THE EFFECT OF GIVING NAA AND BAP ON THE ESTABLISHMENT OF AREN PLANT SHOOT

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ABSTRACT

Ariani, SH, Sukmana, SD. 2018. The effect of giving NAA and BAP On The Establishment of Aren Plant Shoot. Biodiversitas 19: xxxx. Procurement of palm seeds is quite difficult because it is an annual plant. The period of dormancy of palm sugar seeds is quite long, which is the variety between 1-12 months. One way to overcome this is by plant tissue culture. The results showed that the giving of NAA and BAP had no significantly effect on all observation parameters. Treatment interactions did not significantly affect all observation parameters. Aren is a wood plant that is relatively difficult to culture because annual plants have high phenolic compounds.

Keywords : Palm, Naa, BAP

A. INTRODUCTION

Aren (A. pinnata) is one type of palm plant, which is spread in almost all regions of Indonesia, especially in 14 provinces, namely Papua, Maluku, North Maluku, North Sumatra, West Sumatra, West Java, Central Java, Banten, North Sulawesi , South Sulawesi, Southeast Sulawesi, Bengkulu, South Kalimantan and Aceh (Permentan, 2014).

Palm trees have high economic potential because almost all parts can provide financial benefits, where all parts of their body can be utilized. From the leaves, we can make brooms sticks or sticks, trunks to support the house, the midrib (ijuk) can be for the roof of the house, sugar and palm wine / fresh (fresh drink), the fruit produces collagen (Ramadhani, 2015).

During this time the procurement of palm seeds is quite difficult because it is an annual plant. The period of dormancy of palm sugar seeds is quite long, which varies between 1-12 months. Vegetative breeding is a way out that can be taken, namely by tissue culture techniques. In sugar palm plants which are annual plants need a relatively longer time and require complex culture media formulations (Nurmayulis et al, 2011).

Factors determining the success of tissue culture are growth regulators (ZPT). The most widely used ZPT are Naphthalene Acetic Acid (NAA) and Benzyl Aminopurine (BAP). NAA is a group of auxins that function in inducing cell elongation, affecting apical dominance, axillary and adventitious shoot inhibition and rooting initiation, whereas BAP functions to stimulate cell division in explant-made tissue and stimulate shoot growth (Wattimena et al., 1992).

B. MATERIALS AND METHODS

The research was carried out at the Tissue Culture Laboratory of the Technical Implementation Unit (UPT) of the Horticulture Main Building in Johor Medan Building starting from April to July 2018. The plant material used was aren plant sprouts using a completely random factorial 2 factor design, namely NAA (0, 1, 2 and 3 ppm) and BAP (0, 1, 2, and 3 ppm). The treatment was repeated 5 times. Data were analyzed by variance and continued with DMRT at 5% level.

The manufacture of regeneration media was carried out by diluting stock solution in accordance with the provisions for MS media which added ZPT according to the treatment. The amount of media solution made in accordance with the number of culture bottles needed. The number of bottles prepared and the making of the media is adjusted to the number of explants available and to be planted. In addition, the determination of this MS media pH in the range of 5.8 is determined by adding 1 N NaOH solution if the pH is too low or adding 1 N HCl if the pH is too high, while continuing to stir until the solution becomes clear. Towards the boiling point, 7 g per liter of media is added. After the solution becomes clear the heating is stopped and the media is immediately put into a culture bottle of 15 ml and covered with aluminum foil. Then sterilized in an autoclave at a pressure of 15 psi with a temperature of 121 oC for 20 minutes. After sterilization is complete, the culture bottle is removed and incubated for 2 weeks in the transfer room before planting explants. The contaminated media is removed from the culture room and not used for explant planting. The parameters observed were the percentage of live explants, percentage of explants forming buds, number of shoots, and length of shoots.

C. RESULTS AND DISCUSSION

Aren is a wood plant that is relatively difficult to culture because annual plants have high phenolic compounds. According to Widyawati et al (2009), the older the palm seeds, the permeability of the water decreases, but it is not impermeable, so imbibisu lasts longer, partly due to the increase in the content of lignin and tannin which cover the sclereid cells of seed skin.

