



Viability of introduced varieties of Surfinia and Calibrachoa in sterile culture depending on the season of explant selection

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Abstract

The article presents the results of experimental studies concerning the influence of the explant selection season of six introduced varieties of surfinia and two introduced varieties of calibrachoa on their viability in a sterile culture. The dependence of the viability of the introduced varieties of surfinia and calibrachoa in a sterile culture on the time of year in which the explant was isolated is shown. It has been established that the best season for selecting explants of the studied varieties for their introduction into sterile culture is the summer season.

Keywords: sterile culture, season, viability, surfinia, c librachoa

Introduction

It is well known that the process of clonal micropropagation begins with the selection of a plant, isolation of the explant, its sterilization and planting on a nutrient medium. One of the fundamental roles in this process belongs to the explant selection season, that is, the time of year in which the explant was isolated.

According to our own research, as well as the research of numerous authors, the time of year in which the explant was isolated affects the clonal micro-reproduction of plants, their viability in a sterile culture (B doni and Chauhan, 2010;

Mihaljevi et al., 2013; Zhumagulova and Frolov, 2014; Wegayehu et al., 2015; Karuleet al., 2016; Zhatko et al., 2017; Lebedev et al., 2019; Kutas et al., 2010; Shornikov, 2008; Prasad and Chaturvedi, 1988; Bond k et al., 1986; Nikitina et al., 2020; Sehgal et al., 1989; Pandeliev et al., 1990; Leontiev-Orlov et al., 1988; Robb, 1957; Sidorovich and Kutas, 1995; Mascarello, 2003;).

Thus, the studies conducted by G.D. Shornikov (2008) showed high efficiency of using honeysuckle, actinidia, lemongrass and eleutherococcus shoots isolated in the summer as explants, which allowed to obtain 50-91% sterile viable explants. The nodes of the increments

isolated in autumn were characterized by low viability (0-20%), high infection (up to 88.6%) and were unsuitable for obtaining a sterile culture.

After investigating the influence of the chrysanthemum explant selection season, Prasad and Chaturvedi (1988) found that the most favorable time for explant selection is March-April. Explants selected in January-February and May-December were unable to proliferate as a result of the formation of a callus at the base of the explant, which darkened and inhibited the formation of shoots, which was not observed in chrysanthemum explants isolated in March-April. They quickly regenerated shoots without callus formation.

Bondok et al. (1986) proved that the optimal time of year for isolating pomegranate explants falls on March, since the highest percentage of survival of sterile cultures was noted for explants isolated in March.

Thanks to the research conducted by A.V. Nikitina and co-authors (2020), the best timing for the selection of explants of clone rootstocks of apple trees 54-118, which fall at the end of May – beginning of June, with the preservation of their viability in a sterile culture, has been established.

If we analyze the experimental data presented in the literature on the influence of the explant selection season on their viability in a sterile culture, we can conclude that there is an optimal time of year in which it is advisable to select material for introduction into a sterile culture, and it is determined experimentally for each plant species or variety separately. Introduced varieties of surfinia and calibrachoa are no exception to this rule.

The purpose of this stage of the study was to determine a favorable season for the selection of explants of introduced varieties of surfinia and calibrachoa.

Materials and Methods

The objects of the study were six introduced varieties of surfinia: Surfinia x hybrida hort "Purple", Surfinia x hybrida hort «Black prince»,

Surfinia x hybrida hort "Blue Vein", Surfinia x hybrida hort "Double Red", Surfinia x hybrida hort "Star Yellow", Surfinia x hybrida hort "Blue" and two varieties of calibrachoa: Calibrachoa x hybrida hort "Kabloom deep blue", Calibrachoa x hybrida hort "Kabloom white".

As explants, buds with a piece of a stem 5-6 mm long were used, isolated from the shoots of the above-listed varieties in the summer and autumn season. To free the explants from infection (in order to avoid destruction of chlorophyll in the explants), we used a gentle method of sterilization developed by us, including the following processing steps:

- washing the shoots with soap solution followed by rinsing them with running tap water for 10 minutes;
- treatment of shoots with a 3% fungicide solution ("Topaz") for 15 minutes with six times rinsing with tap water for 12 minutes;
- sterilization of explants with a 5% commercial preparation of sodium hypochloride "Whiteness" with the addition of 2-3 drops of detergent "Tween 80" at an exposure of 15 minutes, followed by washing them in three shifts of sterile bidistilled water for 10-15 minutes each.

