出國報告（出國類別：其它-國際會議）

出席蘭花及觀賞植物國際研討會

服務機關：行政院農委會高雄區農業改良場
姓名職稱：蔡奇助副研究員
派赴國家：泰國清邁
出國期間：**101** 年 **1** 月 **8~14** 日
報告日期：**101** 年 **4** 月 **3** 日

摘要

此研討會是泰國自 2011 年 11 月 9 日~2012 年 2 月 15 日在清邁舉辦的清邁花卉博覽會活動中的所搭配的國際研討會之一。本次的蘭花及觀賞植物國際研討會主要針對蘭花及觀賞植物的栽培、育種、組織培養等各個相關領域的學術交流，以及泰國重要經濟作物的產區參訪等。泰國在熱帶蘭花，如石斛蘭、萬代蘭及千代蘭等在育種、商業生產及種原在世界上皆有舉足輕重的地位，藍色萬代蘭與千代蘭的育種與種原尤其豐富。蝴蝶蘭是目前臺灣最重要的花卉產業，每年產值約新台幣 30 億元，台灣在蝴蝶蘭的種原、種苗生產與栽培技術方面居於領先地位，爲使臺灣蝴蝶蘭產業能永續發展，近幾年台灣在積極從事蝴蝶蘭與藍色萬代蘭(或藍色千代蘭)的屬間雜交與胚拯救試驗，發現目前台灣在蝴蝶蘭育種技術上依然超越其他國家，對於發展蝴蝶蘭產業上依然占在有利的位置。心得與建議包括：舉辦國際學術研討會是一個提升台灣國際學術地位與國家形象的良好機會，政府應加以鼓勵與補助。遠緣雜交與胚拯救在提升產業競爭力相當有助益，台灣目前在蘭花屬間雜交與胚拯救技術領先全球，應該重點式的在經費與人力的支持。爲提升台灣組織培養的國際能見度，在於科學性的論文寫作與英文編修應該設立專責機構，以協助研究人員發表國際性期刊論文。另外，植物學是園藝產業發展的基礎，不僅在學校需設立相關系所，也應該重視植物園的設立與發展，這樣對國家整體園藝產業的發展有其正面的價值。

目錄

一、目的

本次的蘭花及觀賞植物國際研討會主要針對蘭花及觀賞植物的栽培、育種、組織培養等各個相關領域的學術交流，以及泰國重要經濟作物的產區參訪等。泰國在熱帶蘭花，如石斛蘭、萬代蘭及千代蘭等在育種、商業生產及種原在世界上皆有舉足輕重的地位，藍色萬代蘭與千代蘭的育種與種原尤其豐富。蝴蝶蘭是目前臺灣最重要的花卉產業，每年產值約新台幣 30 億元，台灣在蝴蝶蘭的種原、種苗生產與栽培技術方面居於領先地位，爲使臺灣蝴蝶蘭產業能永續發展，近幾年蔡副研究員奇助積極從事蝴蝶蘭與藍色萬代蘭(或藍色千代蘭)的屬間雜交與胚拯救試驗，可以藉由此次的學術交流與產區參訪，使之能更瞭解泰國目前的蘭花發展情形，以及目前藍色萬代蘭與千代蘭的育種狀況，使之未來能應用於蝴蝶蘭與萬代蘭(或千代蘭)的屬間雜交上，以提升臺灣蝴蝶蘭產業的競爭力。

二、行程表及研習內容

「蘭花及觀賞植物國際研討會」行程內容

The International Symposium on Orchids and Ornamental Plants

Jan 8-14, 2012

時間		地點	行程內容
1 月 8 日	（日）	本場、高雄、桃園 (住宿：桃園)	本場->高雄高鐵站->桃園
1 月 9 日	（一）	桃園、曼谷、清邁 (住宿：清邁)	桃園 5:30 搭乘計程車->桃園國際機場->泰國曼谷國際機場->泰國清邁國際機場
			抵達會場及註冊
			開幕式及專題演講
			專題研討
1 月 10 日	（二）		專題研討
1 月 11 日	（三）		蘭花及觀賞植物產區專業參訪 商業會談
1 月 12 日	(四)		清邁皇家花卉博覽會參訪
1 月 13 日	（五）	泰國、桃園(住宿：桃園)	泰國清邁國際機場->泰國曼谷國際機場-> 22:10 抵達桃園國際機場->出關至桃園市
1 月 14 日	（六）	桃園、屏東 (住宿：屏東)	桃園->高雄->屏東

