THE BOTANICAL GARDEN ORGANIZATION
PRIME MINISTER'S OFFICE

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THE BOTANICAL GARDEN ORGANIZATION

NEWSLETTER

KEW & BGO

January 25, 1994

Professor Sanga Sabhasri, Chairman, the Botanical Garden Organization welcomes a team of specialists from the Royal Botainc Gardens, Kew, England. From left, Carolin Gohler, Dr. Weerachai Nanakorn, Prof. Sanga Sabhasri, Paul Richards and John Simmons.

His excellency the British Ambassador to Thailand,

Christian Adams and his wife visited the Garden on November 8, 1993. Dr. Weerachai Nanakorn, Director of BGO is on the left. Dr. Chusee Trisonthi, Right.

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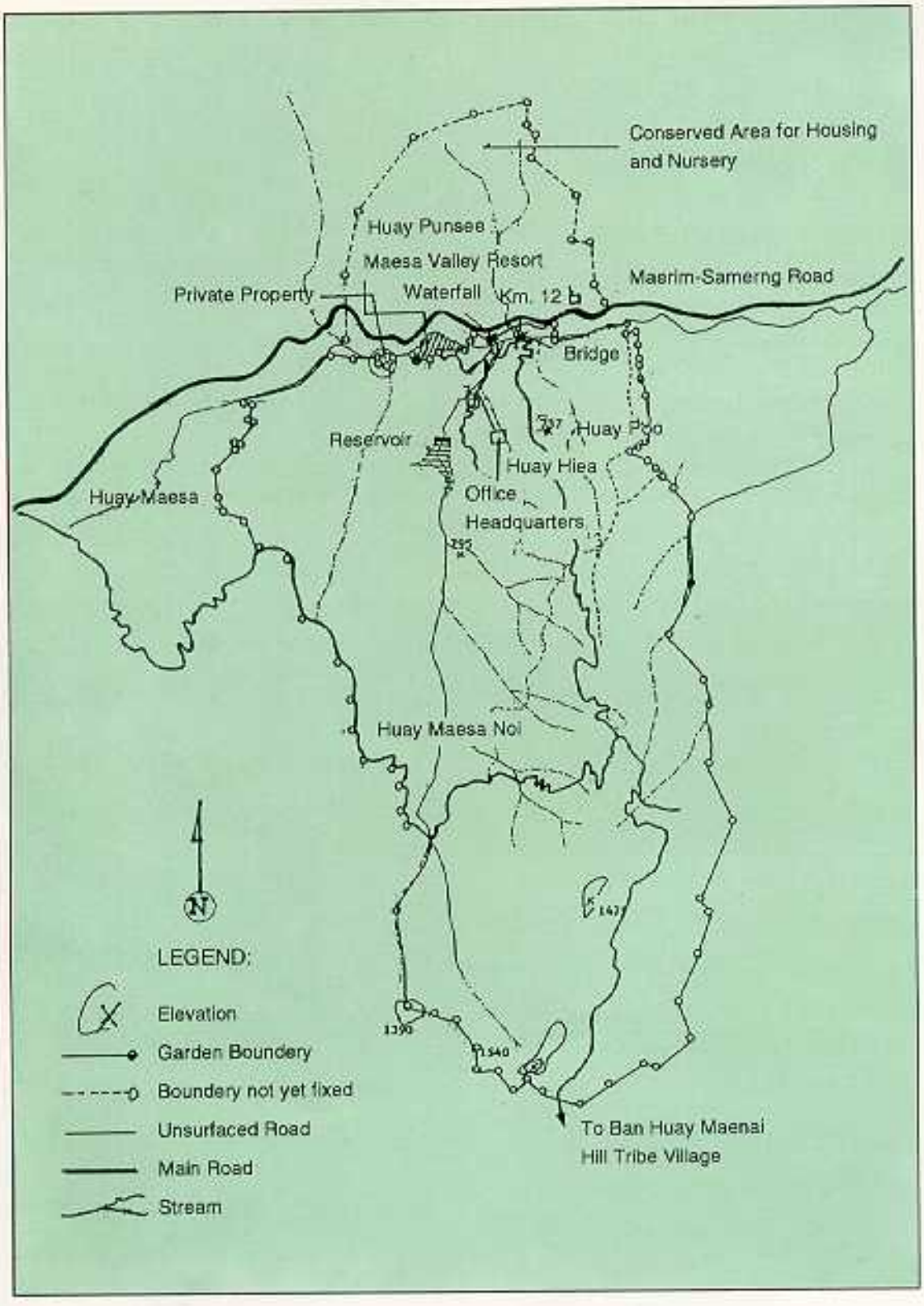

