

Role of organic growth supplement in *in vitro* multiplication of orchid species- A review

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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 type 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

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 (Arditti and Ernst 1993). One of the most critical elements determining the efficacy of *in vitro* orchid propagation is the concentration of macro and micronutrients in the media (Churchill et al 1972, Pakum et al., 2016).

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 (Rahman et al. 2004, Kaur & Bhutani 2012, Chen et al. 2014).

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* (Islam et al., 2003; Gnasekaran et al., 2010). By adding the natural adjuvants, the multiplication rate of the regenerants can be elevated (Fonnesbech 1972, Kaur and Bhutani 2012). Literature survey indicates that there is positive impact of organic growth

38 substances in *in vitro* multiplication, as observed in various type of orchid specie (Kaur and
39 Bhutani 2012).

40 Orchids are threatened and endangered species everywhere of the world, so there's
41 innumerable factors which are responsible for their current situation for instance
42 deforestation, excess utilization of fertilizers, overabundance of ground abuse and
43 overabundance of assortment (Znaniacka et al. 2005; Kaur and Bhutani 2012). *In vitro*
44 culture methods were generally utilized for preservation of numerous species of orchid for
45 example in *Dendrobium sp.*, *Cymbidium sp.*, *Bulbophyllum*, and *geodorum* species and so
46 on.

47 *In vitro* protocorm proliferation of the species of *Cymbidium pendulum* was previously
48 studied using organic growth supplements (Kaur and Bhutani 2012). An epiphytic orchid
49 *Bulbophyllum nipondhii* Seidenf (Pakum et al. 2016), *Bulbophyllum dhaninivatii* Seidenf.
50 (Kongbangkerd et al. 2017).

51 Previously Studied the micropropagation of *Bulbophyllum* species in which observed the
52 factors which help to improving the shoot multiplication in medium components and Impact
53 of the organic growth additives on shoot recovery productivity of *Bulbophyllum* which
54 performed explicitly in species of *B. Dhaninivatii*, the results of various organic growth
55 supplements on *B. Dhaninivatii* which affected shoot regeneration or multiplication. Addition
56 of 100ml of coconut water to the VW medium, along with 50ml of potato extract and 50ml of
57 banana homogenate had the greatest impact on shoot regeneration and formation of the
58 plantlets. Organic growth supplements can encourage *B. Dhaninivatii* shoots formation and
59 multiplication (Kongbangkerd et al. 2017).

60 Different type of organic additives (e.g. Peptone, banana homogenate, coconut water) were
61 mentioned as helping to develop large amounts of shoot and fresh seedling in Mitra medium.
62 Initiation and Multiplication rate of regenerants observed after adding these organic growth
63 supplements in culture media. They also reported that 50g/l Banana homogenate proved the
64 benefits of healthy shoots developments in *C. pendulum* species and Initiation of healthy
65 shoot systems from PLBs, which imposed high sucrose concentration in Banana
66 homogenate (BH) as recommended by Aktar et al. (2008) in developments of *Dendrobium*
67 orchid PLBs in *in vitro* regeneration (Kaur and Bhutani, 2012)

68 Kongbangkerd et al. (2017) reviewed on *B. dhaninivatii* shoots which were cultured *in vitro*
69 multiplication for 12 weeks on semi-solid VW medium, in which supplemented with varying
70 concentration of a mixture of coconut water with Potato extract (PE) and also banana
71 homogenate (BH). They mentioned that applying organic supplements to the medium,
72 increased *in vitro* shoots growth and morphological improvement over those culture. The
73 medium combined with the most concentrated 150 ml/L of coconut water and 50 g/l of
74 Potato extract which had the highest number of shoots regeneration.

75

76 DISCUSSION

77 Earlier Kaur and Bhutani (2012) reported, in Mitra medium (M medium) the impact of growth
78 additives on protocorm proliferation, large number of shoots production, and development of
79 fresh plantlets was examined.

80 Minea et al. (2004) reported the effects of 10% Banana Homogenate (BH) on the leaf size of
81 *Spathoglottis kimbalianai*. It was discovered that PLBs were amplified effectively with 10%
82 coconut water and 2 ml/l peptone and stimulating fresh plantlet proliferation. Lekha et al.
83 (2005) also reported similar type of impact of various growth additives in *Dendrobium*
84 species. Gnasekaran et al. 2012 examined the effects of organic potato, papaya, and tomato
85 extracts at different composition, which effective on orchid PLBs of V. Kasem's Delight
86 species in *in vitro* orchid propagation.

87 Ichihashi and Islam (1999), reported that effects of organic growth supplements in orchids is
88 simple and advantageous process which help to improve the media of industrial production.
89 The amount of tissue regeneration in culture media was dependent on the use of organic

90 growth additives. Helpful impacts of growth additives on proliferation, protocorms separation
91 and development of seedlings was earlier reported by [Arditti \(1979\)](#).
92 [Pakum et al. \(2016\)](#) was recorded that the pseudobulbs were previously cultured for six
93 months on 25,50,75 g/l of potato extract and 50,100,150, 200 ml/l of coconut water which
94 supplied in VW culture media to see whether the organic supplementation effects on
95 *Bulbophyllum nipondhii* proliferation, after that 75 g/l potato extract mixed with 100 ml/l
96 Coconut water which produced the ultimate results in *Bulbophyllum Nipondhii*, with highest
97 numbers of new pseudobulb, leaves, roots as well as high leaf length and root length.

98 99 **CONCLUSION**

100
101 The main target of this exploration was directed to know the various concentration of Potato
102 Extracts (PE), Coconut Water (CW) as well as Banana Homogenate (BH) which affected
103 shoot multiplication & plantlets recovery possibilities in *in vitro* multiplication and the
104 outcomes will aid preservation strategies and utilization of *in vitro* conservation
105 (Kongbangkerd et al. 2016). *Bulbophyllum nipondhii seidenf* is grouped in section
106 *Chirropetalum Lindl* and this species was discovered in Thailand ([Pakum et al. 2016](#)).

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