

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

Abstract: The main purpose of this article is to review role of several organic growth additives such 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.

Keyword: 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. Orchids are mainly cultivated for their beauty. *Ansellia Africana* Lindl., *Ancistrochillus rothschildianus*, *Barkeria spectabilis*, *Calanthe triplicate*, *Coelogyne speciosa*,

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Euanthesanderiana are examples of some orchid genera. 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 orchid plantlet (RAHMAN et al. 2004, KAUR & BHUTANI 2012, Chen et al. 2014).

In the medium used various type of complex growth supplements including Banana Homogenate which was obtained from mature fruits, which was homogenized and incorporated into the culture media. Coconut water as well as peptones were utilized in the culture media (KAUR and BHUTANI, 2012).

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 substances in *in vitro* multiplication, as observed in various type of orchid specie (KAUR and BHUTANI 2012).

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

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overabundance of assortment (Znanięcka et al. 2005; KAUR&BHUTANI 2012). *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 (KAUR & BHUTANI 2012), An epiphytic orchid *Bulbophyllum nipondhii* Seidenf (PAKUM et al. 2016), *Bulbophyllum dhaninivatii* Seidenf. (KONGBANGKERD et al. 2016).

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. 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 (KONGBANGKERD et al. 2016).

KAUR and BHUTANI described *in vitro* *Cymbidium pendulum* proliferation using protocorms. 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. They also reported that 50g/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. (2008) in developments of *Dendrobium* orchid PLBs in *in vitro* regeneration (KAUR & BHUTANI, 2012)

KONGBANGKERD et al. (2016) 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.

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 vitro* multiplication and the outcomes will aid preservation strategies and utilization of *in vitro* conservation (KONGBANGKERD et al. 2016). *Bulbophyllum nipondhiense* is grouped in section *Chirropetalum* Lindl. and this species was discovered in Thailand (PAKUM et al. 2016).

Discussion:

Earlier KAUR and BHUTANI (2012) 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. (2004) reported the effects of 10% Banana Homogenate (BH) on the leaf size of *Spathoglottis kimbalianai*. It was discovered that PLBs were amplified effectively with 10% coconut water and 2 ml/l peptone and stimulating fresh plantlet proliferation. LEKNA et

al. (2005) also reported similar type of impact of various growth additives in *Dendrobium* species.

GNASEKARAN et al. 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 & ISLAM (1999), 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. (2016) 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.

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