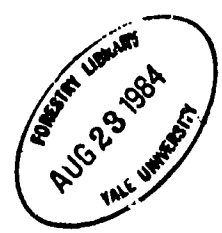
FOREST GENETIC RESOURCES

information -· No. 12



FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

FOREST GENETIC RESOURCES

INFORMATION - No. 12

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Rome, 1983

CONTENTS

NOTE FROM THE EDITOR

In Forest Genetic Resources Information No. 10 (1981), a questionnaire was included with the main purpose of monitoring the support from our readers, and with the additional objective of up-dating our ever-expanding mailing list. The response to the questionnaire is encouraging, and will help us justify the continued publication of FGRI.

If you have not yet returned the questionnaire, we would urge you to do so or, alternatively, to drop us a line stating your interest and giving us your exact mailing address.

The official distribution list of FGRI presently includes some 1,900 addressees in 145 countries throughout the world, distributed by regions as follows:

Region	Number of addressees
Europe	590
North America	406
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Near East	27
Asia	278
Australia-Pacific	63
TOTAL:	1,915.

Regarding the present issue of FGRI, you will note that it includes - in addition to the usual technical articles, notes and information - an index covering the first ten years of publication, 1972 - 1982 (numbers 1 - 11). The index is divided into : (A) Subjects (sub-divided into 11 sub-headings); (B) Authors; and (C) Species. We hope that you will find the index useful.

Many back-numbers are out of print; before writing to us asking for specific issues which contain articles or notes of special interest to you, please check with your local forestry library or with collegues if they have them on their shelves for copying.

We are always welcoming your suggestions on how to improve FGRI in the future; short notes of general interest and manuscripts of up to some 3,000 words are also very welcome.

We would especially appreciate information on activities, problems and research findings from the ninety-nine developing countries to which FGRI is distributed:

Please write to us !

All correspondence to FGRI should be directed to the following address:

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SEED COLLECTIONS OF TROPICAL ACACIAS IN INDONESIA, PAPUA NEW GUINEA AND AUSTRALIA

by

J.W. Turnbull [1/], D.J. Skelton [2/], M. Subagyono [3/], and Eko Bhakti Hardiyanto [4/]

SUMMARY

In 1982 FAO-supported seed collections of tropical Acacia species were made in Indonesia, Papua New Guinea and Australia by national forestry authorities. Seeds were collected from A. auriculiformis, A. aulacocarpa, A. cincinnata, A. crassicarpa, A. leptocarpa, A. mangium, A. polystachya and A. simsii. Information on geographical occurrence, ecology, phenology of flowering and fruiting, and utilisation of the species was assembled. The seeds are now available for testing internationally in species and provenance trials.

INTRODUCTION

The best known of the tropical lowland acacias from Australasia is Acacia auriculiformis which has been planted widely for fuelwood, erosion control and aesthetic purposes (NAS 1979). Recent experience in Sabah, Malaysia, has highlighted the potential of A. mangium for planting in areas dominated by the grass Imperata cylindrica (Tham 1979; NAS 1983). These acacias have not yet been tested thoroughly in provenance trials and other acacias from the same geographic areas have still to be included in species introduction trials.

In 1982 FAO's Forestry Department supported exploration of the gene resources of acacias in northern Australia, Indonesia and Papua New Guinea in cooperation with national forestry institutes with the objective of procuring seed of potentially useful species for use internationally in species introduction and provenance trials. This report summarises geographical and ecological information obtained during field exploration, describes seed collection and lists the seed available for distribution.

SPECIES' DISTRIBUTION, ECOLOGY AND UTILISATION

The following digests of information are confined to those species for which seed collections were made in 1982.

A. auriculiformis

A tree 25-35 m tall on favourable sites in tropical woodlands but smaller elsewhere. The main stem is of variable form, sometimes straight and dominant for a greater part of

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tree height or crooked and heavily branched. Tall, straight trees have been located in Papua New Guinea. The natural distribution extends through Australia, Papua New Guinea and Indonesia. In Australia it is found on Cape York Peninsula, Queensland, mainly on river systems flowing westwards, and in the north of the Northern Territory. It is found in many areas of western and southern Papua New Guinea and extends into Irian Jaya and the Kai Islands of Indonesia. The altitudinal range is from near sea level to 500 m.

The climate is mainly hot and humid to subhumid (Thornthwaite's classification). The mean annual rainfall is 1000-2000 mm with a distinct winter dry season of 4-5 months. A. auriculiformis occurs on a variety of soil types, including heavy clays, tolerates seasonally-waterlogged soils and can grow on both acidic and alkaline sites.

A. auriculiformis is grown in the tropical lowlands of a number of countries including India, Indonesia, Malaysia, Papua New Guinea and Tanzania. It grows well in beach and sea-front plantings, and is used to control erosion. It is planted for shade, shelter and ornamental purposes and is especially suitable for infertile sites. This acacia can be planted on degraded Imperata grasslands but benefits from adequate cultivation in the early years of establishment. The wood is used mainly for fuel, including charcoal, but is suitable for heavy construction and furniture. High pulp yields have been obtained from young plantation-grown wood and the bark contains tannins that could be used in leather cureing. Choice of the right provenance, based on systematic trials and breeding, should substantially improve the performance and value of this species (see also p. 8).

A. aulacocarpa

This acacia can grow rapidly into a large tree 35 m tall and with a diameter up to 1 m but in parts of its range it is reduced to a bushy shrub 4-5 m in height. The natural distribution is very extensive with a latitudinal range from 6°-30°S. In Australia it is found from northern New South Wales along the entire east coast of Queensland, and extends from the western part of the Gulf of Carpentaria, through the Northern Territory into northern Western Australia. It is widespread in Western Province of Papua New Guinea and extends into Irian Jaya in Indonesia. The altitudinal range is from near sea level to 1000 m.

