



**UNIVERSITI PUTRA MALAYSIA**

**MANIPULATION OF SAFED MUSLI (*Chlorophytum borivilianum*)  
TUBERS USING GROWTH REGULATOR TO ENHANCE  
SPROUTING AND STORABILITY**

**JUJU NAKASHA JAAFAR**

**FP 2012 19**

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TUBERS USING GROWTH REGULATOR TO  
ENHANCE SPROUTING AND STORABILITY**

**By**

**JUJU NAKASHA JAAFAR**

**Thesis Submitted to the School of Graduate Studies, Universiti  
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Master of Science**

**January 2012**

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**MANIPULATION OF SAFED MUSLI (*Chlorophytum borivillianum*) TUBERS USING GROWTH REGULATOR TO ENHANCE SPROUTING AND STORABILITY**

By

**JUJU NAKASHA BINTI JAAFAR**

**January 2012**

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Establishing a new crop outside its origin is a challenge in the agriculture production. Understanding the behavior of planting materials as well as the plant growth and development under specific conditions are important in cultivating a new crop. Therefore, this thesis focuses on three aspects of handling the planting materials of safed musli, a newly introduced crop in Malaysia.

In the first experiment, safed musli tuber were soaked gibberellic acid ( $GA_3$ ) at 10, 15 and 20 mg/L, and humic acid (HA) at 5, 10 and 15% to break tuber dormancy. Result from this experiment showed that both  $GA_3$  and HA were successful in breaking the tuber dormancy and promoted homogenous sprouting. Tubers treated with 20 mg/L  $GA_3$  and 15% HA were found to have

higher leaf area index, fibrous root length, and higher number of tubers with bigger tuber diameter which finally translated to increased yield. However, 15% HA was more cost effective compared to 20 mg/L GA<sub>3</sub>.

In the second experiment, tubers were either planted as whole or cut with three levels of tuber weight (3, 6 and 9 g). There was no interaction between the two factors all measured parameters. Besides, different tuber weight categories did not affect the plant growth. However, when the tubers were subjected to cutting, it influenced the plants to produce higher leaf area index, fibrous root length, higher number of tubers, bigger tuber diameter and finally, higher tuber dry weight.

In the third experiment, tubers were stored in two temperatures which is at 28°C and 10°C and were sprayed with paclobutrazol at four concentrations of 0, 100, 200 and 300 mg/L. The data demonstrated that safed musli tubers had excessive sprouting in 28°C especially for treatment without paclobutrazol. Paclobutrazol at 28°C was not successful in inhibiting sprouting, but it reduced sprouting as well as sprout growth. Only minimal sprouting occurred in tubers stored at 10°C during the eight months of storage. Upon removal from the storage environment, the tuber viability was also not affected by this low temperature.

Overall, in order to cultivate safed musli, cut tuber weighing 3 g should be treated with 15% HA for an hour prior to planting. Upon harvest the tubers can be stored up to five months at 10°C without loss in planting quality.

Abstrak thesis yang dikemukakan kepada Senat Universiti Putra Malaysia  
sebagai memenuhi keperluan untuk Ijazah Master Sains

**MANIPULASI TUBER SAFED MUSLI (*Chlorophytum borivillianum*)  
DENGAN MENGGUNAKAN PENGGALAK TUMBESARAN UNTUK  
MENINGKATKAN PERCAMBAHAN DAN KEUPAYAAN PENYIMPANAN**

Oleh

**JUJU NAKASHA BINTI JAAFAR**

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Penanaman tanaman baru di luar kawasan asalnya merupakan satu cabaran di dalam bidang pertanian. Memahami ciri-ciri bahan tanaman serta pertumbuhan dan perkembangannya di dalam keadaan persekitaran tertentu adalah penting bagi tanaman tersebut. Oleh itu, tesis ini memberikan tumpuan kepada tiga aspek pengendalian bahan tanaman safed musli, yakni tanaman baru di Malaysia.

Di dalam eksperimen pertama, dormansi diatasi dengan merendamkan tuber di dalam asid giberelik ( $GA_3$ ) pada 10, 15 dan 20 mg/L dan asid humik (HA) pada 5, 10 dan 15%. Didapati bahawa  $GA_3$  dan HA berjaya mengatasi dormansi dan menggalak percambahan tuber dengan sekata. Rawatan dengan 20 mg/L  $GA_3$  dan 15% HA menunjukkan pertumbuhan yang bagus

kerana terdapat peningkatan di dalam indeks luas daun, panjang akar fiber dan bilangan tuber dengan diameter tuber yang lebih besar, di mana semua ini secara kolektifnya akan meningkatkan hasil. Walaubagaimanapun, 15% HA ternyata lebih kos efektif berbanding 20 mg/L GA<sub>3</sub>.