三、 研討會紀要

此次的「蘭花及觀賞植物國際研討會」是泰國農業部、泰國園藝學會，以及國際園藝學會所共同籌辦，由泰國農業部 Mantana Milne 博士擔任會議主席，有來自 10 個國家，總計將近 167 人參加，其中台灣有 3 位參加，分別來自台灣大學、屏東科技大學與筆者。此次國際研討會所研討的方向包含蘭花，主要是蝴蝶蘭、國蘭、文心蘭及石斛蘭，以及觀賞植物，主要是菊花、百合、仙人掌、及一些草花。每天重要的行程如下：

1 月 9 日：報到、開幕式及歡迎酒會。接著由 Rapee Sagarik 教授進行一場專題演講，題目爲「The concepts of righteousness and fairness in the conservation of horticultural plant specimens in the world of tropical countries」。然後由 Mantana Milne 博士擔任第一節的主持人，主要是介紹緬甸的觀賞植物與泰國原生種蘭花的生物多樣性。第二節是由 Seiichi Fukai 教授主持，主要內容在介紹觀賞植物及蘭花在環境逆境下的生理反應。

1 月 10 日：第三節由 Fure-Chyi Chen 教授主持，主要在介紹觀賞植物與蘭花的微體繁殖。第四節由 Saw Lwin 博士主持，主要在介紹蘭花的去病毒、體胚誘導(somatic embryogenesis)、及器官形成(organogenesis)。第五節由 Suwit Chaikiattiyos 博士主持，主要在介紹屬間雜交(intergeneric hybridization)及胚拯救(embryo rescue)。

1月11日：早上首先參訪位於泰國清邁的詩麗吉皇后植物園(Queen Sirikit Botanical Garden)，此植物園是泰國最具規模的植物園，具有教育、推廣、研究及種原保存等功能，有以各式各類植物爲主題的主題館，如棕櫚科、蘭科植物、蕨類、觀賞鳳梨、秋海棠、睡蓮科、蓮花科、斑葉植物、仙人掌等。下午參訪位

於清邁的Dasada 蘭園，園區內有種植一些文心蘭、菊花、火鶴花及草花等。

1 月 12 日：參訪 2011 清邁皇家花卉博覽會(Royal Flora Ratchaphruek 2011)，除了有許多國家形象主題館外，還有以各式各類植物爲主題的主題區，如棕櫚科、蘭科植物、蕨類、睡蓮科、仙人掌等，值得一提的是有一間介紹各種蘭花的主題館，以及一間利用蘭花進行布置的展館。另外，還有一間介紹各種水耕栽培的設施的主題館，裡面有各式各樣的水耕栽培模式。

四、心得及建議

1. 國際研討會的價值：

本次國際研討會在泰國清邁帝國美平飯店舉辦，借用飯店的國際會議廳舉行，場地設施豪華、舒適，多媒體功能完整，每一個與會者皆能有參與感，加上舉辦場地交通方便，所以整體而言舉辦很成功，對於提升泰國國家形象與國際學術地位甚有幫助。建議台灣應該也要積極鼓勵舉辦國際研討會，可以藉此展現台灣的學術實力與國家競爭力。

2. 遠緣雜交與胚拯救技術的應用：

品種是農作物產業能否持續發展的基礎，若能擴大台灣品種的多樣性，則在產業的發展上能比其他國家更有競爭力。遠緣雜交與胚拯救技術能夠有效導入新的育種種原，有效的提升品種育成效率，對於增加品種的多樣性甚有幫助。本次研討會也有不少遠緣雜交與胚拯救技術方面的研究報導，筆者也介紹蝴蝶蘭的遠緣雜交與胚拯救技術，目前台灣在蝴蝶蘭方面的遠緣雜交與胚拯救技術居於領先的地位，建議政府能持續投入研究經費。