SHOWING THE GARDEN'S AREA OF 3,500 RAI

HISTORICAL BACKGROUND OF THE BOTANICAL GARDEN ORGANIZATION

Mainland Southeast Asia comprises southern China (Yunnan province), Burma, Thailand, Laos, Cambodia, Vietnam, and Malaysia. The vegetation as a whole consists of a unique tropical rain forest -- deciduous and savanna type. In floristic terms southern China, Burma, and Thailand belong to one of the least studied areas of Asia. In these regions *ex-situ* conservation has received very little attention. Although, it is realized that plants are an important natural resource and require a thorough systematic investigation, if they are to be properly utilized. Owing to a lack of taxo-nomists in Thailand, the majority of wild plants still await taxonomic treatment and evaluation for economic exploitation.

In Thailand, there has been no comprehensive *ex-situ* programme of activities, while such a progression has been accomplished in many Asian countries, i.e., Ceylon, India, Singapore, Indonesia, China, and Japan. Meanwhile, the forested areas of Thailand have been depleted at an alarming rate. This situation clearly justifies the necessity for establishing a true Botanical Garden to strengthen botanical research, to conserve and propagate rare and endangered Thai plants, and a Herbarium to deposit the plant specimens providing material for students and researchers. These needs gave strong motivation to the Thai Government for the establishment of the Botanical Garden Organization.

The Botanical Garden Organization was established in 1992 and declared in the Royal Gazette volume 109(40).1992 dated April 31, 1992. The status of the organization is a state enterprise under the Office of the Under-Permanent Secretary, The Prime Minister's Office. For this, your honour, Mr. Surasak Tiemprasert, Minister of the Prime Minister's Office was assigned from the Prime Minister to supervise the organization.

In September 1992, the Cabinet proposed that the establishment of the Garden was in honour of Her Majesty, Queen Sirikit, on Her Royal Highness's sixtieth birthday anniversary.

FUTURE PROSPECT

The garden has a strong commitment to conserve the Thai flora. For this objective, there are 3 major goals for the esta-blishment of the Garden:

1). To gather a fundamental knowledge of Thai plants.

There are about 15,000 species vascular plants in Thailand but only approximately 6,000 species are recognized by botanists. Many of these are in danger of extinction because of the rapid destruction of their habitats, principally in northern, north-eastern and eastern regions of the country. This critical situation has activated the Thai Government to gather botanical information and to conserve Thai plants before they are lost.

2). To conserve the genetic diversity of Thai plants.

Species such as rattans, palms, bamboos, trees of economic importance, medicinal plants, ferns, and especially orchids, are taken from the forests at an alarming rate and to an extent that cannot be sustained. In many regions, such species are clearly suffering from a heavy decline in their genetic diversity. Thus, the establishment of the Garden will address the major part of these problems.

3). To strengthen studies and research on Thai plants.

A large number of Thai plants have never been examined for their potential economic importance and useful products, more over, many species have not yet been described correctly or given their correct name. The value that these plants may have for mankind has been ignored.

At present, Thailand's regulation of protected areas is one of south-east Asia's most effective systems. All the beautiful forests are strictly conserved in the form of either National Parks or Wildlife Sanc-tuaries. These exceed approximately 13 percent of the country's area. Although, the forested areas in most parts of the country are perfectly protected, this does not guarantee that the species of plants in protected areas will survive for very long. It is clearly shown that in many protected areas, the plant species are certainly suffering significant loss and at an alarming rate.

