XIV. THE FLORA MALESIANA PROJECT AND ITS RELEVANCE TO MALAYSIA[1]

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ABSTRACT

In a developing country like Malaysia, it is becoming difficult to attract funds to do basic taxonomic work. Taxonomic research must be made relevant to national needs. Among the increasing needs for indigenous plants and their environment in Malaysia are their conservation and determining the sustainable use of these resources. Both of these needs require a good and correct understanding of what is there, where they are found, how they interact in their natural environment and how they response to human perturbations. Basic to such understanding is good taxonomy and identification. The work of documenting the flora of Malaysia is still progressing very slowly. We are not advocating that the Flora Malesiana project solves the needs of Malaysia but if the project is to create a wider interest and to make a greater impact in countries of the Malesian region, the speed of taxonomic revision must increase. In this context, analysis of the progress, needs and prospects of the Flora Malesiana project made by Roos (1997) still applies today. The Flora Malesiana project has helped local floristic projects such as the Tree Flora of Sabah and Sarawak project in Malaysia. In recent years, the use of the Internet has added new dimensions of information dissemination to botanists in the Malesian region, e.g., the international plant names index, Kew records of taxonomic literature and type specimen database (provided by the Nationaal Herbarium Nederland, Leiden; Royal Botanic Gardens, Kew; and other herbaria in the world). Some of these e-facilities are not directly linked with the Flora Malesiana project, but have been very helpful for those working outside Europe and the USA. Such efforts should increase. In addition, the question of format of the publication needs some re-examination, participation from the Malesian region through common funding mechanism should be made available and there is a need for a wider distribution of the Flora Malesiana publications.

INTRODUCTION

This paper will focus on the needs of Malaysia in having a good understanding of her native flora. It is purposely written in this context because in some respect the situation in Malaysia is rather similar to many countries in the Malesian region.

SOME BACKGROUND

Malaysia is not a large country but is located in an area with a very rich flora. Malaysia has an area of 329,758 km^2. Its landmass straddles between about 0° 49' N and 7° 30' N,

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very much in the moist tropical region. The South China Sea divides the country into two main portions; viz. Peninsular Malaysia on its western portion connects to mainland Asia and to the east, Sabah and Sarawak on the island of Borneo. East Malaysia (Sabah and Sarawak) comprises the larger area of the two halves (Peninsular Malaysia with 131,598 km^2 and East Malaysia totals 198,069 km^2). Its vascular flora has been estimated to comprise about 15,000 species. Although the two halves are within the Sunda Shelf, containing similar floristic elements, there are differences in their species diversity, composition, and distribution. Wong (1998) comparing the endemism and rarity of some selected plant groups of Borneo and Peninsular Malaysia noted a significantly richer flora in Borneo than the other islands west of the Wallace Line. Comparing tree species from the two portions of Malaysia and taking into account the 58 families so far published in the 'Tree Flora of Sabah and Sarawak' volumes 1–3, on the average, Sabah and Sarawak have over 27% more species than Peninsular Malaysia (Soepadmo & Wong, 1995; Soepadmo et al., 1996; Soepadmo & Saw, 2000). It also appears that species diversity per unit area is higher in E Malaysia than in W Malaysia. The 50 ha demographic plot established at Pasoh Forest Reserve, Peninsular Malaysia, registered c. 820 species while the 51 ha plot at Lambir National Park, Sarawak, contained c. 1,200 species. In recent years, attempts have also been made to identify phytogeographic provinces in Malaysia (Wong, 1998; Saw & Sam, 2000). It is evident from such studies that for a small country like Malaysia and within short distances, there can be units of phytogeographical communities unique to specific areas. An understanding and identification of such provinces would have important conservation uses. Clearly, there are differences in the two regions and would require a good understanding of their floristic contents.

HOW WELL DO WE KNOW THE FLORA OF MALAYSIA?

