PENGEMBANGAN KLON CENDANA (*Santalum album* Linn.) MENGGUNAKAN TEKNIK KULTUR MATA TUNAS DAN EMBRIOGENESIS SOMATIK

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INTISARI

Cendana merupakan species tanaman hutan yang sulit dibudidayakan secara vegetatif makro (stek pucuk, stek akar, cangkok, dan grafting) sehingga menyulitkan ketersediaannya dalam mendukung upaya rehabilitasi lahan kritis. Untuk itu, perlu dilakukan upaya penyediaan cendana sebagai bahan tanaman melalui perbanyakan vegetatif mikro. Tujuan utama penelitian ini adalah mempelajari metode perbanyakan klon cendana (*Santalum album* Linn.) secara kultur jaringan melalui kombinasi kultur mata tunas dan embriogenesis somatik. Cabang cendana diperoleh dari plot konservasi sumberdaya genetik di Watusipat, Gunung Kidul, Yogyakarta, Indonesia. Penelitian ini dilakukan di laboratorium kultur jaringan Balai Besar Penelitian Bioteknologi dan Pemuliaan Tanaman Hutan (BBPBPTH) di Kaliurang, Yogyakarta, Indonesia. Pelaksanaan penelitian mulai dari September 2013 – Agustus 2015. Penelitian embriogenesis somatik terdiri dari 5 tahapan : antara lain induksi kalus, maturasi, maturasi ke-2, pertumbuhan dan perkembangan plantlet, dan aklimatisasi. Media dasar MS cocok digunakan untuk penelitian ini, karena merupakan media yang sering digunakan dalam kultur jaringan. Keistimewaan media ini karena kandungan nitrat, kalium, dan amoniumnya tinggi, serta mengandung hara an-organik yang layak untuk memenuhi kebutuhan berbagai jenis sel tumbuhan dalam kultur jaringan. Hasil penelitian rendaman cabang dan kultur mata tunas menunjukkan bahwa klon C2 dan C3 memberikan respon terbaik terhadap pertumbuhan tunas cendana. ZPT ABA tidak berpengaruh terhadap absisi daun pada kultur mata tunas cendana, karena tidak diketahuinya kandungan hormon endogen yang terdapat dalam daun. Terjadinya absisi daun menyebabkan transpor nutrisi, hormon, dan air ke bagian tanaman lainnya, walaupun demikian daun masih tetap hijau dan segar serta masih mengalami pembelahan sel dan metabolisme sehingga berdampak positif terhadap penelitian embriogenesis somatik. Hasil induksi kalus menunjukkan bahwa klon C3 dan ZPT 2,4-D 1 mg/l memberikan respon terbaik terbukti dari hasil analisis morfologi diperoleh kalus embriogenik sebanyak 37 botol (28%) dan tekstur kalus friabel berwarna putih, kuning, dan coklat muda. Berdasarkan data maturasi, sebanyak 15 botol (36%) tumbuh dan berkembang membentuk masa kalus embriogenik, yang kemudian berkembang membentuk sel globular dan friabel berwarna putih mengkilat. Pada tahap maturasi ke-2 terlihat bahwa sel-sel kalus embriogenik yang mengalami maturasi lebih lanjut sudah berbentuk formasi hati dan torpedo. Dari hasil pertumbuhan dan perkembangan plantlet diketahui bahwa sebanyak 89 tunas (39,5%) tumbuh menjadi plantlet yang sempurna, sedangkan sisanya sebanyak 110 tunas (49%) tumbuh tidak sempurna. Hasil aklimatisasi menunjukkan bahwa sebanyak 42 plantlet (45,16%) tumbuh sempurna dengan rerata panjang tunas 2,17 cm dan rerata panjang akar 2,03 cm.

Kata Kunci : *Santalum album*, kultur mata tunas, embriogenesis somatik, aklimatisasi

DEVELOPMENTS SANDALWOOD (*Santalum album* Linn.) CLONE THROUGH NODE CULTURE AND SOMATIC EMBRYOGENESIS

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ABSTRACT

Sandalwood is a species of forest plants which is difficult to be cultivated through macro propagation (shoot cuttings, root cuttings, airlayeng, and grafting) so that the number of its presence is not enough to support rehabilitating critical lands. Thus, another way of providing more sandalwood in nature should be attempted. Micro propagation is a possible way to do. The main purpose of this research is to study the propagation method of tissue culture upon sandalwood (*Santalum album* Linn.) clone by combining the shoot culture and somatic embryogenesis technique. The branch of Sandalwood was taken from a conservation plot of genetic resource in Watusipat, Gunungkidul, Yogyakarta, Indonesia. This research was conducted in the laboratory of tissue culture at Center of Forest Biotechnology and Tree Improvement (CFBTI) located in Kaliurang, Yogyakarta, Indonesia. The research had been conducted from September 2013 – December 2014. The somatic embryogenesis research consists of 5 steps, such as callus induction, maturation, second maturation, plantlets growth and development, and acclimatization. The basic media of MS is the appropriate one to this research as it is commonly used in tissue culture. Another distinctive feature is noted through its richness of nitrate, potassium, and ammonium as well as the an-organic nutrient which is eligible to fulfil the needs of various kinds of plant cells in tissue culture. The result of branch immersion and node culture showed that clone C2 and C3 generated the best response upon the growth of sandalwood buds. PGR ABA did not effect the leaf abscission in sandalwood shoot culture as the endogenous hormones within the leaf could not be observed. Moreover, the leaf abscission let the nutrition, hormones, and water be carried away to the other parts of plant. However, the leaf was still green and fresh, and able to perform a cell division and metabolism which positively impacts the somatic embryogenesis research. The result of callus induction showed that the C3 clone and PGR 2.4-D 1 mg/l performed the best result. It was observed through the result of morphological analysis of which showed the availability of 37 bottle (28%) callus embryogenic and vriable callus texture which is white, yellow, and cream in colours. According to the maturation data, 15 bottles (36%) were growing and developing into callus embryogenic period. After that, they produced globular and friable cells which are shiny and white in colour. In the second maturation, it could be observed that the embryogenic callus cells which were maturated in advance generated a formation of heart and torpedo. From the result of plantlet growth and development, it was found that 89 buds (39.5%) were growing perfectly, while the rest 110 buds (49%) were growing abnormally. The acclimatization result showed that 42 plantlet (45.16%) were growing normally by 2.17 cm in average buds length and 2.03 cm in average roots length.

Keywords: *Santalum album*, node culture, somatic embryogenesis, acclimatization