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OCCURRENCE OF DRYING PLUM TREES IN THE CULTIVAR ČAČANSKA RODNA, ČAČANSKA LEPOTICA AND VALJEVKA GRAFTED ON MYROBALAN

SUMMARY

This paper shows results for production by plum cultivars Čačanska Rodna, Čačanska Lepotica and Valjevka growing in Polimlje production area. Cultivars are grafted onto myrobalan.

The occurrence of tree drying in the examined cultivars was the highest in the first five years after planting, and sometimes after six years. The aboveground part dries first, while the rootstock remains alive and continues to produce sprouts. Further tree drying is not noted after six or more years.

Based on the whole number of examined trees, 6.37% dried during examination, which is not negligible from an economic aspect.

Because of seedling heterogeneity of the myrobalan rootstock used for grafting, it is necessary to choose specific biotypes for suitable cultivars, so that insufficient compatibility between cultivars and the rootstock can be avoided.

Plum cultivars should be cultivated properly using good agrotechnical measures.

Key words: Čačanska Rodna, Čačanska Lepotica, Valjevka, tree drying

INTRODUCTION

Plums have been planted in Montenegro for ages. The greatest part of production is done in the Polimlje region. For a long time, the most common cultivar was *Požegača,* and a few less indigenous brandy cultivars. In recent times, *Stanley* and *Čačanska* cultivars have been involved.

Unselected myrobalan is used as a base for grafting plums, (Mišić, 1984; Medigović, 1989). Although myrobalan (*Prunus cerasifera* Ehrh.) is now used as generative base for plums, its seedlings show a certain lack of consistency, so we should take care when their using this cultivar in nursery production. It does not always show good affinity with the cultivars Californian blue, Stanley and Muley grass (Mišić, 1996). Poorer affinity of myrobalan with Californian blue and Stanley was noted by Milovanović (1969). Božović and Jaćimović (2003) stated that the number of received buds Stanley grafted on seedlings of 23 genotypes of

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myrobalan, separated from the region of Gornje Polimlje, varied from 74.36 to 100.00%.

During grafting, more incongruity at the connection point of the base and scion was noticed. Marro (1989, in agreement with Ninkovski, 2002) stated the following: insufficient lignification of callus due to instability of the fruit tree and irregular sap flow; in the xylem vascular tissue there are intrusions of parenchymal tissue and so the circulation of non-organic sap is slower, and connection point is brittle and fragile. Cambium layer and wood splicing occurs in "curves" and not directly between certain tissues on the connection point. Therefore, thickening is noticed and sometimes the edges of a connection point are sunken or the increase in substrate is disproportional compared to scion, and vice versa.

MATERIAL AND METHODS

Research was conducted in Bijelo Polje municipality in the localities: Lješnica, Kostenica (four orchards, Ivanje and Metanjac, table 1). Three cultivars grafted on myrobalan were studied: *Čačanska Rodna, Čačanska Lepotica* and *Valjevka*. For establishing planting, heterogeneous planting material was used, purchased from state or private nurseries.

Table 1. Locality, cultivars and planting years

Place	Owner	Cultivar	Planting year	N^{o} of trees
Ljesnica (Lj1)	Radović B.	Č. Rodna	1990	20
Kostenica (K1)	Jaćimović B.	Č. Lepotica	1994	41
		Valjevka	1998	87
Ivanje (I1)	Obradović V.	Č. Rodna	1997	30
		Č. Lepotica	1997	30
Kostenica (K2)	Jaćimović J.	Č. Lepotica	1997	72
		Valjevka	1998	40
Metanjac (M1)	Rakonjac R.	Č. Rodna	1998	30
		Č. Lepotica	1999	25
Kostenica (K3)	Šebek O.	Č. Lepotica	1998	30
Kostenica (K4)	Adamović V.	Č. Rodna	1998	25
		Č. Lepotica	1998	25

The connection points of scions and rootstocks (myrobalan) were checked and signs of incongruity were noted. In the spring, every year, a number of dried tree trunks, provoked by middle incongruity of the rootstocks and the previous part, were recorded, as well as some other factors (inadequate agro technique, incomplete protection, mechanical damages...).