Floristically, W Malaysia (Peninsular Malaysia) is better documented than E Malaysia. There is a complete tree flora account for Peninsular Malaysia (Whitmore, 1972, 1973; Ng, 1978, 1989). For some families or groups other than trees, there are recent revisions for orchids, grasses, bamboo, rattans, pitcher plants, and ferns (Holttum, 1964, 1968; Gilliland, 1971; J. Dransfield, 1979; Piggott, 1988; Seidenfaden & Wood, 1992; Wong, 1995; Clarke, 2001) but there is no complete recent revision of the flora of Peninsular Malaysia. A checklist of vascular plants of Peninsular Malaysia has recently been published (Turner, 1997). Outside these groups that have recent accounts, literature on plants of Peninsular Malaysia is scattered and requires some searching to obtain information, e.g. journal articles [e.g. Zingiberaceae (Holttum, 1950); try the indices of the Fl. Males. Bull.! Ed.]. For those not recently revised, we have to rely on Ridley's five volumes on the Flora of the Malay Peninsula (Ridley, 1922–1925).

FLORA OF SABAH AND SARAWAK

For Borneo and East Malaysia, until the initiation of the 'Tree Flora of Sabah and Sarawak' project, the only applicable and accessible references for most plant identification and information were the Flora Malesiana publications. Little other references are available documenting the flora of E Malaysia. Most of the available references were in the form

of short accounts or forester's manuals of common or selected forest trees (Browne, 1955; Smythies, 1965; Burgess, 1966; Cockburn, 1976, 1980; Anderson, 1980; Ashton, 1988). Rattans and bamboo being of some commercial importance and pitcher plants with ornamental potential have accounts published over the years (J. Dransfield, 1984, 1992, 1997; S. Dransfield, 1992; Clarke, 1997). Outside these references, the only other important ones for Borneo are the two checklists (useful but often of limited scope) on the Bornean plants by Merrill (1921) and Masamune (1942).

WHY DOES MALAYSIA REQUIRE A COMPLETE DOCUMENTATION OF ITS FLORA?

The answer to this question is very obvious to most of us. We are in the company of converts but we really must tackle this question in the light of people who do not really understand the importance of good floristic revisions that support sustainable resource utilisation, conservation, and their importance to biodiversity maintenance. In Malaysia, we see that the greatest needs in having a complete documentation of our flora lie in two main areas, viz. plant/habitat conservation and the sustainable utilisation of our plant resources. Often these two needs intertwine. Sustainable utilisation would very often require the conservation of the resources. Scientific or academic interest, although very important and basic to support these needs for the country, has in recent years become secondary. It is in many ways not an ideal situation but often when one has to deal with conflicting needs and limited resource allocations, such approaches are sometimes seen as not essential for a developing country like Malaysia. Very often administrators and sometimes scientists included do not appreciate that results derived from academic pursuits can provide in the long run a better understanding of the subject that can support the applied sciences.

We shall now provide some examples how critically essential a good understanding of our local flora is to the maintenance of the physical well-being of our plant and forest resources. Malaysia is now at a crossroad in forest resource management. Forest areas in Malaysia must have covered over 90% of the land area at the turn of the 20th century. After our independence, forestry and large-scale plantation of industrial crops were the main economic activities that fuelled the country's economy for national development. In Peninsular Malaysia for example, by 1960 there was still over 70% of the land area under natural forest cover. In the few decades following the late 1960s, massive land development schemes converted large forest areas into agricultural lands. The most affected areas are the lowland forests. This trend is reflected in the loss of forest cover; by 1970 only c. 60.7% forested land remained and by 1980, 49.4 % (Forest Statistics Peninsular Malaysia 1979–1985). This has now stabilised at 44.5% in 1997 (Chin et al., 1997) as most of the land more suitable for agriculture has already been taken, leaving behind marginal agricultural lands in the hills and mountains, and protected areas in National Parks and Wildlife Sanctuaries.

Furthermore, the loss of lowland forests also saw the shift of forestry activities to the more sensitive hill forests. The pressures on the forest resources is further aggravated by the demand and rising timber prices in the market, resulting in the greater utilisation of more timber species (Saw & Sam, 2000). All these generate a greater degree of damage

