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68349

ACQUISITION, CHARACTERISATION AND DISSEMINATION OF GERMPLASM OF POTENTIALLY USEFUL NITROGEN-FIXING TREES

FINAL REPORT
(GRANT #DAN-5542-G-SS-2094-00)
11/1/82 - 12/31/84

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OBJECTIVES OF PROJECT:

1) Assemble seed stocks of nitrogen-fixing trees (NFTs) with agroforestry potential, compile their geographical origin and known characteristics.

2) Characterize and increase selected acquisitions for productivity under a range of agroclimatic regimes.

3) Provide a centralized seed service for NFT germplasm requested by LDC researchers and interested investigators in the US.

ACCOMPLISHMENTS BY OBJECTIVE

Collection and Characterization of Seed. Seed collection of NFT began at the UH with collection and evaluation of *Leucaena* spp., starting in the mid-60's. Continuing to date, over 750 accessions have been made and grown at the UH Waimanalo Experiment Station. Collection of NFT germplasm began in 1980. Under the work of the present grant, the total number of accessions exceeded 240, separate from those collected by the NiFTAL project. A list of these is attached to this summary.

In work supported by the US Department of Agriculture, many of these species were evaluated in a series of species network trials established in Hawaii and abroad. Overseas sites utilized facilities of the UH Soils Benchmark Project.

Partly on the basis of these trials, a database of economically important NFT species was initiated and improved during the period of this grant. The database lists origins, uses and climatic requirements of 44 important NFT species and will be updated periodically. A recent printout of the database (MacDicken and Brewbaker, 1984) is attached.

Increase selected acquisitions. Twenty of the most promising species in the USDA-funded project were selected for emphasis in the present study. Selection of the species was made on the basis of their growth rate, multiplicity of uses, wide adaptation, or exceptional adaptation to problem sites and viability and availability of seed.

Arrangements were made with numerous collaborating institutions in the collection of the seed. Effort was made to obtain sufficient seed of each species so that the same accession could be used at all sites. The accessions, for the most part, had been evaluated in either our network trials or trials of the collaborating institution. Further, the accessions were collected from protected stands that could be revisited should the need arise. We designated such accessions as "experimental standards". The species collected are listed in Table 1.

Table 1. List of experimental standards compiled under grant.

Species	Abbrev.	N No.	Location of Parent Stand
Acacia auriculiformis	AUR	N269	Purwakarta, Java
Acacia mangium	MAN	N267	Mossman, N. Queensland
Acacia mearnsii	MEA	N163	Olinda, Maui, Hawaii
Acacia nilotica	NIL	N282	Whagoli, Pune, India
Acrocarpus fraxinifolius	ACR	N459	Yunnan, China
Albizia falcataria	FAL	N10	Taitung, Taiwan
Albizia procera	PRC	N253	Abra, Philippines
Alnus nepalensis	ALN	N270	Nagarjung, Nepal
Cassia siamea*	SIA	N76	Chiang Mai, Thailand
Calliandra calothyrsus	CAL	N276	Meambar, Honduras
Dalbergia sissoo	DAL	N271	Nawal Parasi, Nepal
Enterlobium cyclocarpum	ENT	N277	CATIE, Costa Rica
Gliricidia sepium	GLI	N248	Gualen, Guatemala
Leucaena leucecephala	LEU	K8	Waimanalo, Hawaii
Leucaena diversifolia	DIV	K156	Waimanalo, Hawaii
Mimosa scabrella	MIM	N99	Rio Negro, Puerto Rico
Pithecellobium dulce	PIT	N266	La Paz, Honduras
Prosopis alba	ALB	N275	Cordoba, Argentina
Samanea saman	SAM	N25	Honolulu, Hawaii
Sesbania grandiflora	SES	N265	Pangisinan, Philippiines

*Leguminous, but not NFT

Centralized Seed Service. We have been servicing LDC researchers with *Leucaena* seed for over 15 years. This has been possible because of concurrent selection and evaluation work over that period. Due to the short term of the grant, and the fact that we had few flowering NFT species other than the leucaenas in our trials, we opted for a dispersal methodology based on evaluation of the experimental standard versus locally preferred non-NFT. We chose to work with small trials rather than simply send lots of seed, as it was believed that such a method would ensure that the seed would be planted and that we would hear back from collaborators.

Two types of experiments were designed and advertised through mailings of the NFTA--Site Adaptability Trials (SAT) and International Yield Trials (IYT). SAT are small trials, normally unreplicated, 0.25ha is size, including 10 or more species. IYT, while similar in size are more formal trials, utilizing the augmented replicated block design with 10-20 NFT species and checks. Collaborators were encouraged to include locally favored and non-NFT species for comparison. More descriptive summaries of the trials are as follows:

-SAT. A single long narrow block planted to each species, normally 6 x 20m, with 40 sampled trees every 6 months. Option: 2 reps each, with 9 x 9m pots and 20 sampled trees/plot.

-IYT. Four replications of outstanding species and a single

replicate of untested species. Small plots (8 x 9m), with a center 20 trees sampled every 6 montsh. Population of 10,000/ha, with 5000/ha in arid regions.

Surprisingly, few collaborators opted for the IYT, preferring instead the more "preliminary" SAT trials. A brief list of the collaborators recruited during the period of the grant is outlined below.

Project North Shaba, Zaire. Established in cooperation with Development Alternatives, Inc., under joint USAID/Government of Zaire program. Site is located at 4°30'S, 800m altitute, 1200mm rainfall, 3 mo. dry season. Soil acid. Seed sent July, 1984: AUR, MAN, NIL, FAL, PRO, SIA, CAL, DAL, ENT, GLI LEU, DIV, MIM, PIT, SAM, SES.

Bharatiya Agro-Industries Foundation, Pune, India. Two sites to be selected by BAIF, probably on semi-arid sites near Ahmedabad, Gujarat and Urulikanchan, Maharastra. Seed arrived 2/85, after 4 mos. in customs. Seed sent (for 2 trials): AUR, MAN, NIL, FAL, SIA, CAL, ENT, GLI, LEU, DIV, PIT, SAM, SES, ALB, PRO.

Sri Lanka Demonstration Trials. A network of trials at four elevations, established cooperatively with Conservation Farming and the Nitrogen Fixing Tree Association and the following Institutions:

- Coconut Research Institute, Lunawila. Sea level, intercropping studies with coconut. Pronounced dry season.
- International Winged Bean Institute, Kandy. Elevation = 500m. Sloping hill lands, 5mo. dry season.
- Tea Research Institute, Talawakele. 1700m. Tea estates. Trials for firewood production and shade.
- Department of Agriculture, Anuradhapura. 9 mo. dry season, elevation = 250m.

