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**Forestry/Fuelwood
Research and Development
(F/FRED) Project**

FORESTRY/FUELWOOD RESEARCH AND DEVELOPMENT (F/FRED) PROJECT

Sponsored by: U.S. Agency for International Development Bureau for Science and Technology (Office of Forestry, Environment, and Natural Resources and Office of Rural and Institutional Development) and Bureau for Asia and the Near East (Office of Energy and Natural Resources).

Cover Photo: National Academy of Sciences (NAS)

WHAT IS F/FRED?

In recognition of the rapid depletion of tropical forest resources and the increased scarcity of fuelwood and other tree products, the U.S. Agency for International Development (USAID) has designed and funded the Forestry/Fuelwood Research and Development (F/FRED) Project. F/FRED is designed to help scientists address the needs of small-scale farmers in the developing world for fuelwood and other tree products. It provides a network through which scientists exchange research plans, methods, and results. Research and development activities center on the production and use of trees that meet the several household needs of small farmers. These trees, in project terms, are multipurpose tree species (MPTS).

Integrating the biological and social sciences is critical to successful adaptation of MPTS to meet small farmers' needs. Recognizing that familiarity with each other's disciplines is essential for biologists and social scientists to cooperate effectively, F/FRED sponsors workshops and short-term training to introduce each group to concepts of the other.

F/FRED is being carried out by the Winrock International Institute for Agricultural Development, a private, nonprofit U.S. organization working in agricultural development around the world. Under its five-year, \$8.9 million contract with USAID, Winrock International is responsible for:

- developing a network of Asian scientists actively involved in research focusing on small-farm use of MPTS,
- building an information and decision support system on experiment data targeted to priority MPTS, and
- extending the benefits of Asian MPTS research to Africa and Latin America.

THE MPTRS RESEARCH NETWORK

More than 60 forestry research and information specialists from 12 countries met in Bangkok, Thailand in 1986 to establish a network on MPTS research for small-farm use. The MPTS Research Network operates at two levels:

- formal network membership of forestry departments, forestry and agricultural research institutes, social-science research institutes, and schools of forestry and agriculture in Asia; and
- broader, less formal participation by any interested scientists in national meetings, seminars, workshops, and other selected activities organized by the MPTS Research Network.

The network encourages building the research capabilities and facilities related to MPTS in Asia. It provides ways for interested scientists to share research results and information. And it provides a forum to help scientists plan MPTS research programs for their own countries.

A steering committee of leading regional scientists, along with representatives of the research committee, is the governing body of the MPTS Research Network. The research committee helps set priorities for regional MPTS research through review of national research priorities and proposals, and by planning and approving studies funded through the network.

National MPTS Organizing Meetings provide a forum for scientists to exchange information and views on network-related research and to develop agendas of research topics for discussion by their representatives at research committee meetings.

Institutions participate in the MPTS Research Network through memoranda of understanding (MOU) or letters of agreement (LOA) with Winrock International. By country, they are:

India

Botany Department, University of Delhi (MOU)
National Institute of Wasteland and Rural Development (LOA)
The Bharatiya Agro Industries Foundation (LOA)

Indonesia

Agency for Forestry Research and Development (MOU)

Malaysia

Forest Research Institute of Malaysia (MOU)
Universiti Pertanian Malaysia (MOU)

Nepal

Institute of Forestry (MOU)
Institute of Agriculture and Animal Science (LOA)
Forest Survey and Research Office (LOA)

Philippines

Central Mindanao University (LOA)
Forestry Research Institute, Ministry of Natural Resources (MOU)
University of the Philippines at Los Banos (MOU)
Visayas State College of Agriculture (MOU)

Singapore

Plantek International, Ltd. (MOU)

Sri Lanka

Forestry Department (MOU)

Taiwan

Taiwan Forest Research Institute (MOU)

Thailand

Center for Applied Economics Research (LOA)
Kasetsart University (MOU)
Thailand Institute of Scientific and Technological Research (MOU)

In addition, through an agreement signed by the Government of Pakistan and USAID, Pakistani institutions may participate in F/FRED activities.

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PRIORITY SPECIES

Participants at a 1984 workshop sponsored by the International Union of Forestry Research Organizations (IUFRO) outlined a 10-year program to develop and disseminate technology to increase MPTS productivity and usefulness. They said such technology should result in sustainable land-use systems, raise incomes, and meet basic needs of rural people in the developing world.