A. aulacocarpa grows mainly in tropical humid and subhumid climatic zones but is also found in subtropical areas in Australia. The rainfall has a well-developed monsoonal pattern in the north and a uniform distribution in the south. Annual rainfall is usually in the range 900-1500 mm. Light frosts may occur at the higher altitudes and in southern localities. It occurs on a wide variety of soil types including deep infertile sands. It is commonly found along streams and rainforest edges but extends into open eucalypt forests.

This species has not been utilised extensively as an exotic, but it has the potential to grow well on a range of infertile sites in both tropical highlands and lowlands. It is considered a useful timber species in Queensland and Papua New Guinea. As an exotic it could be grown for fuel, timber, pulp or as an ornamental species. In view of its potential use in the tropics on poor soils it deserves extensive exploration, seed collection and provenance testing (see also p. 9).

A. cincinnata

A. cincinnata is confined to the east coast of Queensland in two main areas, in the north between 16-18°S and in the south between 25-28°S. The altitudinal range of northern occurrences is usually 150-750 m and in the south it is below 150 m. In the moister parts of northern Queensland this tall, straight, slender tree grows up to 25 m in height and 40 cm in diameter. In other localities it occurs as a small tree or large shrub up to 9 m in height.

The climate in the north of its range is hot humid or hot subhumid with a mean annual rainfall from 2000-3500 mm with a well-defined summer maximum. In the south the climate is warm humid or subhumid with an annual rainfall of 1100-1500 mm evenly distributed through the year. Light frosts may occur in both localities. A. cincinnata is found on acidic leached sands or loams. In northern areas it grows on the margins of rainforests but in the south it is mainly associated with eucalypts in open-forest.

This species has not been tested outside Australia. It may be a useful species for agroforestry purposes, casting a light shade but producing wood suitable for posts and poles. It is reported to make good fuelwood when dry.

A. crassicarpa

A small to medium tree, 5-20 m tall, but occasionally reaching 30 m. The stem is frequently straight. In open situations it is strongly branched and casts a moderate shade. This acacia occurs along the northeast coast and hinterland of Queensland. It is found north of 20°S and extending to the tip of Cape York Peninsula close to the sea and on offshore islands. A. crassicarpa is widespread in Western Province of Papua New Guinea and almost certainly occurs across the border in Irian Jaya, Indonesia. Its principal occurrence is below 200 m but it has been recorded to about 700 m.

Most occurrences are in the hot humid climatic zone with limited areas in the hot wet and warm humid zones. Most localities are frost free. The mean annual rainfall has a wide range, from 1000-3500 mm, with a monsoonal or well-developed summer maximum pattern. It tolerates a variety of sites and soil types. In Queensland it is often found on sandy soils but it will grow on clays and soils with impeded drainage. Its occurrence close to the sea suggests that it may tolerate a degree of salt in the soil. A. crassicarpa is found mainly in open eucalypt woodland or open savanna dominated by acacias (see also p. 8).

In Papua New Guinea the wood has been used for heavy construction, furniture, cabinet making, boat building and panelling. It is used for native building posts, and despite its Lyctus borer susceptibility it has a reputation for durability. It could be a useful species for fuelwood and planting in coastal areas.

A. leptocarpa

A shrub or small tree, usually less than 15 m tall with a short main stem and many large ascending branches. It has a wide natural distribution between latitudes 8-26°S in Papua New Guinea and Australia. It occurs in a relatively narrow coastal belt from southeast Queensland northwards on the eastern side of Cape York Peninsula and into southern areas of Papua New Guinea. There are also occurrences across northern Australia in northwest Queensland, the north of the Northern Territory and the Kimberly area of Western Australia. It is mainly found below 100 m but can extend to about 500 m. The climate is mainly hot humid but is subhumid in southern Queensland. Mean annual rainfall is in the range 750-1750 mm with a well-defined summer maximum. A. leptocarpa commonly occurs on the flats and gentle slopes of the coastal lowlands on a wide variety of soils including sands and sandy loams, shallow laterites and heavy clays with impeded drainage. It is usually found in savanna woodland, grasslands and fringing monsoon forest.

In Queensland the wood is reported to be dark brown, closegrained, hard, decorative and useful in turnery and cabinet work. It does not appear to have been tested as an exotic although the variety of sites on which it grows suggests it could be an adaptable species that could provide small timber or fuelwood.

A. mangium

A large tree, to 25-30 m tall, with a straight bole which may be over half of the total height. The natural distribution extends from northeastern Australia through southern Papua New Guinea and into Irian Jaya and Maluku provinces of Indonesia. The latitudinal range is from c. 1°S in Irian Jaya to 18°S in Australia. It usually occurs at altitudes below 300 m.

The distribution is along the boundary of the tropical warm and hot climatic zones, and either humid or wet. Mean annual rainfall is between 1500-3000 mm with a monsoon or strongly developed summer maximum pattern. A. mangium occurs on a wide range of soil types derived from acidic parent materials. The soils may have impeded drainage and be of low fertility. This acacia is found on the fringes of rainforest and in open forest and woodland (see also pp. 5-8).

Most experience with A. mangium as an exotic is in Sabah, Malaysia, where most planting has been in abandoned shifting cultivation areas colonized by the grass Imperata cylindrica. This acacia has proved to be a successful competitor in the grasslands and has grown well. The timber can be sawn easily, planed to a smooth surface and polished. It appears to be suitable for general construction purposes, furniture, veneer and particle board. Tests indicate that the wood can be pulped readily and its papermaking qualities are promising.

A. oraria

A small tree usually 6-10 m tall with a well-defined main stem,but a branchy shrub of 3-5 m in some situations. In Australia A. oraria occurs on the northeast coast of Queensland with the principal occurrence from Bowen to Princess Charlotte Bay (14-20°S). It is found in the Thursday Island group in Torres Strait, and in Indonesia on the islands of Timor and Flores. It is not recorded from Papua New Guinea. In Australia this acacia is at low altitudes, usually between sea level and 50 m, but in Indonesia it is recorded up to 1000 m.