Seed sent (not at all sites): AUR, ACR, MEA, NIL, FAL, PRO, ALN, SIA, CAL, DAL, ENT, GLI, LEU, DIV, MIM, PIT, SAM, SES, ALB

CATIE, Turrialba, Costa Rica. Established in collaboration with CATIE-GTZ Agroforestry Project, Site located in Puriscal, elevation: 1000m, rainfall: 2000m, 6mo dry season. Soil type: ultisol, low base saturation, high clay content. Abandoned pasture land. Seed sent: AUR, MAN, MEA, NIL, FAL, PRO, ALN, SIA, CAL, DAL, ENT, GLI, LEU, DIV, MIM, PIT, SAM, SES

US Peace Corps, Philippines. A network of 3 sites (not firmly selected at this time) established in collaboration with PCVs on three islands of the Philippines:

- Tarlac. 150m elev, with 6 mo dry season.

-Oriental Mindoro.
-Brookes Point, Palawan. Sea level, productive soils.

Seed sent: AUR, MAN, MEA, FAL, PRC, SIA, CAL, GLI, DIV, LEU, PIT, SAM, SES

Ponape, Caroline Islands. Established in collaboration with the Ponape Agriculture and Trade School. Seed arrived January, 1985. Site not yet selected. Species sent: AUR, MAN, MEA, FAL, PRC, SIA, CAL, GLI, LEU, DIV, PIT, SAM, SES

Cook Islands. A network of three sites, representing uplands, lowlands and mid-eleveation areas, in collaboration with the Ministry of Agriculture and US Peace Corps. Seed sent November, 1984. Seed sent (not for inclusion at all sites): AUR, MAN, MEA, FAL, PRC, ALN, SIA, CAL, DAL, ENT, GLI, DIV, LEU, MIM, PIT, SAM, SES.

Peru. A single demonstration experiment to be established at the North Carolina State University, on highly acid soils. Species include: AUR, MAN, MEA, FAL, PRC, FAL, SIA, CAL, GLI, LEU, DIV, PIT, SAM, SES.

University of Hawaii IBSNAT Project Sumatra, Indonesia. Site located on AID-financed site, with extremely weathered, acidic soils. Seed sent: AUR, MAN, MEA, ALB, PRC, SIA, CAL, ENT, GLI, DIV, LEU, PIT, SAM, SES

A total of 17 plantings will be in place as direct output of the grant. We currently have about 50 requests outstanding. Theses will be filled in the future , under the auspices of NFTA.

NFTA MASTER SEEDLIST

N NUMBER	SPECIES	COLLECTION SITE	COLLECTOR	INSTITUTE	PRIORITY LIST	PRESENT INVENTORY	DATE
00002	Acacia acuriculiformis	Thailand		Pak Chong Livestock Stat.	A	44 seeds	09/21/83
00273	Acacia altissima	Costa Rica	Noel Vietmeyer	NAS	C	50 seeds	7/9/84
00001	Acacia auriculiformis		Jake Halliday	NiftAl Project	A	depleted	09/21/83
00003	Acacia auriculiformis	Pathani Campus, Thailand	J.L.Brewbaker	U. of Hawaii	A	depleted	09/21/83
00004	Acacia auriculiformis	Java, Indonesia	Hu Ta-Wei	FRI	A	5 g	09/21/83
00005	Acacia auriculiformis	unknown	Hu Ta-Wei	FRI	A	depleted	09/21/83
00065	Acacia auriculiformis	Java, Indonesia	C. Hodges	IPIF	A		
00072	Acacia auriculiformis			Bioenergy Dev. Corp, Hilo	A	depleted	10/3/83
00077	Acacia auriculiformis	Chiang Mai, Thailand	D. Rerksem	Chiang Mai Univ.	A	290 g	10/3/83
00269	Acacia auriculiformis	Java, Indonesia	Hartono	Perum Perhutani	A	175 g	5/84
00274	Acacia berlandiana	Linares, Nuevo Leon, Mexico	J. Brewbaker	U of Hawaii	C	10 seeds	1/85
00006	Acacia mangium	Agana, Guam	Carlos Noguez	Agr. Dept.	A	depleted	09/21/83
00007	Acacia mangium	Cassowary, Qld.	C. Brewer	CSIRO	A	10 g	09/21/83
00050	Acacia mangium	Sandakan, Sabah, Malaysia	T.V. Ensebio	Forest Research Centre	A	2 g	10/03/83
00062	Acacia mangium	Daintree, N.Q. Australia		Aust.Trop. Plant Supplies	A	50 g	10/3/83
00201	Acacia mangium	Agana, Guam	William Null	Guam Dept. of Agriculture	A	3 g	10/3/83
00276	Acacia mangium	Mossman, N.Q., Australia	J. Doran	CSIRO	A		
00074	Acacia mearnsii	Nairobi, Kenya	Dr. S.O. Keya		A	190 g	10/3/83
00282	Acacia nilotica	Urulikanchan, Pune, India	Naryan Hedge	BAIF	A		
00209	Acacia pennata	Estanzuela, Veracruz, Mexico	Enrique Pardo Tejeda	INISRB	B	7 g	10/3/83
00033	Acrocarpus fraxinifolius	Malawi			B	8 seeds	09/21/83
00071	Acrocarpus fraxinifolius	F.R.I. Colleges, Dehradun, India		F.R.I. Dehradun	B	10 g	10/3/83
00203	Adenathera pavonina	Ponape			B	50 g	10/3/83
00208	Albizia adianthifolia	Nigeria			C	22 g	10/3/83
00014	Albizia caribea	Dorroughby, Australia	Paul Recter	Fruit Spirit Nursery	C	10 seeds	09/21/83
00008	Albizia falcataria	Fiji		Dept. Ag.	A	30 g	09/21/83
00009	Albizia falcataria	Dorroughby, Australia	Paul Recter	Fruit Spirit Nursery	A	3 g	09/21/83
00010	Albizia falcataria	Taitung, Taiwan	Hu Ta-Wei	FRI	A	17 seeds	09/21/83
00073	Albizia falcataria	Hilo, Hawaii, Usa		Bioenergy Corp.	A	50 g	10/3/83
00011	Albizia lebbek	Fiji		Dept. Ag.	A	15 seeds	09/21/83
00012	Albizia lebbek	Oahu, Hawaii	Rick Van den Beldt	U. of Hawaii	A	10 g	09/21/83
00061	Albizia lebbek	Lahaina, Maui	J.L. Brewbaker	University of Hawaii	A	depleted	10/3/83
00256	Albizia lebbekoides	Solsona, Ilocos Norte, Philippines	E. Cadewang	Hodam	C	100 g	3/84
00015	Albizia lopantha (?)	Dorroughby, Australia	Paul Recter	Fruit Spirit Nursery	C	11 g	09/21/83
00058	Albizia lucida	Dorroughby, Australia	Paul Recher	Fruit Spirit Nursery	C	10 seeds	10/03/83