RESULTS AND DISCUSSION

Research results are shown in Table 2. Drying of tree trunks of *Čačanksa Rodna*, *Čačanska Lepotica* and *Valjevka* was noticed, often from the first to the fifth year after planting, and sometimes into the sixth year. In all dried trees, only the aboveground part is dried – the one that belongs to the cultivar – while the base stays alive and continues to make sprouts. After the sixth and following years, further tree drying is not noticed. Opinions on causes of premature drying of fruits are different. One of the causes is physiological incongruity, which is shown by inadequate nutrition of the scion by nutritional matter and hormones that are absorbed by the root from the soil. A lower percentage of received grafts is noticed in the nursery, and later they lag in growth, show thickening on the grafting point, have an earlier drop of fruits and leaves. In winter, they most often suffer from winter frosts, and if they overwinter, they are attacked by plant diseases and pests and are also endangered by drought during vegetative growth (Kremenović, 1996). This incongruity is often consequence of interference during fruit circulation through the graft.

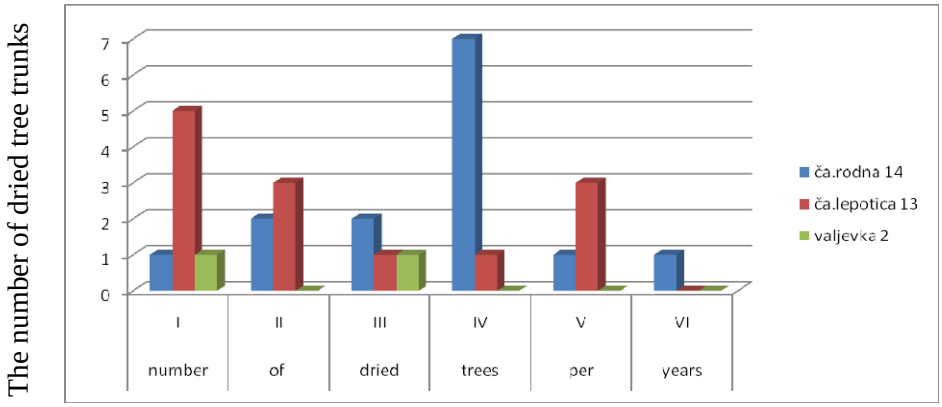
Table 2. Number and percentage of dried trees

Cultivar	No of trees	Number of dried trees per years												Total dried trees	
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	number	%
Č. Rodna (Lj1)	20	-	-	-	4	1	-	-	-	-	-	-	-	5	25
Č. Rodna (I1)	30	-	-	-	-	-	1							1	3,33
Č. Rodna (M1)	30	-	2	-	2									4	13,33
Č. Rodna (K4)	25	1	-	2	1	-	-							4	16
Č. Lepotica (K1)	41	1	1	1	1	-	-	-	-	-				4	9,75
Č. Lepotica (I1)	30	-	-	-	-	-	-							0	0
Č. Lepotica (K2)	72	-	2	-	-	2	-							4	5,55
Č. Lepotica (M1)	25	-	-	-	-	-								0	0
Č. Lepotica (K4)	25	2	-	-	-	-	-							2	8
Č. Lepotica (K3)	30	2	-	-	-	1	-							3	10
Valjevka (K1)	87	1	-	-	-	-								1	1,15
Valjevka (K2)	40	-	-	1	-	-								1	2,5
Total	455	7	5	4	8	4	1	-	-	-	-	-	-	29	6,37

Virus diseases add to this poor affinity if the base and graft, or even just one of components, are infected. Inappropriate ecological conditions also influence the incongruity: i.e., nutrient-poor soils, incomplete agro technical measures, and so on. Marro (1989, in agreement with Ninkovski, 2002) emphasises that when healthy planting material is used for grafting, graft reception is better. Even in cases of incompatible cultivars of pears and quinces, if healthy material is used, appearances of incompatibility decrease compared to grafts made with virus infected material. The same author also states that some peaches, plums and apricots on a myrobalan base show abundant growth of the

tree tops in the second year from planting, and after that, apoplexy follows. Its appearance is interpreted as late incompatibility, and it implies that the life of the grafted fruit is short. He also states that similar observations are noticed while grafting some other types of fruits, from vine to apples and pears.

