NEW MASS PROPAGATION SYSTEM FOR TRUE-TO-TYPE PLANTING MATERIAL IN MALAYSIA

Norsyuhaida Ahmad Shafawi
Horticulture Research Centre, MARDI Kluang, Beg Berkunci No. 525,
86009 Kluang, Johor, Malaysia
Email: syuhaida@mardi.gov.my,

Rosimah Jamil
Horticulture Research Centre, MARDI Kluang, Beg Berkunci No. 525,
86009 Kluang, Johor, Malaysia
Email: irma@mardi.gov.my,

Noor Baiti Abd Aziz
Horticulture Research Centre, MARDI Kluang, Beg Berkunci No. 525,
86009 Kluang, Johor, Malaysia
Email: aabaiti@mardi.gov.my,

Fatkhiah Ahmad Marzuki
Horticulture Research Centre, MARDI Kluang, Beg Berkunci No. 525,
86009 Kluang, Johor, Malaysia
Email: afatkhiah@mardi.gov.my,

Azlan Azizi Muhamad Noor
Crop *& Soil Science Research Centre, MARDI Kluang, Beg Berkunci No. 525,*
86009 Kluang, Johor, Malaysia
Email: azlanmn@mardi.gov.my,

Noor Syahira Nasarudin
Horticulture Research Centre, MARDI Headquarters, Persiaran MARDI-UPM,
43400 Serdang, Selangor, Malaysia
Email: syahira@mardi.gov.my,

Razali Mustaffa
Horticulture Research Centre, MARDI Headquarters, Persiaran MARDI-UPM,
43400 Serdang, Selangor, Malaysia
Email: razally@mardi.gov.my,

Salehudin Md Radzuan
Horticulture Research Centre, MARDI Sintok,
06050 Bukit Kayu Hitam, Kedah, Malaysia
Email: salehudin@mardi.gov.my,

Joanna Cho Lee Ying
Horticulture Research Centre, MARDI Headquarters, Persiaran MARDI-UPM,
43400 Serdang, Selangor, Malaysia
Email: joanna@mardi.gov.my,

ABSTRACT

The change of world weather affects agriculture as well as in Malaysia. Long lasting rain and drought more than usual affect irrigation which is an important factor in the success of such a crop. The propagation system of some planting material is heavily influenced by the weather especially if we use sectional techniques. The selection of plants for this study is based on the highest demand from various fields. Four years of research has been done by MARDI to obtain the best system for cultivating planting material in Malaysia by large number of cuttings in a short time. Selected plants are pineapple, jaboticaba, papaya, pamelo, mahkota dewa and mas cotek. Three systems were used in this study: 1) closed-capillary propagation system, 2) self-watering propagation chamber system and 3) opened-propagation system (control). Through this study, the closed-capillary propagation system covered a percentage of success of 80%, 72%, 63%, 60%, 75% and 68% respectively for each crop. The self-watering propagation chamber system results in 95%, 92%, 95%, 90%, 98% and 98% success rates for each crop and opened-propagation system (control) resulting in a success percentage of 35%, 20% 5%, 31%, 25% and 23% respectively for each crop. Based on the results of the system seen to produce a high percentage of success for the various crops is a self-watering propagation chamber System that produces high success percentages of 95%, 92%, 95%, 90%, 98% and 98% respectively for each crop. The study succeeded in achieving the objective of helping producers of pineapple, jaboticaba,

papaya, pamelo, mahkota dewaand mas cotek producers who were previously having critical problem by global weather changes.

Keywords: climate change, planting material, propagation technique, self-watering system, chamber

INTRODUCTION

Climate change is affecting world productivity in agriculture including Malaysia. Long lasting rain and drought more than usual affect irrigation which is an important factor in the success of such a crop. Plant linkages are not merely references to crop yields. It also includes the supply of planting materials which is the beginning of expanding the cultivation of crop and increasing the production of certain fruits and plants to be used as exports of the country or local use to meet demand for raw supplies. Currently available propagation techniques for pineapple, papaya, herbs and other fruit plants are still unable to solve the shortage of planting material due to climate change and we still lack of research information about the solution of decreasing production of planting material due to this factor. Therefore, the objective of this study is to produce planting material propagation system capable of producing mass planting materials in a short time without being influenced by global weather changes.

The propagation system of some planting material is heavily influenced by the weather especially if we use sectional or cutting techniques. The selection of plants for this study is based on the highest demand from various fields such as pineapple because according to LPNM, pineapple variety MD2 is currently the most popular variety where it is being traded globally mainly due to its excellent taste, sweetness, attractive golden flesh with golden skin color and its perfect cylindrical shape. While the pineapple industry is growing rapidly, there is a critical supply shortage of MD2 pineapple planting material. More than 7 million MD2 pineapple material per year is needed but the supply of this planting material is still inadequate. Exotica 2 papaya was choose because of this hybrid experiencing the percentage of seed producing hermaphrodite seedlings is low which only 50%. Jaboticaba and pamelo are usually reproduced using air-layering but due to global weather changes require other techniques to be used to produce two high-grade plant species in the niche market. The mahkota dewa and mas cotek is an herb of the least choice of the supply of planting material which is a factor of two of the crop industry is quite slow.

In this study, we use three propagation systems, an opened propagation system practiced by most planting material suppliers. The closed-capillary propagation system is a system employed by most researchers and some planting materials suppliers working closely with researchers and this self-watering propagation chamber system is the latest system created to overcome the shortcomings of both systems to help planting material suppliers reduce damage and plant mortality due to global weather changes. This study shows that the system of self-watering propagation chambers can overcome the weaknesses and problems faced by the conventional propagation system, closed-capillary propagation system.