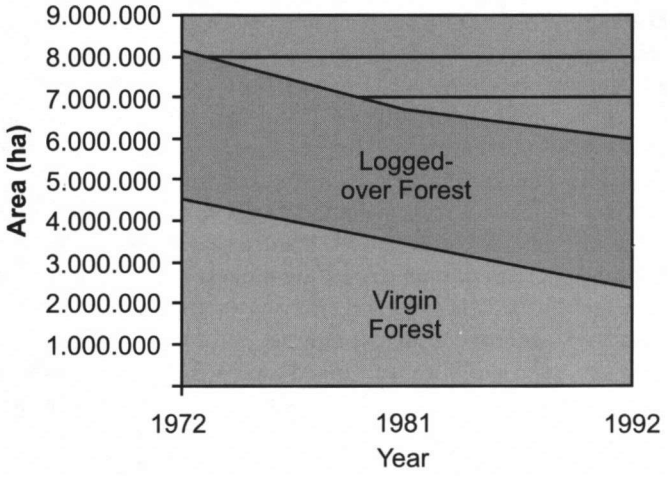

Fig. 1. Graph showing forest cover trends due to logging and forest conversion in Peninsular Malaysia based on National Forest Inventories results (Anon., 1987; Chin et al., 1997).

in the hill forests where often natural regeneration is poor (Yong, 1990). There are two conservation problems relating to such utilisation; firstly there is habitat loss and secondly increasing species utilisation may cause species extinction. Ultimately, for Malaysia, it is expected that only the Permanent Forest Estate and the totally protected areas will remain forested, the remaining would likely be converted to other land uses. We would expect to see about 40% of the land area under some forest cover. Based on the last three national inventories made in Peninsular Malaysia, the forestry conversion trends and loss of virgin forest areas to logged-over forest areas is given in Fig. 1. Up to about 1992, the rate of deforestation and loss of virgin forest area appeared to be linear which is worrying. However, as the latest national inventory is being planed, it is expected that this trend would have tapered off by now.

Although Malaysia has probably one of the best departmental set-ups for tropical forestry management, we are uncertain if the current pace of exploitation will not adversely affect the health of the forest and result in the threat of survival of species. There are just too many species in the country that we do not have sufficient information on. Very often the only available information one has access to is from floristic accounts or in some obscure publications. What are often available are descriptions and short notes on their distribution and incidental observation on the ecology of the plant. For most species we do not know enough of their ecology and biology to really understand their management and conservation needs. Sometimes, we cannot even find a name for the plant. Looking at the state of affairs in Malaysia, with our dwindling forest resources and increasing threat to the forest environment, it is sometimes worrying that often even very basic requirement like getting a name of a plant is unavailable.

It is also at this level of information poverty that we have to act quickly if we do not want to loose species. Very often conservation and management decisions are made from

very scarce information. Take for example the recent listing of threatened trees in 'The World list of Threatened Trees' (Oldfield et al., 1998). Most scores of threats using the IUCN Red List Categories (IUCN, 1994) applied the criteria on the loss of habitat range. Such decision is often based mainly on herbarium specimens, subjectively over-laid on what we know of extant forest areas. In some of the rare species, where the species may be described from a few herbarium specimens or even from a single collection, how can we accurately assess their conservation status? Ironically, it is because the tree flora of Peninsular Malaysia is much better known than those of her neighbouring countries, that Malaysia had been credited with one of the highest number of threatened tree species scored under the IUCN categories and criteria. Neighbouring countries with greater forest threat have been accorded with less number of threatened tree species in this listing. In spite of this in a sense it does well for Malaysia that such a listing forms a wake-up call for the country that we must deal seriously with plant conservation problems in the country.

In the following examples, we wish to argue of the importance for basic taxonomic research at the alpha level.

THE EXAMPLE OF THE FAMILY DIPTEROCARPACEAE

The Dipterocarpaceae is an excellent example of a family that has been studied in relative detail at the alpha taxonomic level from a rather local level in Peninsular Malaysia (Foxworthy, 1932; Symington, 1943) to a nearly monographic treatment (Ashton, 1982). The process has resulted in a relatively good understanding of the different species in the family that have helped us to better manage some of the species in Malaysia. The forerunner of forestry-orientated revision, the 'Foresters' manual of the dipterocarps' (Symington, 1943), became to our mind an important milestone towards applied forest taxonomy in Malaysia. Essential for good forestry practices, management, and sustainable timber exploitation it is a good understanding of what is there. One of the fundamental publications that was built upon for the production of the 'Manual of the Malayan Silviculture' (Wyatt-Smith, 1963), we believe is the foundational work on the taxonomic treatment of the dipterocarps by Symington. Symington's account went beyond mere good taxonomy; i.e. good taxon circumscription but he also included much information on field characters for practical identification, silviculture, and uses. Following this format, the 'Tree Flora of Malaya' revisions were written and more recently the 'Tree Flora of Sabah and Sarawak' volumes.

