

SINGAPORE

Project Title: Population and conservation biology of a threatened Malesian ornamental genus, *Johannesteijmannia* H.E. Moore (Palmae)

Study Leader: Associate Professor Hugh Tan Tiang Wah, The National University of Singapore, Singapore

This 21-month project, which started in March 2002, aims to conduct studies on population genetics, evolution, systematics and phylogeny of *Johannesteijmannia*, purposely to provide information necessary to effectively manage conservation as well as sustainable exploitation of the species.

Johannesteijmannia is a genus of four species of forest understorey palms ranging from southern Thailand, Peninsular Malaysia, Sumatra and western Borneo. The four species are *J. altifrons* (Reichb.f. et Zoll) H.E. Moore, *J. lanceolata* J. Dransfield, *J. magnifica* J. Dransfield and *J. perakensis* J. Dransfield.

J. altifrons, which is the most widely distributed congener, occurs in southern Thailand, Peninsular Malaysia, western Sarawak, western Kalimantan and Sumatra. The other three are endemic to Peninsular Malaysia, and are relatively rarer and more threatened. *J. perakensis* is restricted to the Kledang Saiong and Gunung Bubu Forest Reserves in Perak. *J. magnifica* occurs in patches in Ulu Semenyih, Selangor and in a few hills in northeastern Negeri Sembilan, whereas *J. lanceolata* is known in Selangor, Pahang (Dransfield 1972) and Negeri Sembilan.

The four species are under threat due to the loss of habitat because of logging, deforestation, over-

collection of leaves (by the indigenous communities for making house and roof thatches) and seeds (for export). The condition has become worse because all four species are sensitive to forest disturbance and are severely threatened by forest clearance.

Although *J. altifrons* is more widespread and common than the others, it should also be considered under threat. Field observations in Belum Forest, Perak over a 10-year period reported that the native population of *J. altifrons* has decreased to approximately a quarter of the original population (Lim and Whitmore 2000). On the other hand, the conservation of *J. perakensis* is particularly important since the species is restricted to Perak. Consequently, conservation of the four species should be carried out before it is too late.

The evolutionary history and distribution of the four *Johannesteijmannia* species exhibit an interesting pattern because one species is widespread and the other three species are endemic to Peninsular Malaysia. Of the three species, *J. perakensis* is endemic to Perak. It is also the only species with a trunk, although the reason for this phenomenon is not known. It would be interesting to confirm whether all the *Johannesteijmannia* species are monophyletic.

One of the more efficient strategies to conserve the plants properly is to understand the genetic variations within and among populations. In order to better understand the population genetic structure, it is important to study the reproductive biology, especially the mating system of the plants. Mating systems determine the pattern of genetic transmission and affect the organisation of genetic variation in a population. Hence, the knowledge of mating systems and inter- and intra- population genetic variability has important practical application in the management and conservation of these endangered plant species.



J. altifrons



J. perakensis

At present, field collections have been made for 73% (19 out of 26) of all the study sites of four *Johannesteijsmannia* species in Thailand and Malaysia. Collections have been subjected to the following analyses: morphometric, molecular, and phylogeny.

Morphometric Analysis. Some preliminary phenograms using morphological characters for each species using the samples have been collected. Most of the populations examined were morphologically indistinguishable. However, differences were observed in the inflorescence morphology for *J. lanceolata* at two study sites. For the plants at the Angsi Forest Reserve (Negeri Sembilan, Malaysia) their inflorescences show more rachillae when compared with those of the Sungai Lalang Forest Reserve (Selangor, Malaysia). Populations in Pahang (Malaysia) will have to be examined before any conclusions could be drawn.

Molecular Analysis. Amplified Fragment Length Polymorphism (AFLP) fingerprinting was carried out for *J. altifrons* from eight populations. Eight primer combinations were screened but only six have been selected for the analysis as they produced more polymorphic bands. A total of 418 bands were scored, of which 316 were polymorphic. Analysis using the software AFLP-SURV 1.0 was carried out to estimate the genetic differences within and among populations. Preliminary results show that the genetic variation among populations can be detected although they are morphologically indistinguishable. Also, cluster analysis was done using the computer programme Multi-Variate Statistical Package (MVSP) version 3.10b. The cluster analysis showed that most of the individuals from the same population are clustered together.

Phylogeny. Interests are in studying the relationships of *Johannesteijsmannia* with its sister group *Licuala* and selected taxa from the same subfamily Coryphoideae. DNA sequencing will be carried out using the three targeted nuclear genes or regions, viz., genes encoding for phosphoribulokinase (*PRK*), the second largest subunit of RNA polymerase II (*RPB2*) and 5S ribosomal DNA. DNA sequencing has been successfully optimised and developed for *PRK* and *RPB2*. Both the genes, *PRK* and *RPB2*, have been amplified. PCR amplification for *PRK* yielded a band of approximately 700 base pairs (bp) and that for *RPB2* yielded a band of approximately 900 bp. Both regions have been cloned into a vector and then sequenced. Next activities to be done will be on trying out the protocol for amplifying and sequencing 5S ribosomal DNA. ■

VIETNAM

Project Title: The study and conservation of bryophyte diversity of Vu Quang Protected Area in Ha Tinh Province

Project Leader: Tran Ninh, National University of Hanoi, Vietnam

Although bryophytes play a significant role in the forest ecosystem and perform a vital ecological role as a whole, the knowledge of Vietnamese on bryophytes is still uneven and fragmentary. Easily accessible mountains such as Tamdao Mountains, Hoang Lien Son mountainous range, have been visited by various expeditions and collectors whereas in large areas of Vietnam including Vu Quang Protected Area no collections have been made yet.

Vu Quang Protected Area is an area of spectacular natural beauty for tourism. It is largely a mountainous area sharing its border along the western side with Laos. It has global importance from the recent discovery of *Psudoryx nghetinhensis* and *Megamuntiacus vuquangensis*, respectively the sixth and seventh large mammals discovered during the past 100 years.

During the first year of the project, about 1500 packets of mosses and liverworts were collected in three expeditions. Preliminary determination of some 200 packets belonging to liverworts and mosses include: four species new to science, namely *Cololejeunea vuquangensis* Pocs; *Colura brevistyla* Herz. var. *vietnamica* Pocs; *Frullania tranninhiana* Pocs and *F. vuquangensis* Pocs; and eight species new to Vietnam, namely: *Cololejeunea madothecoides* (Steph.) Ben; *Dumortia hirsute* ssp. *Nepalensis* (Tay.) Schust.; *Frullania junghunhiana* Gott.; *Heteroscysphus zollingeri* (Gott) Schiffn; *Lejeunea anisophylla* Mont.; *Lejeunea exilis* (Reinw.) Grolle; *Lejeunea obscura* Mitt.; *Plagiochila aff. Javanica* (Swartz) Dum.; and *Plagiochila intergrilobula* Schiffn. More packets need to be identified and classified in the second year of the project.



Bryophyte