TISSUE CULTURE OF *Bactris gasipaes* via LIQUID CULTURE

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The palm *Bactris gasipaes* also known as pejibaye or peach palm, is native to the tropical forests of South and Central America (Graefe *et al*., 2013). Bactris produces high fruit yields up to 3.8 t ha^{-1} yr^{-1} (Bolanho *et al*., 2013). The fruits (*Figure 1*) are rich in starch and contain all essential and non-essential amino acids. One kilogramme of bactris palm fruits contains, on average, 16 - 49 g of lysine, 8 - 13 g of methionine, 10 - 19 g of cysteine, 27 - 39 g of threonine and 4.5 - 7 g of tryptophan (Cabral *et al*., 2013).

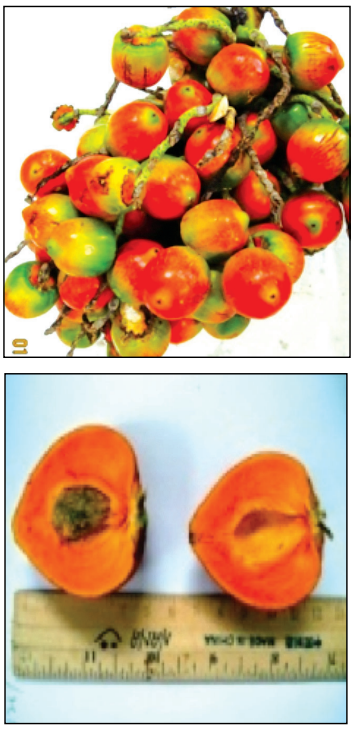

Figure 1. Bactris gasipaes *fruits.*

Bactris fruits contain high quality oil due to its elevated content of total sterols at 4400 mg kg^{-1} with a vitamin E content of 135 mg kg^{-1} (Santos *et al*., 2013). Furthermore, bactris is suitable for cultivation and production of up to 3 t ha^{-1} yr^{-1} palm hearts (Clement and Manshard, 2010) (*Figure 2*).

PROPAGATION TECHNOLOGY

Bactris is generally seed propagated while vegetative propagation is through suckers and more recently through tissue culture processes. The Malaysian Palm Oil Board (MPOB) introduced two technologies on bactris cultivation, namely cultivation for palm heart production (Rajanaidu *et al*., 2004) and integration with oil palm (Suboh *et al*., 2005). The planting materials were derived from suckers. A method for cloning bactris palm via *in vitro* culture using solid culture process was developed at MPOB (Rohani, 2003). However, the solid culture process was slow and establishment of cultures was difficult. It takes one year to produce ramets using solid culture medium. To address this issue, liquid culture system was developed to further improve the efficiency of

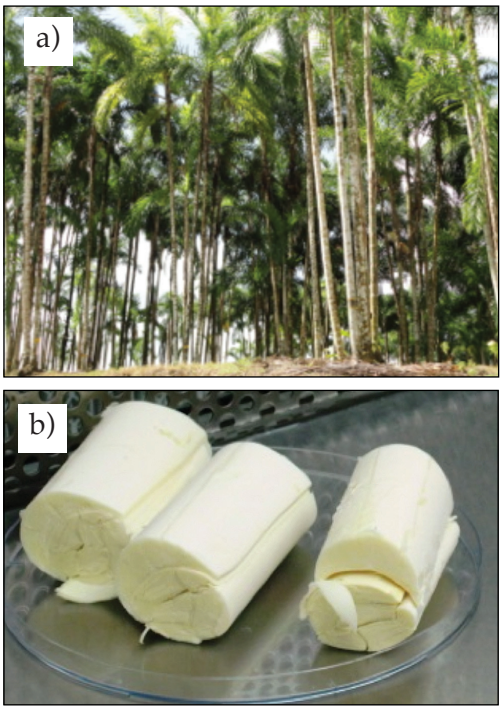

Figure 2. a) Bactris palms at MPOB Research Station, Lahad Datu, Sabah and b) palm heart.