Furthermore, without a clear taxonomic account of the family, it would be impossible to understand the conservation needs of the species in the family. Until recently, little is thought of the conservation needs of timber species, even in a family as important as the Dipterocarpaceae. As mentioned earlier, forest areas in the country covered well over 60% of the surface area of Peninsular Malaysia in the 1960s and 1970s. For the dipterocarps, their apparent ubiquitous distributions do not seem to be of conservation concern. However, over the last 30 years large forest areas were lost to other land uses and forest resources become more scarce, there is now growing concern for their conservation. Recent detailed analysis of dipterocarp distribution in Peninsular Malaysia showed that

species in the family are far from evenly distributed throughout their ranges (Saw & Sam, 2000). There are 157 species recorded for Peninsular Malaysia, 30 species are endemic to the region and a further 34 non-endemic species range within one to three adjacent states in Peninsular Malaysia. Many of the rare species are found in areas that have now been converted to other land uses, e.g. agriculture areas such as oil palm and rubber plantations. As a result, in a recent exercise to list threatened trees of the world, 124 out of the 157 species of dipterocarps were listed in some degree of threat (Oldfield et al., 1998). Although there can be some argument over whether some of these species are actually under threat, there is little doubt that there exists a strong need now to look into the conservation status in many of these species.

The most recent revision of the family that relates to the Malaysian taxa was the revision made by Ashton (1982). In this work and his other earlier publications relating to the Flora Malesiana account, he sorted out most of the taxonomic and nomenclatural problems in the family. As a result taxonomic limits and nomenclature are now rather stabilised for the species found in the Malesian region, in particular for Malaysia. The main point in this example is that the family is well studied at both broad near monographic level under the Flora Malesiana project and at a more local level for Peninsular Malaysia. This has provided the strong foundation for other sciences to add on to the understanding of the family, be it for academic pursuits or for the applied sciences. In the case of the conservation and sustainable utilisation of the family, it was only by having good identification of the herbarium specimens that we are able to generate accurate maps for distributions and subsequently provide a better understanding of patterns of distribution of the species of Dipterocarpaceae for Peninsular Malaysia. This in turn will provide input for species conservation. Following up on such understanding a number of colleagues in Malaysia are now looking into genetic variation of species of dipterocarps to help us understand conservation of species at population levels (Lee et al., 2000a, b). Without a sound understanding of the taxonomy of the family it would be impossible to postulate relationships within the family (Dayanandan et al., 1999).

Increasingly, in the last few years, the Forest Department of Peninsular Malaysia is becoming aware of the importance of conservation of the main timber family, the Dipterocarpaceae. The department has called upon the Forest Research Institute Malaysia to advise on matters relating to the conservation of threatened dipterocarp species (e.g. relocation of *Hopea bilitonensis* P.S. Ashton and *Shorea kuantanensis* P.S. Ashton; both species are only known from point locations, and survey of *Shorea lumutensis* Symington, a species only known to occur in the Lumut district of Perak). It is only with a sound understanding of these species that we are able to contribute towards their conservation and protection. Malaysia is still at its infancy towards species and habitat conservation methodologies but attempts are now being made to move towards that direction (Lee et al., 2000a, b; Saw & Sam, 2000).

OTHER EXAMPLES

In some ways, similar pattern is seen in other plant groups. However, in most other examples, we have not seen the completion of the Flora Malesiana revisions yet. Some

