Banat's University of Agricultural Sciences and Veterinary Medicine from Timisoara

Contact: web: *http://dse.usab-tm.ro*, e-mail: *bjb@usab-tm.ro*

INFLUENCE OF SUCROSE CONCENTRATION ON *IN VITRO* MULTIPLICATION OF *RIBES RUBRUM* SPECIES

Carmen Manole[2], Viorica Bălan[2], Cătălina Tudora[1], M. Buțu[1], Georgeta Fidler[1], Steliana Rodino[1], Diana Golea[1], Alina Buțu[1]

[1]*National Institute of Research and Development for Biological Sciences, Department of Biotechnology, 0630031, Splaiul Independentei 296, Bucharest, Romania, e–mail:alina_butu@yahoo.com*
[2]*University of Agronomic Sciences and Veterinary Medicine, Faculty of Agriculture, Bucharest, Romania*

Abstract. Sucrose is one of the major sources of carbon and energy to the culture media used for in vitro cultures of plants. In this article, was studied the influence of different sucrose concentrations on in vitro multiplication of the species Ribes rubrum (15 g/l, 30 g/l, 45 g/l, 60 g/l) on MS culture medium containing half macroelements supplemented with growth regulators BA (0.2 mg/l), IBA (0.01 mg/l) at pH=5.7–5.8. The highest multiplication rate was observed using the culture medium with a sucrose concentration of 45 g/l.

Key words: *Ribes rubrum*, sucrose concentration, micropropagation

Introduction

Ribes rubrum (red currant) is a rare species from the spontaneous flora, with importance in both food and medical industry.

It is valuable for its medicinal properties and commercial use in pharmaceutical and food industry and for the potential represented by leafs, fruits, seeds, buds and flowers.

The presence of sugars in the culture is an important factor of *in vitro* multiplication of plants [RICARDO *et al.*, 2004].

In plant tissue culture is needed a medium containing a permanent flow of carbohydrates to support their in vitro survival [BUTNARIU *et al.*, 2011]; the photosynthetic activity of tissues can be reduced by using a low light intensity, humidity and relatively high gas exchange [REZA *et al.*, 2009].

In vitro multiplication of plant material depends on many factors including the concentration and type of exogenous carbon source added in the environment, serving as an energy source and necessary for maintaining osmotic potential [TOUQEER *et al.*, 2007].

One of these components is the concentration of sucrose which was found to be an important factor in the osmotic and photosynthetic potential and rooting response of plants [NASSER *et al.*, 2005].

The present study was conducted to determine the influence of sucrose concentration in culture medium on *in vitro* multiplication of the explants taken from red currant.

Materials and method

MS culture medium [MURASHIGE *et al.*, 1962], half macronutrients content, was supplemented with BA (0.2 mg/l) and IBA (0.01 mg/l) at pH 5.7–5.8.

Concentrations of sucrose added to MS medium were MS I (15 g/l), MS II (30 g/l), MS III (45 g/l), MS IV (60 g/l).

We used flasks (capacity 50 ml) containing 15–20 ml of culture medium autoclaved, and then maintained for 30 minutes to UV light.

The study conducted on total 25 samples for each variant of medium inoculating one explant; the tubes were closed and kept in climate chamber at temperature between 23–25°C and a photoperiod of 16 hours (fluorescent light).

Explants consisted of shoot apex and nodal segments taken from young shoots of *Ribes rubrum* with a size of 0.3–0.5cm.

After three weeks of growth in climatic chamber, measurements were made compared with plantlets obtained in other medium variants.

Results

In this experiment, significant differences were noticed on plant height (*Table 1*).

Culture medium containing different sucrose concentrations present different values of plant height after three weeks from

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starting the experiment.

The results of in vitro multiplication on MS I medium culture, showed that the nodal segments were not developed.