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00037	Albizia moluccana	Sri Lanka	J. W. Bonner	USAID	C	75 g	10/03/83
00060	Albizia odoratissima	Dorroughby, Australia	Paul Recher	Fruit Spirit Nursery	C	15 seeds	10/03/83
00013	Albizia procera	Fiji		Dept. Ag.	B	26 g	09/21/83
00053	Albizia procera	Zambales, Philippines	Saturina Halos	FORI	B	130 g	10/03/83
00253	Albizia procera	FORI		Philippines	B	400 g	3/84
00254	Albizia procera	Solsona, Ilocos Norte, Philippines	E. Cadewang	Hodam	B	100 g	3/84
00255	Albizia procera	Solsona, Ilocos Norte, Philippines	E. Cadewang	Hodam	B	100 g	3/84
00261	Albizia procera	Abra, Philippines	Rick Van den Beldt	University of Hawaii	B	30 g	3/84
00261	Albizia procera	Abra, Philippines	Rick Van den Beldt	University of Hawaii	B	30 g	3/84
00059	Albizia richardiana	Dorroughby, Australia	Paul Recher	Fruit Spirit Nursery	C	3 seeds	10/03/83
00206	Alnus nepalensis			Silvicultural Trial Units	A	10 g	10/3/83
00270	Alnus nepalensis	Nepal	Tom Arens		A	25 g	5/84
00210	Alnus rubra		C.A. Harrigton	USFS	B	8 g	10/3/83
00251	Bauhinia blakeana	Oahu, Hawaii USA	Nancy Glover	Univ. of Hawaii		480 g	10/3/83
00202	Caesalpinia peltophoroides	Atibaia, Brazil		C.N.S.E.N.	C		
00043	Caesalpinia yucatanen	Bacalor, Q. Roo, Mexico	Javier Chavelas		C	32 g	10/03/83
00211	Cajanus cajan			ICRISAT	A	140 g	10/3/83
00212	Cajanus cajan			ICRISAT	A	125 g	10/3/83
00213	Cajanus cajan			ICRISAT	A	170 g	10/3/83
00066	Calliandra calothrysus	Java, Indonesia	C. Hodges	IPIF	A	74 g	10/3/83
00016	Calliandra calothyrsus	Java, Indonesia	Hu Ta-Wei	FRI	A	45 seeds	09/21/83
00017	Calliandra calothyrsus	Taiwan	Hu Ta-Wei	FRI	A	11 g	09/21/83
00051	Calliandra calothyrsus	Bogor, Indoniesia	R.G. Pillani	Benchmark Soils Project	A	23 g	10/03/83
00052	Calliandra calothyrsus	Java, Indonesia	Jake Halliday	NifTAL	A	13 g	10/03/83
00063	Calliandra calothyrsus	Java, Indonesia	Bambang Soegiarto	Perum Perhutani	A	80 g	11/22/83
00267	Calliandra calothyrsus	Comayagua, Hondurasa	Colin Hughes	CFI	A	1 kg	5/84
00268	Calliandra calothyrsus	Java, Indonesia	Hartono	Perum Perhutani	A	750 g	5/84
00070	Cassia biopsularis	Minas, Brazil	Franz Leher		C	5 g	10/3/83
00281	Cassia saimea	Urulikanchan, Pune, India	Naryan Hedge	BAIF	C		
00076	Cassia siame	Chiang Mai, Thailand	B. Rerkasem	Chian Mai Univ.	C	180 g	10/3/83
00049	Cassia siamea	Bangalore, India	V. Bhaskar	U. of Ag. Sc.	C	10 g	10/03/83
00283	Cassia sturtii	Beer-Sheva, Israel	Noel Vietmeyer	NAS	C	6 g	1/85
00081	Casuarina cunninghamiana	Gainsville, Florida	Don Rockwood	Univ. of Florida	D	10 g	10/3/83
00082	Casuarina cunninghamiana	Gainesville, Florida	Don Rockwood	Univ. of Florida	D	13 g	10/3/83
00083	Casuarina cunninghamiana	Gainesville, Florida	Don Rockwood	Univ. of Florida	D	10 g	10/3/83
00084	Casuarina cunninghamiana	Gainesville, Florida	Don Rockwood	Univ. of Florida	D	10 g	10/3/83
00087	Casuarina cunninghamiana	Gainesville, Florida	Don Rockwood	Univ. of Florida	D	17 g	10/3/83
00088	Casuarina cunninghamiana	Gainesville, Florida	Don Rockwood	Univ. of Florida	D	9 g	10/3/83
00089	Casuarina cunninghamiana	Gainesville, Florida	Don Rockwood	Univ. of Florida	D	14 g	10/3/83
00091	Casuarina cunninghamiana	Gainesville, Florida	Don Rockwood	Univ. of Florida	D	8 g	10/3/83

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00092	Casuarina cunninghamiana	Gainesville, Florida	Don Rockwood	Univ. of Florida	D	13 g	10/3/83
00093	Casuarina cunninghamiana	Gainesville, Florida	Don Rockwood	Univ. of Florida	D	10 g	10/3/83
00096	Casuarina equisetefolia	Canberra, Australia		CSIRO	D	10 g	10/3/83
00097	Casuarina equisetefolia var. incana	Canberra, Australia		CSIRO	D	5 g	10/3/83
00080	Casuarina equisetifolia	Gainesville, Florida	Don Rockwood	Univ. of Florida	D	15 g	10/3/83
00085	Casuarina equisetifolia	Gainesville, Florida	Don Rockwood	Univ. of Florida	D	7 g	10/3/83
00086	Casuarina equisetifolia	Gainesville, Florida	Don Rockwood	Univ. of Florida	D	20 g	10/3/83
00095	Casuarina equisetifolia	Gainesville, Florida	Don Rockwood	Univ. of Florida	D	5 g	10/3/83
00098	Casuarina equisetifolia	Gainesville, Florida		Univ. of Florida	D	20 g	10/3/83
00064	Casuarina equisitifolia	Waimalo, Oahu	D. Goo	USFS	D	depleted	10/3/83
00094	Casuarina glauca	Gainesville, Florida	Don Rockwood	Univ. of Florida	D	34 g	10/3/83
00090	Casusrina cunninghamiana	Gainesville, Florida	Don Rockwood	Univ. of Florida	D	10 g	10/3/83
00075	Casusrina equisitifolia	Romblon, Leyte, Zambales, Philip.	Saturnina Halos	FDRI	D	5 g	10/3/83
00205	Dalbergia sisso	Bara lapur, Nepal			A	35 g	10/3/83
00018	Dalbergia sissoo	Mardan, Pakistan		Forest Research Institute	A	16 g	09/21/83
00057	Dalbergia sissoo	Dorroughby, Australia	Paul Rector	Fruit Spirit Nursery	A	3 g	10/03/83
00271	Dalbergia sissoo	Nepal	Tom Arens		A	10 g	6/84
00041	Delonix regia	San Felipe, Bacalar, Mexico	Javier Chavelas		C	32 g	10/03/83
00277	Enterlobium cyclocarpum	Costa Rica	Ben Chang	CATIE	B		
00019	Enterolobium cyclocarpum	Taiwan	Ron Hurou	FRI	B	100 g	09/21/83
00020	Enterolobium cyclocarpum	Hunduras			B	819 g	09/21/83
00045	Enterolobium cyclocarpum	Bacalo, Q.Roo, Mexico	Javier Chavelas		B	65 g	10/03/83
00214	Erythrina crista-galli	St. John Bldg., UH, Oahu, Hawaii	Nancy Glover	Univ. of Hawaii		575 g	10/83
00021	Erythrina glauca (fusca)	Dorroughby, Australia	Paul Recter	Fruit Spirit Nursery	A	10 seeds	09/21/83
00047	Erythrina poeppigiana	Turrialba, Costa Rica	Ben Chang	CATIE	A	depleted	10/03/83
00223	GLiricidia sepium	Costa Rica	Elia Mora	CATIE	A	8 seeds	1/6/84
00260	Gliricidia ehrenbergii	Sierra Madre del Sur,Oaxaca,Mexico	Colin Hughes	CFI	C	100 seeds	3/84
00022	Gliricidia sepium	Phillipines	Mao Chanco	Evening Post	A	5 seeds	09/21/83
00048	Gliricidia sepium	Getambe,Peredeiya, Sri Lanka	P.A. Chadhokar	FAO	A	30 seeds	10/03/83
00054	Gliricidia sepium	Zambales, Philippines	Saturina Halos	FDRI	A	depleted	10/03/83
00079	Gliricidia sepium	Chiang Mai, Thailand	B. Rerkasem	Chiang Mai Univ.	A	80 g	10/3/83
00215	Gliricidia sepium	Kepong, Malaysia			A	depleted	3/84
00216	Gliricidia sepium	Bogor, Indonesia	Setiati Sastraprodja	Lembaga Biol. Nat'l	A	depleted	1/6/84
00217	Gliricidia sepium	Meseta de Estrada, Nicaragua	Colin Hughes	TFI Oxford	A	268 seeds	1/24/84
00218	Gliricidia sepium	Meseta de Estrada, Nicaragua	Colin Hughes	TFI Oxford	A	85 g	2/85
00219	Gliricidia sepium	Kepong, Selangor, Malaysia	Dr. S.K. Yap	Penyelidikan Perhutanan	A	50 seeds	1/6/84

