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POLYEMBRYONY ABILITY OF JACKFRUIT (ARTOCARPUS HETEROPHYLLUS) SEED

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POLYEMBRYONY ABILITY OF JACKFRUIT (*ARTOCARPUS HETEROPHYLLUS)* SEED

BY

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A project report submitted to Faculty of Agriculture, Universiti Putra Malaysia, in fulfillment of the requirement of PRT 4999 (Final Year Project) for the award of the degree of Bachelor of Agricultural Science

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CERTIFICATION

This project entitled “Polyembryony Ability of Jackfruit (*Artocarpus heterophyllus)* Seed”, is prepared by Nur Farah Dinah Bt Muhamad and submitted to the Faculty of Agriculture in fulfillment of the requirement of PRT 4999 (Final Year Project) for the award of the degree of Bachelor of Agricutural Science.

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LIST OF ABBREVIATIONS

BAP	6-benzylaminopurine
BA	benzyladenine
GA_3	gibberellic acid
NaOH	sodium hydroxide
HCl	hydrochloric acid
RCBD	randomize complete block design
MS	Murshige and Skoog
PGR	plant growth regulator
LAR	laminar air flow

ABSTRACT

Polyembryony is common in jackfruit but which part of the seed responded to polyembryony is the main issue. The development of multiple embryos within the same seed is defined as polyembryony. The objectives of the experiment were to compare the ability of different structural forms of seed and the effect of different concentration of benzylaminopurine (BAP) on shoot induction through polyembryony in *Artocarpus heterophyllus* seed while the different structural forms of seed tested were complete seed, seed without minor cotyledon and seed without minor cotyledon and zygotic embryo. The different concentrations of BAP were 0 mg/L, 4 mg/L and 8 mg/L. The experiment was arranged in a Randomized Complete Block Design (RCBD) with 9 treatments and 10 replications for each treatment. Each replication contained one explant. The different seed structures were cultured inside jars containing half strength MS (Murshige and Skoog) medium with different concentrations of BAP. After 12 weeks of culture, it was observed that complete seed cultured on medium supplemented with 4 mg/L BAP showed the best response producing the highest number and percentage of shoot induction.

ABSTRAK

Poliembrio adalah biasa pada nangka tetapi bahagian biji manakah yang memberi respon kepada poliembrio menjadi isu utama. Perkembangan embrio berganda dalam kalangan biji didefinisikan sebagai poliembrio. Objektif eksperimen ini adalah untuk membandingkan keupayaan struktur yang berbeza pada biji dan kesan kepekatan benzylaminopurine (BAP) yang berbeza untuk pertumbuhan pucuk melalui poliembrio pada biji *Artocarpus heterophyllus*. Perbezaan struktur biji terdiri daripada biji lengkap, biji tanpa kotiledon minor serta zigot embrio manakala perbezaan kepekatan BAP pula adalah diantara 0 mg/L, 4 mg/L dan 8 mg/L. Eksperimen ini diatur dalam Rekabentuk Blok Lengkap (RCBD) dengan 9 rawatan dan 10 replikasi bagi setiap rawatan. Setiap replikasi mengandungi satu eksplan. Biji yang berbeza struktur telah dikulturkan di dalam balang jar yang mengandungi media MS separuh (Murshige dan Skoog) dengan kepekatan BAP yang berbeza (0, 4 dan 8 mg/L). Selepas dikultur selama 12 minggu, pemerhatian telah dijalankan terhadap biji lengkap yang dikultur dalam media yang ditambah dengan 4 mg/L BAP menunjukkan kesan yang paling baik dalam memberi respon untuk penghasilan jumlah pucuk dan peratusan bagi pertumbuhan pucuk yang tinggi.

CHAPTER 1

INTRODUCTION

According to Love and Paull (2011) jackfruit is said to have originated from Southwest India, where it can be found growing wild in the rain forest of the Western Ghats, India. The jackfruit plants were then grown widely throughout India mostly in West Bengal, Bihar, Kerala, Tamilnadu and Karnataka. Then, the fruit was introduced throughout the tropical countries of Southeast Asia including Malaysia and Indonesia, and tropical Africa. Now, jackfruit becomes common in Bangladesh, Burma, Sri Lanka and Thailand, where the fruit is highly esteemed (Jaiswal and Amin, 1992). In South India, jackfruit is among the popular fruit ranking next to mango and banana (El-Zaher, 2008). In Bangladesh, jackfruit is known as their national fruit. The jackfruit plays an important role in the economy of Bangladesh because it is a multipurpose tree that provides food, fodder, timber and fuel (Khan *et al*., 2010).