of these groups that have already local floristic accounts include groups particularly with economic interest. Among some good examples are rattans (J. Dransfield, 1979, 1984, 1992, 1997), bamboos (S. Dransfield, 1992; Wong, 1995) and Tree Flora of Malaya (Whitmore 1972, 1973; Ng 1978, 1989). There are also a number of families, although sometimes of less economic interest, for which accounts for Peninsular Malaysia have been published, because interested botanists have studied them. These include treatments of orchids (Holttum, 1964; Seidenfaden & Wood, 1992), ferns (Holttum, 1968; Piggott, 1988), grasses (Gilliland, 1971), and pitcher plants (Clarke, 1997, 2001). Other than these revisions there are basically few comprehensive revisions for either Peninsular Malaysia or Borneo. Outside the Flora Malesiana accounts, for any other taxonomic references, one has to refer to scattered revisions from journals and other sources (e.g. Euphorbiaceae: Airy Shaw, 1975; Marantaceae: Holttum, 1951; Zingiberaceae: Holttum, 1950). In these examples, we have local floristic accounts revised first before the Flora Malesiana revisions were out. We see value in these works also as they ultimately provide the basis for the flora of the country.

THE TREE FLORA OF SABAH AND SARAWAK EXAMPLE

From another point of view, we see that the Flora Malesiana project has greatly benefited local floristic work by providing the foundation for such revisions. In our revisions for the Tree Flora of Sabah and Sarawak (TFSS) volumes, for example, the Flora Malesiana accounts gave an initial thrust into our project. In volumes 1 to 4 of the Tree Flora, we revised 64 families covering 1,343 species. From these, 48 families had Flora Malesiana revisions (see Table 1). This gave the TFSS revisions with basic reference to work on. Such helps of course greatly increase the speed of the revisions. In spite of this, the four volumes have taken ten years to complete. The project is now at its half-life. In total, at this halfway point, the TFSS project has revised 1,343 species, giving our rate of production at about 122 species a year. In 1995, the Flora Malesiana rate was cited as about 145 species per year (Roos, 1997). Considering the limited manpower resources available under the TFSS project, the rate of 122 species per year is a respectable figure.

Table 1 clearly show that in spite of the fact that 75% of the families had Flora Malesiana accounts, the TFSS project added a further 143 new species, i.e. just over 10% of the

Table 1. Comparison of families revised under The Tree Flora of Sabah and Sarawak (TFSS) project and The Flora Malesiana (FM) projects.

Revised in TFSS			Revised in FM	New from TFSS
Volume	Families	Species	Families	Species
1	31	308	27	36
2	23	283	17	39
3	4	431	3	28
4	6	321	1	*
Total	64	1343	48	*

revised species. The new taxa include those of larger families that had been revised under Flora Malesiana project; e.g. the Anacardiaceae with 19 new species, Burseraceae with 12, Fagaceae with 11, and Loganiaceae also with 19. The additions are mainly due to the significant additional collections since the families were last revised under the Flora Malesiana project (Leenhouts, 1956, 1962, 1984; Soepadmo, 1972; Ding Hou, 1978). A further reason was the different species circumscription adopted by different researchers. For example, in the revision of the genus *Fagraea*, Leenhouts (1962) appeared to have broader species concepts than that of Wong & Sugau (1996). In Wong & Sugau's revision, 21 new species were added for Borneo, increasing the number of *Fagraea* species in Borneo from 15 (Leenhouts, 1962, 1984) to 42 (Wong & Sugau, 1996). Here, we wish to make two important points. Firstly, continued exploration of forest areas in Borneo will continue to add more information and data to the local flora and thus help us better understand and enumerate the flora of the Malesian region (Wong & Sugau, 1996; J. Dransfield, 2001). Secondly, detailed local floristic study can improve understanding of local variation and may help better understand species circumscription. In some groups, it may require intensive fieldwork to properly understand species variation before a near monographic treatment can be attempted. Often such attempts can only be done at a local floristic level (J. Dransfield, 2001). The point to make here is that local floristic work can be done to greatly improve our understanding of species that are found in the region.

Finally, for the remaining 45 families to be revised under TFSS project, we have only 24 families that have Flora Malesiana accounts. The next half of the project will see greater challenges to get the revisions done.

WHAT ABOUT OTHER FAMILIES?