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00220	Gliricidia sepium	Santiago, Costa Rica	Elia Mora	CATIE	A	6 seeds	1/6/84
00221	Gliricidia sepium	Costa Rica	Elia Mora	CATIE	A	9 seeds	1/6/84
00222	Gliricidia sepium	Esterillos, Costa Rica	Elia Mora	CATIE	A	9 seeds	1/6/84
00224	Gliricidia sepium	La Pacifica, Costa Rica	Elia Mora	CATIE	A	4 seeds	1/6/84
00225	Gliricidia sepium	Liberia, Costa Rica	Elia Mora	CATIE	A	8 seeds	1/6/83
00226	Gliricidia sepium	La Cruz, Costa Rica	Elia Mora	CATIE	A	6 seeds	1/6/84
00227	Gliricidia sepium	Liberia, Costa Rica	Elia Mora	CATIE	A	13 seeds	1/6/84
00229	Gliricidia sepium	Tamarindo, Costa Rica	Elia Mora	CATIE	A	depleted	1/6/84
00230	Gliricidia sepium	Leon, Nicaragua	Ben Chang	CATIE	A	400 g	1/6/84
00231	Gliricidia sepium	Caniaw, Ilocos Sur, Philippines	Ernesto C. Bumatay	Visayas	A	100 seeds	1/9/84
00232	Gliricidia sepium	Central Java, Indonesia	R. Soerjono	Perun Perhutani	A	100 seeds	1/9/84
00233	Gliricidia sepium	Leon, Nicaragua	Jochen Heuveldop	CATIE	A	865 g	3/84
00234	Gliricidia sepium	Veracruz, Mexico	Jorge Montano	INIREB	A	45 g	3/84
00235	Gliricidia sepium	Kepong, Selangor, Malaysia	Dr. S.K. Yap	Penyelidikan Perhutanan	A	depleted	6/84
00236	Gliricidia sepium	Basseterre, St. Kitts	Elizabeth Eiley	Peace Corps	A	65 g	5/84
00237	Gliricidia sepium	Nevis, St. Kitts	Robert Wicker	Peace Corps	A	80 g	5/84
00238	Gliricidia sepium	Jamaica	Stanley Clapp	Peace Corps	A	7 seeds	7/84
00239	Gliricidia sepium	Vado Hondo, Guatemala	Colin Hughes	CFI	A	360 g	6/84
00240	Gliricidia sepium	Los Gineos, Guatemala	Peter Wotowiec	Peace Corps	A	40 g	6/84
00241	Gliricidia sepium	Concepcion, Guatemala	Peter Wotowiec	Peace Corps	A	200 g	5/84
00242	Gliricidia sepium	Cumbre de Ingeniero, Guatemala	Peter Wotowiec	Peace Corps	A	40 g	5/84
00243	Gliricidia sepium	Monte Rico, Guatemala	Colin Hughes	CFI	A	370 g	5/84
00244	Gliricidia sepium	Oratorio, Guatemala	Peter Wotowiec	Peace Corps	A	118 g	5/84
00245	Gliricidia sepium	La Maquina, Guatemala	Peter Wotowiec	Peace Corps	A	118 g	5/84
00246	Gliricidia sepium	San Luis, Guatemala	Peter Wotowiec	Peace Corps	A	118 g	5/84
00247	Gliricidia sepium	Playa de Samala, Guatemala	Colin Hughes	CFI	A	370 g	5/84
00248	Gliricidia sepium	Gualan, Guatemala	Colin Hughes	CFI	A	368 g	5/84
00249	Gliricidia sepium	Volcan Suchitan, Guatemala	Colin Hughes	CFI	A	370 g	5/84
00250	Gliricidia sepium	La Gloria, Guatemala	Peter Wotowiec	Peace Corps	A	236 g	5/84
00400	Gliricidia sepium	Agua Blanca, Guatemala	Peter Wotowiec	Peace Corps	A	118 g	5/84
00401	Gliricidia sepium	Azulco, Guatemala	Peter Wotowiec	Peace Corps	A	80 g	5/84
00402	Gliricidia sepium	Meteare, Nicaragua	Colin Hughes	CFI	A	120 g	5/84
00403	Gliricidia sepium	Piedra Larga, Nicaragua	Colin Hughes	CFI	A	250 g	5/84
00404	Gliricidia sepium	Boaco, Nicaragua	Colin Hughes	CFI	A	250 g	5/84