A loss that can never be recovered.

THE BOTANICAL GARDEN EXECUTIVE BOARD

1.	**Professor Sanga Sabhasri**	Chairman
2.	Mr. Alai Ingavanij	Committee
3.	Dr. Thawatchai Santisuk	Committee
4.	Mrs. Umpom Lekuthai	Committee
5.	Dr. Tiwa Sabbakit	Committee
6.	Khunying Chodchoy Sobhonphnich	Committee
7.	M.L. Charuphant Thongtham	Committee
8.	Professor Nakhon Nalampang	Committee
9.	Professor Anon Thiangtrong	Committee
10.	Dr. Weerachai Nanakorn	Committee & Secretary

THE BOTANICAL GARDEN HONOURARY AND ADVISORY BOARD

1.	M. C. Bhitsatej Rajani	Thailand
2.	Professor Tem Smitinand	Thailand
3.	Air Force General Kamthon Sinthuvanon	Thailand
4.	Professor Ghillean T. Prance	England
5.	Professor Tetsuo M. Koyama	Japan
6.	Professor Kunio Iwatsuki	Japan
7.	Professor Kai Larsen	Denmark
8.	Professor Mike Balick	U.S.A.

At the Garden;
Prof. Prance, left; T. Smitinand, right.

THE BOTANICAL GARDEN ARCHITECTURE AND LANDSCAPE-DESIGN COMMITTEE

1.	Dr. Weerachai Nanakorn		Chairman
2.	Miss Rachada Chantaviriyavit	3.	Mrs. Poonsup Jateleela Committee
4.	Mr. Pin Kurkool	5.	Mr. Chana Promdej Committee
6.	Mr. Sirichai Hongvittayakorn	7.	Mr. Chwann Lojaya Committee
8.	Dr. Terdsak Kosaiyakanon	9.	Mr. Sanan Kumsai Committee
10.	Mr. Nattavood Prasertsuvan		Committee & Secretary

THE BOTANICAL GARDEN DIRECTOR

Dr. Weerachal Nanakorn (Sept. 25, 48) has been appointed Director of the Botanical Garden Organization and Mae Sa Botanic Garden, effective August 1, 1993. He graduated B.Sc. in Biology from Chiang Mai University in 1972, M.Sc. in Botany from Kasetsart University in 1982, and PhD. in Systematic Botany from The City University of New York, in 1989.

Some of his positions held and relative practical experiences are:
Royal Forest Department officer as Park Naturalist at KhaoYai National Park, Nakhon Ratchasima.Chief, KhaoNangRum Wildlife Research Station, Uthaithani; and Senior scientist, staff, the Forest Herbarium, Royal Forest Department, Bangkok 10900, Thailand.

Dr. Nanakorn has been trained in botanical research and flora work for **Flora of Thalland** and has paid short visits to many majors Botanical Gardens and Herbaria, i.e., Botanical Institute, Aarhus University, and University of Copenhagen, Denmark. Museum National d'Histoire Naturelle, Laboratoire de Phanerogamie, France; the Rijksherbarium, Leiden, Netherlands; Herbarium, Conservatoire et Jardin Botaniques de la Ville de Geneve, Switzerland; Herbarium, The Royal Botanic Gardens, Kew; British Museum, Natural History, and Herbarium of the Linnean Society, London, England; The Gray Herbarium, Harvard University Herbarium, Department of Botany, University of California at Berkeley; Botanical Garden, Belem, Para State, Brazil, The United States National Herbarium, Smithsonian Institution; and Goldi Museum.

Besides his permanent job at the Botanical Garden Organization in Chiang Mai, Dr. Nanakorn is actively involved in many conservation activities in Thailand. He is also a visiting Professor in Botany at Kasetsart University in Bangkok and Chiang Mai University.