The distribution is mainly in warm and hot humid climatic zones. Most areas are frost-free. The mean annual rainfall is about 1700-2200 mm with a strong monsoonal pattern in the north and a pronounced summer maximum farther south. Many occurrences of A. oraria are at the edge of beaches, sometimes on the frontal dune and often within a few metres of the highwater mark. In some of the drier parts of its range it occurs in the channels of seasonally dry watercourses. It has also been recorded from steep rocky slopes. The soils are mainly deep sands but may be shallow sands over clay or sandy skeletal. The broad vegetation types range from woodland and shrubland, especially near beaches, to layered woodland and the margins of rainforest.

The small dimensions of the stem of this species restricts its range of uses. The wood is not used in Australia but where it is native in Indonesia it is reported to be favoured by villagers for house posts. In Indonesia it has been planted for fuel and ornamental purposes. It has been little tried as an exotic but has potential for planting in exposed coastal sites or on salt-affected areas for shade, shelter, small posts and fuelwood.

A. polystachya

This species varies from a bushy shrub 3-4 m in height in open situations near the coast to a tall, relatively small-crowned tree up to 25 m in rainforest. It is one of the few species of Acacia found in rainforest. A. polystachya occurs on the north east coast of Queensland where it extends from Cape York to the Cairns area, mainly on lowlands near

the sea. It has also been recorded on the Palm Islands southeast of Cairns and as far north as Moa Island in Torres Strait. The main distribution is from 11-17°S. It is usually found from sea level to 250 m but it occurs at 520 m on the Atherton Tableland. It has not been recorded in the Northern Territory of Australia or in Papua New Guinea.

The distribution is mainly in the hot humid climatic zone but it can occur in the hot subhumid zone. Mean annual rainfall is in the range 1100-2200 mm with a monsoonal pattern. Frosts are rare or absent throughout its range. It has been recorded growing on acidic soils derived from granite, quartzite and sandstone. The soils are often deep sands but vary from skeletal to relatively fertile alluvials. Although it occurs in rainforest A. polystachya is more commonly found in open forest and in dune woodlands on stabilised sand dunes close to sea.

A. polystachya has not been tested as an exotic. It is related to A. auriculiformis and is difficult to distinguish from this species unless fruits are available. Its utilisation is likely to be similar to A. auriculiformis.

A. simsii

A woody multistemmed shrub 3-4 m, rarely 6 m, tall growing in open woodland and frequently forming thickets where the ground has been disturbed by cultivation or road-building. A. confusa of Taiwan and the Philippines is a closely-related, but taller, species than A. simsii (Pedley 1975). It has a wide natural distribution in northern areas of Queensland and the Northern Territory, in southern Papua New Guinea and in Irian Jaya. The altitudinal range is from near sea-level to c. 800 m. It occurs mainly in the hot humid zone with a mean annual rainfall of 1000-2000 mm with a pronounced summer maximum. The small dimensions of the stem will restrict the range of use of this species but it could be planted for erosion control and low windbreaks or harvested for small-sized fuelwood.

SEED COLLECTION OF ACACIA MANGIUM IN INDONESIA

Seed collections of A. mangium for international provenance trials were made in Australia and Papua New Guinea in 1980 (Doran and Skelton 1982) and the 1982 collection in Indonesia aimed to complete the range-wide sampling (Map 1, p.7).

Geographical occurrence and ecology. Information about A. mangium in Indonesia is fragmentary but the natural stands appear to be confined to the eastern provinces of Maluku and Irian Jaya.

Maluku. This province is comprised of about 1000 islands of which only Ceram and Halmahera are of significant size. A. mangium is known to occur in three main areas: the Sula Inslands (1°52'S; 125°22'E), Ceram (c. 3°S; 129°E) and the Aru Islands (c. 6°S; 134°30'E). The Sula Islands are the western limit of the species' distribution and herbarium specimens confirm the occurrence below 50 m on the islands of Taliabu and Sanana. In the Aru Islands it is found on Trangan Is. and is also reported to occur on Wamar Is. and Baun Is. (Pantas Hutapea* pers. comm.). It is difficult to reach the Sula and Aru island sites and the most accessible occurrences are on the southwest coast of Ceram.

Ceram is a large mountainous island about 350 km long and 40-70 km wide which is inadequately explored botanically. A herbarium specimen confirmed A. mangium at Waesalan village near Kairatu and a small population has been found near Piru (Suratmo et.al. 1980). These localities were further explored in 1982 and seed collections made at Piru.

* Forest Administration Central Maluku, Forest Office, Ambon, Maluku.

Remnants of a larger occurrence of A. mangium grow in the hills behind Waesalan about 4 km south of Kairatu up to an altitude of at least 200 m. Another population is located 5 km northwest of Kairatu and extends for c. 5 km on the coastal plain and low hills at an altitude of 20-100 m to near Kawatu. Most trees are less than 20 m tall and 40 cm diameter. The sites are disturbed by cultivation and frequent fires. Trees 4-5 cm tall with a diameter over 10 cm survive the fires and re-sprout even when completely defoliated.

Piru lies west of Kairatu on the south coast of Ceram. Small stands of A. mangium occur at Pasaulun, Hutan Kepala Tihu, Luanua Hutan and Way Huang at altitudes 20-300 m, and are accessible from the road from Piru to Pasa and Pelita Jaya. The trees are up to 20 m tall and many are straight with no fluting.

In Ceram A. mangium typically occupies a very narrow zone between primary rainforest and open Melaleuca forest. It regenerates naturally where there is disturbance by fire or cultivation and young trees are seen frequently in areas covered by Imperata grass or as emergents from former clearings in the rainforest. The soils are acid, pale clay or clay loams, sometimes gravelly, derived from metamorphic schists and shales. The wood is used locally on a limited scale for house and boat-building timbers and domestic fuel.

