IN VITRO PROPAGATION OF APRICOT *(PRUNUS ARMENIACA* L.)

Lalso Vasile*,Onet Aurelia*, Vicas Simona*, Agud Eliza*, Onet Cristian*

*University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048, Oradea, Romania, e-mail:vasilelaslo@yahoo.com

Abstract

The paper studies in vitro multiplication of four cultivars of apricot (Prunus armeniaca L.) with explants consisting of uninodali cuttings, cut from semilignified shoots. For proliferation BAP was more effective than zeatin. On the MS culture medium with BAP (2 mg /l) the apricot cultivar Rareș formed in average 4.6 shoots with an average length of 1.9 cm. IAA in a concentration of 1 mg/l has rhyzogene effect higher than that of the concentration of 0.5 mg/l. The early cultivars have an upper morphogenic reaction in comparison with the cultivars with late ripening.

Key words:micropropagation, 6-Benzylaminopurine, apricot cultivar, zeatin

INTRODUCTION

Apricot (*Prunus armeniaca* L.) has a very limited geographical area due to its special ecological requirements. However, it is considered to be the second species as importance after peach with an annual production of about 2.5 million tons (Perez- Tornero, Burgos, 2001). Apricot seedlings rooted to a very small extent and the only solution to multiplying valuable varieties is grafting on the appropriate rootstock (Reighard et al., 1990).

Informationson tissue culture in apricots are generally very few. Many of the studies have focused on obtaining virus free mother plants (Kataeva, and Kramarenko, 1989; Balla, Vértesy 2001). Increasing the micromultiplication rate by optimizing the composition of culture media, of phytohormonal balance and carbon sources used has also been studied (Yasuhiro Murai et al 1997; Marino, Bertazza,, Magnini, and Doro Altan, 1993, Perez-Tornero, López,, Egea, and Burgos, 2000, Karim. Farag et al., 2012).

Research in recent years has resulted in the development of culture medium recipes, which have been associated with adequate sterilization procedures and explant optimization and have led to an improvement in the micromultiplication rate. At the same time, however, studies have revealed a high specificity of the behavior of different varieties in cultivation in vitro. In Romania, the germplasm found in the national collections at *Prunus Armeniaca* counts 394 genotypes (Official Catalog 2003). It is important for the valuable genotypes for production but also for the valuable genes sources to determine the optimal conditions for in vitro culture. The

characterization based on morphological descriptors is complied by the molecular genetics studies (Hemaid, Soliman, 2012).

MATERIAL AND METHOD

The biological material used consisted of uninodal cuttings cut from semilignified annual branches, harvested in August from SC Prototera SRL. For the experiments we used 4 cultivars with different ripening periods. The characterization of the varieties taken in the study with the help of the morphological markers is shown in Table 1. After removing the leaf petiole, the 20-25 cm annual branches were kept under water for 15 minutes. Following was the cut in single-leaf cuttings with axillary shoots of 15 mm -20 mm.

They were disinfected with 70% ethyl alcohol for 90 seconds and then with a 1.5% sodium hypochlorite solution (15 minutes) to which a drop of Tween 80 was added to 50 ml of solution. Then followed 3 washes with water sterile distilled for 5 minutes each. We used 2 variants of culture media (Table 1) with 0.06% agar, 3% sucrose, sterilized at 121^0C for 15 minutes. Each experimental variant had 5 repetitions. The vitamins and the phytohormones were added after sterilization using 22 μm Millipore vials. Propagation was done in 50 ml sterile pots (15 ml medium/culture vessel). After inoculation, they were placed in a SANYO growth chamber ensuring a temperature of 18^0C at night and 24^0C at day, at 16/8 hours photoperiod, with 2000 lx on day.

Rareș

The tree: it is of small force, with early fructification, mainly on bouquets of May and mixed branches, with early flowering. The fruit maturing period is in the first decade of June, being the earliest maturation of known apricot phenotypes.

Mamaia

Variety of Romanian origin, homologated in 1975

Technical characteristics: the flowering period is medium abundant to late; medium force trees; combined fructification on short and long branches; high production potential, between 13-15 t ha; semi-late fruit ripening epoch, after July 20^{th} and between July 20-30.

Saturn

Saturn - has medium strength, good production capacity, resistant to frost and disease, has medium, spherical and asymmetric fruit, yellow-orange, red-stained on the sunny side. The pulp is orange, farmyard, sweet, with very good taste. Is cultivated in the south and Dobrogea and matures in the first half of July.

Comandor
The tree is of medium to small force. Large spherical fruit, slightly elongated and slightly flattened sideways, medium size 60-65g. Fine velvety, yellow-orange fine-grained peach. The pulp is light orange, juicy, balanced, sweet and aromatic, non-perennial, appreciated for consumption and industrialization. The tree is well resistant to diseases and frost, blooms abundantly and lately. Recovery: it is harvested in early August.