RESEARCH ACTIVITIES

The research activities at the Botanical Garden Organization have been supported both by government budget and from the private sector. The major research goals of are to strengthen ability of the Garden staff, and to serve the nation's needs; these emphasize multidisciplinary research on plants. The Garden also promotes joint research with universities and institutions overseas. At present 2 research funds were granted to Ramkamhaeng University and Kasetsart University.

1). ***"Biodiversity of Lichens at Maesa Botanical Garden"***
conducted by Dr. Kansri Boonprakob, Asst. Prof. Pibul Mongkolsuk and Ms. Nattsurang Homchan, from Faculty of Science, Ramkamhaeng University.
Study period- 2 years/ grant 350,000 Baht.

(2). ***"A Study and Collection of Rattans in Thailand for Maesa Botanical Garden"***
conducted by Dr. Isara Wongkhaluang, from Faculty of Forestry, Kasetsart University.
Study period-1 year/ grant 200,000 Baht.

The Garden now welcomes cooperation from universities and institutions for joint studies on Thai flora, especially on Ferns, Orchids, and the computerization of the botanical data base.

AJINOMOTO FOUNDATION
SUPPORTS STUDY AND SURVEY OF THE FLORA AT THE GARDEN

A grant an amount of 200,000 Bt. was allocated by AJINOMOTO Foundation (Thailand) in July 1994 in order to accelerate the ground survey and flora study at the garden, The flora study is conducting under the guidance of Professor Tem Smitinand, Supervisor to the Royal Forest Department; Dr. W. Nanakorn, Director BGO; Dr. T. Trisonthi, Faculty of Science, Chiang Mai University; Mr. R. Pooma, Head, Huay Kaew Arboretum, and by botanical staff of the garden. Since September 1993 to the period of January 1994, based on the collected specimens deposited in the herbarium, 480 specimens each with 6 duplicates have been recorded so far. These specimens comprise 85 families and 285 genera of which all were collected inside the garden area. Details of their descriptions and data on habitats, localities, ecology, and species distribution are accumulating on the computer data base.

The flora activities will be focused on a larger scale for the whole forested area of Doi Suthep. Starting next year, botanical expeditions will be regularly arranged and targeted to other mountain ranges in Northern Thailand.

The survey to locate the boundary of the garden is in satisfactory progress. Maps of the whole garden are in the process of revising and comparing with aerial photographs. It is expected that the final detail map of the area will come out in May 1994.

NEW ENTRANCE BRIDGE FOR THE GARDEN

Work started on the construction of a new bridge over Huay Maesa which will form part of the main entrance to the Botanical Gardens. This rc. single span bridge costs 2.3 M. Baht. It was designed by Office of Accelerated Rural Development, Chiang Mai province, and will be completed by April 1994, well ahead of the rainy season.

The Architecture and Landscape Design Committee discussed the location of the bridge.

BUDGET AND FINANCIAL AID

At the first stage of the establishment of the Garden, budget and fundamental support are being provided entirely by the Thai Government. In 1993, the Garden obtained a budget of 10 M. Baht and this amount increased to 60 M. Baht for 1994. These increasing figures clearly indicate strong support from the Government to enable the Garden to effectively progress within a short time frame. Major technical supports and consulting are also being initially provided by the Forest Herbarium (BKF), Royal Forest Department, in Bangkok.

The botanical activities of the Garden will closely join with other Universities and Institutions within Thailand and abroad. Considering the activities involved the future achievement of the Garden is likely to be positive and realistic. The Garden is expecting to increase contacts with foreign botanical gardens in the near future.

VISITORS

The Garden has been very pleased to welcome many outstanding scientists from overseas. Although the Garden has just started, and is not yet officially open, there were more than 3,000 visitors to January 1994, most of which were university students. Thirty Botanists came from overseas, from Canada, Denmark, England, Finland, Germany, India, Japan, Nepal, Sweden, and United States. Some of the more notable are:

Professor Ghillean T. Prance: Director, The Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AB, ***England***.

