Evaluation of some sweet cherry cultivars on PHLC and CAB

dwarfing rootstock in Iстира-Buzau, Romania

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Abstract

INTRODUCTION

Growth vigour is a specie of great importance in Romania. Due to the demands of increasingly large part of the market, many growers establish their cherry orchards to meet consumer demands. Unfortunately, in our country, cherry trees are produced mainly on genotypes with low productivity (P. Iulian I. and Mihai I.) to reduce the trees' height and to anticipate yield, farmers appear to take advantage from it, naturally. The use of dwarfing rootstocks which allow to establish intensive cherry orchard. If there are currently a lot of useful information about the behavior of some varieties of sweet cherry on dwarf rootstocks in various areas of culture in the world (Poland et al, 2000; Pappoge et al, 2008; Balmer, 2008; Kureus, 2008; Budjits and Hirotsu, 2009; Balbous et al, 2010), in terms of cultural conditions of Romania there are only few published data about the performances of cherry varieties on this dwarfing rootstock. For this purpose, in this paper we present in 2009-2011 the data obtained by means of some varieties of cherry rootstocks grafted on dwarf PHLC and CAB11E and CAB11B rootstocks in a young orchard of each one, on an experimental area for its sweet fruit culture in Romania.

MATERIALS and METHODS

Research has been conducted in Iстиra Fruit Nursery of USM University Bucharest. The farm located on parallel 46°30’ north latitude between 24°41’ to 24°45’ east longitude, at an altitude of 114 m, the village Sântuie, Sucea. Such horti climate is quite warm. The average annual temperature is 10.1°C, and the average annual precipitation totaling 500 mm. Distances that separate the major urban centers are 105 km Bucharest and 25 km from the city of Iстиra. Nursery area falls in the plain region that begins at the foot of hills (Sălciu Major), just below hill Istrița and connects this area with the Black Sea. An intensive modern cherry plantation was established in 2009 on an area of 8 ha. The trees were planted at distances of 4 x 2 m and are trained in central leader. Plot provides wire support system and treated plain trees. The next combinations were presented: Komel, Roșu/Milos, FirmRed/CAB11E, Ferrovia/CAB11E, Girandole/CAB11E, and EarlyRed/CAB11E. Variants are simple random selected and thickness of 15%.

In the experiment, we determined: trunk cross-sectional area (TCA) calculated from the trunk diameter measured at 35 cm height above the graft union at the root collars; the area of the stem, trunk, median and long branches and the share of the long and short branches/tree; fruiting elements were also measured: total number of flowers, number of flowers per branch on the fruiting branches and per tree, fruit set percentage depending on the total number of flowers/tree; Yield per tree (kg) was calculated as the average weight of harvested fruit. Yield per hectare (ha) was obtained by multiplying the yield per tree and tree density [trees/ha]. Fruit weight (g) was obtained as the average of fruit weight of the total of 25 fruits from each tree. The main phenophases were noted according to Fickinger’s method of reference stages (Schirmer et al. 1995). All gathered data were processed by analysis of variance and Duncan’s multiple range test at a level of significance of 5% using Coelho software.

RESULTS and DISCUSSION

Tree height and trunk cross-sectional area (TCA) indicated the influence of the rootstock. In the early spring of 2011, the trees were measured and the data collected Table 1, show some differences between the varieties. As TCA, the most vigorous was Komel=25.17 cm² followed by EarlyRed=22.17 cm², and was recorded by Komel=25.17 cm² followed by EarlyRed=21.27 cm² and FirmRed/CAB=20.90 cm². All of them are higher than the mean of the varieties, but the differences are not statistically significant. With negative significance was Komel=25.17 cm² which recorded the lowest value of TCA (15.31 cm²) tree height between Komel=20 cm with very significant difference compared to the mean of the effect. All the other variants presented small differences between them and statistically insignificant comparing to the mean. A significant negative difference was observed at FirmRed/CAB where the average tree height was only 210 cm.