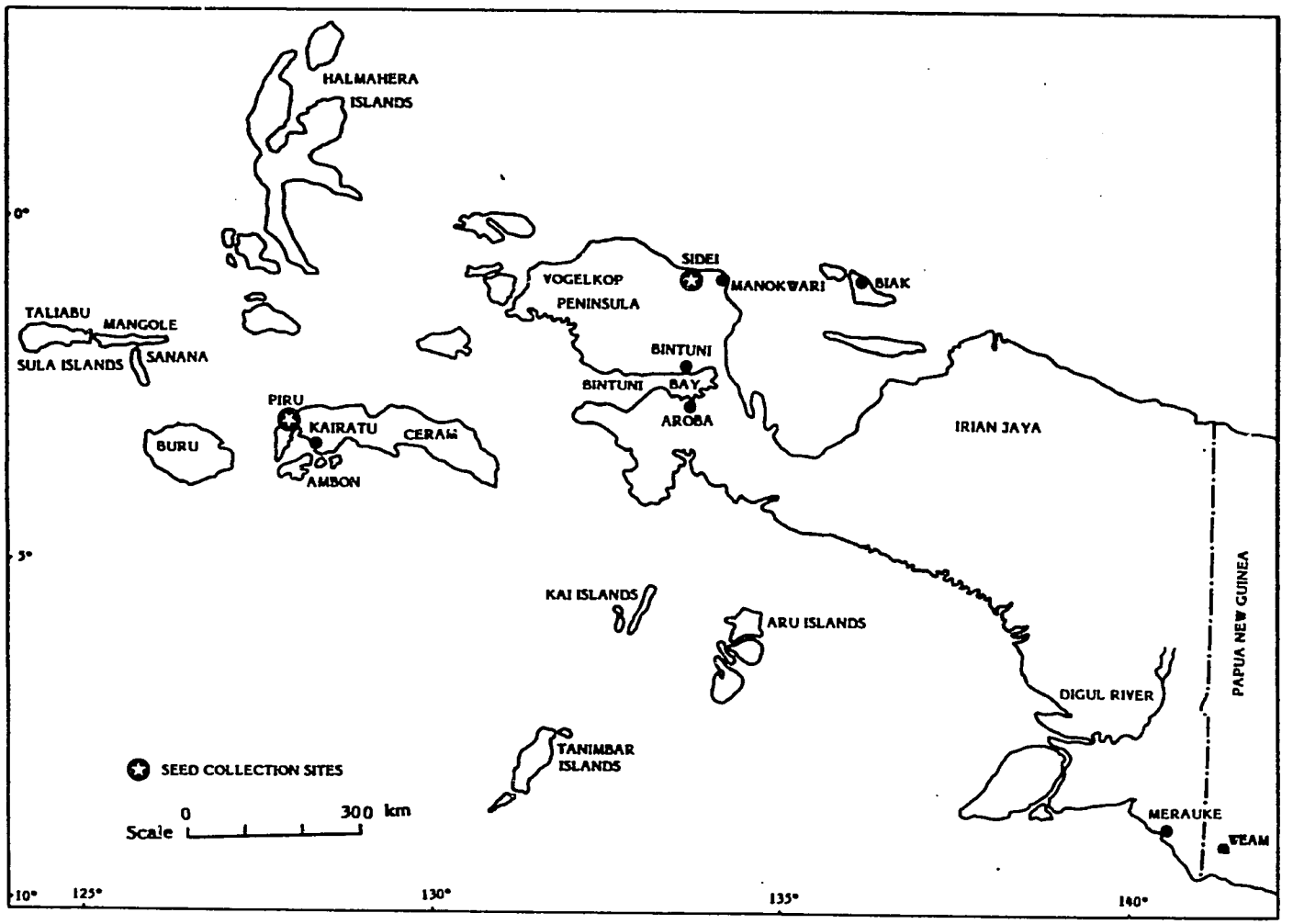
Irian Jaya. The distribution of A. mangium is poorly mapped in Irian Jaya but it is known to grow on Vogelkop Peninsula ($1-5^{o}$ S, $131^{o}-134^{o}$ E) and in the southern lowlands adjacent to Papua New Guinea.

On Vogelkop Peninsula A. mangium is known from herbarium collections to occur around Bintuni Bay, on Jop Island in Cenderawasih Bay and near Sidei to the west of Manokwari on the north coast. At Sidei the small, pure, open stand covers about 15 ha as an enclave in primary rainforest. The site is covered by Imperata grass on infertile, pale grey to yellowish compact clay. The tallest tree observed was 17 m, the majority are 10-15 m tall and 8-20 cm diameter. The occurrences near Merauke in southeast Irian Jaya were not visited but are probably very similar to those described in the adjacent area of Western Province in Papua New Guinea.

Flowering and fruiting. The phenology of flowering and seed production of A. mangium in Ceram is variable. Observations at Piru by Suratmo et al. (1980) suggested that seed is mature in August and September but in 1982 about 90% of the seed crop was shed by late August and June-July was the optimum time for seed collection. No seed remained on the Kairatu trees in August 1982 although many bore immature pods, about 1-2 months after flowering, and a mature seed crop later in the year seemed probable. A similar difference in the fruiting season of cultivated plants in neighbouring areas in Maluku was attributed to local variation in rainfall and microclimatic conditions by Hanson and Imelda (1981). The seed crop situation at Sidei in 1982 was similar to that at Piru as the majority of the seed had been dispersed by late August and the optimum collection time would have been July.

Careful observations of flowering and fruiting times of A. mangium on a number of sites over a number of years will be necessary before it becomes possible to predict accurately the optimum time for seed collections in natural stands in Indonesia.

Seed collection techniques. Seeds were collected at the Pasaulun-Amarelle River area near Piru, Ceram, and at Sidei, Irian Jaya (Map 1) by locally-hired climbers who cut off branches and stripped the fruits into bags. After air-drying the pods were hand-threshed and the seeds cleaned by village women using bamboo trays.



Map 1. Eastern Indonesia showing Acacia mangium seed collection sites (see Table 2).