Table 1

Mean values for plant height (PH), assessed at different sucrose concentrations (15, 30, 45, 60 g/l) and number of leafs (NL), after three weeks from cultivation

Treatments	Means	
	PH(cm)	NL
MS I (15 g/l)	–	–
MS II (30 g/l)	1.0	2 leafs (0.2, 0.6 cm)
	0.33	2 primary leafs
	0.50	0.2 cm
	0.63	0.3 cm
	0.40	0.2 cm
MS III (45 g/l)	0.80	2 leafs (primary leaf, 0.3cm)
	0.52	2 leafs (0.3, 0.2 cm)
	0.71	2 leafs (0.2 cm)
	1.20	1 leaf (0.8 cm)
	0.82	1 leaf (0.7 cm)
MS IV (60 g/l)	0.60	3 leafs (0.2 cm)
	1.00	2 leafs (0.2 cm)
	1.02	2 leafs (0.4, 0.2 cm)
	0.50	2 primary leafs
	0.60	1 leaf (0.2 cm)

In other cases, it was showed the importance of increasing sucrose concentration on the multiplication of *Ribes* species (*Figure 1*).

During the experiment, we decided that the reference medium should be the one developed by Murashige and Skoog [MURASHIGE *et.al*, 1962], with optimum concentration of sucrose 30 g/l.

In *Figure 1*, we can see that in all cases except the first one, the increase in height of plantlets was directly proportional to increasing sucrose concentration.

In other studies, the results obtained by increasing the concentration of sucrose were found to be at the expense of those obtained using mannitol [GARCIA *et.al*, 2002].

After 21 days, plant height was between 0.33–1.20 cm (*Table 1*); lower limit is common in MS II (30 g/l). The greatest height of plantlets was recorded in the culture medium using MS III 45 g/l, PH=120 cm.

In terms of leaf growth, MS III and MS IV had a higher growth rate than using MS II. In addition, considering their size, the largest was recorded in the multiplication on MS medium III, the maximum diameter was 10 cm. regarding their number, more leaves per plantlet occurs using MS IV.

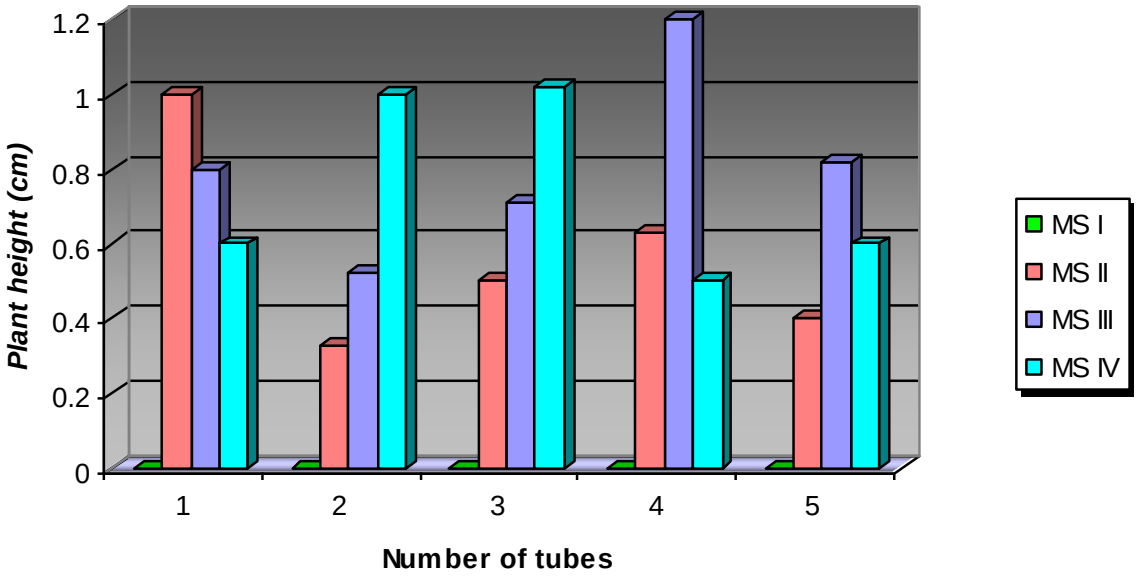

Figure 1. Plant height mean values (PH), according to sucrose concentration in the culture medium

Conclusions

Sucrose concentration influenced growth and accumulation of biomass (fresh weight) of *Ribes* plantlets propagated *in vitro*.

The presence of 45 g/l sucrose in the culture medium was the most efficient treatment for increasing height and fresh weight of plants cultivated *in vitro*.

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