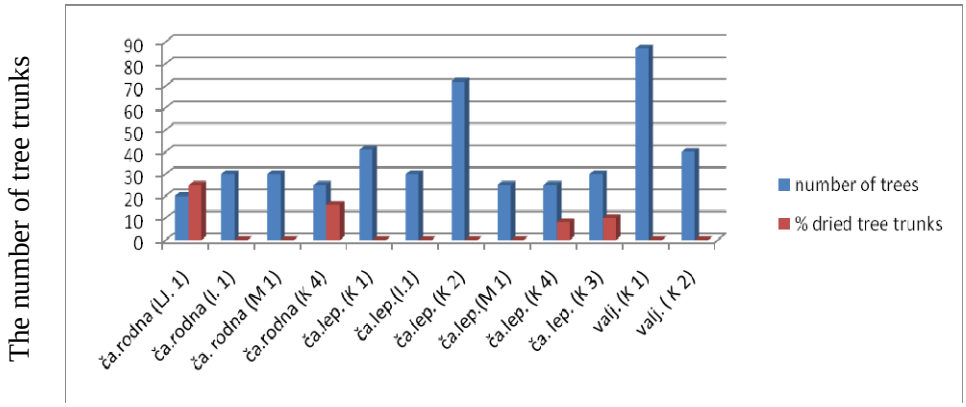
Removing incompatibility is achieved by grafting compatible combinations and by using bases and graft branches free of viruses. Partly removing incompatibilities can be achieved if appropriate agro ecological conditions are selected for cultivars and types, if the most appropriate type of grafting is used, and if agro technical measures, nutrition, protection and care are applied in the orchard. Reduction of physiological and mechanical incompatibility can be influenced by these measures (Medigović, 1989).



Graph 1. The number of dried tree trunks – in total and per years

According to some authors, (Arsenijević et al., 1972) parasitic fungi (*Verticilium sp. Cytospora sp.* and others) can cause this pathological state by their effects. Their research notes that phytopathogenic bacteria might be cause of this appearance. Vasiljkov (1964) came to these same conclusions. Moravan (1962) connects this appearance with viruses.

In the examined nurseries, plums were grown in a half intensive way. Cultivation of soil and watering was not applied, protection was irregular, and fertilising, cutting, and grass mowing were regular. Due to irregularity of protection during the first years, pathological states cannot be excluded completely. However, as the appearance disappeared, and later stopped, under the same conditions of poor protective measures, it is highly possible that drying appeared because of incompatibility. This is especially true if during the process of hybridisation in creating *Čačanska Rodna* and *Valjevka*, the Stanley cultivar was used, which is marked as the one which has poor affinity with myrobalan.



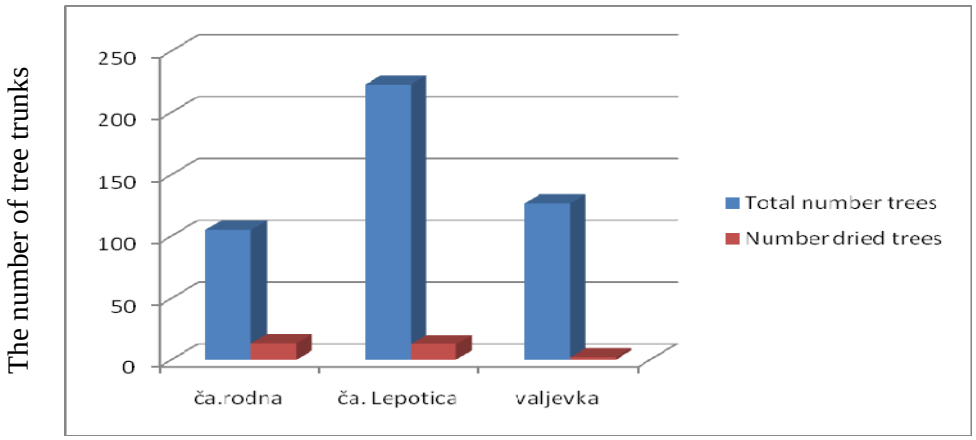
Graph 2. Drying of examined cultivars through localities