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TABLE 1. NUMBER OF *Bactris gasipaes* SHOOTS PRODUCED THROUGH LIQUID AND SOLID CULTURES

Culturing method	Ortet No.	No. of cultures	No. of shoots produced after 12 months	Total No. of shoots	Ratio liquid/ solid
Liquid	0.378/230	5	424	3 750	6.8
	0.426/946	8	1 393		
	RS 2	9	1 051		
	RS 5	5	882		
Solid	0.378/230	12	119	553	
	0.426/946	16	268		
	RS 2	8	128		
	RS 5	26	38		

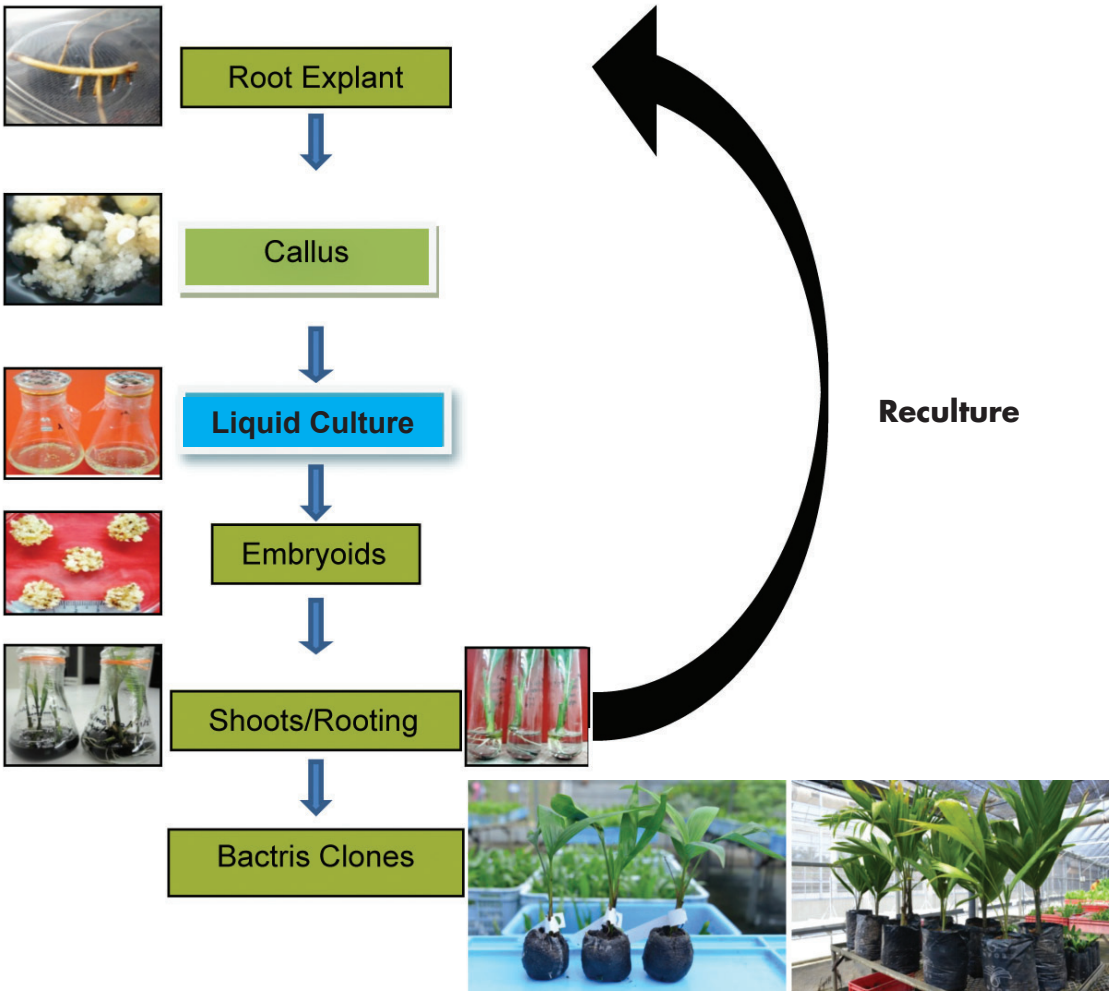

Figure 3. Liquid culture of Bactris gasipaes.

clonal propagation of bactris. The liquid culture protocol takes three months to produce friable callus from rooted plantlets or shoot explants. An initial culture of 0.300 g friable callus could potentially produce up to 6.8 times more shoots through the liquid culture system compared to solid cultures after 12 months *(Table 1)*.

METHODOLOGY

Roots from sterile *in vitro* bactris seedling are used as the initial explants. Root segments of 1 cm length are transferred onto 30 ml of solid callus induction medium, *i.e.* MS medium, supplemented with auxin and cytokinin. Friable calli start to form at the root tips and at the root primordia after one month in culture, then transferred into liquid media. After two months, mature cells are transferred onto solid basal medium to allow formation of embryoids and shoots (*Figure 3*).

BENEFITS

- More efficient process.
- Potential for automation.

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