We are confident that the Tree Flora of Sabah and Sarawak project even with its problems in securing funds and attracting contributors will see its completion. It may be a matter of pace. The Tree Flora of Malaya took 24 years to complete. We are hoping that the Tree Flora of Sabah and Sarawak project will take much less time than this. Even with the complete 'Tree Flora of Malaysia' becoming available, covering about 5,000 tree species (authors estimation), we estimate that the accounts may only cover less than 50% of the total vascular plant flora of Malaysia. There would still be major gaps of understanding of many plant groups particularly groups or families that are large or inherently difficult to tackle. The Tree Flora of Sabah and Sarawak would be tackling some of the difficult families no doubt, e.g. the Annonaceae, Apocynaceae, Euphorbiaceae, Lauraceae, Myrtaceae, and Rubiaceae. In these families, however, only the tree species will be revised, so in families which contain numerous non-tree genera, we may still be dependent on the Flora Malesiana project and other non-Malaysian inputs.

For a country like Malaysia, the Flora Malesiana project is still very important. In the foreseeable future, it would be unlikely that a total flora will be attempted for the country. We simply do not have the resources and the manpower to tackle such a venture. Currently most of the limited botanical resources are channelled towards the Tree Flora of Sabah and Sarawak project.

FLORA MALESIANA PROJECT AND INTERNATIONAL COOPERATION

We would like now to turn to the Malaysian linkages to the Flora Malesian project and other collaborations. The Tree Flora of Sabah and Sarawak project since its inception in 1991 has received very good support and encouragement from the Flora Malesiana collaborators, particularly from the Nationaal Herbarium Nederland, Leiden, and the Royal Botanic Gardens, Kew. When the project started, we had initial funds to send liaison officers and occasionally young botanists to European herbaria. This has been tremendously useful to authors of families. Such funding mechanism allowed many of our contributors to visit herbaria in Europe resulting in preparing better revisions. Among some of the important benefits our researchers had from the visits included:

- Access to type specimens and other older collections which are often not available in Malaysian herbaria;
- opportunity to examine specimens at a regional, if not a global scale that allows botanists to better understand variation and delimit species, often not possible within the country because our collections tend to be local;
- access to the excellent library facilities in both Kew and Leiden that provided the basis to solve tricky nomenclatural problems. The Liaison officers often acted on behalf of other researchers to source these documents or publications;
- although indirectly, these visits also allowed researchers clean time to conduct their studies free from their general distractions had they remained based at home institutions.

Additionally, the visits provided opportunities for good interactions and networking between Malaysian botanists and their European colleagues who sometimes are specialists in the families being revised.

In the course of the project, we also had large number of loans taken and/or made to our collaborators. Such loans are indispensable for the revisions. Often very good quality Cibachrome photographs of type specimens were made available at almost no cost. The project had also exchanges of personnel other than among botanists. We were very fortunate the project initially was able to fund the services of a botanical artist from the Oxford University, Ms Rosemary Wise, who had not only contributed greatly in both providing many of the illustrations included in the TFSS volumes but also conducted training to our botanical artists.

The project has also received contributions from many collaborators outside Malaysia. Some of the collaborators are currently actively writing accounts for the Flora Malesiana project. This is a vast difference previously when national flora projects were seen as a hindrance to work of the Flora Malesiana project. Increasingly, more botanists see the importance of complimenting the wider Flora Malesiana effort with national flora efforts. In the Tree Flora of Sabah and Sarawak project, for example, up to volume 4, we have 10 families contributed by individuals involved directly or indirectly with the Flora Malesiana project. They were: F.A.C.B. Adema, P.W. Leenhouts & P.C. van Welzen (Sapindaceae), S. Andrews (Aquifoliaceae), Ding Hou (Leguminosae–Caesalpinioideae), D.T. Jones (Rutaceae), D. Kennard (Capparidaceae), M.A. Pinard (Lecythidaceae), G.T.

Prance (Chrysobalanaceae), R.M.K. Saunders (Illiciaceae), C. Schirarend (Rhamnaceae), and W.J.J.O. de Wilde (Myristicaceae). For future volumes, we have the following committed to writing revisions: P.S. Ashton (Dipterocarpaceae), M. Coode (Elaeocarpaceae), D.J. Middleton (Apocynaceae), I.C. Nielsen (Mimosoideae), D.J. Mabberley & C.M. Pannell (Meliaceae), C. Puff et al. (Rubiaceae), P.C. van Welzen et al. (Euphorbiaceae), and P. Wilkie (Sterculiaceae).