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N NUMBER	SPECIES	COLLECTION SITE	COLLECTOR	INSTITUTE	PRIORITY LIST	PRESENT INVENTORY	DATE
00405	Gliricidia sepium	Guayabillas, Honduras	Colin Hughes	CFI	A	250 g	5/84
00406	Gliricidia sepium	Masaquara, Honduras	Colin Hughes	CFI	A	150 g	5/84
00407	Gliricidia sepium	Ibadan, Nigeria	James Sumberg	IITA	A	1 kg	5/84
00408	Gliricidia sepium	Bolinao, Philippines	James Brewbaker	University of Hawaii	A	70 g	6/84
00409	Gliricidia sepium	Concepcion, Panama	Phil Shannon	CATIE	A	depleted	6/84
00410	Gliricidia sepium	Playa Naranjo, Costa Rica	Ben Chang	CATIE	A	50 seeds	6/84
00411	Gliricidia sepium	Playa Tamarindo, Costa Rica	Ben Chang	CATIE	A	50 seeds	7/84
00412	Gliricidia sepium	India	C.K. Atal		A	300 seeds	7/84
00413	Gliricidia sepium	Matagalpa, Nicaragua	Langley		A	60 seeds	1/85
00414	Gliricidia sepium	Nueva Segovia, Nicaragua	Langley		A	60 seeds	1/85
00415	Gliricidia sepium	Esteli, Nicaragua	Langley		A	120 seeds	1/85
00416	Gliricidia sepium	Condega, Esteli, Nicaragua	Langley		A	60 seeds	1/85
00417	Gliricidia sepium	Totogalpa, Madriz, Nicaragua	Langley		A	60 seeds	1/85
00418	Gliricidia sepium	Ahuachapan, El Salvador	Langley		A	25 seed	1/85
00419	Gliricidia sepium	St. George East, Trinidad	John Leyer	Timmers & Leyer	A	200 seed	1/85
00420	Gliricidia sepium	Western Samoa	P.I. Thomas	Nu'u Crop Dev. Project	A	180 seed	1/85
00421	Gliricidia sepium	Ciudad Arce, El Slvador	Hugo Zambrana	CATIE	A	200 gr.	1/85
00422	Gliricidia sepium	Colombo, Sri Lanka	Rick Van den Beldt	U of Hawaii	A	25 seed	1/85
00423	Gliricidia sepium	Badoc, Ilocos Norte, Philippines	Bumatay	ViSCA	A	50 seeds	1/85
00424	Gliricidia sepium	Cabagan, Isabela, Philippines	Bumatay	ViSCA	A	50 seed	1/85
00425	Gliricidia sepium	Alitagtag, Botanga, Philippines	Bumatay	ViSCA	A	50 seed	1/85
00426	Gliricidia sepium	Payudpud, Ilocos Norte, Philippines	Bumatay	ViSCA	A	50 seeds	1/85
00427	Gliricidia sepium	Pantanbangen, Philippines	Bumatay	ViSCA	A	100 seeds	1/85
00428	Gliricidia sepium	Poral, Panpanga, Philippines	Bumatay	ViSCA	A	60 seeds	1/85
00429	Gliricidia sepium	Agno, Pangasinan, Philippines	Bumatay	ViSCA	A	50 seeds	1/85
00430	Gliricidia sepium	Los Banos, Laguna, Philippines	Bumatay	ViSCA	A	50 seeds	1/85
00431	Gliricidia sepium	Bangueo, Abra, Philippines	Bumatay	ViSCA	A	50 seeds	1/85
00432	Gliricidia sepium	San Sebastian, I.Sur, Philippines	Bumatay	ViSCA	A	50 seeds	1/85
00433	Gliricidia sepium	Pidigan, Abra, Philippines	Bumatay	ViSCA	A	50 seeds	1/85

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NFTA MASTER SEEDLIST

N NUMBER	SPECIES	COLLECTION SITE	COLLECTOR	INSTITUTE	PRIORITY LIST	PRESENT INVENTORY	DATE
00434	Gliricidia sepium	Pasuguin, I. Norte, Philippines	Bumatay	ViSCA	A	50 seeds	1/85
00435	Gliricidia sepium	Tayom, Abra, Philippines	Bumatay	ViSCA	A	40 seeds	1/85
00436	Gliricidia sepium	Pirili, Ilocos Norte, Philippines	Bumatay	ViSCA	A	50 seeds	1/85
00437	Gliricidia sepium	Nasig-ID, Zambo, Philippines	Bumatay	ViSCA	A	36 seeds	1/85
00438	Gliricidia sepium	San Rafael, Bulaca, Philippines	Bumatay	ViSCA	A	15 seeds	1/85
00228	Glricidia sepium	Tamarindo, Costa Rica	Elia Mora	CATIE	A	depleted	1/6/84
00044	Lonchocarpus rugosus	Bacalor, Q.Roo,Mexico	Javier Chavelas		C	15 g	10/03/83
00031	Lysiloma acapulcense (?)	Chiapas, Mexico	J.L. Brewbaker	U. of Hawaii	C	3 g	09/21/83
00040	Lysiloma bahamensis	Bacalar, Q. Roo, Mexico	Javier Chavelas		B	7 g	10/03/83
00032	Lysiloma sp.	Chiapas, Mexico	J.L. Brewbaker	U. of Hawaii		45 seeds	09/21/83
00099	Mimosa scabrela	Rio Negro, Brazil	John Earhart		A	80 g	10/3/83
00038	Mimosa scabrella	Canoinhas, Brazil	Djalma Chaves	Rigesa Forestal	A	15 g	10/13/83
00039	Mimosa scabrella	Curitiba,Parana, Brazil	Djalma Chaves	Rigesa Forestal	A	15 g	10/03/83
00278	Mimosa scabrella		Jose Campos	CATIE	A	1/85	55 g
00030	Parkia javanica	Trang Bot.Gdn.NE Songkla, Thailand	J.L. Brewbaker	U. of Hawaii	A	50 g	09/21/83
00068	Parkia javanica	San Teodoro, Philippines	H. Curran	US Peace Corps	A	50 g	10/3/83
00262	Parkinsonia aculeata			CNRF	A		
00263	Parkinsonia aculeata	Djibo, Haute-Volta		CTFT	A	100 g	4/84
00264	Parkinsonia aculeata	Soba-Khartoum, Sudan		Soba Arboretum	A	85 g	4/84
00272	Parkinsonia aculeata	Nicaragua	Colin Hughes	CFI	A	125 g	6/84
00056	Piliostigma malabaricum	Batangas, Philippines	Saturina Halos	FORI	C	130 g	10/03/83
00042	Piscidia comunis	Bacalor, Q. Roo, Mexico	Javier Chavelas		C	12 g	10/03/83
00055	Pithecellobium dulce	Nueva Ecija, Philippines	Saturnina Halos	FORI	A	75 g	10/03/83
00266	Pithecellobium dulce	La Paz, Honduras	Colin Hughes	CFI	A	1.5 kg	5/84
00275	Prosopis alba	Villa Dolores, Cordoba, Argentina	R. Ayerza	La Magdalena	A		
00024	Prosopis chilensis	Argentina	Peter Felker	U. of California	A	15 seeds	09/21/83
00035	Prosopis juliflora	Sri Lanka	J.W. Bonner	USAID	A	37 g	10/03/83
00200	Prosopis juliflora	Senegal	Peter Felker		A	30 seeds	10/3/83
00023	Prosopis pallida	Honolulu, Hawaii	Rick Van den Beldt	U. of Hawaii	A	57 seeds	09/21/83
00252	Prosopis pallida	Kahala park, Oahu, Hawaii USA	Carl Evans	University of Hawaii	A	225 seeds	1/27/84
00069	Pterocarpus indicus	Honolulu, Hawaii, USA	Rick Van Den Beldt	University of Hawaii	A	10 g	10/3/83
00025	Samanea saman	Honolulu, Hawaii	Rick Van den Beldt	U. of Hawaii	A	35 g	09/21/83