Barrau (1976) suggested that jackfruit originated in Malaysia due to the great diversity of jackfruit cultivars in Malaysia. Jackfruit is widely cultivated in Malaysia, because of this it was said to have likely been introduced and never found in the wild (Jarrett 1959). According to the statistics by Department of Agriculture Malaysia, in 2011 the planted area of jackfruit in Malaysia is about 4260.8 hectare with harvested area of 2895.4 hectare as shown in Figure 1. The most planted area of jackfruit in Malaysia is in Pahang with 1745.9 ha, mostly in

Temerloh (546.8 ha) followed by Negeri Sembilan with 463.1 ha and Johor with 404.8 ha. Estimation on the production of jackfruit is about 23 735 mt in 2011 with a production value of more than RM 55,000,000.

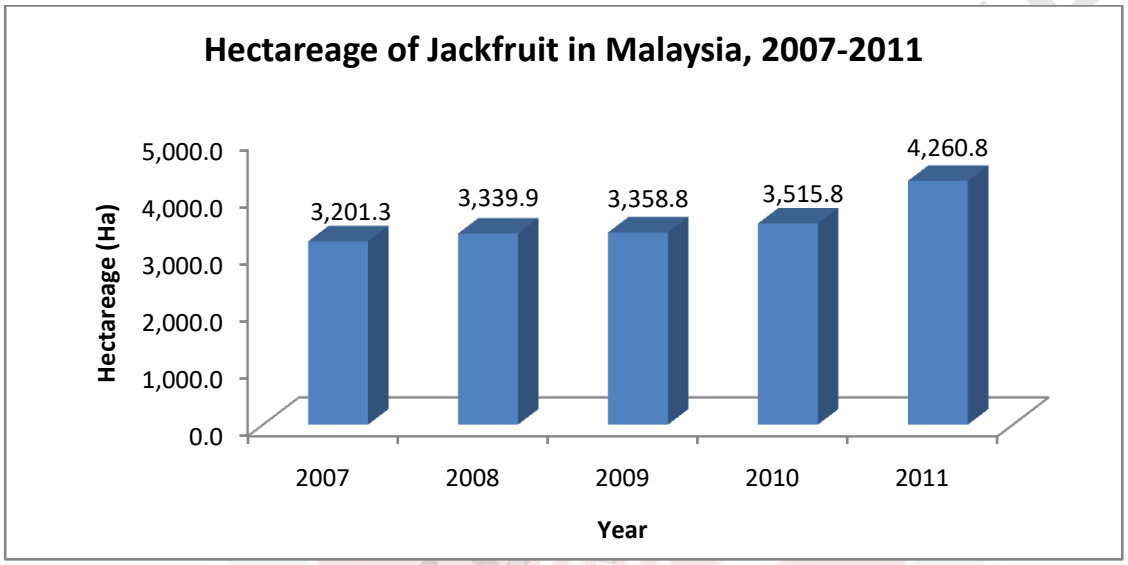

Figure 1 : Hectarage of Jackfruit in Malaysia from 2007-2011.

(Source : Agriculture Department Peninsular Malaysia, 2012)

In Malaysia, jackfruit is being eaten fresh because the ripe flesh having crunchy and juicy texture with sweet tasted is much favoured by the people. This tropical fruit is highly demanded during the fruit season. More than 25 clones of jackfruit were registered in Malaysia. However, there are five varieties of jackfruit which are popular and mostly planted by the local farmers, which are J29, J31, Mantin (J32), Tekam Yellow and Mastura. These

varieties are chosen as the best because their fruits are of very high quality in term of the colour, texture and taste. Moreover, these jackfruit trees are capable of producing high yield per season and resistance towards diseases.

Jackfruit tree is considered as an economic crop which can give bundles of benefits. Besides, growing jackfruit is considered as profitable if the tree can last for more than 8 to 10 years old. Moreover, this plant is regarded as a species which is worthy of research attention because of its wider potential use in nutrition and potential to increase local incomes when grown in agroforestry and home garden system (Haq, 2006). Therefore, because of the benefits, the improvement in propagation of jackfruit through in vitro method is very important. Studies on polyembryony under in vitro condition allow high rate of multiplication which lead to the production of large number of progeny compared with the polyembryony of jackfruit under natural condition in the field. Due to that reason, this study was carried out to meet the objectives which are:

- To determine the polyembryony ability of *Artocarpus heterophyllus* under in vitro condition.

- To determine the effect of different concentrations of BAP on shoot induction from different structural forms of *A. heterophyllus* seed.

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