

NURSERY CONDITIONS FOR *ONCIDIUM* (SWEET SUGAR) GROWTH AND DEVELOPMENT AT SEEDLING AND ADULT STAGES

Le Hoai Thanh, Le Huu Can

Received: 10 November 2014 / Accepted: 10 October 2017 / Published: November 2017

©Hong Duc University (HDU) and Hong Duc University Journal of Science

Abstract: Viet Nam is a tropical country with monsoons, which is suitable for growing different kinds of flowers including *Oncidium-sweet sugar Orchids*. Production of Orchids in Viet Nam has not fully developed, compared with the potentials of this kind of flowers due to a lack of appropriate process of technology to produce Orchids. Research on techniques to grow *Oncidium-Sweet Sugar Orchids* in the period of seedling and production with a hope of contributing to the development of Orchids in Viet Nam.

Effects of flowerbeds used on living scale and growth of Oncidium-sweet sugar Orchids in the period of seedling after 8 weeks are presented. To sum up, coir is the best condition for growing oncidium in the period of seedling.

Effects of nutrition on one- year- old oncidium sweet sugar Orchids grown in coir beds (after 8 weeks). In this period, using NPK 30-10-10 with the concentration of 1g/l/m² and watering once in every three days shows the best result.

Effects of nutrition on the growth and development of oncidium sweet sugar Orchids from 6 to 18 months old (after 8 weeks). In this period, using NPK 20-20-20 with concentration of 1g/l/m² gives the best result.

Effects of oncidium bulbs on the appearance of oncidium buds after 9 weeks. Under the same nutrition supply, the oncidium sweet sugar Orchids give the highest scale of bud production when treated for blooming as in R1 (bulb diameter of 2.5-3 centimeters).

Keywords: *Oncidium-sweet sugar Orchids, nursery condition, effect.*

1. Introduction

In ornamental world, orchid plays a special and royalty position that give orchid very high value on the market. They also hold an ecological partner to maintain biodiversity of the forests (Kaushik, 1983). Orchids are one of the most valued cut-flowers and potted plants among flowering plants and stay at top price on international flower markets. The orchid also

Le Hoai Thanh

Department of Postgraduate management and education, Hong Duc University

Email: Lehoaitanh@hdu.edu.vn (✉)

Le Huu Can

Faculty of Agricultural, Forestry and Fishery, Hong Duc University

Email: Lehuucan@hdu.edu.vn (✉)

occupies a significant position in the cut flower industry due to its attractiveness, long shelf life, high productivity, right season of bloom, ease of packing and transportation. The orchids represent one of the successfully mass propagated by tissue culture method and rapidly commercialized micro-propagation techniques into ornamental industry.

Most orchids originated in the tropical humid forests of Central and South America, India, Sri Lanka, Burma, South China, Thailand, Malaysia, Philippines, New Guinea and Australia (Chandra, 2015). A single orchid fruit bears several thousands of seeds; all of those seeds lack essential components for self-germination. In spite of a very large number of seeds produced, only few seeds germinate in nature. Currently, the horticultural markets depend on natural orchid populations as a source of stock plants, but most of them are not propagated and commercialized successfully. Although these orchid species are still common, the development of an industrial means for their propagation is required to reduce collection pressures on wild plants.

Vietnam is located at tropical region that is a mother land of several tropical orchids and one of these is *Oncidium* (Sweet sugar). Although the country holds orchid biodiversity but it is still poor in orchid production and sales. In the present study, an attempt was made to investigate growth conditions that fit to *Oncidium* development: “Nursery conditions for *Oncidium* (Sweet sugar) growth and development at seedling and adult stages”.

2. Subjects and research methods

2.1. Subjects for research

Post-vitro *Oncidium* Sweet sugar Orchids, aged 1 year (after 2 weeks of growing) and aged 6-18 months.

2.2. Research methods

Experiments implemented in the artificial conditions, which enables adjustments in lights and temperature, in the net-houses of Hong Duc University.

The experiments were arranged as follows:

Randomly, repeated every three times, each treatment using 10 samples.

Regularly observed, data collected after every 10 to 15 days.

Data analyzed using IRRISTAT.

3. Results and discussion

3.1. The effects of the flowerbeds used on living scale and growth of *Oncidium*-sweet sugar Orchids in the period of seedling

All four substrates increased shoot length growth but coir had showed highest shoot growth in length. The same trend also occurred in root number development and this may be

due its capacity to maintain substrate moisture which enhances root development. Although leaf number in coir was lower moss substrate but it was still much higher than fern and charcoal. Overall, growth and developemtal parameters in coir increased survival rate of seedlings after transferring from in-vitro condition.

Conclusion: coir was the most suitable substrate for *Oncidium* seedling growth and development.

Table 1. Effects of flowerbeds used on living scale and growth of *Oncidium*-sweet sugar Orchids in the period of seedling after 8 weeks.

Observation Index (OI) Substrate (S)	Growth in height (cm)	Growth in number of roots (root)	Growth in number of leaves (leaf)	Percentage of alive samples
S1: Moss	0.41	1.55	0.32	88.11
S2: Coir	0.81	2.47	0.27	92.12
S3: Ferns	0.52	1.75	0.07	72.16
S4: Charcoal	0.37	1.65	0.27	76.21
LSD (5%)	0.28	0.70		
CV%	3.90	0.20		

3.2. The effects of nutrition on one- year- old *oncidium* sweet sugar Orchids grown in coir beds after 8 weeks of observation

Nutrients are essential components for plant growth and development in both macro and micro elements. Four nutrient formulas were tested to understand nutrient requirement of *Oncidium* development. Three formulas (F1, F2 and F3) used different NPK contents while the last one (F4) was combination of F1 and F2 including fish suspension as additional nutrients.