SEED COLLECTIONS OF ACACIAS IN WESTERN PROVINCE, PAPUA NEW GUINEA

The island of New Guinea has seven tree-form acacias: A. aulacocarpa, A. auriculiformis, A. crassicarpa, A. leptocarpa, A. mangium, A. simsii and A. solandri (Verdcourt 1979). These species occur naturally in the Trans-Fly 'Oriomo Plateau' region of Western Province, Papua New Guinea, several extend into Irian Jaya (Van Royen 1963) and all occur in parts of northern Australia. Of these species only A. mangium has been sampled in planned collections.

Geographical occurrence and ecology. Western Province is situated between 5° to 9°S latitude and 141° to 144°E longitude and forms the greater length of Papua New Guinea's border with Irian Jaya (Map 2). Detailed descriptions of the climate, land form, soil and vegetation in the province can be found in Paijmans et al. (1971) and McAlpine et al. (1982). Most of the province is an extensive lowland area with the Oriomo Plateau forming a slightly elevated region rising to 40 m a.s.l. from the Fly River in the north to the coastal mangroves in the south. It consists of gently undulating terrain dissected by a number of deep rivers. The soils are acidic to strongly acidic and moderately to very poorly drained. They include undifferentiated fluvial deposits and organic soils, and various weathered soils such as acrisols and ultisols. Lateritic areas are frequent. The flat terrain and the slowly-permeable subsoil result in much of the plateau being flooded during the wet season. The climate is humid to subhumid with an annual rainfall about 2000 mm of which over 75% is received in a wet season lasting from December to May (see Table 1).

A mosaic of open grassland, savanna woodland and forest covers the plateau. The tall forest has been termed 'monsoon forest' (Paijmans et al. 1971). It is structurally poorer than rainforest and has an open to moderately dense canopy with emergents reaching 30-40 m. Acacias are a frequent component of the monsoon forest. The pattern of vegetation types is influenced by flood, fire, local drainage, cultivation and the browsing of animals. Acacias occur throughout the region but the prominence of each species varies within the mosaic. Overall Melaleuca species form the predominant woody vegetation.

A. mangium is the most common acacia throughout the province. It is found from scattered individual trees to dense mixed stands. It grows on the better-drained sites and is locally absent in some Melaleuca-dominated savanna woodlands. Comprehensive seed collections have been made in the middle reaches of the Oriomo River and west of the Morehead and Bensbach Rivers (Doran and Skelton 1982).

A. auriculiformis occurs throughout the region but is nowhere common and individual trees are widely separated in the savanna woodland. It is found locally in mixed dense tall savanna woodland/dry evergreen forest as well-formed dominants (to 35 m high, and 80 cm diameter) but is most prolific bordering the grass plains to the south and east of Balamuk, where the trees are shorter, have broad crowns, are often windswept and of poor form. It is very infrequent in the Oriomo River area. The larger trees occur on better-drained sites, however, A. auriculiformis will tolerate flooding as trees bordering the grass plains bear flood marks 80-90 cm up the trunk. This flooding lasts up to 5 months of the year. Other species of acacia are absent and pure stands of a Melaleuca species occur frequently on such sites.

A. crassicarpa occurs infrequently in isolated mixed stands in the medium to tall savanna woodland but does occur prolifically in the narrow transition zone between poorly-drained, slightly-raised plateaux of open grassland and Banksia scrub savanna and the surrounding medium to tall mixed savanna woodland. Such trees are of medium height (c. 12 m) and diameter (c. 40 cm). The occurrence of isolated trees of A. crassicarpa on the grassy plateaux indicates a tolerance of poorly-drained soils and fire. Along the Oriomo River stands occur at the edge of grassland caused by farming and fires which

suggest it may be more fire-hardy than other Acacia species. Elsewhere along the river it grows in mixed acacia forests where heights reach 28 m and diameters over 50 cm.

Acacia aulacocarpa occurs very infrequently in the mosaic of savanna woodland and dry evergreen forests as isolated trees or as a minor component of open mixed stands. In these situations it reaches a height of about 22 m and diameter up to 60 cm. Areas of medium-age monsoon forest exist containing a few large senescent dominants of A. aulacocarpa (height over 30 m, diameter up to 90 cm) but such areas are not common. Young and mid-age trees occur in mixed acacia forest along the Oriomo River.

Flowering and seed production. Since 1979 several observations have been made of the phenology of flowering and fruiting of acacias in Western Province and the following generalisations can be made:

1. Flowering of acacia species occurs between April and July. A.auriculiformis flowers later than A. mangium, A. crassicarpa and A. aulacocarpa. A few natural hybrids of A. mangium x A. auriculiformis were seen at two sites in 1982.

2. Seed of all the Acacia species ripens towards the end of September, although A. mangium appears to be first followed by A. auriculiformis and A. aulacocarpa, then A. crassicarpa. Seed of A. leptocarpa and A. simsii also mature at this time.

3. Fruit ripening occurs rapidly with pods turning from green to brown and opening within two days. Many seeds remain attached to the pods by their funicles for one to two weeks but are dispersed as time passes.