The percentage of live explants showed that sugar palm plants could be cultured on MS medium, but it had not shown its effect as seen from the percentage of live explants that were 100% (Table 1). One of the determining factors in the development of explants is the concentration of auxins and cytokines. If auxins and cytokines at low concentrations can

stimulate the growth and development of explants but at high concentrations these growth regulating agents can inhibit the development of exploratory morphogenesis. Moore (1979); George and Sherrington (1984); and Satria, Dwipa, Jamsari (1999) reported that the administration of growth regulators Auksin and cytokines at low concentrations can stimulate growth and development of explants and maintain the life force of explant tissue, but at high concentrations, these growth regulators can be inhibits the development of exploratory morphogenesis.

Table 1. Effect of NAA and BAP concentrations on the percentage of live explants (%)

NAA Concentration (ppm)	BAP Concentration (ppm)				Average
	B0 (0 ppm)	B1 (1 ppm)	B2 (2 ppm)	B3 3 ppm)	
N0 (0 ppm)	100	100	100	100	100
N1 (1 ppm)	100	100	100	100	100
N2 (2 ppm)	100	100	100	100	100
N3 (3 ppm)	100	100	100	100	100
Average	100	100	100	100	100

As with the percentage of the explants forming buds, auxins and cytokines have not shown any visible effect (Table 2). The percentage of explants formed 100% buds. Furthermore Evans, Sharp, and Ammivato, (1986) reported that the concentration of growth regulators of auxin and cytokines in explant tissue was a limiting factor and an explant growth and morphogenesis. The concentration of growth regulators of auxin and cytokines in the explant tissue can improve life ability, growth and development of explant tissue (Satria, et al, 1999).

Table 2. Effect of NAA and BAP concentrations on the percentage of explants forming shoots (%)

NAA Concentration (ppm)	BAP Concentration (ppm)				Average
	B0 (0 ppm)	B1 (1 ppm)	B2 (2 ppm)	B3 3 ppm)	
N0 (0 ppm)	100	100	100	100	100
N1 (1 ppm)	100	100	100	100	100
N2 (2 ppm)	100	100	100	100	100
N3 (3 ppm)	100	100	100	100	100
Average	100	100	100	100	100

The important role of auxin and cytokinin is to reprogram somatic cells which will determine the next stage of differentiation. Reprogramming causes dedifference and redifference to the development of new trajectories. In this study the number of shoots produced was only 1 bud for all treatments (Table 3).

Table 3. Effect of NAA and BAP concentrations on the number of shoots (fruit)

NAA Concentration (ppm)	BAP Concentration (ppm)				Average
	B0 (0 ppm)	B1 (1 ppm)	B2 (2 ppm)	B3 3 ppm)	
N0 (0 ppm)	1	1	1	1	1
N1 (1 ppm)	1	1	1	1	1
N2 (2 ppm)	1	1	1	1	1
N3 (3 ppm)	1	1	1	1	1
Average	1	1	1	1	1

In annual crops the growth rate is very slow when compared to other horticultural crops. When viewed from the length of the longest shoots in NAA treatment found in N3 that is equal to 1.09 cm and the lowest in N2 is 0.92 cm. In the BAP treatment the longest shoot length in B1 treatment was 1.04 cm and the lowest in B2 was 0.92 (Table 4). This is in line with Istika's opinion (2009) that the effects of plant growth regulators are a function of the balance of these substances which will regulate growth in certain phases. However, growth regulators such as auxin and cytokinin play a very prominent role in plant propagation in vitro.

Table 4. Effect of NAA and BAP concentrations on shoot length (cm)

NAA Concentration (ppm)	BAP Concentration (ppm)				Average
	B0 (0 ppm)	B1 (1 ppm)	B2 (2 ppm)	B3 3 ppm)	
N0 (0 ppm)	0.79	1.49	0.69	0.90	0.97
N1 (1 ppm)	0.96	0.84	1.01	1.15	0.99
N2 (2 ppm)	1.23	0.70	0.96	0.78	0.92
N3 (3 ppm)	0.99	1.13	1.02	1.20	1.09
Average	0.99	1.04	0.92	1.01	0.99

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REFERENCES

Ekawati, E. 2010. Modul Pjj Teknik Mikropropagasi Tanaman Perkebunan Bidang Peminatan Kultur Jaringan Tanaman. http://www.panpandiz.co.cc/2009/05/modul-pjj-teknik-mikropropagasi tanaman.html. Diakses tanggal 19 Januari 2010.

Gardner, F. B., R.B. Pearce dan R. Mitchell, 1991. Fisiologi Tanaman Budidaya. Terjemahan H. Susilo dan Subiyanto. UI Press: Jakarta.

