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Alternative gelling agents to develop cost effective medium for *in vitro* propagation of *Dendrobium* cv. "Big Jumbo White"

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In vitro propagation is the most common method of Dendrobium propagation. Commonly, agar is used as an effective gelling agent though, it is expensive. However, the developing a cost-effective method is beneficial for small-batch productions and is recommended. The objective of the current study was to evaluate the efficacy of 'kithul' flour (starch extracted from the pith of *Caryota urens*) and xanthan gum as alternative gelling agents to develop an efficient, cost-effective medium for *in vitro* propagation of Dendrobium. Seeds of *Dendrobium* cv. "Big Jumbo White" was cultured using full-strength Murashige and Skoog (MS) medium. After 90 days of incubation, 1g of Protocorm Like Bodies (PLBs) and plantlets of *Dendrobium* cv. "Big Jumbo White" were transferred to twelve different MS media supplemented with BAP (Benzyl Amino Purine) (2.5 mg/L) and NAA (Naphthalene Acetic Acid) (0.5 mg/L) and solidified with either agar (1:0) or with alternative agents; kithul flour (0:1) and xanthan gum (0:1) or a series of combinations of each alternative gelling agent with agar (1:4, 2:3, 3:2 and 4:1) totalling to 12 treatments with six number of replicates per each. The weight of plantlets and PLBs, number of plantlets, number of leaves, number of roots, and length of the roots were recorded as growth parameters in fortnight intervals for a period of 90 days to assess the growth performance. After 90 days of incubation, the MS medium of agar: kithul flour (1:4) of the treatment series with kithul flour and agar: xanthan gum (2:3) of the treatment series of xanthan gum, have shown significantly high performance in the growth and development of PLBs and plantlets. Four growth parameters, number of plantlets: 44, number of leaves per plantlet: 5, number of roots per plantlet: 12 and root length: 1.5 cm, were significantly high in the agar: kithul flour (1:4) medium than in the agar: xanthan gum (2:3) medium. Moreover, compared to the conventional tissue culture media prepared using only agar, the modified medium using agar: kithul flour (1:4) has shown 73% of cost reduction. In conclusion, the use of agar and kithul flour (1:4) as an alternative gelling agent can be recommended as a cost-effective medium for the development of PLBs into plantlets of *Dendrobium* cv. "Big Jumbo White" on a small scale in *vitro* culture system.

Keywords: Alternative gelling agent, "Big Jumbo White", Cost-effective *in vitro* media, *Dendrobium* cv. Kithul flour, Xanthan gum