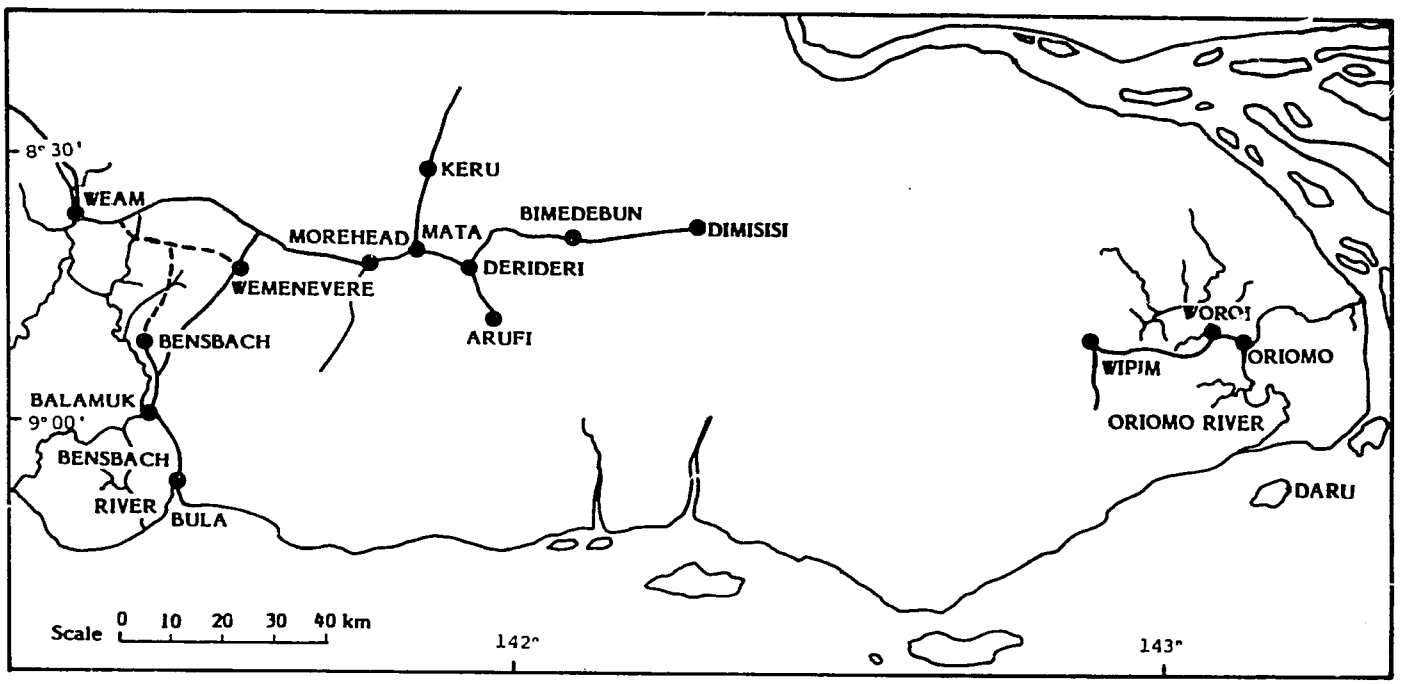
4. Seed collection in the Morehead area must take place between the last week of September and the last week of October. At the Oriomo River it can be one to two weeks later.

5. Acacias retain their phyllodes throughout the year unless burnt by ground fires which are common during the dry season. Immature fruit is destroyed by such fires while mature fruit sheds seed during the fire. Burned areas are therefore not productive seed collection sites.

Seed collection techniques. Western Province is remote, has numerous rivers and swamps but few roads (Map 2, p.10). Most of the Oriomo Plateau is accessible by walking from small airstrips, however the severe limitations of aircraft cost, payload and space and the unavailability of land transport at such locations restrict real accessibility for seed collections. The 1982 expedition used a vehicle and light aluminium barge (landing craft) to reach collection sites on the Oriomo River and in the Morehead area. The expedition took 42 days including 16 days in Port Moresby and Daru to organise and finalise the collection, 7 days travelling by barge, 5 days travel by vehicle and 14 days collecting and extracting seed in the field. The collection of acacia seed in Western Province is time-consuming, expensive and difficult to organise.

Climbers are not available in the area and the semi-nomadic habits of the small population makes it difficult to recruit any assistance in the field. Seed collections were made using 0.308 calibre rifles with 110 grain soft-nosed ammunition, supplemented by felling trees with a chainsaw where there were sufficient trees in the population to allow this technique. Space limitations in the transport made it necessary for all seed to be extracted in the field. This was carried out manually after sun drying (if needed).

In 1982 seed crops of A. crassicarpa were good but those of A. auriculiformis and A. aulacocarpa were moderate to poor. Yields from A. auriculiformis were reduced by the high incidence of seed-boring insects.



Map 2. Southern Western Province, Papua New Guinea showing seed collection areas (see Table 2).

SEED COLLECTIONS IN NORTHERN AUSTRALIA

A number of Acacia species from northern Australia have potential for planting in the humid tropics. These include:

A. auriculiformis
A. aulacocarpa
A. cincinnata
A. crassicarpa
A. flavescens
A. hyloncma
A. leptocarpa
A. mangium
A. melanoxylon
A. oraria
A. polystachya
A. simsii
A. solandri ssp. solandri

A. auriculiformis and A. aulacocarpa have a wide geographic range in northern Australia, the other species are restricted to Queensland with A. hyloncma having a very localised range in rainforest near Cairns. All the species except A. melanoxylon are found in the tropical lowlands. This species has its main distribution in temperate southern Australia but reaches its northern limit at 16°S in the tropical highlands from 900-1500 m.

Seed collections were concentrated in northern Queensland where the climate is tropical hot humid to subhumid with a short winter dry season and a high total annual rainfall. Temperatures near the coast are high and equable, inland they have a greater amplitude and at the highest altitudes light winter frosts are recorded. Rainfall and temperature data are given in Table 1.

Between 1980 and 1982 the CSIRO Tree Seed Centre made collections of A. mangium in northern Queensland to provide seed in small quantities for international provenance research (Doran and Skelton 1982). In 1981 staff of the CSIRO Forest Research Station, Atherton, collected A. auriculiformis and A. polystachya on Cape York, and seeds of A. auriculiformis (Northern Territory), A. cincinnata and A. crassicarpa (Queensland) were collected under contract.

The 1982 collections by CSIRO aimed to complement the earlier collections by procuring seeds of additional species and provenances. Seeds were obtained of A. auriculiformis, A. aulacocarpa, A. cincinnata, A. leptocarpa, A. oraria, A. polystachya and A. simsii. The fruits of these species mature in October to November and seed remains on the trees until December or January after which time seed collection is impractical. A variety of techniques were used to harvest fruit-bearing branches from standing and felled trees. The fruits were dried, broken down in a mechanical flailing thresher and cleaned in a Kurt Pelz Saatmeister separator as described by Doran et al. (1982). Threshing the seed pods of many of these tropical acacias produces a highly-irritant dust from which the operator needs protection. A helmet fitted with a device to blow filtered air over the face of the operator was found to be satisfactory for this purpose.