George, E.F and P.D. Sherrington. 1984. Plant Propagation by Tissue Culture, Handbook and Directory of Comercial Laboratoryes. Easter Press, England.

Gunawan, L.W. 1995. Teknik Kultur Jaringan In Vitro dalam Hortikultura. Penebar Swadaya: Jakarta.

Harahap, M.K. 2013. Analisis keragaman genetik tanaman aren (*Arenga pinnata* Merr) di Tapanuli Selatan dengan marka RAPD. Tesis. Universitas Sumatera Utara, Medan.

Haris, T.N. 1994. Developmental and germination studies of the sugar palm (*Arenga pinnata* Merr) seed. Disertasi. Universiti Putra Malaysia, Malaysia.

Hendaryono, D.P.S. dan A. Wijayani. 1994. Teknik Kultur Jaringan, Pengenalan dan Petunjuk Perbanyakan secara vegetatip. Jogjakarta: Kanisius.

Kartina, A.M, Nurmayulis, dan Susiyanti. 2011. Pengaruh Indole Butiric Acid (IBA) Terhadap Pembentukan Akar Pada Tanaman Aren. Agrivigor 10(2): 208-218.

Lakitan, B. 1995. Fisiologi Pertumbuhan dan Perkembangan Tanaman. Raja Grafindo Persada: Jakarta.

Lasut, M.T. 2012. Budidaya aren (*Arenga pinnata* (Wurmb) Merr) yang baik. Modul. Kerjasama antara Universitas Texas A & M, Institut Pertanian Bogor (IPB), Universitas Udayana dan Universitas Sam Ratulangi.

Lempang, M. 2012. Pohon aren dan manfaat produksinya. Balai penelitian kehutanan Makassar. *Info Teknis Eboni* 9 :37-54.

Naemah, D., D. Payung, dan W. Sokendera. 2013. Budidaya tanaman aren (*Arenga pinnata* Merr) sebuah alternatif dalam upaya peningkatan pendapatan masyarakat. Makalah. Disampaikan pada Seminar Nasional Agroforestri pada tanggal 26-27 Oktober 2013, Banjarbaru.

Permentan. 2014. Pedoman budidaya aren (*Arenga pinnata* MERR) yang baik. Lampiran peraturan Menteri Pertanian Republik Indonesia Nomor133 / Permentan / OT.140 / 12/2013 tentang pedoman budidaya aren (*Arenga pinnata* MERR) yang baik.

Rida, P, B.Satria dan R. Thaib. 2003. Upaya Perbanyakan Vegeatif Enau (Arenga pinnata (Wumrb) Merr.) Melalui Regenerasi Tunas Secara *In Vitro*. Stigma 10 (3): 208-212.

Salisbury, F.B. dan Ross, W.C., 1995. Fisiologi Tumbuhan Jilit Tiga. Penerjemah. Lukman, D. R. Dan Sumaryono. Penerbit ITB: Bandung.

Soeryowinoto, M. 1996. Pemuliaan Tanaman Secara In Vitro. Kanisius: Jogjakarta.

Steel, R.G.D dan J.H. Torrie. 1995. Prinsip dan Prosedur Statistik. Gramedia, Pustaka Utama, Jakarta.

Sulaiman, A.H. 1996. Dasar-Dasar Biokimia untuk Pertanian, USU-Press, Medan.

Wattimena, dkk. 1992. Bioteknologi Tanaman. Laboratorium Kultur Jaringan Tanaman, Pusat Antar Spesies, IPB, Bogor.

Widyawati, N., Tohari, P. Yudono, dan I. Soenardi. 2009.Permeabilitas dan Perkecambahan Benih Aren (*Arenga pinnata* (Wurmb.) Merr.). J.Agron. Indonesia 37 (2): 152-158.

Wilkins, M.B., 1992. Fisiologi Tanaman. Penerjemah Sutedjo M.M dan Kartasapoetra A.G. penerbit Bumi Aksara: Jakarta.

Yusnita, 2003. Kultur Jaringan. Cara Memperbanyak Tanaman Secara Efisien. Agromedia Pustaka: Jakarta.

Yuwono, T. 2008. Bioteknologi Pertanian. Gadjah Mada University Press: Yogyakarta.

Zulkarnain, H. 2009. Kultur Jaringan Tanaman. Bumi Aksara: Jakarta.