



## **Role of Organic Growth Supplement *In vitro* Multiplication of Orchid Species- A Review**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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### **ABSTRACT**

The main purpose of this article is to review role of several organic growth additives such as Apple juice, coconut water (CW), maize extract, banana homogenate (BH), peptone and protocorms etc which stimulate the multiplication rate of various orchid species in *in vitro* multiplication. These organic growth supplements help to increase the number of shoots, root and leaf in culture medium. In many orchid tissue culture, organic growth supplements, which are the most essential medium aspect to stimulate tissue growth, production and facilitate the regeneration of shoot. The banana homogenate (BH) had the highest rate of regeneration and root developments. The use of organic growth supplements resulted in increased regeneration, the creation of more shoots and the development of fresh plantlets. Amino acids, proteins, vitamins, carbohydrates and various types of organic compounds are present in these growth supplements. These components have the potential to play a significant role in the development and creation of culture. Now more research is needed to figure out which factors are responsible for the organic additives' promoter effect.

**Keywords:** Orchids; banana homogenate; coconut water; peptone; protocorms.

## 1. INTRODUCTION

Orchids are one of the largest and most diverse group of Orchidaceous family which could be successfully propagated and manage to germinate their minute seeds in artificial media. The composition of culture medium has a significant impact on the rate of seed germination of each orchid species [1]. One of the most critical elements determining the efficacy of in vitro orchid propagation is the concentration of macro and micronutrients in the media [2,3].

In culture media, organic growth additives include Potato extract (PE), apple cider, maize extract, Banana homogenate (BH), peptone, coconut water (CW), and other organic growth supplements in culture media have the potential to boost the multiplication rate of regenerants and production of orchids plantlet [4,5,6].

Supplementing the culture media with organic growth factors which allows orchid PLBs to propagate quickly and this has been shown in the cases of *Phalaenopsis* as well as *Doritaenopsis* [7,8]. By adding the natural adjuvants, the multiplication rate of the regenerants can be [9, 5]. Literature survey indicates that there is positive impact of organic growth substances in *in vitro* multiplication, as observed in various type of orchid specie [5].

## 2. ROLE OF ORCHIDS

Orchids are threatened and endangered species everywhere of the world, so there's innumerable factors which are responsible for their current situation for instance deforestation, excess utilization of fertilizers, overabundance of ground abuse and overabundance of assortment [10, 5]. *In vitro* culture methods were generally utilized for preservation of numerous species of orchid for example in *Dendrobium sp.*, *Cymbidium sp.*, *Bulbophyllum*, and *geodorum* species and so on.

*In vitro* protocorm proliferation of the species of *Cymbidium pendulum* was previously studied using organic growth supplements [5], An epiphytic orchid *Bulbophyllum nipondhii* Seidenf [3], *Bulbophyllum dhaninivatii* Seidenf [11].

## 3. MICRO PROPAGATION

Previously Studied the micropropagation of *Bulbophyllum* species in which observed the factors which help to improving the shoot multiplication in medium components and Impact

of the organic growth additives on shoot recovery productivity of *Bulbophyllum* which performed explicitly in species of *B. Dhaninivatii*, the results of various organic growth supplements on *B. Dhaninivatii* which affected shoot regeneration or multiplication [12,13]. Addition of 100ml of coconut water to the VW medium, along with 50ml of potato extract and 50ml of banana homogenate had the greatest impact on shoot regeneration and formation of the plantlets. Organic growth supplements can encourage *B. Dhaninivatii* shoots formation and multiplication [11].

Different type of organic additives (e.g. Peptone, banana homogenate, coconut water) were mentioned as helping to develop large amounts of shoot and fresh seedling in Mitra medium. Initiation and Multiplication rate of regenerants observed after adding these organic growth supplements in culture media [14,15]. They also reported that 50 g/l Banana homogenate proved the benefits of healthy shoots developments in *C. pendulum* species and Initiation of healthy shoot systems from PLBs, which imposed high sucrose concentration in Banana homogenate (BH) as recommended by Aktar et al. [16] in developments of *Dendrobium* orchid PLBs in *in vitro* regeneration [5].

Kongbangkerd et al. [11] reviewed on *B. dhaninivatii* shoots which were cultured *in vitro* multiplication for 12 weeks on semi-solid VW medium, in which supplemented with varying concentration of a mixture of coconut water with Potato extract (PE) and also banana homogenate (BH). They mentioned that applying organic supplements to the medium, increased *in vitro* shoots growth and morphological improvement over those culture. The medium combined with the most concentrated 150 ml/L of coconut water and 50 g/l of Potato extract which had the highest number of shoots regeneration.

## 4. EMPIRICAL REVIEW

Earlier Kaur and Bhutani [5] reported, in Mitra medium (M medium) the impact of growth additives on protocorm proliferation, large number of shoots production, and development of fresh plantlets was examined.

Minea et al. [17] reported the effects of 10% Banana Homogenate (BH) on the leaf size of *Spathoglottis kimballianai*. It was discovered that PLBs were amplified effectively with 10% coconut water and 2 ml/l peptone and stimulating

fresh plantlet proliferation. Lekha et al. [18] also reported similar type of impact of various growth additives in *Dendrobium* species. Gnasekaran et al. [19] examined the effects of organic potato, papaya, and tomato extracts at different composition, which effective on orchid PLBs of V. Kasem's Delight species in *in vitro* orchid propagation.

Ichihashi and Islam [20], reported that effects of organic growth supplements in orchids is simple and advantageous process which help to improve the media of industrial production. The amount of tissue regeneration in culture media was dependent on the use of organic growth additives. Helpful impacts of growth additives on proliferation, protocorms separation and development of seedlings was earlier reported by Arditti (1979).

Pakum et al. [3] was recorded that the pseudobulbs were previously cultured for six months on 25,50,75 g/l of potato extract and 50,100,150, 200 ml/l of coconut water which supplied in VW culture media to see whether the organic supplementation effects on *Bulbophyllum nipondhii* proliferation, after that 75 g/l potato extract mixed with 100 ml/l Coconut water which produced the ultimate results in *Bulbophyllum Nipondhii*, with highest numbers of new pseudobulb, leaves, roots as well as high leaf length and root length.

## 5. CONCLUSION

The main target of this exploration was directed to know the various concentration of Potato Extracts (PE), Coconut Water (CW) as well as Banana Homogenate (BH) which affected shoot multiplication & plantlets recovery possibilities in *in vitro* multiplication and the outcomes will aid preservation strategies and utilization of *in vitro* conservation (Kongbangkerd et al. 2016). *Bulbophyllum nipondhii seidenf* is grouped in section *Chirropetalum Lindle* and this species was discovered in Thailand [3].

## CONSENT

It is not applicable.

## ETHICAL APPROVAL

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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