3. 提升台灣組織培養之國際能見度：

台灣在蘭科植物組織培養都有不錯的成果，不過在論文的國際能見度上遠遠不及實質的成果，主要礙於科學性的英文論文寫作能力，若能有一個專門爲研究人員修飾英文論文寫作的專責機構，應該對我國的科學論文的發表甚有幫助。

4. 植物園功能的發揮：

植物園不僅具有教育、推廣、研究與種原保存的功能，而且還有生態與觀光的功能。世界各國都有設立植物園，很多先進國家的大城市也都有自己的中、小型植物園，雖然這些位於市政府所管轄的植物園的功能多半沒有進行研究，但也都能發揮其他功能。台灣也有一處植物園，不過台灣的植物園屬於林業試驗所管轄，在人力與經費上都無法發揮植物園該有的功能。泰國皇家植物園的規模及經營的用心實在值得台灣借鏡，這也是展現國家植物研究的實力。

五、附件

1. 發表論文內容

A new hybrid genus *Amenopsis* (Orchidaceae) derived from the cross between *Amesiella* and *Phalaenopsis*

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Keywords: intergeneric hybridization, new hybrid genus, *Amenopsis*, *Amesiella*, *Phalaenopsis*, embryo rescue

Abstract

***Phalaenopsis* is one of the important economic orchids in the world. To date, thousands of *Phalaenopsis* varieties have been bred and commercialized. In order to introduce unique characteristics of the spur structure from the flower of *Amesiella* into *Phalaenopsis* germplasm, intergeneric hybridization between *Phalaenopsis* Sogo Yukidian and *Amesiella philippinensis* were conducted by artificial pollination. Four months later, the capsules were harvested. The immature embryos with placenta were manipulated and placed into germination medium. Approximately 300 intergeneric embryos of each capsule were rescued. After subculturing for one year in the culture medium and two-week hardiness, intergeneric hybrids were cultivated in greenhouse. After one and half years of cultivation, the first flower of the hybrid was bloomed. The new hybrid was named as *Amenopsis* Kaohsiung Magic and registered at the Royal Horticulture Society. Leaf morphology of the hybrid is lanceolate, coriaceus and dark green. The hybrid bears greenish-white flower with black markings on the lip and a short spur at the back of the lip.**

INTRODUCTION

Phalaenopsis belongs to subtribe Aeridinae, tribe Vandeae, Orchidaceae (Dressler, 1993). The native species for the genus are approximately 66 species, mainly distribute in Southeast Asia (Christenson, 2001). Until now, orchid breeding has been manipulated for over 150 years (Lenz and Wimber, 1959). From past few decades, thousands of *Phalaenopsis*/*Doritaenopsis* varieties have been bred and

commercialized based on intrageneric/intergeneric hybridization. Genus *Amesiella* also belongs to subtribe Aeridinae, tribe Vandeae (Dressler, 1993). The genus *Amesiella* was previously considered to be monotypic. Recently, Cootes and Banks (1998) introduced a new species of genus *Amesiella*. Species of the genus distributes in the Philippines (Banks and Cootes, 1998).

Both pre-zygotic and post-zygotic hybridization barriers might affect the success of breeding, especially intrageneric or intergeneric hybridization. Pre-zygotic barriers may be due to abnormal pollination, pollen tube growth, or fertilization. Post-zygotic barriers prevent a hybrid zygote from developing into a viable plant due to hybrid breakdown or reduced hybrid viability (Pickersgill, 1993). Intrageneric or intergeneric hybrids are useful for the breeding of new cultivars. However, in some cases, successful intrageneric or intergeneric crosses are difficult to finish because of pre- or post-zygotic barriers. These hybridization barriers can be overcome through embryo rescue, pollen treatments, bud pollination, in vitro ovule pollination, cut or grafted style techniques, bridging species, and plant growth regulators (Pickersgill, 1993; Lu and Bridgen, 1996; Palmer et al., 2002).