The different type distribution (table 2) was studied and the Duncan’s test split the variants in the case of medium branches in two groups: one with higher number such as Komel, FirmRed/CAB, Cabernet/CAB11E and Komel/Rd/CAB, and another group with lowest number such as EarlyRed/CAB11E, Cabernet/CAB and Varan/CAB. The same analysis we could say for the long branches, where all the variants presented differences statistically significant, the number of long branches/tree, Komel/CAB11E recorded the highest number (21.34) and Cabernet/CAB the lowest (6.04). For the effect of fruiting branches (FirmRed/CAB and Komel/CAB, the highest number of short branches (280). The stem of long branches/tree (fig. 1) highlights Komel (28.31%) and FirmRed/CAB (27.07%) and regarding the short branches, Cabernet/CAB is the variant with the highest percentage (86.87%). For the fruiting branches, the influence of the treatments into consideration that these dates are not defining the fruiting branches and the number of short branches, we can note that throughout the years after planting and the growth processes are present. The Principal Analysis of variance (Fig. 2, fig. 2) which has a typical sprout fruiting, in our situation described a stable pattern of fruiting.

With 54.6% more than the next bigger value of total annual growth was the combination Cabernet/CAB (19.30 cm). Komel/CAB and Varan/CAB have recorded a slower growth rhythm and together with the Cabernet/CAB and EarlyRed/CAB is one of the lowest growth rate (10.91 cm). The distribution analysis of inflorescences appeared on specific type of fruiting branches and the number of total annual growths with the highest number of inflorescences on short fruiting branches (Table 2) from the 9% of average values (9.6% from 18.11). Exceeding Komel/CAB, none of the cultivars/stock combinations had any significant differences on long fruiting branches. Even that Cabernet/CAB, Komel/CAB or EarlyRed/CAB, the appearance of inflorescences was relatively balanced regarding the types of branches (21.3% on short fruiting branches and 11.58 on medium branches).

A very small number of flowers was observed at FirmRed/CAB (26.05), FirmRed/CAB/PHLC and Ear/Med/Chilie (17.45). The fruit set percentage varied so widely in terms, from 51.2% at Varan/CAB to 3.7% at EarlyRed/CAB. The best fruit set recorded at EarlyRed and FirmRed should be followed in the future in order to determine if it is a feature of such a cultivar when grafted on different rootstocks.

The biggest fruit size was noted at Cabernet/CAB (g) and the lowest for Komel/CAB (5.3 g) and Ferrovia/CAB (5.6 g). The highest yield per tree was recorded by Komel (793.33 g/tree) due to a great fruit set percentage and large fruits (85.4 g). Although Komel produced small fruits, the cultivar seems to be one of the most promising saving (323.07 g/tree).

Some correlations have been made regarding the yield (g/tree) in relation with TCA (cm²) and total annual growth (cm). A close connection between these elements could be observed through the correlation index value such as 0.87 in the case of Yield/Tot Annual growth (Fig. 3). We also have recorded a correlation between TCA (cm²) and total annual growth (cm) with 0.67 correlation index value (Fig. 4).

In the climatic conditions of the Iстира in 2011, the March was 2001.5°C the date of bud burst for the most of the cultivars. Ferrovia/CAB flowered one day after Komel/CAB and FirmRed/CAB. In April 10, except Komel/CAB (April 3), Komel/CAB and FirmRed/CAB (April 3). After six or seven days, first flowers appear on the branches and the blossom period was 7 days for FirmRed/CAB, 8 days for Komel/CAB, Ferrovia/CAB, and 9 days for Kabernet/CAB. The average temperature was occurred in the period April 24 to 26. Fruit set took place in the first week of May. Three varieties were recorded in the flowering period in June, 8 (Komel/CAB and Cabernet/CAB and FirmRed/CAB) was in June, 12 (FirmRed/CAB and EarlyRed/CAB) and the latest one was Varan/CAB in June, 16.