RESULTS AND DISCUSSION

1.Effects of different cytokinins and their concentrations on shoot proliferation

To test the micromultiplication capacity of the four varieties of apricots, we used the MS and Gamborg B5 medium with phytohormonal compositions to stimulate both shoots and roots. The composition of these culture media is presented in Tables 1 and 2.

Table 1

Variants of culture media for micromultiplication

Crt. no.	Medium	cytokinins		Auxin IAA
		BAP	Zeatin	
1	V1 - MS	1mg/l	2mg/l	0,1mg/l
2	V2 - MS	2mg/l	1mg/l	0.1 mg/l
3	V3- Gamborg B5	1mg/l	2mg/l	0,1 mg/l
4	V4- Gamborg B5	2mg/l	1mg/l	0,1 mg/l

The MS culture medium further stimulates the formation of shoots at a 2 mg/l BAP content in all 4 cultivars. BAP has a caulogenic effect higher than an equivalent zeatin concentration. Gamborg B5 Medium with 2 mg BAP/l stimulates shoot formation even if to a lesser extent than the MS medium (Fig.1). The caulogenic effect of Zeatin is better the composition of the Gamborg B5 medium. Due to the aspect of the length of the formed shoots, the most environmentally stimulating variant of the medium is V3 (Fig.2). The most receptive to micromultiplication is the Rareş cultivar, which is the earliest. This form on V2 an average of 4.6 shoots per uninodal cuttings and an average of 1.9 cm long on V4. Our data show the close dependence of the explant age (correlated here with the early or late cultivar) and its reaction on different environmental compositions. The caulogenesis on Rareş cultivar is presented in Fig. 3.

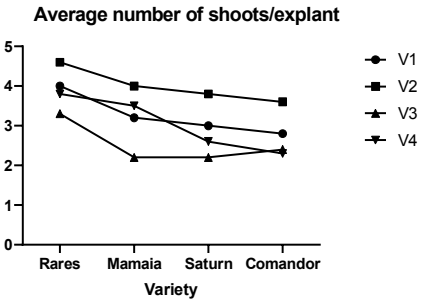

Fig.1 Average number of shoots/explant

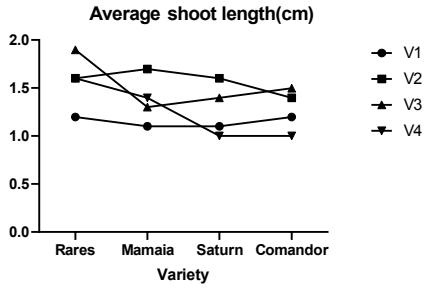

Fig.2 Average shoot length (cm)

Table 2

Mediums for rooting stimulation

Nr. crt	Medium	IAA	BAP
Ctr.	MS	-	0,I mg/l
1	V1 - MS	0,5mg/l	0,1mg/l
2	V2 - MS	1mg/l	0.1 mg/l
3	V3- Gamborg B5	0,5mg/l	0,1 mg/l
4	V4- Gamborg B5	1mg/l	0,1 mg/l

Fig 3. Caulogenesis on Rareș cultivar

2. Root initiation on shoots

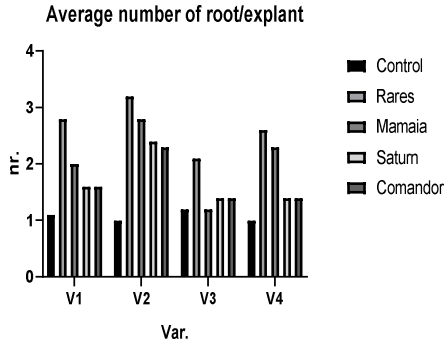

Fig.4 Average number of root/explant

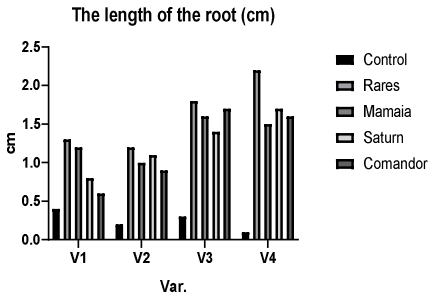

Fig. 5 The length of the root (cm)

Concentrations of 1 mg/l IAA provide a higher rhizogenic capacity of both MS and Gamborg B5 (Fig. 4). The length of the roots (Fig 5) is influenced by their number and the composition of the Gamborg B5 medium at which the measured lengths are superior to those on the MS medium both at an IAA concentration of 0.5 mg/l and at 1 mg/l. It is also noted that the Rareş cultivar is superior to the other cultivars on all variants of culture media, both in the number of roots per explant (3.2 at V2) and their length (1.8 cm per V3). The number of roots formed and their length correlates negatively with the cultivation delay. The rhizogenic effect of the IAA addition is relevant in all variants compared to the control variant.

CONCLUSIONS

MS and Gamborg B5 culture mediums are suitable for apricot micromultiplication under the conditions of use of appropriate phytohormonal balances. BAP has a more pronounced morphogenic effect than zeatin.The explant response to in vitro culture is closely correlated with the effects of the plants from which it originates.

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