SEED DISTRIBUTION

Distribution of the seeds collected in Indonesia, Papua New Guinea and Australia is being coordinated by the CSIRO Tree Seed Centre, Canberra, in collaboration with FAO's Forestry Department. Approximately half of the acacia seed collected in Indonesia and Papua New Guinea was retained for local distribution and the remainder made available for international trials. In both countries the seed will be used to establish seed stands. Papua New Guinea seedlots of A. aulacocarpa, A. auriculiformis and A. crassicarpa surplus to local needs are available in the sample sizes of 20 g, 30 g and 50 g respectively from the Office of Forests, P.O. Box 5055, Boroko, Papua New Guinea. (see also page 19).

TABLE 1. CLIMATIC DATA FOR METEOROLOGICAL STATIONS CLOSE TO THE ACACIA COLLECTION SITES

Station location details				Temperature (°C)				Mean monthly rainfall (mm)											Mean
				January		July													annual
Name	Lat. (°S)	Long. (°E)	Alt. (m)	Mean min.	Mean max.	Mean min.	Mean max.	J	F	M	A	M	J	J	A	S	O	N	D	rainfall (mm)
Manokwari	0°53'	134°05'	3	-	-	-	-	244	292	321	262	239	181	203	151	128	81	109	295	2593
Piru	3°01'	128°10'	5	-	-	-	-	304	319	341	182	232	198	193	186	251	197	161	311	2875
Ambon	3°41'	128°10'	5	23	32	22	28	-	-	-	-	-	-	-	-	-	-	-	-	-
Morehead	8°43'	141°38'	31	-	-	-	-	332	262	318	157	154	86	54	52	38	80	114	224	1913
Daru	9°04'	143°12'	8	23	32	22	29	280	258	325	321	223	108	93	52	42	55	111	204	2063
Oenpelli	12°19'	133°03'	7	24	33	18	32	324	287	264	74	11	2	3	1	3	28	109	216	1322
Coen	13°57'	143°12'	193	23	31	17	27	272	266	247	94	12	9	6	3	2	22	52	67	1052
Cooktown	15°28'	145°15'	4	24	31	19	25	364	355	376	208	72	49	26	30	15	23	59	156	1733
Laura	15°36'	144°27'	91	-	-	-	-	232	241	180	31	8	9	4	3	4	17	56	134	919
Kuranda	16°51'	145°39'	326	-	-	-	-	423	389	435	233	106	77	48	42	37	42	70	164	2066
Cairns	16°53'	145°45'	3	24	32	17	25	421	422	460	264	110	72	39	42	43	50	98	203	2224
Atherton	17°17'	145°27'	752	18	29	10	22	297	313	249	108	60	46	29	24	23	27	75	174	1425

TABLE 2. PROVENANCE DETAILS OF SEEDLOTS OF TROPICAL ACACIAS COLLECTED IN INDONESIA, PAPUA NEW GUINEA AND AUSTRALIA

CSIRO Seedlot No.	Provenance location		Lat. (°S)	Long. (°E)	Alt. (m)	Details of trees within provenance			Seedlot viability /10g of cleaned seed
						No.	Max. ht (m)	Max. dbh (cm)	
A. aulacocarpa									
13687	Iokwa	PNG	8°41'	141°29'	35	9	20	58	510
13688	Keru	PNG	8°32'	141°45'	40	6	30	62	430
13689	Oriomo River	PNG	8°48'	143°09'	20	5	20	37	530
13865	Buckley	QLD	17°09'	145°37'	720	5	25	45	810
13866	Garioch	QLD	16°40'	145°18'	400	6	13	40	610
13877	Julatten	QLD	16°35'	145°25'	410	10	-	-	590
A. auriculiformis									
13686	Iokwa	PNG	8°41'	141°29'	35	10	28	89	360
13684	Balamuk	PNG	8°54'	141°18'	20	17	29	83	320
13685	Bula	PNG	9°09'	141°20'	5	10	15	42	330
13854	Oenpelli	NT	12°20'	133°04'	50	200	-	-	470
13191	Darwin	NT	12°27'	130°50'	30	45	-	-	340
13869	Springvale	QLD	15°48'	144°55'	150	3	20	60	320
13861	Scatterbrain Ck	QLD	15°50'	144°55'	160	4	20	40	400
13862	Normanby River	QLD	15°50'	145°00'	160	2	25	35	560
A. cincinnata									
13878	Julatten	QLD	16°35'	145°25'	410	12	-	-	620
13361	Julatten	QLD	16°37'	145°20'	480	9	15	25	890
13864	Shoteel	QLD	16°57'	145°38'	440	5	25	40	880
A. crassicarpa									
13681	Mata	PNG	8°40'	141°45'	30	10	12	57	490
13683	Wuroi-Wipim	PNG	8°49'	143°00'	20	15	13	31	360
13682	Oriomo River	PNG	8°50'	143°10'	20	11	26	55	410
13680	Wemenever	PNG	8°51'	141°26'	30	21	20	41	440
13683	Shoteel	QLD	16°57'	145°38'	440	5	15	30	390
A. leptocarpa									
13691	Wuroi-Wipim	PNG	8°52'	143°03'	30	4	8	18	1170
13652	Heathlands	QLD	12°45'	143°15'	60	10	8	10	690
13653	Starcke	QLD	14°16'	144°26'	2	1	10	20	600
A. mangium									
13622	Sidei, Irian Jaya	IND	0°46'	133°34'	30	15	17	20	860
13621	Piru, Ceram	IND	3°04'	128°12'	150	9	22	32	1160
A. oraria									
13654	Starcke	QLD	14°16'	144°26'	1	1	6	20	185
13867	Springvale	QLD	15°48'	144°56'	150	5	6	-	430
A. polystachya									
13500	McIlwraith Ra.	QLD	13°42'	143°18'	360	2	12	35	530
13871	Bridle	QLD	16°58'	145°37'	480	4	20	40	570
A. simsii									
13690	Rouku	PNG	8°48'	141°32'	30	10	5	3	1200

Samples of the seeds listed in Table 2 are available on a purchase or exchange basis from the Tree Seed Centre, CSIRO Division of Forest Research, P.O. Box 4008, Queen Victoria Terrace,Canberra, A.C.T. 2600, Australia. A copy of the request should be sent to the Director, Forest Resources Division, FAO, Via delle Terme di Caracalla, I-00100, Roma,(Italy).