Professor Tetsuo M. Koyama: College of Agriculture, Nihon University, Fujisawa City, ***Japan.***

Professor Kai Larsen: Editor-in-chief, Nord. J. Botany & Opera Botanica, Member Royal Danish Academy of Sciences & Letters. Botanical Institute, Aarhus University, ***Denmark.***

Professor Michael J. Balick; Director and Philecology Curator, Institute of Economic Botany, The New York Botanical Garden Bronx, N.Y. 10458: ***U.S.A.***

Professor Dr. Dietrich Schmidt-Vogt, Ethnobotanist, University of Heidelberg, ***Germany.***

Professor Olli Letho: Vice President of the International Association of Universities; and Delegation of the Finnish Academies of Science and letters, Helsinki, ***Finland.***

KEW TEAM ARRIVE AT CHIANG MAI

Professor Sanga Sabhasri,

Chairman, the Botanical Garden Organization welcomed a team of specialists from the Royal Botanic Gardens, Kew, and expressed his pleasure in the developing cooperation between Kew and the Maesa Botanic Garden. Professor Sanga Sabhasri will also meet the Kew team with the committee that is directing the landscape of the garden to discuss development strategies. The Kew team is very enthusiastic about this project and delighted with this opportunity to work with Dr. Weerachai Nanakorn and his staff on this international programme.

This team of specialists is headed by the Kew Curator, John Simmons, with Paul Richards (who manages Kew's satellite garden, Wakehurst Place in the County of Sussex, England) and Carolin Göhler (Landscape Architect, who involved with garden's projects).

Modern botanic gardens have many functions, such as research into ethnobotany, biochemistry and conservation biology as well as ecotourism and education. The multi-level nature of these programmes can be reflected through the harmony of a scientifically based garden that blends

function and beauty. The potential for Thailand's Botanic Garden Organization is immense, because of the obvious loss of natural forest there is great urgency to conserve living plant germplasm through the development of species recovery programmes and sustainable land based practices. These, with the need to advance biological education of Thai children, are serious considerations for the country's long-term future.

Members of the Royal families of Thailand and England share a great love of gardens and botany and in both countries they are very supportive of the work of today's botanic gardens.

The creation of a successful botanic garden demands long-term commitment and international cooperation -- in this Maesa has made the right start.

FURTHER DETAILS OF THE KEW TEAM

John Simmons

has been Curator (Director of Horticulture) of the Gardens since 1972. He has overseen its successful progress through a fast changing period and his work has been recognized by many awards. His activities involve managing the world's largest documented collection of living plants and operating conservation and education programmes that reach world-wide and involve the application of technologies such as micro propagation and cryopreservation. His breadths of interests are extensive and within the United Kingdom he is the Past-President of the Institute of Horticulture, current vice-president of the National Council for the Conservation of Plants and Gardens and Chairman of the Advisory Panel for the Forestry Commission's Bedgebury Pinetum, to name a few responsibilities.

Paul A. Richards

Past experience has included working for the Royal Horticultural Society's Garden at Wisley (Surrey) in arboretum establishment and management, and at the Royal Botanic Gardens, Kew, and the subtropical Tresco Abbey Gardens (South West England). Having graduated with the Diploma in Horticulture at the Royal Botanic Gardens, Edinburgh, he has worked as a landscape manager being involved in design and management.

Currently Paul Richards is in charge of the ornamental botanical collection at the Royal Botanic Gardens, Kew's satellite garden, Wakehurst Place, managing the maintenance and further developments of areas with high visitor profile, and the diverse botanical collections, in particular the forest flora of Eastern Asia.

trained as a horticulturist in Germany and she continued her education at the Royal Botanic Gardens, Kew, and graduated with the Diploma in Horticulture. A following scholarship enabled her to work and advise the Jerusalem University Botanic Garden (Israel) and to gain further knowledge of management and curation of botanic gardens. Also additional field study trips to other Mediterranean countries gave the opportunity to study local flora, ecology and conservation. Recently she graduated from the University of Newcastle with a Master in Landscape Design (sponsored by Royal Botanic Gardens, Kew).