NFTA MASTER SEEDLIST

N NUMBER	SPECIES	COLLECTION SITE	COLLECTOR	INSTITUTE	PRIORITY LIST	PRESENT INVENTORY	DATE
00204	Samanea saman	Oahu, Hawaii USA	Rick Van den Beldt	University of Hawaii	A	180 g	10/3/83
00257	Samanea saman	Cabagan, Isabela, Philippines		FORI	A	287 g	3/84
00258	Samanea saman	San Juan, Abra, Philippines	Rick Van den Beldt	University of Hawaii	A	155 g	3/84
00279	Sapium sebiferum				C		
00026	Schizolobium parahyba	Brazil	Hu Ta-Wei	FRI	B	4 seeds	09/21/83
00078	Sesbania glandiflora	Chiang Mai, Thailand	B. Rerkasem	Chiang Mai Univ.	A	200 g	10/3/83
00027	Sesbania grandiflora	Honolulu, Hawaii	Rick Van den Beldt	U. of Hawaii	A	63 seeds	09/21/83
00028	Sesbania grandiflora	Honolulu, Hawaii	Rick Van den Beldt	U. of Hawaii	A	840 g	09/21/83
00036	Sesbania grandiflora	Sri Lanka	J.W. Bonner	USAID	A	depleted	10/01/83
0067	Sesbania grandiflora	Java, Indonesia			A	40 g	10/3/83
00207	Sesbania grandiflora	Nafanua, W. Samoa	William J. Cable	Univ. of South Pacific	A	45 g	10/3/83
00259	Sesbania grandiflora	Boni, Pangasinan, Philippines	Rick Van den Beldt	University of Hawaii	A	50 g	3/84
00265	Sesbania grandiflora	San Jose, Bani, Pangasinan, Phil.	Arudfo Cabrena	PANELCO	A	1.5 kg	5/84
00280	Sesbania grandiflora	Urulikanchan, Pune, India	Naryan Hegde	BAIF	A		
00046	Simarouba glauca	Bacalor, Q.Roo, Mexico	Javier Chavelas			35 g	10/03/83
00284	Tipuana tipa	Beer-Sheva, Israel	Noel Vietmeyer	NAS	C	15 g	1/85
00029	Tipuana tipu	S. Africa	Hu Ta-Wei	FRI	C	10 seeds	09/21/83
00034	Tipuana tipu	Durroughby, Australia	Paul Recter	Fruit Spirit Nursery	C	16 seeds	09/21/83

MacDicken, Kenneth G., and James L. Brewbaker. Nitrogen Fixing Tree Association, P.O.Box 680, Waimanalo, Hawaii

DESCRIPTIVE SUMMARIES OF ECONOMICALLY IMPORTANT NITROGEN FIXING TREES

The following summary has been compiled by NFTA from a wide variety of sources including research papers, general publications and unpublished experimental data. NFTA now maintains a computerized data base which contains descriptive, environmental and utilization information on nitrogen-fixing trees. The species included in this listing are those selected by the participants of the Bellagio Workshop, and published by NFTA in Resource Documents on Nitrogen-Fixing Trees (NFTA 82-03/12).

Unfortunately many of the data on these tree species are neither published nor readily available. NFTA seeks to help disseminate this information and would appreciate your review and editing of these lists.

The following lists summarize information in two formats: 1) environmental descriptions, and; 2) utilization information. The abbreviations used in these summaries are defined as follows:

GENERAL ECOLOGICAL ZONE

A = Arid tropics
HT = Humid tropics
SA = Semi-arid tropics
SH = Sub-humid tropics
T = Temperate zone
TH = Tropical highlands

PRODUCTS AND UTILIZATION

The rating system is 1-4, with:

1 = excellent
2 = good
3 = fair
4 = poor but useable

e.g. fuel(2) = species is a good quality fuelwood

The categories of use are:

WOOD USE: fuel, timber, pulp, poles
FORAGE: leaves, pods
OTHER: human, green manure, medicinal, gum, tannin, ornamental

"--" = information not presently available in NFTA data base

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DESCRIPTIVE INFORMATION FOR SELECTED NFT SPECIES

SPECIES	HEIGHT AT MATURITY	DBH AT MATURITY	TREE FORM	LEAF TYPE	CLIMATIC ZONE(S)	MINIMUM RAINFALL	DRY SEASON TOLERANCE	ELEVATION RANGE	TEMP. RANGE	SOIL REACTION	OTHER LIMITATIONS
Acacia albida Del.	20m	150cm	fair-poor	--	A	300mm	extended	--	--	--	--
Acacia auriculiformis A. Cunn. ex Benth.	15-25m	80cm	poor	alternate, simple flattened phyllodes	HT, SH,	1300mm	4-8 months	0-600m	20-30C	strongly acid - highly alkaline	low wind tolerance
Acacia confusa Merr.	14m	--	--	simply flattened phyllodes	HT, SH	750mm	--	--	--	acid soils	--
Acacia farnesiana (L.) Willd.	10m	--	--	--	A	--	--	--	--	wide adaptability	- -
Acacia mangium Willd.	30m	25cm	good	alternate, flattened phyllodes	HT, SH	1000mm	2-4 months	<800m	22-25C	moderately acid	--
Acacia mearnsii Willd.	25m	--	poor	alternate, bipinnately compound	TH	500mm	2-3 months	1500-2500m	12-18C	neutral to acid	moderately frost susceptible
Acacia nilotica (L.) Willd. ex Del.	20m	--	poor	alternate, bipinnately compound	A	--	extended	--	--	--	--
Acacia saligna (Labill.) H.Wendl.	8m	30cm	good	alternate, flattened phyllodes	HT, SH, A	300mm	--	0-300m	13-30C	acid to alkaline	--
Acacia senegal (L.) Willd.	13m	--	poor	alternate, bipinnately compound	A	200mm	extended	100-1700m	14-43C	--	--
Acacia tortilis (Forsk.) Hayne	15m	--	poor, often shrubby	bipinnately compound	A	100mm	extended	lowland	--	--	--
Albizia falcataria (L.) Fosberg	45m	200cm	fair-good	bipinnately compound	HT, SH	1000mm	0-2 months	0-1200m	20-34C	neutral to acid	--
Albizia lebbek (L.) Benth.	30m	100cm	fair-poor	bipinnately compound	A, SH	600mm	2-6 months	0-1600m	20-38C	neutral to acid	--

