The Effects of the Basal Medium, and the Addition of Sugar and Banana on the Growth of *Oncidium* Plantlets Cultured In Vitro

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INTRODUCTION

We have reported previously that the growth of in vitro plantlets of *Cymbidium* and *Cattleya* was promoted markedly when organic matter was added to the basal medium (Kusumoto and Furukawa, 1977; Kusumoto, 1979a; Kusumoto 1979b). This report describes the effects of the basal medium and the concentration of added sugar or banana on the growth of *Oncidium* plantlets cultured *in vitro.*

MATERIALS AND METHODS

The protocorm-like bodies (PLB) were used as experimental material and were obtained by in vitro culture of axillary buds from the peduncle of *Oncidium* 'Aloha Iwanaga'.

Plantlets with 5-mm-high buds and no root were selected, and 40 pieces (5 g) were planted on each medium. Murashige and Skoog's (MS) nutrient medium was used as the standard basal medium, and 0.1 ml liter^{-1} of NAA and BA, plant growth-regulating substances, 3 g liter^{-1} of Gellan gum, and 20 g liter^{-1} of sucrose were added.

Each plantlet was cultured under 16-h day length at 2500 lux and 24±2C conditions. A check of plantlet growth was made 60 days after planting.

Experiment 1. Several media, MS, White (W), Knudson's C (KC), and Hyponex (H), were used as basal media in this experiment as well as MS media at 3/4 and 1/2 concentrations were investigated.

Experiment 2. Banana flesh (100 g liter^{-1}) was added to each basal medium to check the effect of banana on the growth of the plantlets.

Experiment 3. The amounts of sugar and banana flesh added, was varied to check the effect on the growth of plantlets.

RESULTS AND DISCUSSION

The results are shown in Tables 1, 2, and 3. The subsequent growth of the plants raised in vitro has proved to be excellent and it is suspected that the good stiff leaf and compact root growth noted are a result of the in vitro culture. The results from Experiment 1 show that the MS medium was the most suitable basal medium. With the decrease in concentration of the MS medium, the growth index and number of roots on the plantlets decreased, and the length of the roots increased. Medium H was slightly inferior to $^1/_2$-MS medium, but it could be utilized. When the W and KC media were used, the colour of the plantlets changed from green to yellow, growth and height were adversely affected. It is thought that the concentrations of salts in the W or KC media were too low in comparison with the MS medium. These results

Table 1. Effects of basal medium and concentration of MS medium on the growth of *Oncidium* plantlet cultured in vitro.

Medium*	Avg. fresh weight (g)	Growth index**	Avg. height of leaves (cm)	Avg. number of leaves	Avg. number of roots	Avg. length of roots (cm)
MS	0.85	6.76	7.70	6.24	5.25	1.48
3/4 MS	0.68	5.42	7.34	6.10	5.13	2.08
1/2 MS	0.65	5.18	6.92	6.05	4.75	3.21
W	0.45	3.58	3.76	5.23	4.56	4.07
KC	0.45	3.60	4.25	5.08	4.25	2.55
H	0.56	4.48	7.68	5.70	5.25	3.42

* MS=Murashige and Skoog, W=White's, KC=Knudson's, H=Hyponex.
** Growth index=total fresh weight per planting fresh weight.

Table 2. Effects of basal medium and concentration of MS medium on the growth of *Oncidium* plantlet cultured in vitro.

Medium*	Avg. fresh weight (g)	Growth index**	Avg. height of leaves (cm)	Avg. number of leaves	Avg. number of roots	Avg. length of roots (cm)
MS	0.85	6.76	7.70	6.24	5.25	1.48
MSB-100	1.12	8.96	10.85	6.40	6.25	4.01
3/4 MSB-100	1.08	8.66	10.75	6.20	6.00	4.85
1/2 MSB-100	0.97	7.76	8.87	6.17	5.38	5.73
WB-100	0.84	6.79	6.72	5.88	5.63	6.39
KCB-100	0.74	5.96	7.03	5.90	5.18	4.39
HB-100	1.12	9.02	9.15	6.25	6.40	4.59

* MS=Murashige and Skoog, W=White's, KC=Knudson's, H=Hyponex, B=banana.
** Growth index=total fresh weight per planting fresh weight.

show that *Oncidium* produced in vitro require a reasonably high concentration of salts in the medium. The results of Experiments 1 and 2 showed that the addition of 100 g liter^{-1} of banana flesh to each medium promoted growth considerably. It must be emphasized that the results from the addition of 100 g liter^{-1} of banana flesh to the HB (Hyponex with banana) medium was as good as that obtained from the MS medium with banana. Furthermore, the addition of banana flesh to all media promoted root elongation. It is well known that increasing the sugar content of media has a beneficial effect. The addition of 1.5 times (30 g liter^{-1}) of sugar to the MS medium in Experiment 3 provided the best results in the growth of the explants,

Table 3. Effects of basal medium and concentration of MS medium on the growth of *Oncidium* plantlet cultured in vitro.

Medium*	Avg. fresh weight (g)	Growth index**	Avg. height of leaves (cm)	Avg. number of leaves	Avg. number of roots	Avg. length of roots (cm)
MSS-20	0.85	6.76	7.70	6.24	5.25	1.48
MSS-30	1.14	9.19	9.60	6.25	6.08	3.25
MSS-40	1.29	10.34	9.60	6.55	6.80	4.36
MSB-100	1.12	8.96	10.85	6.40	6.25	4.01
MSB-150	1.36	10.86	9.94	5.78	6.38	4.31
MSB-200	1.40	11.19	10.23	6.16	6.60	5.24

* MS=Murashige and Skoog, B=banana, s=sucrose.
** Growth index=total fresh weight per planting fresh weight.

comparable to the MSB-100 and HB-100 media. Increasing the banana flesh quantity added to the medium did not change the height or number of leaves of the explants, but increased the number of roots, and promoted root elongation.

The high growth index of the explants in the media with added banana flesh was caused by good root development. The conclusion is that *Oncidium* plantlets in vitro give the best results on an MS medium, with 30 g liter^{-1} of sucrose and 100 to150 g liter^{-1} of banana flesh added.

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