The embryo rescue of hybrid from intra- and inter-generic crosses is commonly applied in *Phalaenopsis* breeding programs. So far, intergeneric hybridization has been introduced to increase varieties diversity of *Phalaenopsis*. *Aerides*, *Amesiella*, *Arachnis*, *Ascocentrum*, *Ascoglossum*, *Cleisocentron*, *Diploprora*, *Doritis*, *Eurychone*, *Haraella*, *Kingidium*, *Luisia*, *Neofinetia*, *Papilionanthe*, *Paraphalaenopsis*, *Renanthera*, *Rhynchostylis*, *Sarcanthopsis*, *Sarcochilus*, *Sedirea*, *Trichoglottis*, *Vanda*, and *Vandopsis* have been successfully directly to hybridized with *Phalaenopsis* (Moir, 1995). Recently, two new hybrid genus, *Chouara* and *Chenara* have been successfully made by the crossing between *Doritaenopsis* and Angracuem and between *Doritaenopsis* and *Paraphalaenopsis*, respectively (Tsai, 2009a, 2009b).

In order to introduce unique spur gene from *Amesiella* spp. into *Phalaenopsis* spp., intergeneric hybridization and embryo rescue were conducted between *Phalaenopsis* Sogo Yukidian (♀) (Fig. 1) and *Amesiella philippinensis* (♂) (Fig. 2) in this study.

MATERALS AND METHODS

Plant materials

Phalaenopsis Sogo Yukidian (♀) and *Amesiella philippinensis* (♂) were used as maternal and paternal parents, respectively. Those plants were cultured in green house at Kaohsiung District Agricultural Improvement Station, Taiwan.

Methods

The immature embryos were rescued after about 105 days of artificial pollination between *Phalaenopsis* Sogo Yukidian (♀) and *Amesiella philippinensis* (♂). The capsule was harvested and immersed in 70% ethanol for 30 seconds, followed by treatment in 1.25% sodium hypochloride for 15 minutes, after that, the capsule was washed with sterile distilled water three times and dissected under sterile conditions in a laminar flow hood. Immature embryos with placenta were transplanted and cultured in medium of 3 g/L Hyponex No. 1, supplemented with 2 g/L peptone, 7 g/L agar, 150 mL/L coconut water, 30 g/L sucrose. The pH of the medium was adjusted to 5.8 before autoclaving. The immature embryos were incubated at 25±2°C and under a light/dark cycle of 16/8 h. The medium of subculture for the plantlet includes 2.5 g/L Hyponex No. 1, supplemented with 2 g/L peptone, banana 80 g/L, potato 30g/L, onion 10 g/L, inositol 0.1g/L, 20 g/L sucrose, 7 g/L agar, and 1 g/L of activated charcoal. The pH of the medium was also adjusted to 5.8 before autoclaving.

RESULTS AND DISCUSSION

The capsules of intergeneric hybridization between these two genera were harvested after pollination for three and half months. The immature embryos with placenta were manipulated and transplanted into the germination medium. After two-month culture, the embryos derived from intergeneric hybridization between *Phalaenopsis* Sogo Yukidian (♀) and *Amesiella philippinensis* (♂) grew up called protocorms (Fig. 3). Approximately 150 embryos for each capsule were successfully rescued. The protocorms were sub-cultured once per month. After two-year culturing, plantlets were transplanted into greenhouse. After two-year cultivation, the first flower of this hybrid was blooming (Fig. 4). After searching the Wildcatt Orchids Database (Moir, 1995), this hybrid is a new artificial generic hybrid. The new hybrid was named as *Amenopsis* Kaohsiung Magic and registered at the Royal Horticulture Society (Tsai, 2009c). This is a new hybrid genus belonging to a bigeneric hybrid, including *Phalaenopsis* and *Amesiella*.