Presently she is assisting with the design and implementation of new developments at the Royal Botanic Gardens, Kew. Her special interest includes ecology and con-servation, botanic garden management and design as well as incorporating traditional landscape elements into modern landscapes.

Maerua siamensis (Kurz) Pax

Trees, unarmed; cataphylls present at base of shoots.
Leaves 3-foliolate.
Inflorescences corymbose, racemose or flowers solitary.
Sepals 4, connate at base.
Petal 0.
Stamens few to many.
Gynophore long; ovary cylindrical, 1-locular; ovules numerous; stigma disc-shaped.
Fruits ellipsoidal; glabrous.
Seeds 1-3, large.

IN THE NORTHERN THAILAND

by

M.L.Charuphant Thongtham

Ferns are common throughout the Kingdom of Thailand, from the mountain ranges of the Northern Region to the lowlands of the Central Plains. They can be found even on limestone cliffs, on trunks and branches of trees. Ferns can be found in swampy areas or along canals or roadside ditches.

From April 1978 to March 1981, developmental research on economic ferns as cash crop for the hill tribes of Northern Thailand was conducted at Doi Pui Research Station, Chiang Mai, and at an experimental plot at the Department of Horticulture, Faculty of Agriculture, Kasetsart University. The result of this investigation is summarized as follows:

GERMPLASM COLLECTION AND EVALUATION

In April 1978, the fern research team made a survey and collected tropical and sub-tropical ferns, both native and exotic species, for testing on cultural practice, propagation technique and evaluation on their uses for the welfare of the highland people. The first report (ARS/USDA Semi-Annual Report Apr.-Sept. 1978) was presented with 16 families belonging to 39 genera and 87 species. In 1980, about 49 exotic species of fern were collected from Nepal, Sri Lanka and Taiwan, bringing the total to 136 species, most of them were identified by a taxonomist of the project. It can be concluded that the future use of ferns in the highlands will emphasize:

1). Cut-leaf ferns for both the fresh and dry flower arrangement businesses.

2). Ornamental ferns as pot plants for domestic and foreign markets.

3). Edible ferns as additional income for the hill tribes during the rainy season. All the ferns that passed the final evaluation were maintained and subjected to mass propagation by spore culture at Doi Pui Research Station, Chiang Mai, for further distribution.

MORPHOLOGY, HABITAT, GROWTH PATTERN AND THE ECOLOGY OF SOME ECONOMIC FERNS

The research team conducted several investigations on the morphology, habitat, growth pattern as well as the ecology of some highland species such as the bracken ferns and climbing ferns. It was found that the active phase of fern growth in the highlands is from May to the end of October. The bracken fern (*Pteridium aquilinum* var. *wightianum*) was the most dominant fern that covered almost one-third of the total highland area, from an altitude of 3,813 to 5,363 feet above sea level. The economical aspects of this fern were presented in ARS/USDA Semi-Annual Report (Apr.-Sept. 1979). An ecotype of a climbing fern (*Lygodium flexuosum*) which is economically significant in the southern provinces was also discovered in the highlands. The habitat, morphology and quality test were presented in ARS/USDA Semi-Annual Report (Oct. 1978-Mar. 1979).

CULTURAL PRACTICE

Several fertilizer trials were conducted in the highlands using both ferns in plots and in pots. It was found that 15-15-15 (N-P-K complete fertilizer) at the rate of 5 gm/8-inch pot/2 months or about 400 kg./rai/year is the most suitable for cut-leaf ferns in plots. Slow release fertilizer (14-14-14) should be provided at a rate of 4 gm/8-Inch pot/3 months for ornamental pot ferns.

For cut-leaf fern cultivation in the highlands, a spacing of 40 cm. between the rows and 20 cm. between the plants in the row is generally recommended. Plant spacing of 10-30 cm. provided significantly longer marketable fronds than wider spacing. Shade level for growing ferns in the highlands should be maintained at 50 percent shade for better quality of both cut ferns and potted ferns.