Di dalam eksperimen kedua, tuber ditanam sebagai 'whole' (tanpa potongan) dan 'cut tubers' (tuber di potong) dengan setiap satunya terbahagi kepada tiga kategori berat (3, 6 dan 9 g). Didapati bahawa kedua-dua faktor adalah saling tidak mempengaruhi antara satu sama lain bagi semua parameter yang diukur. Berat bahan tanaman yang digunakan juga didapati tidak mempengaruhi pertumbuhan safed musli. Tetapi, apabila bahan tanaman tersebut dipotong sebelum penanaman, ia menghasilkan indeks luas daun, panjang akar fiber, bilangan tuber, diameter tuber yang lebih tinggi berbanding bahan tanaman yang ditanam terus.

Di dalam eksperimen ketiga, tuber disimpan pada dua suhu iaitu 28°C dan 10°C, dan disemur dengan empat kepekatan paclobutrazol iaitu 0, 100, 200 dan 300 mg/l. Data menunjukkan percambahan tertinggi semasa tuber disimpan pada 28°C tanpa paclobutrazol. Semburan paclobutrazol pada 28°C tidak berjaya menghentikan percambahan, tetapi ia hanya merendahkan percambahan dan pertumbuhan tunas pucuk berbanding dengan rawatan kawalan. Hanya sedikit percambahan berlaku pada tuber yang disimpan di dalam 10°C selama lapan bulan. Suhu rendah juga didapati tidak mempengaruhi kebernasan tuber apabila tuber dikeluarkan daripada penyimpanan dan ditanam.

Secara keseluruhannya, tuber bersaiz 3 g yang telah direndam satu jam di dalam 15% HA adalah disyorkan untuk penanaman safed musli. Selepas tuber dituai, ia boleh disimpan pada suhu 10°C, tanpa memberi kesan kepada kualitinya sebagai bahan tanaman.





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Finally, I would like to extend my greatest appreciation to my beloved parents and sisters who were always understanding and encouraged me throughout this study.

I certify that a Thesis Examination Committee has met on 13<sup>th</sup> January 2012 to conduct the final examination of Juju Nakasha Jaafar on her thesis entitled “Manipulation of Safed Musli (*Chlorophytum borivillianum*) Tubers using Growth Regulator to Enhance Sprouting and Storability” in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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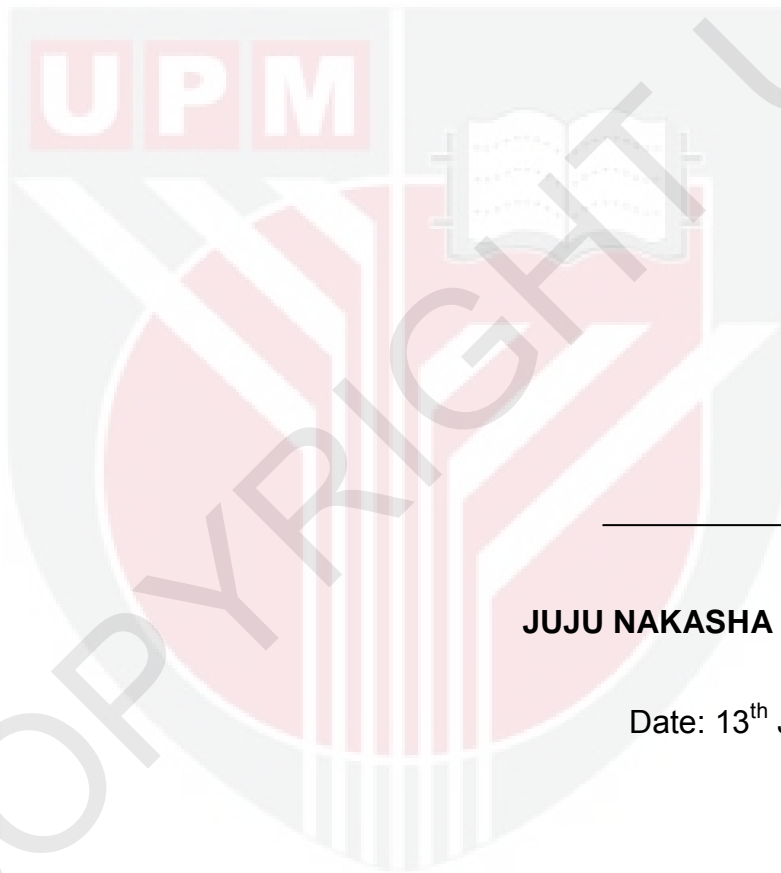
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## DECLARATION

I declare that the thesis is my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or other institutions.



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**JUJU NAKASHA BINTI JAAFAR**

Date: 13<sup>th</sup> January 2012

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