The morphological characters of intergenric hybrids revealed intermediate phenotype of *Phalaenopsis* Sogo Yukidian and *Amesiella philippinensis*. The plant with lanceolate, dark greenish leaves is shown (Fig. 5). The leaf width of hybrids is thinner than that of *Phalaenopsis* Sogo Yukidian but wider than that of *Amesiella philippinensis*. The plant height of hybrids is similar to that of *Phalaenopsis* Sogo Yukidian. White flowers with dark orange color labellum (Fig. 4) and a short spur at the back of the labellum.

In conclusion, intergenerc hybridization of *Phalaenopsis* and *Amesiella* can increase the cultivar diversity. *Amesiella philippinensis* could be a bridging species for

further breeding between *Amesiella* spp. and *Phalaenopsis* spp. New genes of certain horticultural characters can be introduced from *Amesiella* into *Phalaenopsis*.

ACKNOWLEDGEMENTS

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Tsai, C.C. 2009c. A new hybrid genus for *Amesiella* Schltr. ex Garay x *Phalaenopsis* Bl., *Amenopsis* [Amn.] Tsai. Orch. Rev. Suppl. 117(1287): 64.

Figures

Fig. 1. The floral characteristics of mother plant *Phalaenopsis* Sogo Yukidian.

Fig. 2. The floral characteristics of father plant *Amesiella philippinensis*.

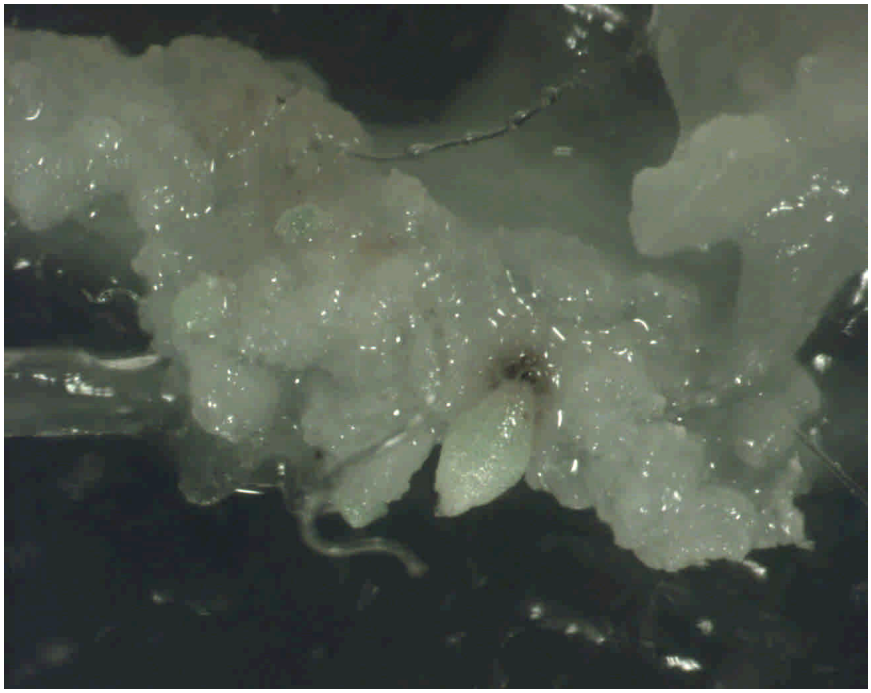

Fig. 3. Rescued embryos were showed after two-month culture.

Fig. 4. First flower is shown after two-year planting in green house.

Fig. 5. Leaf characteristics of *Amenopsis* Kaohsiung Magic.

2. 本次國際研討會相關照片

筆者與與會學者合照

歡迎晚會

海報展示場景

筆者和會議主席(右一)及荷蘭學者合照

1 月 11 日參訪泰國清邁皇家植物園

皇家植物園蘭科與蕨類植物館

泰國皇家植物園內之自然科學博物館

農場場長負責解說

切花用菊花套網袋，方便運輸

觀賞植物

參訪清邁花卉博覽會