Taking these recommendations, F/FRED staff consulted with Asian foresters and administrators to select priority species for initial research emphasis in two climatic regions:

Humid and Sub-humid Zone

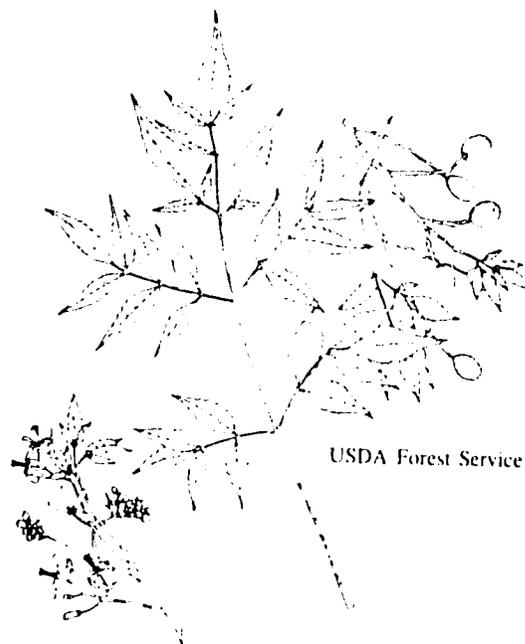
Scientific Name	Common Names
<i>Acacia auriculiformis</i>	Auri (Philippines), Kasia (Indonesia), Kathin narong (Thailand), Northern black wattle
<i>Acacia mangium</i>	Brown salwood, Kathin thepha (Thailand), Mangium
<i>Leucaena spp.</i>	Guaje, Yaje, Uaxin (Latin America); Ipil-ipil (Philippines); Subabul (India); Lamtora (Indonesia); Leadtree; Leucaena
<i>Melia azedarach</i>	Chinaberry, Persian lilac, White cedar



Acacia mangium is a priority species for the humid and semi-humid tropics.



Leucaena leucocephala is gathered for forage in Maharashtra State, India.



USDA Forest Service

Melia azedarach, native to southern Asia, is used for fuelwood, furniture, and cabinetmaking. Leaves and dried fruits protect stored clothing and other articles from insects, and various tree parts have medicinal uses.

Arid and Semi-arid Zone

Semi-arid Sub-zone (550 mm – 1,200 mm annual rainfall)

Scientific Name	Common Names
<i>Acacia nilotica</i>	Babar, Kiker (Pakistan); Babul (India); Munga (Africa); Prickly acacia (Australia)
<i>Dalbergia sissoo</i>	Indian rosewood, Indian teakwood, Sissoo, Sisu, Sonossissoo (Java), Tali
<i>Eucalyptus camaldulensis</i>	Eucalyptus, Kaman (Thailand), Murray red gum, Red river gum

Arid Sub-zone (less than 550 mm annual rainfall)

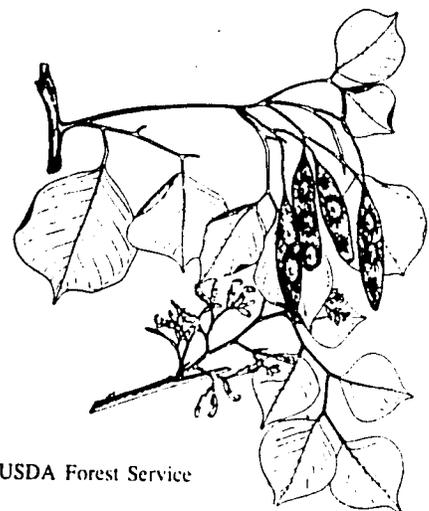
Scientific Name	Common Names
<i>Acacia nilotica</i>	(see above list)
<i>Prosopis cineraria</i>	Jand, khejri (India), ghaf (Arabia), jandi (Pakistan)
<i>Prosopis juliflora</i>	Mesquite, algarroba



Eucalyptus camaldulensis tolerates periodic water logging.



Acacia nilotica, an important fuelwood species for the arid and semi-arid tropics, is grown in a "hurri" plantation near Hyderabad, Pakistan.



USDA Forest Service

Dalbergia sissoo, a valued timber tree from India, is used for general construction, furniture, shipbuilding, and utility poles. Its branches make excellent fuel and also serve as fodder.

EXPERIMENTAL FIELD TRIALS

Scientists from Asia, Australia, and the U.S. developed a standard experimental design and minimum data sets at a 1986 meeting in Malaysia. Ten institutions in Indonesia, Malaysia, Pakistan, Philippines, Taiwan, and Thailand established experimental sites in 1987.



Nurseries such as this one in Thailand are a basic part of the network trials.

A manual has been developed to help standardize methods for the trials. Videotapes, short courses, and other reference materials also aid in this standardization.

Social-science case studies, developed in conjunction with the field trials, should help identify tree characteristics desired by farmers for various purposes and increase our knowledge and understanding of farmers' use and production of MPTS.

