spinosa* (Eremin, 1977; Eremin and Polovyanov 1984). In creation of new plum cultivars, especially for their resistance to diseases, the view on the use of interspecies hybridization strengthens its position more and more (Trifonov D. 1972). With remote hybridization, due to differences of genomes, a broad formative process is at hand. Diversity in the offspring allows to be chosen hybrids with valuable qualities representing an interest as a source material for selection of new species. (Eremin, 1977; Eremin and Polovyanov 1984).

The aim of the research is to study the inheritance of growth vigour and some morphological characteristics of generations of crossings of Blackthorn with representatives of *Prunus domestica* and enriching the theoretical basis of the selection work with plum.

Materials and Methods

The growth and morphological characteristics were studied of generations of three interspecies crossings with the participation of Blackthorn /*Prunus spinosa*/ as a maternal form with representatives of *Prunus domestica* as follows:

1. Blackthorn X Green Renclod 83 hybrids
2. Blackthorn X Yellow Ablashka plum 43 hybrids
3. Blackthorn X Topalka - 16 hybrids

Sizes of trees were determined: - trunk circumference, height of tree, diameter and volume of crown. Length and width of leaves were determined. Morphological characteristics of fruits were examined, weight and colour of exocarp were studied. The results of the studies conducted on plants of the offspring and the source forms were compared, and the influence of parents in relation to different indicators were found.

Hybridization was conducted by Prof. Micho Balev. Gardens were established on lightly grey forest soil, and trees were planted at a distance - interrow 5m and within the row 4 m.

Yellow Ablanshka plum is a local cultivar. Fruits become ripen early in the end of July. They are oval in shape, ochre-yellow colouring and weight - 16.9g. Stone is separated easily. Early flowering.

Topalka is a local cultivar. Fruits have dark blue colouring. They become ripen very early. They have oval shape and weight of 21-24 g. Stone is not separated.

The researches were conducted according to Methods for Studying Plant Resources in Fruit Orchard Cultivars (Nedev et al., 1979).