More recently with the advances in computer and the Internet, a number of facilities previously not easily available have now become a matter some mouse-clicks away. Among the few websites we found useful in our work include:

- The International Plant Names Index (website: http://www.ipni.org/) which provides full list of plant names, where they were published and other information, which previously most of us obtained from the Index Kewensis;
- type specimen database established by the Nationaal Herbarium Nederland (from AMD, L, U, and WAG) is now downloadable from their website (http://www.nationaalherbarium.nl/home.htm#types);
- Flora Malesiana Bulletin bibliographies (http://132.229.92.132/fmbull/biblio.html);
- types from Botanical Museum, University of Copenhagen, Denmark (http://www.nathimus.ku.dk/);
- Index herbariorum (http://www.nybg.org/bsci/ih/ih.html);
- Kew record of taxonomic literature (http://rbgkew.org.uk);
- Geonet Names Server (http://www.nima.mil), for downloading geographical names from any country in the world, which is very useful in checking localities of collections.

A number of programs are currently available that aid revision work or help keep databases of specimens. In FRIM, we have been using the software BRAHMS (Botanical Research and Herbarium Management System) developed by D. Filer at the University of Oxford (http://www.brahms.co.uk/). This software have been instrumental to manage specimens and at the same time been very useful in revision work. The programme that previously ran in a DOS environment has been completely overhauled into a Windows version that is very easy to use.

CONCLUSION

During the past Flora Malesiana symposia, much has been discussed on how the speed and progress of the Flora Malesiana project can be improved (Geesink, 1990; Rifai, 1997; Roos, 1997; J. Dransfield, 2001). Observations made by these people still apply today. The pace of production by the Flora Malesiana project is still too slow for the needs of the region. The example we have in Malaysia and probably also true for the rest of the Malesian countries indicates that the flora is needed now, rather than in about 40 years time (Geesink, 1990; Roos, 1997). Under the present circumstances, we perceive that it is unlikely that the rate of revisions for the Flora Malesiana project can significantly increase in the near future. We are not advocating that the Flora Malesiana project solves the needs of Malaysia or for the botanical needs of the region. However, we are hopeful that the current close collaboration between the institutions and individuals will

continue. That a multiple-prong approach in cataloguing the diversity of flora in Malesian region can follow at both the wider regional level and the narrower often national level which often more readily attract national funding.

Finally, we wish to conclude this paper by putting up a want-list to the Flora Malesiana Project that we feel can bring more relevance to national needs:

1. Revisions need speeding up.
2. We feel that the format may require some tuning up. Since 1996, typification, previously not included in the format, but now included is one example of improvement but we feel that synonymy should be more comprehensively covered at the Flora Malesiana level. Such information becomes very useful in national flora projects. The format is to some extend not too consistent between families revised, e.g. descriptions are variable from family to family, similarly distribution information, maps, etc. Keys to taxa should be made more user-friendly, e.g. if possible provide mixed-keys utilising both reproductive and vegetative characters. Some families revised for example included keys to taxa occurring in particular islands as well as general keys based on reproductive characters. The island-based keys to taxa are often easier to use when one is confronted with a key covering more than 50 species. Illustrations are often too few and again are variable in quality between families, some lack details especially in reproductive structures.
3. Cheap editions could be produced, e.g. similar to the ones produced by the PROSEA project.
4. Identification lists, which were distributed in the past, have stopped. Here, it may be possible in the future that such lists can be provided on the web, maybe linked up with BRAHMS currently used to manage the type specimen data at the Nationaal Herbarium Nederland. Linkages between herbaria in the region should be attempted. We are pleased that there is an initiative to share herbarium specimen data under the 'South East Asian Botanical Information Network' project sponsored by the European Commission and led by the Nationaal Herbarium Nederland, Leiden.
5. We wish to urge the setting up of some grant/fellowship system for aspiring botanists from the Malesian region that provides both short-term and post-graduate support to conduct research at various herbaria in Europe. It is important to note that there is a strong need to build up trained man-power capacity of Malesian botanists to continue to work in the region.
6. Short courses targeting aspiring botanists in the region in both traditional and modern methodologies in plant systematics and taxonomy, similar to the UNESCO/MAB programme that has been held irregularly in Bogor, Indonesia, might be given as an incentive and inspiration to new generations of botanists.

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