The F/FRED Project also provides cooperating scientists with:

- seed
- herbicides
- soil characterization services
- germplasm
- database management and modeling assistance

F/FRED COORDINATING UNIT

The F/FRED Coordinating Unit is located at the Kasetsart University Faculty of Forestry in Bangkok, Thailand. A four-person team of network specialists, consisting of an agroforester, forest economist, rural sociologist, and training specialist support the project through:

Network Development

- integration of MPTS and social-science research
- coordination of short-term training for social scientists and foresters on major forestry and social-science concepts, respectively

Research Support

- regional research on the *Leucaena* psyllid
- germplasm collection and dissemination
- network trials
- social-science studies related to MPTS trials
- fellowships for Asian scientists to pursue Ph.D. programs
- social and economic research on selected farm and village forestry topics
- assessment of improved small-farm MPTS production through biotechnology
- small grants

Network Coordination

- regular meetings with relevant donor agencies and projects
- assistance to USAID-mission forestry programs
- review and approval of research grants
- national MPTS organizing meetings
- arid and semi-arid network development
- periodic workshops on topics relevant to MPTS for small-farm use

Short-term Training Sponsorship

- regional and national training courses
- participation in existing regional agroforestry and social forestry courses
- exchange programs for junior scientists
- development of short-term courses to meet specific training needs.



Scientists exchange information at a recent meeting.

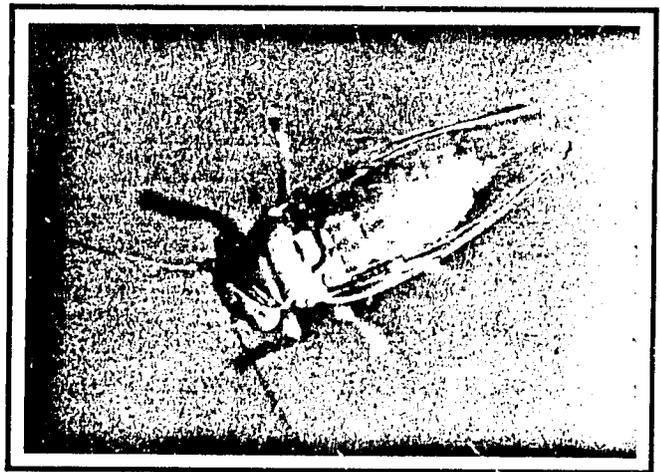


Ken MacDicken, F/FRED Team Leader and MPTS Network Specialist, reports on field staff progress.

F/FRED RESEARCH SERVICES

Coordination of regional *Leucaena* psyllid research

Damage to *Leucaena* by the jumping plant louse (*Heteropsylla cubana*) or psyllid is extensive in parts of Southeast Asia and the Pacific, but research on controls and alternative or resistant species has been isolated, with little communication or coordination among scientists.



Heteropsylla cubana or psyllid has damaged Leucaena in much of Southeast Asia and the Pacific.

At a workshop co-sponsored by the F/FRED Project and the Nitrogen Fixing Tree Association, scientists established an action plan for regional psyllid control. The F/FRED psyllid advisory committee has submitted proposals to major donor agencies to fund coordinated research. F/FRED is supporting up to \$250,000 of this effort.

Biotechnology

F/FRED supports research to identify potentials of the following biotechnologies to help small farmers increase MPTS production:

- MPTS tissue culture — to screen for acid-soil tolerant *Leucaena* spp. and improve growth characteristics of MPTS
- mycorrhizal inoculants — to identify and produce improved strains of fungi beneficial to nutrient assimilation by root systems
- improved *Rhizobium* strains — to identify and produce improved strains of nitrogen-fixing bacteria



Mycorrhizal fungi help Acacia mangium absorb micro- and macronutrients, which allows the tree to grow better in soils deficient in readily available minerals.

The project also supports research on small-farm production of gums, resins, and exudates; small-farmer access to biotechnologies and the economics of their use; and the socioeconomic impact of biotechnologies on selected Asian countries.

In addition, Plantek International in Singapore is conducting a series of multi-location tissue culture field studies in five network countries.

Asia/U.S. Collaboration

F/FRED and USAID-mission funds support collaboration between Asian institutions and U.S. schools of forestry. Three Indian institutions—National Botanical Research Institute, Madurai Kamaraj University, and Bharathidasan University—are collaborating with Auburn University in the U.S. to develop better ways of growing trees on poor soils.



MPTS elimination trials like these in India are reviewed by cooperating Auburn University and Indian scientists.