The treatment F2 NPK 30-10 -10 with using in 3-day intervals showed most efficiently supplied nutrients for *Oncidium* of one year old. This treatment increased significantly shoot growth and development in terms of shoot length, leaf and root number.

Table 2. Effects of nutrition on one - year - old *oncidium* sweet sugar Orchids grown in coir beds (after 8 weeks)

Observation Index (OI) Formula (F)	Speed of height growth (cm)	Growth in number of leaves (leaf)	Branch producing scale (%)
F1: NPK 30-10-10 (0.5g/l)	0.43	0.73	17.52
F2: NPK 30-10-10 (1g/l)	0.93	0.89	22.19
F3: NPK 30-10-10 (1.5g/l)	1.25	0.24	11.37

F4: 3 times of using NPK 30-10-10 (1g/l) + 2 times of using NPK 20-20-20 (0.5 g/l) + 1 time of using fish milk (2.5ml/l)	0.31	0.28	6.16
LSD (5%)	0.39	0.23	
CV %	4.00	4.90	

3.3. The effects of nutrition on the growth and development of oncidium sweet sugar Orchids from 6 to 18 months old

Five treatments (T1 to T5) were applied to 6-18 month old plants to find the most suitable condition for *Oncidium* nursery before potting them. Shoot length and leaf number were best performed in T1 treatment with NPK only even this formula applied without additional nutrients such as vitamins and fish suspension. Shoot numbers were almost similar in all treatments with basic NPK components and additional elements. The treatment T1 NPK 20-20-20 (1g/l/m²) showed most efficiently supplied nutrients for *Oncidium* at 6-18 month old.

Table 3. Effects of nutrition on the growth and development of oncidium sweet sugar Orchids from 6 to 18 months old (after 8 weeks)

Observation Index (OI) Treatment (T)	Speed of height growth (cm)	Growth in number of leaves (leaf)	Branch producing scale (%)
T1: NPK 20-20-20 (1g/l)	2.11	2.98	0.93
T2: NPK 30-20-10 (1g/l)	1.64	2.78	1.03
T3: NPK 12-2-14 (1g/l)	1.56	2.70	1.06
T4: 5 times of using NPK 30-10-10 (1g/l) + 1 time of using vitamin B1 (3ml/l) + 1 time of using fish milk (3ml/l)	1.39	2.60	1.06
T5: 5 times of using NPK 12-2-14 (1g/l) + 1 time of using vitamin B1 (3ml/l) + 1 time of using fish milk (3ml/l)	0.73	2.50	1.17
LSD (5%)	0.95	0.19	0.10
CV %	4.30	1.10	5.00

3.4. The effects of oncidium bulbs on the appearance of oncidium buds

The length and size of pseudobulbs are known to affect flowering ability. Thirty adult *Oncidium* plants different in length of pseudobulbs were treated with flowering stimulants for

9 weeks. The results showed that pseudobulbs with 2.5-3cms in length formed highest flower numbers and inflorescent length. The pseudobulbs which had length of more than 3cms reduce flowering induction and bud formation significantly. This finding is important that helps keep *Oncidium* plants at right stage for controlling flowering. Generally, in the same conditions of nutrients and coir, applying flower induced treatments on pseudobulbs in size 2,5-3cm (R1) showed the highest flower bud formation compared to other treatments.

Table 4. Effects of oncidium bulbs on the appearance of oncidium buds after 9 weeks

Observation Index (OI) Recipe (R)	Number of trees (tree)	Number of trees with buds (tree)	Appearance scale (%)	Height of shoot (cm)	Diameter of shoot (cm)
R1: 2.5- 3cm	30	17	56.67	82.01	0.32
R2: >3 - 4 cm	30	2	6.67	65.54	0.36

4. Conclusion and suggestions

4.1. Conclusion

Coir is the most suitable for growing oncidium. In this coir bed, the flower develops well and strongly and produces a lot of roots.

The most suitable nutrition supply for one-year-old oncidium is NPK 30:10:10 with the concentration of 1g/l/m² and for 6 to 18 month-old oncidium is NPK 20:20:20 1g/l/m².

4.2. Suggestion for further study

Further experiments should continue to be conducted on techniques which have been used to control the flower blooming./.

References

- [1] Nguyen Hoang Loc, Mai Van Pho (2000), *Preliminary investigation orchid species composition of Thua Thien Hue and conservation in vitro initially some species here*. Biological Journal 22 (3b): 173-178.
- [2] Nguyen Quang Thach, Hoang Thi Nga (2000), *Applied research methods in human culture quickly sliced vanda orchid, Cattleya and Phalaenopsis*. Journal of Agriculture and Food Branch, no. 462. 12 /546-552
- [3] Nguyen Quang Thach (2005), *Orchid - technique selection, propagation and cultivation*, Hanoi Agriculture Publisher.
- [4] Le Van Tuong Huan, takamura T, Tanaka M (2004a), *Callus formation and plant regeneration from callus through somatic embryo structures in Symbidium orchid*. Plant Science 166: 1443-1449.

- [5] Le Van Tuong Huan and Tanaka M (2004b), *Callus induction form protocorm-like body segments and plant regeneration in Cymbidium (Orchidaceae)*. The Journal of Hortucultural Science and Biotechnology 79(3): 406-410.
- [6] Kaushik P (1983), *Ecological and Anotomical Marvels of the Himalayan. Orchids*. Today and tomorrow's printers and Publishers, New Delhi, India.
- [7] De, Lakshman Chandra (2015), *Commercial Orchids*, Ebook ISBN 978-3-11-044122-2.