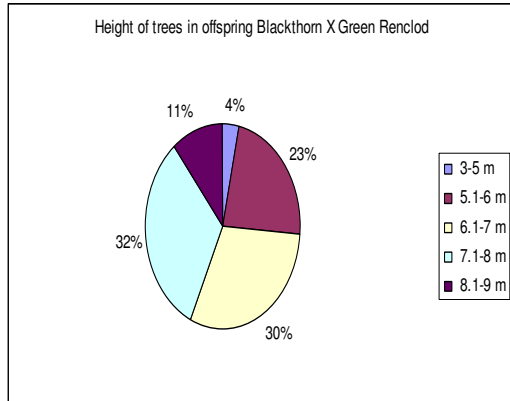


Fig 1

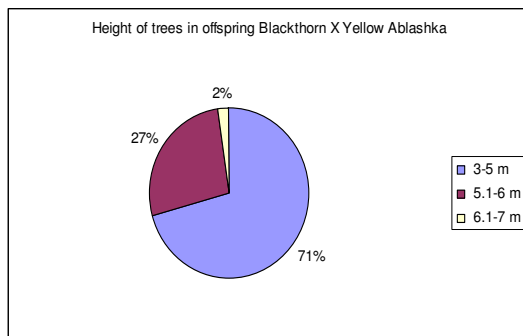


Fig 2

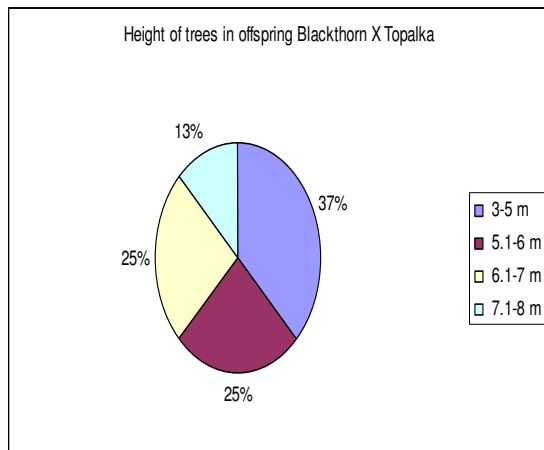


Fig 3

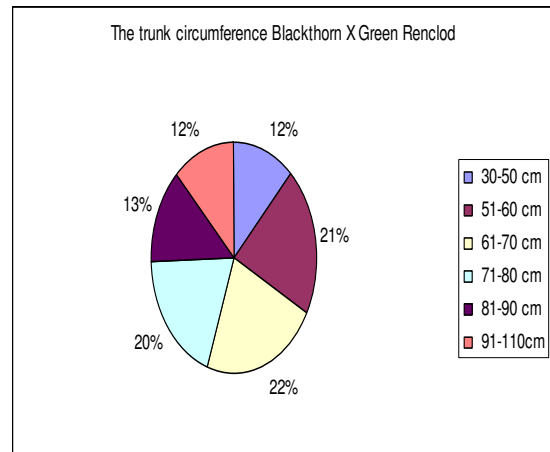


Fig4

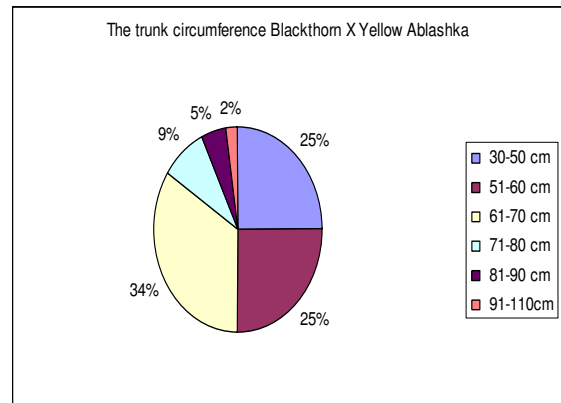


Fig 5

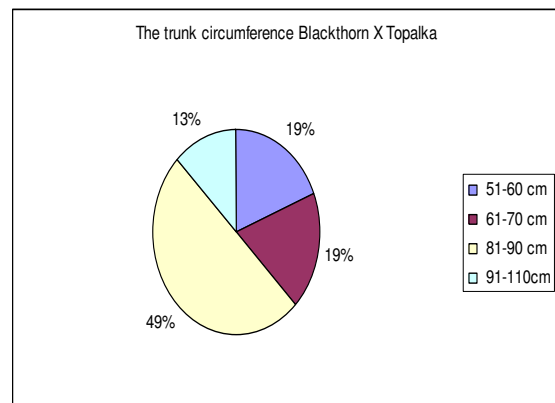


Fig 6

Results and Discussion

Main indicators for growth vigour of fruit trees are: height, diameter and volume of crown and trunk circumference. According to these indicators the parental forms differ significantly. Blackthorn grown slightly, the sample used in this case has a height of 1.60 m. Paternal forms had a

significantly greater growth vigour. The trees of Green Renclod were the highest as they reached 7.38 m. Topalka trees were less height – 5.90 m and Yellow Ablanshka plum – 5.50 m. In the offspring of the first combination, the height of trees varied from 3.70 to 9.10 m, as almost 70% had a height of 6.0-8.0m. In the second combination, variation according to this indicator was from 2.80 to 6.40 m., as 66% had a height from 4.0-6.0 m. In the third combination, trees reached a height from 4.3 m to 7.6 m., as 56% were 4-5 m. During the study of height of trees from the offspring for all the three combinations was noticed an approaching to the size of the parental parents, which showed stronger influences of paternal forms in inheritance of that indicator. This was most strongly expressed in the combination Blackthorn X Green Renclod (Fig.1, 2, 3).

The crown volume of Blackthorn was 0.50 m, of Green Renclod - 76.8 m., Yellow Ablanshka plum - 22.1 m and Topalka - 23.5 m. All plants from the offspring of the three combinations had a crown volume significantly exceeding that of the maternal parent. The largest crown volume had the trees of the offspring from the combination Blackthorn X Green Renclod, as for 46% of them it is over 50 m.

The trunk circumference was a very important pomological feature characterizing growth vigour in fruit tree species. For parental forms was as follows: Blackthorn 12 cm, Green Renclod 108 cm, Yellow Ablanshka plum 47 cm and Topalka 48 cm. All plants of the offspring had thick trunks significantly exceeding that in the maternal parent. In the crossing with the participation of Green Renclod, 75% of trees had a trunk circumference over 60 cm, in the second combination 70% had over 50 cm and for the third combination 80% were over 60 cm (Fig. 4, 5, 6).

In relation to growth vigour indicators, trees of the offspring of the three combinations repeatedly exceeded the maternal parent. Plants received from hybridization of Blackthorn with the above mentioned paternal forms of *Prunus domestica*, formed trees with big sizes approaching and exceeding sizes of paternal parents.

Leaves of Blackthorn were considerably smaller in size than these of paternal forms, and annual shoots were with length of 36.6 mm and width of 18.2 mm. Leave sizes in Green Renclod were 71x45 mm., for Zhulta Ablanska plum 55x35 mm and Blackthorn - 63x40 mm.

Plants from the offspring of the first combination had large leaves as almost 45% exceeded the sizes of paternal parent. In the second crossings 80% of plants had larger leaves

than paternal parent. In the offspring of combination with the participation of Topalka 70% had leave length of 50-60 mm.

An important feature of fruit trees are the characteristics of their fruits, as the main pomological indicator is their weight. For the maternal form, they were small with a weight of 1.8g. For Green Renclod they were 24.2g, for Yellow Ablanshka plum - 16.9 g and Topalka - 22.5 g. For the first combination almost 65% of the trees had fruits with 10-14 g. For the second crossing, the weight varied from 9 to 14 g as almost for 50% it was 9-11 g. For the third combination, the fruit weight varied from 2.5 to 13.8 g, as for 50% it was 5-9 g. The largest fruits of 15-16 and more grams were found in the offspring received with the participation of Green Renclod. In relation to fruit weight, plants of the offspring of the studied crossings took the intermediate position as they slightly approached the paternal parents.

A characteristic feature of fruits is the colouring of their exocarp. For the parental forms it was as follows: for Blackthorn - dark blue colouring, for Green Renclod - yellow-green, for Ablanshka plum - yellow and for Topalka - dark blue. All plants of the offspring of the three crossings had dark-blue to dark-purple colouring. In the inheritance of the colouring of the exocarp was found the domination role of the maternal form - Blackthorn.

Conclusions

Plants from the offspring of the hybridization of Blackthorn as mother, with Green renclod, Yellow Ablanshka plum and Topalka form large trees with sizes close to and exceeding these in the paternal parents. In the inheritance of other characteristics for growth vigour, such as trunk circumference and crown volume was found the same pattern: stronger influence of genetic plasma of the paternal forms. The inheritance of sizes of leaves also was in the direction of the paternal parents. The inheritance of fruit sizes in the offspring of the conducted crossings is intermediate type. From the used paternal forms, Green renclod had the strongest influence over the offspring in the inheritance of growth vigour and fruit size. All plants of the offspring had dark blue colouring of the exocarp, as the inheritance was in the direction of Blackthorn, which was an indication for its dominance in this indicator.

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