The program includes:

- post-doctoral training of Indian scientists at Auburn University
- cooperative research in the two countries
- U.S. technical assistance to researchers and resource managers in India in nursery technology and woody biomass research
- nursery technology workshops in India

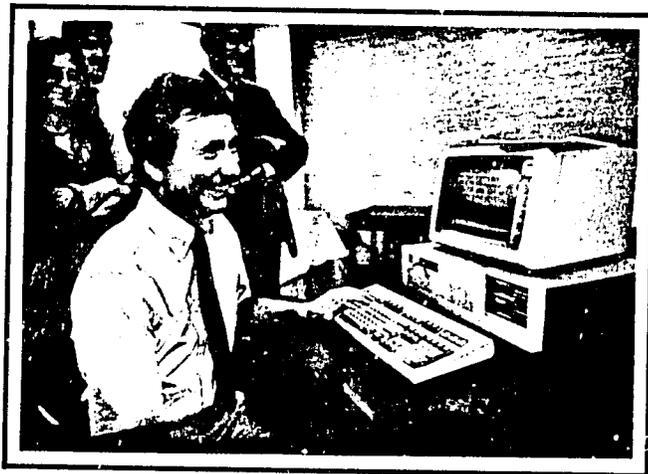
Indian scientists use a soil moisture probe at loblolly pine plantation near Auburn University, Alabama.



BUILDING A DATA MANAGEMENT SYSTEM

The Information and Decision Support System (IADSS), developed by F/FRED's Global Research Team at Maui, Hawaii, is a microcomputer software package designed to help scientists manage multipurpose tree data. IADSS consists of databases and decision support programs that organize, store, retrieve, and analyze research data and information on MPTS field trials, literature, and specialists. A special feature is the system's ability to link several databases and application programs to help scientists identify species and management practices useful to small farmers.

The experiment database contains information from replicated experiments with priority species and provides a mechanism for scientists in the MPTS Research Network to store and share this information. Collaborating scientists enter the minimum data set of tree data measured according to standardized methodology, along with the trial environment data. The Global Research Team will also maintain a farm and village forestry database for socioeconomic information, as well as databases for species, soils characterized by *Soil Taxonomy*, daily weather, and long-term climate.



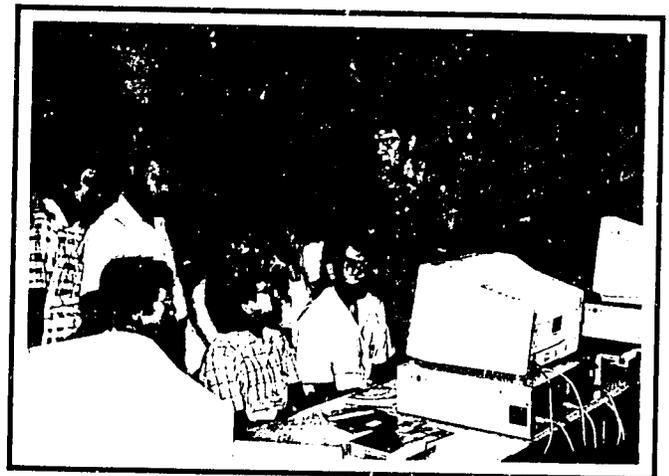
Foster Cady, F/FRED Research and Development Director, demonstrates the experiment database.

After performing statistical and other analyses, summarized information from replicated trials will be entered into a summary database. It contains highly condensed, key information on MPTS and is the primary mechanism through which scientists share information and construct environment models to predict the effects and validity of important determinants of tree performance.

IADSS, a decentralized system distributed to each network cooperator, also contains supplementary databases. The MPTS specialists database contains information on people worldwide with particular MPTS research skills. The abstracts database helps scientists select relevant MPTS literature on priority species from international citations.

F/FRED also provides the following database support for network development:

- ready access to the most current version of IADSS
- database software for user-friendly data entry and management
- data analysis software within the system for immediate interpretation
- user's manual and training in the system to ensure efficient utilization of the stored MPTS information



F/FRED systems programmer trains network scientists in use of the experiment database.

EXTENDING MPTS INFORMATION

Project publications include a quarterly newsletter, *Farm Forestry News*; agroforestry books on research management, biophysical and social-science concepts, and social forestry and common-property issues; and various workshop proceedings, technical papers, and reports.

The F/FRED Global Research Team is developing an abstracts database of the latest citations on priority MPTS. The database is available to network collaborators. In addition, it can be exchanged with other existing bibliographic databases.

HOW TO OBTAIN F/FRED INFORMATION

To receive information about participating in the MPTS Research Network, contact the F/FRED Coordinating Unit in Bangkok, Thailand.

To receive F/FRED publications and/or be included on the F/FRED mailing list, write to Norma Adams, Project Editor, at the F/FRED Project Management Office in Arlington, Virginia.

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