After sterilization, the material was planted on a modified agarized medium MS. Test tubes with planted explants were placed on racks where the air temperature was 24 ° C, illumination – 4000 lux, relative humidity – 70%, photoperiod – 16 hours. Infected, oxidized and viable explants were counted daily for 2 weeks for each explant selection season. The experimental data are given in the Table.

Results and Discussion

The figures in the Table indicate the dependence of the yield of viable buds (explants) of introduced varieties of surfinia and calibrachoa on the time of year in which they were isolated, as well as on the varietal and species belonging of plants.

Table - Viability of explants, introduced varieties of surfinia and calibrachoa, isolated at different times of the year (June, September)

Variety	Explant	Explant selection season (month)					
		June			September		
		V		I	V		I
Surfinia x hybrida hort "Purple"	buds	18/90	0/0	2/10	16/80	2/10	2/10
Surfinia x hybrida hort "Black prince"	buds	17/85	3/15	0/0	12/60	2/10	6/30
Surfinia x hybrida hort "Blue Vein"	buds	14/70	4/20	2/10	12/60	3/15	5/25
Surfinia x hybrida hort "Double Red"	buds	17/85	2/10	1/5	13/65	1/5	6/30
Surfinia x hybrida hort "Star Yellow"	buds	16/80	2/10	2/10	12/60	3/15	5/25
Surfinia x hybrida hort "Blue"	buds	16/80	2/10	2/10	12/60	3/15	5/25
Calibrachoa x hybrida hort "Kabloom deep blue"	buds	16/80	3/15	1/5	10/50	2/10	8/40
Calibrachoa x hybrida hort "Kabloom white"	buds	15/75	2/10	3/15	9/45	2/10	8/10

Abbreviations: V - viable explants, O – oxidized, I - infected; in the numerator the number of explants, pcs., in the denominator – %.

Note. The calculation was made based on 20 explants for each variety.

A high yield (80-90%) of viable buds was noted in the introduced Surfinia x hybrida hort "Purple" variety isolated in the autumn and summer periods, respectively.

An almost similar yield (80-85%) of viable explants is characteristic of four introduced varieties of surfinia: Surfinia x hybrida hort "Blake prince", Surfinia x hybrida hort "Double Red", Surfinia x hybrida hort "Star Yellow", Surfinia x hybrida hort "Blue", selected in the summer in June (Table). A decrease in this indicator (60-65%) was observed in the same varieties isolated in the autumn period in September.

For the introduced Calibrachoa x hybrida hort "Kabloom white", Calibrachoa x hybrida hort "Kabloom deep blue" varieties, a similar pattern of viability was noted, the value of which was 75-80% in summer (June) and decreased to 45-50% in autumn (September).

A relatively low yield (45-60%) of viable explants is characteristic of all the studied introduced varieties of surfinia and calibrachoa, with the exception of one variety of surfinia Surfinia x hybrida hort "Purple", selected in autumn in September.

Conclusion

Summing up the above, it can be concluded that the most favorable season for the selection of explants in order to introduce them into a sterile culture and obtain a high yield of sterile viable material is advisable to select shoots of introduced varieties of surfinia and calibrachoa for isolating explants in the summer in particular in June.

Based on the analysis of the results of experimental studies obtained to study the effect of the season of selection of explants of introduced varieties of surfinia and calibrachoa on their viability in a sterile culture, we can come to the following conclusions:

1) the optimal season for the selection of explants of the studied varieties of surfinia and calibrachoa should be considered the

summer time of the year, in particular, the month of June.

- 2) the yield of viable buds of introduced calibrachoa and surfinia varieties isolated in autumn decreased and amounted to 45-65% compared to the viability of 70-90% buds isolated in the summer.
- 3) the indicator of kidney viability of introduced varieties of surfinia and calibrachoa depends on the time of year to which the explant was isolated, and on the varietal and species belonging of plants.

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