DESCRIPTIVE INFORMATION FOR SELECTED NFT SPECIES

SPECIES	HEIGHT AT MATURITY	DBH AT MATURITY	TREE FORM	LEAF TYPE	CLIMATIC ZONE(S)	MINIMUM RAINFALL	DRY SEASON TOLERANCE	ELEVATION RANGE	TEMP. RANGE	SOIL REACTION	OTHER LIMITATIONS
Alnus acuminata O. Kuntze	25m	—	good	alternate, ovate or elliptical	TH	1000mm	—	1200-3200m	4-27C	—	—
Alnus glutinosa (L.) Gaertn.	40m	—	—	—	T	500mm	—	—	—	—	—
Alnus nepalensis D. Don	30m	40cm	—	alternate, elliptical	TH, T	800mm	—	1000-3000m	—	—	—
Cajanus cajan (L.) Millsp.	3-5m	—	shrubby	spirally arranged, trifoliate	A, SH	400mm	—	—	—	—	sensitive to frost, waterloggin g
Calliandra calothyrsus Meisen.	10m	20cm	multiple stemmed	alternate, bipinnately compound	HT, SH	1000mm	—	0-1500m	—	—	—
Casuarina cunninghamiana Miq.	35m	—	—	scale leaves	TH, T	500mm	—	—	—	—	—
Casuarina equisetifolia L.	35m	18cm	excellent	scale leaves	HT, SH	750mm	3-4 months	0-1400m	10-35C	alkaline to neutral	—
Casuarina glauca Sieb. ex Spreng.	20m	60CM	excellent	scale leaves	A, SA, HT	—	—	—	—	—	—
Casuarina junghuhniana Miq.	30m	—	excellent	scale leaves	HT	—	—	—	—	—	—
Dalbergia sissoo Roxb.	30m	—	good-excelle nt	alternate, pinnately compound	A, SH	500mm	3-4 months	0-1000m	—	—	—
Erythrina bertoeroana Urban	10m	—	—	—	HT	—	—	to 2000m	—	—	—
Erythrina fusca Lour.	30m	—	fair	—	HT	—	—	to 1500m	—	—	—
Erythrina poeppigiana (Walpers) O.F. Cook	40m	—	—	—	A	+	—	—	—	—	—
Gliricidia sepium (Jacq.) Steud.	10m	30cm	fair-poor	alternate, pinnately compound	HT, SH	1000mm	4-6 months	0-1600m	22-30C	—	—

DESCRIPTIVE INFORMATION FOR SELECTED NFT SPECIES

SPECIES	HEIGHT AT MATURITY	DBH AT MATURITY	TREE FORM	LEAF TYPE	CLIMATIC ZONE(S)	MINIMUM RAINFALL	DRY SEASON TOLERANCE	ELEVATION RANGE	TEMP. RANGE	SOIL REACTION	OTHER LIMITATIONS
Inga vera (L.) Britton	20m	100cm	—	alternate, pinnately compound	HT, TH	1000mm	—	lowlands	—	—	—
Intsia bijuga (Colebr.) O. Kuntze	40m	150cm	fair-good	—	HT	2000mm	—	—	—	—	—
Leucaena diversifolia (Schlecht.) Benth.	20m	20 cm	excellent compound	alternate, bipinnately	HT, SH	500mm	4-8 months	0-1500m	18-30C	moderately acid to alkaline	unknown
Leucaena leucocephala (Lam.) De Wit	20m	50cm	fair	alternate, bipinnately compound	HT, SH	600mm	4-8 months	0-1000m	20-30C	moderately acid - mod. alkaline	strongly acid soils, waterloggin g
Mimosa scabrella Benth.	12m	40cm	—	bipinnately compound	TH	—	—	to 2400m	—	—	—
Parkia javanica (Lam.) Merrill	40m	—	—	—	HT	—	—	0-700m	—	—	—
Parkia speciosa Hassk.	15m	—	—	—	HT	—	—	to 1500m	—	—	—
Parkinsonia aculeata L.	20m	40cm	poor	alternate, bipinnately compound	A	200mm	6-8 months	0-1300m	—	—	intolerant of waterlogged soils
Pithecellobium dulce (Roxb.) Benth.	20m	100cm	poor	alternate, bipinnately compound	A, SA	450mm	6-8 months	0-1[illegible]00m	20-30C	no limitations reported	windthrow danger,
Pongamia pinnata (L.) Pierre	8m	—	—	—	A	500mm	—	0-1200m	—	—	—
Prosopis alba/chilensis "complex"	15m	—	fair-poor	—	A	200mm	8-11 months	to 2900m	—	—	intolerant of moderate (<-5C) frost
Prosopis cineraria (L.) Druce	9m	—	fair-poor	—	A	100mm	8-11 months	lowlands	—	neutral to highly alkaline	—

DESCRIPTIVE INFORMATION FOR SELECTED NFT SPECIES

SPECIES	HEIGHT AT MATURITY	DBH AT MATURITY	TREE FORM	LEAF TYPE	CLIMATIC ZONE(S)	MINIMUM RAINFALL	DRY SEASON TOLERANCE	ELEVATION RANGE	TEMP. RANGE	SOIL REACTION	OTHER LIMITATIONS
Prosopis pallida/juliflora "complex"	15m	--	fair-poor	--	A	200mm	--	0-1500m	--	--	--
Prosopis tamarugo F. Phil.	15m	80cm	--	--	A	<100mm	10-12 months	1000-1500m	--	--	--
Pterocarpus indicus Willd.	40m	200cm	good	pinnately compound	HT	--	--	--	--	--	--
Robinia pseudoacacia L.	30m	90cm	good	pinnate, compound	T	1500mm	--	1000m	0-100C	strongly acid - slightly alkaline	--
Samanea saman (Jacq.) Merrill	40m	200cm	fair-poor	--	HT, SH	600mm	2-4 months	0-700m	18-30C	neutral to acid	--
Sesbania grandiflora (L.) Poir.	10m	30cm	good	alternate, even, pinnate	HT	1000mm	2-3 months	800m	20-30C	limits not reported	susceptible to wind damage

