

NEW CLONAL ROOTSTOCKS FOR PLUMS ON THE BASIS OF *P. domestica* L., *P. cerasifera* Ehrh. and *P. insititia* L.

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Abstract

The clones with high ability of root formation on one-year-old shoots which arose from stoolbeds of mother plants have been singled out at the Faculty of Agriculture in Sarajevo. The original material was produced from seed collected from a wider area of central and north Bosnia.

Selections obtained from indigenous cultivars belonging to *P. domestica* L. have a high zone of rooting ability of shoots, that is they form a root along the whole mounded part of shoot. The root is compact with long and strong primary roots. Rooting ability index of this selection ranged from 1,05 to 2,91.

Rootstock selections developed from *P. cerasifera* Ehrh. also have high rooting ability zone of shoots but smaller number of formed roots, so that the rooting system has dispersed form. Rooting ability index of shoots ranging from 1,26 to 2,13 is satisfactory.

Selections on the basis of *P. insititia* L. have somewhat weaker rooting ability on the mounded parts of the shoot than *P. domestica* L. and *P. cerasifera* Ehrh. This selections have rooting ability index 0,88 and 1,67.

Introduction

The selection of vegetative rootstocks for plums is one of the main prerequisites for intensifying the production of this fruit crop.

The wider area of Bosnia and Herzegovina, as well as some areas of Yugoslavia are abundant in germplasma of autochthonous plum cultivars and myrobolan accession. Up till now, this material has not been used in selection of vegetative rootstocks, although good results in previous selection of generative rootstocks for plum and apricot (Kapetanović, 1968., Kapetanović et al., 1976., Paunović, 1969., 1977.) made foundation for continuing the work on developing vegetative rootstocks. The principal purpose of the research is to explore

possibilities for developing vegetative rootstocks on the basis of indigenous plum cultivars (*Prunus domestica* L. and *P. insititia* L.) and large number of myrobolan accession (*P. cerasifera* Ehrh).

Material and method

In the area of central and northern Bosnia, representative trees of indigenous plum cultivars and myrobolan accession were selected and used for production of seeds. Over the 1987-1991 period they were used for gathering seeds. The phases of research were as follows:

- seedling production
- planting of one-year old seedlings in stoolbeds table, spaced at 1,2m x 0,30m
- analysis of rooting ability degree and the ability of shoot formation over two-year period
- selection of plants with the best rooting ability and transplantation of one-year old shoots in stoolbeds table for secondary selection, in order to carry on with the research.

The following data were gathered about each mother plant: rooting height, number and length of primary roots, the degree of rooting with secondary roots, length and number of shoots and proportion of total length of primary roots on the shoots to above-ground system (rooting ability index).

In the next phases of work more facts about vigour, fruiting, fruit quality and compatibility of plum cultivars (požegača and stanley) with selected rootstocks will be obtained.

Results and discussion

First results confirmed the fact that vegetative rootstocks with satisfactory degree of rooting ability may be selected out of large population of indigenous plum cultivars and myrobolan accession. 360 seedlings with the ability of root formation on the mounded part of shoot were selected out of 4.280 seedlings in stoolbeds table for first selection. Many differences were shown in rooting ability, especially among certain cultivars and accession. On the basis of rooting ability on the mounded parts of the above-ground system and number of shoots, there were selected 86 plants which satisfied established criteria. Some plants showed a high rooting ability of shoots, but they formed small number of shoots (less than 3), so they were not propagated in further work. For further vegetative propagation there were selected 33 plants: of *P. domestica* L. 17 plants, of *P. cerasifera* Ehrh. 12 plants and 4 plants of *P. insititia* L. Their main characteristics are presented in table 1.

3.1. *Prunus domestica* L. selections

All selections obtained from indigenous cultivars belonging to *P. domestica* L. have a high zone of rooting ability of shoots, that is they form a root along the whole mounded part of shoot. The root is compact with long and strong primary

roots, total length amounting to 40 cm per root. The average number of primary roots per shoot ranges from 6,0 to 12,7. These roots are abundant in secondary roots. We think that attention should be paid to the following selections: 11/1-9; 11/1-36; 11/1-37; 11/1-49; and 11/1-78. Rooting ability index of these selections ranges from 1,38-2,91, which shows that the mass of built root is larger than the mass of built above-ground shoot. Average length of primary roots ranges from 13,17-19,81 cm. According to shoot vigour (average length ranges from 44,60 cm to 112,0 cm) vegetative rootstocks of different vigour may be expected in further work. Out of the above-mentioned selections, low vigour is a characteristic of 11/1-36 and 11/1-78 (average shoot lengths are 44,60 cm and 54,00 cm); medium vigorous is 11/1-49 selection and more vigorous are 11/1-9 and 11/1-37 selections.

1/1-2 selection shows good results in rooting ability because it forms an average number of 9,8 primary roots per shoot (average length is 17,20 cm); it is vigorous (average shoot length is 140,20 cm). However, this selection forms large number of premature shoots, which can be considered as a defect.

We think that 1/2-147 and 2/2-17 selections are also interesting (rooting ability index 1,05 and 1,97). The selections form average number of 8 and 8,5 primary roots per shoot with average length of a primary root that amounts to 13,20 cm and 14,35 cm.