MATERIALS AND METHODS

This study was conducted at MARDI Kluang where throughout the year there will be hot weather and long rain for a certain period. Techniques used are cutting techniques because it is the technique that produces the most planting material in the shortest time and can produce true-to-type planting material. The main concern of this technique are water and heat. Three treatments were used: 1) closed-capillary propagation system, 2) self-watering propagation chamber system and 3) conventional system which is opened propagation system. This study uses a split-plot experiment design where each treatment has 4 replications and each replication will use 30 cuttings for each crop.

RESULTS AND DISCUSSION

Referring to the below table, the conventional system which is opened propagation system shows success rate of MD2 pineapple, Jaboticaba, Exotica 2 papaya, Pamelo, Mahkota Dewa and Mas Cotek planting materials are the lowest success rate compare to other systems with success rate value are 35%, 20%, 5%, 31%, 25% and 23% respectively because when using cutting techniques, although it can produce more planting material than other techniques, the technique is very easily influenced by climate changes due to its physiology, this planting material is easy to die because it has been discarded from its parent and lost its ability to get water supply and food. In the long summer, planting material will die due to drought and lack of water while in the long rainy season, planting material will die from excessive water that cause root rot and critical fungal attack problems.

The closed-capillary propagation system shows better result from opened propagation system with success rate of MD2 pineapple, Jaboticaba, Exotica 2 papaya, Pamelo, Mahkota Dewa and Mas Cotek planting materials are 80%, 72%, 63%, 60%, 75% and 68% respectively because this system capable of overcoming irrigation problems as prolonged rain will not affect as this system protects planting material from receiving excessive rainfall, but this system can't protect the effects of prolonged heat. This system structure that does not consider the light and ventilation in closed systems causes extreme heat temperatures trapped in a system that causes planting material to burn and lower the success rate of this propagation system.

While self-watering propagation chamber system shows the significantly best result compare to others with success rate of MD2 pineapple, Jaboticaba, Exotica 2 papaya, Pamelo, Mahkota Dewa and Mas Cotek planting materials are 95%, 92%, 95%, 90%, 98% and 98% respectively because of this system considers all the major factors of propagation planting material which are irrigation, temperature in the system, sunlight and ventilation in the system. Therefore, the percentage of propagation success can

be improved more effectively for all types of planting materials used. By taking all the factors into consideration, it can prevent all the planting material from burn, affected by fungus and other problem causing by climate change and weakness of other systems that will affected the industry of planting material production and crop production.

Table 1. Success rate for different crop using different propagation systems

PLANTING MATERIAL	SUCCESS RATE (%)		
	CLOSED-CAPILLARY PROPAGATION SYSTEM	SELF-WATERING PROPAGATION CHAMBER	OPENED PROPAGATION SYSTEM
MD2 PINEAPPLE	80	95	35
JABOTICABA	72	92	20
E2 PAPAYA	63	95	5
PAMELO	60	90	31
MAHKOTA DEWA	75	98	25
MAS COTEK	68	98	23

CONCLUSION

The production of planting material is very closely related to the weather and is a major factor in the expansion of the cultivation area of a plant and thus a factor in the development of a crop commodity. Through this study, self-watering propagation chamber system able to overcome the problem of planting material production of certain commodity crop that affected by the global climate changes. In addition, the production of planting materials through these techniques and systems can produce mass planting material and capable of controlling the quality of crop production and crop yields later. The study succeeded in achieving the objective of helping producers of pineapple, jaboticaba, papaya, pamelo, mahkota dewa and mas cotek producers who were previously having critical problem by global climate changes. The use of this system can also be extended to a variety of high-impact crops such as Tin trees, landscape trees and other crops that produce less seed. Policy implication from this finding is we can overcome the critical shortage of planting material for certain commodity due to climate change with invite producers, farmers and researchers to courses, demo or seminars under supervision of Malaysia Agriculture Department to further discuss and expand information about this new production systems.

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ABSTRAK

Empat tahun kajian telah dilakukan oleh MARDI untuk mendapatkan sistem yang terbaik bagi membiakan bahan tanaman di Malaysia secara keratan dalam jumlah yang banyak dalam masa yang singkat. Tanaman-tanaman yang dipilih adalah nanas, jaboticaba, betik, limau bali, mahkota dewa dan mas cotek. Sebanyak tiga sistem digunakan dalam kajian ini iaitu 1) sistem pembiakan kapilari tertutup, 2) sistem kebuk pembiakan pengairan kendiri dan 3) sistem pembiakan terbuka (kawalan). Melalui kajian ini mendapati sistem pembiakan kapilari tertutup menghasilkan peratus kejayaan sebanyak 80%, 72%, 63%, 60%, 75% dan 68% masing-masing bagi setiap tanaman. Sistem kebuk pembiakan pengairan kendiri pula menghasilkan peratus kejayaan sebanyak 95%, 92%, 95%, 90%, 98% dan 98% masing-masing bagi setiap tanaman dan sistem pembiakan terbuka (kawalan) menghasilkan peratus kejayaan sebanyak 35%, 20%, 5%, 31%, 25% dan 23% masing-masing bagi setiap tanaman. Berdasarkan keputusan sistem yang dilihat dapat menghasilkan peratus kejayaan yang tinggi bagi pelbagai tanaman adalah Sistem kebuk pembiakan pengairan kendiri yang menghasilkan peratus kejayaan tinggi sebanyak 95%, 92%, 95%, 90%, 98% dan 98% masing-masing bagi setiap tanaman