PRODUCT AND UTILIZATION INFORMATION FOR SELECTED NFT SPECIES

SPECIES	WOOD PRODUCTS	FORAGE PRODUCTS	OTHER PRODUCTS	SPECIFIC GRAVITY	HEATING VALUE (kcal/kg)	WOOD VOLUME (m3/ha/yr)	TREE FORM	SEEDS PER KILO
Acacia albida Del.	timber(2):	pods(2): leaves(2):	shade: ornamental	--	--	--	fair-poor	--
Acacia auriculiformis A. Cunn. ex Benth.	timber(3): poles(1): pulp(2)	none:	tannin(2): ornamental(2):	.80-.75	4800-4900	5-20	poor	60-63,000
Acacia confusa Merr.	fuel(?):	--	ornamental(2):	--	--	--	--	--
Acacia farnesiana (L.) Willd.	fuel(?):	--	ornamental(?):	--	--	--	--	10-12000
Acacia mangium Willd.	timber(2): fuel(2):	--	--	.40-.60	4800-4900	10-40	good	60-11000
Acacia mearnsii Willd.	fuel(2): pulp(2):	--	green manure(2): tannin(1):	.70-.85	4600	18-25	poor	74-88,000
Acacia nilotica (L.) Willd. ex Del.	fuel(1): timber(1):	leaves(1): pods(1):	tannin(1): gum(1)	.67-.68	4800-4950	--	poor	--
Acacia saligna (Labill.) H.Wendl.	fuel(3):	leaves(2)	gum(2):	--	--	1-10	good	--
Acacia senegal (L.) Willd.	poles(?): fuel(1):	leaves(2): pods(2)	gum(1): human(2):	--	--	1-5	poor	--
Acacia tortilis (Forsk.) Hayne	pulp(?): posts(?)	pods(1): leaves(2)	--	--	4400	--	poor, often shrubby	--
Albizia falcataria (L.) Fosberg	pulp(2): fuel(3):	--	--	.33	--	20-50	fair-good	42-44000
Albizia lebbek (L.) Benth.	fuel(2): timber(2):	leaves(1):	gum(?):	.55-.60	5200	18-28	fair-poor	7-9,000
Alnus acuminata O. Kuntze	fuel(1): timber(1): pulp(2):	--	--	.50-.60	--	10-15	good	--
Alnus glutinosa (L.) Geertn.	fuel(?):	--	--	0.52	--	--	--	556-1,409,000

PRODUCT AND UTILIZATION INFORMATION FOR SELECTED NFT SPECIES

SPECIES	WOOD PRODUCTS	FORAGE PRODUCTS	OTHER PRODUCTS	SPECIFIC GRAVITY	HEATING VALUE (kcal/kg)	WOOD VOLUME (m3/ha/yr)	TREE FORM	SEEDS PER KILO
Alnus nepalensis D. Don	fuel(2): timber(3):	—	—	.32-.37	—	—	—	—
Cajanus cajan (L.) Millsp.	fuel(2)	pods(1): leaves(1):	human(1): green manure(2)	—	—	—	shrubby	7-9,000
Calliandra calothyrsus Meissn.	fuel(1):	leaves(2):	green manure(2):	.51-.78	4500-4750	5-20	multiple stemmed	19,000
Casuarina cunninghamiana Miq.	fuel(?)	—	windbreak	.70	—	—	—	1,514-1,654,000
Casuarina equisetifolia L.	fuel(1): timber(1): pulp(2): poles(1)	—	tannin(2): windbreak(1)	.80-1.2	4950	6-18	excellent	861-833,000
Casuarina glauca Sieb. ex Spreng.	fuel(?): poles(1):	—	windbreaks(1):	.98	—	—	excellent	773-981,000
Casuarina junghuhniana Miq.	fuel(1): poles(1):	—	—	—	—	—	excellent	—
Dalbergia sissoo Roxb.	timber(1): fuel(?):	—	shade	.68-.80	—	—	good-excellent	—
Erythrina bertoeroana Urban	—	leaves(?)	windbreaks(?)	—	—	—	—	—
Erythrina fusca Lour.	—	—	shade(?): green manure(?):	—	—	—	fair	—
Erythrina poeppigiana (Walpers) O.F. Cook	pulp(?):	leaves(?):	shade(?): ornamental(?):	—	—	—	—	—
Gliricidia sepium (Jacq.) Steud.	fuel(1): timber(1):	leaves(2)	shade(1): ornamental: green manure(1)	—	4900	to 8	fair-poor	5,000

PRODUCT AND UTILIZATION INFORMATION FOR SELECTED NFT SPECIES

SPECIES	WOOD PRODUCTS	FORAGE PRODUCTS	OTHER PRODUCTS	SPECIFIC GRAVITY	HEATING VALUE (kcal/kg)	WOOD VOLUME (m3/ha/yr)	TREE FORM	SEEDS PER KILO
Inga vera (L.) Britton	fuel(1): timber(2):	--	shade(1): bee fodder(2): human(2)	.57-.59	--	--	--	--
Intsia bijuga (Colebr.) O. Kuntze	timber(1):	--	--	0.65	--	--	fair-good	--
Leucaena diversifolia (Schlecht.) Benth.	poles (4): timber (3): fuel (2):	unknown	green manure (2):	.40-.50	4500-4600	20-40	excellent	40-60,000
Leucaena leucocephala (Lam.) De Wit	fuel(1): pulp(2): poles(2):	leaves(1): 20-27% N in leaves:	human(2): green manure(1): nurse(1)	.45-.55	4600	10-55	fair	18-20,000
Mimosa scabrella Benth.	fuel(?): pulp(2):	--	green manure(1):	--	--	--	--	--
Parkia javanica (Lam.) Merrill	timber(?):	--	ornamental(?): medicinal(?):	--	--	--	--	1,000-1,200
Parkia speciosa Hassk.	--	--	human(?):	--	--	--	--	--
Parkinsonia aculeata L.	fuel(2):	pods(2): leaves(2):	ornamental(?):	0.60	--	--	poor	--
Pithecellobium dulce (Roxb.) Benth.	Fuel (2): Poles (2): Construction (2):	pods (2): leaves (2):	human (2): tannin (2): shade (2)	--	5200-5800	--	poor	5,500-8,800
Pongamia pinnata (L.) Pierre	fuel(2): timber(2):	leaves(1):	oil(1):	--	4600	--	--	--
Prosopis alba/chilensis "complex"	fuel(1): timber(2):	pods(1):	human(1): ornamental(?):	.80-.92	--	--	fair-poor	--
Prosopis cineraria (L.) Druce	fuel(1): timber(2):	leaves(2): browse(1):	green manure	--	--	3	fair-poor	--

PRODUCT AND UTILIZATION INFORMATION FOR SELECTED NFT SPECIES

SPECIES	WOOD PRODUCTS	FORAGE PRODUCTS	OTHER PRODUCTS	SPECIFIC GRAVITY	HEATING VALUE (kcal/kg)	WOOD VOLUME (m3/ha/yr)	TREE FORM	SEEDS PER KILO
Prosopis pallida/juliflora "complex"	fuel(1): timber(2):	pods(1):	bee pasture(1): human(2):	.70-.80	--	5	fair-poor	--
Prosopis tamarugo F. Phil.	fuel(1): timber(3):	leaves(2): pods(2):	--	--	--	--	--	--
Pterocarpus indicus Willd.	timber(1):	--	ornamental(2):	--	--	--	good	1,200-1,300
Robinia pseudoacacia L.	fuel(2):	--	nurse(?):	--	--	to 20	good	35-77,000
Samanea saman (Jacq.) Merrill	timber(1): roundwood(2):	pods(1):	shade(1):	.42-.80	--	--	fair-poor	4,400-7,700
Sesbania grandiflora (L.) Poir.	Pulp (3): gum (2): tannin (3):fuel(3)	leaves (1): pods (2):	human (1): ornamental (2):	0.42	--	5-25	good	21,000