3.2. *Prunus cerasifera Ehrh* selections

Rootstock selections developed from *P. cerasifera Ehrh* accession also have high rooting ability zone of shoots, but smaller number of formed roots, so that the rooting system has dispersed form. Average length of primary roots ranges from 10,36 cm to 26,04 cm. We think that attention should be paid to the following selections: 12/2-1; 12/2-80; and 12/2-280. The best rooting ability index has 12/2-280 selection (2,13). The average number of primary roots is 11,7 per shoot with the average root length of 17,01 cm respectively. This rootstock is medium vigorous. Similar results are obtained with 12/2-1 selection, but rooting ability index of shoots is lower. In contrast to this, 12/2-80 selection has a higher degree of vigour, so more vigorous rootstock can be expected within this selection. Anyway, this selection forms satisfactory number of primary roots, with the average length of 26,04 cm respectively and rooting ability index is 1,52.

Taking into consideration the age of mother plants, number of fully-grown shoots in above-mentioned selections satisfies our criteria (3-6 shoots are formed). This is especially characteristic of 12/2-80 (5 shoots) and 12/2-1 (6 shoots).

3.3. *Prunus insititia L.* selections

Prunus insititia L. selection has somewhat weaker rooting ability on the mounded parts of the shoots than *P. domestica L.* and *P. cerasifera Ehrh*. Interesting selections are 6/1-18 and 12/1-15. 6/1-18 selection has lower rooting ability index (0,88); the average number of primary roots per shoot amounts to 6,60 (the average length of primary roots is 14,18 cm respectively). Rootstock is of a medium vigour, with the average length of shoots amounting to 105,70 cm respectively. 12/1-15 selection has better rooting ability index (1,67) and the average number of primary roots per shoot is 6,00. The average length of roots is

10,92 cm respectively. The selection is interesting for its weak vigour (the average length of shoots is 39,30 cm respectively). However, both selections form smaller number of shoots (3).

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Table 1 - Morphological characteristics of shoots of selected genotypes *Prunus domestica* L., *Prunus cerasifera* Ehrh. and *Prunus insititia* L., II selection, 1991 and 1992

Selection code	Number of shoots	Average length of shoots (cm)		Average number of primary roots		Average length of primary roots (cm)		Index R/TS
1/1-2	5	140.2	± 27.3	9.8	± 1.9	17.20	± 0.61	1.2
5/1-10	4	109.3	± 11.8	8.3	± 0.6	10.00	± 0.27	0.76
6/1-18	3	105.7	± 27.7	6.6	± 2.3	14.18	± 0.46	0.88
6/1-20	4	154.5	± 16.7	7.0	± 2.1	12.57	± 0.45	0.57
11/1-9	4	112.0	± 13.1	10.5	± 0.5	19.81	± 0.81	1.86
11/1-36	7	44.6	± 4.5	9.3	± 1.3	13.97	± 0.48	2.91 ☺
11/1-37	7	103.7	± 13.7	9.3	± 1.3	15.37	± 0.51	1.38
11/1-49	7	86.7	± 17.7	8.3	± 1.5	15.43	± 0.69	1.48
11/1-61	3	86.0	± 12.1	12.7	± 0.6	10.00	± 0.45	1.48
11/1-64	4	95.3	± 16.9	12.3	± 1.7	13.96	± 0.66	1.80
11/1-78	4	54.0	± 9.3	10.5	± 2.1	13.17	± 0.53	2.56 ☺
12/1-7	6	124.8	± 10.9	5.0	± 2.4	17.20	± 0.66	0.69
12/1-15	3	39.3	± 8.2	6.0	± 3.2	10.92	± 0.51	1.67
24/1-26	3	125.0	± 17.2	6.0	± 1.1	18.67	± 0.62	0.89
1/2-147	5	99.4	± 10.5	8.0	± 1.4	13.12	± 0.55	1.05
1/2-221	4	134.8	± 22.5	7.0	± 0.7	11.86	± 0.57	0.61
2/2-10	5	107.2	± 5.3	6.5	± 1.2	13.84	± 0.61	0.84
2/2-11	3	63.3	± 14.1	7.0	± 1.1	15.42	± 0.67	1.71
2/2-17	3	62.0	± 6.2	8.5	± 1.2	14.35	± 0.57	1.97
2/2-21	4	90.5	± 16.8	8.3	± 0.6	16.14	± 0.81	1.48
3/2-8	4	109.5	± 5.0	9.3	± 0.6	14.41	± 0.65	1.22
12/2-1	6	119.3	± 9.5	9.5	± 1.2	15.79	± 0.74	1.26
12/2-12	4	171.5	± 9.3	8.5	± 1.2	12.23	± 0.55	0.61
12/2-35	3	180.7	± 3.9	10.3	± 0.6	20.39	± 0.71	1.16
12/2-37	4	174.0	± 5.6	7.5	± 1.2	14.80	± 0.54	0.64
12/2-46	4	132.0	± 11.5	7.2	± 0.6	12.46	± 0.54	0.68
12/2-70	3	171.0	± 3.3	6.0	± 1.9	24.83	± 1.16	0.87
12/2-80	5	164.0	± 7.7	9.6	± 2.5	26.04	± 1.13	1.52
12/2-93	4	144.5	± 8.4	5.5	± 1.2	22.00	± 0.92	0.84
12/2-95	7	145.0	± 11.0	5.0	± 3.0	21.90	± 0.95	0.76
12/2-195	4	149.5	± 7.4	4.7	± 3.2	10.36	± 0.41	0.32 ☹
12/2-280	3	93.0	± 2.9	11.7	± 0.6	17.01	± 0.71	2.13 ☺
12/2-371	3	111.7	± 8.1	8.3	± 0.6	12.77	± 0.58	0.95