Picture 1. Tree of Čačanska Lepotica dried – base (myrobalan) with many one−year outgrowths

Possible causes were studied during first years after cracking of the tree bark. The possibility of mechanical damage to the bark, such as lesions created by a machine passing by or accidental or planned lesions by human actions, were excluded. In two orchards, after few years of no fertilising, the fruit trees were abundantly fertilised, and almost all cases of damage to those trees appeared in the following year. In this case, there was sudden growth of the tree trunk that year, the autumn months were humid and warm after a dry summer, and so the tree fruits continued their vegetative period. That winter, the fruit trees came into winter unprepared and cracking of tree bark appeared the following spring when the sap started circulating. Spring frost also occurred, which often happens in this region. Therefore, tree bark cracking occurred and later drying of the tree trunks, affecting 10.34% of the trees in those orchards.

The percentage of dried trees from the total planted trees was 6.37%. Although this is not especially high, this percentage of dried plum trees in young nurseries is not negligible, especially keeping in mind the costs of growing and care of plants in the starting years of fruiting. If it is assumed that, in full fruiting,

the plum yield would be about 50 kg per tree (that is, 17 *t/ha)*, that would represent, on this 6.37 % of dried trees, a loss of 1. 08 t/ha of fruits.



Graph 3. Number of dried tree trunks per cultivars compared to total number

Picture 2. Dried tree of Čačanska Lepotica

Picture 3. Dried trunk – base (myrobalan) alive

Although there is still a lot to do regarding research and selection of myrobalan as a base (Colic et al., 2002; Milutinović and Nikolić, 1994; Stančević et al., 1988; Božović, 2002; Božović and Jaćimović, 2003), there are still no trees recognised for the specific purpose of seedling production. By taking seeds from trees from natural populations, we become exposed to the high risk that we would select seed of insufficient germination, or seedlings with insufficient affinity toward cultivars, poor resistance toward pathogens and germs, and uneven tree growth in nurseries and plantations (Medigović, 1989). Further work is needed to select seedlings that can be used as a qualitative and uniform rootstock base for plums and other types of *Prunus.*

CONCLUSION

In accordance with the research of early drying of plum trees, cultivar *Čačanska Rodna, Čačanska Lepotica and Valjevka*, grafted on myrobalan, the following conclusions can be made:

- From the total number of trees examined during the research 6.37 % are affected, which is not negligible from an economic point of view.
- Due to heterogeneity of myrobalan as a base for grafting, certain biotypes should be selected for certain cultivars, in order to avoid insufficient compatibility between cultivars and bases.
- Plum plants should be cherished regularly by appropriate selection and application of agro technical measures.
- Many factors influence the occurrence of tree drying.

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POJAVA SUŠENJA STABALA ŠLJIVE SORTI ČAČANSKA RODNA, ČAČANSKA LEPOTICA I VALJEVKA KALEMLJENIH NA DŽANARICI

SAŽETAK

U radu su prikazani rezultati ispitivanja zasada šljive sorti čačanska rodna, čačanska lepotica i valjevka u proizvodnom reonu Polimlja. Sorte su kalemljene na džanarici.

Sušenje stabala proučavanih sorti uočeno je najčešće od prve do pete godine nakon sadnje, a negdje i šeste. Kod svih osušenih voćaka osuši se samo nadzemni dio, koji pripada sorti, dok podloga ostaje živa i nastavlja da tjera izdanke. Poslije šeste i narednih godina nije zabilježeno dalje sušenje stabala.

Ključne riječi: čačanska rodna, čačanska lepotica, valjevka, sušenje stabala