It was found that the most suitable growing media of ferns in the highlands basically composed of one-part forest topsoil and three-parts well-decayed leaf mold. For ornamental ferns the potting mixture should be added with one-part well-rotten cow manure and one part coarse sand (ARS/USDA Semi-Annual Report Apr.-Sept. 1978, Apr.-Sept. 1979, and the final report). Several trails are being continued to evaluate the use of soiless media in potted fern culture for export and domestic use in the lowland. For spore culture, the best medium is sterilized clayey soil for terrestrial ferns and sterilized stag horn fern fiber for epiphytic ferns. For growth and development of ferns through spore culture were also described in the latest report. Several trials have been made in Doi Pui Research Station to find out the best methods of fern propagation through spore

culture. Most ferns in the highlands require 13-16 months to grow from spores to 3-to-4-inch plants. At present, there are at least 29 species of ornamental ferns being mass propagated by extensive spore culture at Doi Pui Research Station. The processing systems of cut-leaf ferns from the highlands were described and the conventional methods and data in grading and packing system were recorded (ARS/USDA Semi-Annual Report, Oct. 1978-Mar 1979). The fresh fronds must be wrapped in wet newspaper and packed in cardboard box lined with polyethylene sheet to maintain maximum quality during transportation. The vase-life quality of the cut fern from the highlands is about one week (ARS/USDA Semi-Annual Report, Oct. 1979-Mar. 1980).

PICKLED FERN (WARABI) PRODUCTION

About 500 metric tons of the young fronds of bracken fern are gathered annually by the hill tribes during the rainy season for sale to the local processing plants. The processing method of these young fern fronds for export to Japan was described in ARS/USDA Semi-Annual Report (Apr.-Sept. 1978).

The hill tribes usually earn an additional income of about 1.50-2 B. (US$ 0.06-0.08) per kilogram of fresh fronds (1,500-2,000 B./ton). The average yield is only about 33.62 kg./rai/year, which is considerably low (ARS/USDA Semi-Annual Report, Apr.-Sept. 1979) and the hill tribes are able to earn an additional income of only about 40-50 B. (US$ 1.6-2.0) a day. There are about 12 species of other edible and medicinal ferns that serve as both nourishment and medicine for the hill tribes (ARS/USDA Semi-Annual Report Oct. 1978-Mar. 1979).

CUT-LEAF FERN PRODUCTION

Since the start of the project, it was found that the perfect and mature fronds of several highland ferns can be used in fresh and dry flower arrangement that is popular in Japan and Europe. Fresh fronds of **Davallia**, **Nephrolepis**, and **Rumohra** (leather leaf fern) are highly in demand in these countries. Therefore in October 1978, an investigation on the establishment of the grading and packing of fresh fronds for

processing and packing was conducted in Doi Pui Research Station. Data on pinnae grading and packing, as well as the proposed processing systems were presented (ARS/USDA Semi-Annual Report Oct. 1978-Mar. 1979). Dry fern materials from the highlands were commercially accepted in several market tests during Agricultural fairs in Bangkok. The future extension scheme and the present marketing situation and problems were discussed in the latest report.

ORNAMENTAL FERN PRODUCTION AS POT PLANT FOR DOMESTIC AND FOREIGN MARKETS

Presently, there are at least 30 species of ornamental ferns that are suitable for pot plant production. Out of these, 18 species have been commercially propagated by spore culture. The parent stocks of these species belong to well-known genera such as **Nephrolepis**, **Davallia**, **Platycerium**, **Pteridium**, **Pellaea, Blechnum**, **Adiantum**, **Rumohra**, **Asplenium**, **Cyrtomium**, **Pityrogramma**, etc. Several exotic ferns have been evaluated to prevent market problems that may arise in the future. Several trials have been conducted to find out the best growing media for export and domestic consumption. Rice husk mixed with wood shave at 1:1 ratio showed promising results as a growing media for export, while forest topsoil, coarse sand, leaf mold and cow manure at 1:1:3:1 ratio provided the suitable medium for ferns grown for domestic use.