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We thank forestry authorities in Indonesia, Papua New Guinea and Australia for their cooperation in this project. The major contribution to the organisation and implementation of the seed collections by Ir Syahrir (Directorate of Reforestation and Land Rehabilitation, Bogor, Indonesia), M. Tadiring (Acting Provincial Forest Officer, Daru, Papua New Guinea), B.P. Hyland and B. Gray (CSIRO Division of Forest Research, Atherton, Australia), J.C. Doran and E.G. Cole (CSIRO Division of Forest Research, Canberra, Australia) is gratefully acknowledged. The financial support of the Danish Aid Agency, DANIDA, was crucial to the success of the Papua New Guinea collections.

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INTERNATIONAL PROVENANCE TRIALS: ACACIA MANGIUM

Seed availability for international testing of Acacia mangium from Australia, Papua New Guinea and Indonesia was reported in Forest Genetic Resources Information number 11 (Page 48); information on this has also been distributed to potentially interested member governments of FAO through a circular letter dated 31 January 1983.

To date, seed for these international trials, coordinated by FAO's Forestry Department/ the Seed Centre of CSIRO's Division of Forest Research, has been distributed to 43 Institutes for the establishment of experiments on more than one hundred sites.

Some seed is still available for testing. Interested countries which have not yet requested seed should write expressing their interest to the Seed Centre, CSIRO Division of Forest Research, P.O. Box 4008, Canberra A.C.T. 2600,Australia; with a copy of the request addressed to the Director of the Forest Resources Division of FAO (Via delle Terme de Caracalla, I-00100 Rome, Italy).

The following information should be provided:

(i) Do you wish to establish trials on more than one site, and if so how many?
(ii) Do you wish to test the basic set of 8 provenances, the full set of 16 provenances (subject to availability), or a combination of these?
(iii) What are the latitude, longitude, altitude and climatic conditions of each proposed experimental site?
(iv) Have species or provenance trials of A. mangium already been successfully established on the proposed sites or similar ones? If so, what are the indications of these trials?
(v) In which month would you wish to receive the seed?
(vi) Are import permits required for research quantities of tree seed?

The trial design proposed is complete randomised blocks with 36- tree plots and 5 replications. Recommended spacing is 3 x 3 meters.

INTERNATIONAL PROVENANCE TRIALS OF EUCALYPTUS DEGLUPTA

During 1980-83, seed collections have been carried out in natural stands of Eucalyptus deglupta Blume in the West and East New Britain Provinces of Papua New Guinea. The collections have been done within the framework of an FAO/Office of Forests, Papua New Guinea cooperative programme on the collection of forest tree seeds.

By a circular letter dated 21 September 1983 addressed to potentially interested member governments, FAO's Forestry Department announces the availabity of seed from these collections for international provenance trials.

A total of 15 provenances (with seed collected from a minimum of 10 mother trees in each provenance) are available for international provenance trials in interested countries (see Table 1). In addition, a seedlot from a clonal seed orchard established in Papua New Guinea using select material of E. deglupta of Warangoi (New Britain) provenance, will be available for inclusion in the trials (28 mother trees, selected for good growth and form)1/.

The proposed trials will be coordinated by the Office of Forests, Papua New Guinea, in consultation with FAO's Forestry Department.

The establishment of trials using the full basic set of 16 seedlots (15 natural provenances plus the seed orchard seedlot), is recommended for countries interested in testing the species. If local plantations of E. deglupta of natural or introduced origin already exist in the participating country, seed from these should be included as a "control" in the experiments. Another locally widely planted or proven eucalypt species could also serve as "control".

The trials design recommended is Randomized Complete Blocks(RCB). The number of Papua New Guinean seedlots available (16) also lends itself to the establishment of a Balanced Square Lattice, which would be an acceptable alternative to the RCB 2/.

It if of utmost importance to choose a trial site where there are no systematic environmental differences across the experimental site, or to lay out the blocks so that any such variation is eliminated. This is especially important in E. deglupta, which is a very site-sensitive species. It is also important to choose a site representative of potential future plantation areas.

It is recommended to establish the trials using 6 replications of 36-tree plots, with a 1-tree plot surround (giving an inner measurement plot of 16 trees). Recommended spacing is 3 x 3 metres, or alternatively 4 x 4 metres. With 16 treatments and 6 replications of 36-tree plot planted at a spacing of 3 x 3 metres, the total area of each trial will be 3.1 ha, plus buffers. If a spacing of 4 x 4 metres is adopted, the area needed for each RCB trial will be 5.5 ha, plus buffers.

It is recommended to establish randomized blocking already in the nursery to attain maximum precision in the estimation of genetic parameters and differences between the provenances tested. The nursery replications should be confounded with replications in the field, i.e. plants in any one field replication (block) should all come from the same nursery replication.

All randomization should be done using tables of random permutations or a similar, fully objective procedure.

1/ See General Information on E. deglupta on p. 17.

2/ Five replications are needed for a Balanced Square Lattice with 16 treatments.

Trials may be established on more than one site per country, resources permitting.

Countries interested in receiving seed for testing of Eucalyptus deglupta from the collections, and which have not yet responded to our circular of 31 September mentioned above, are advised to write to:

Office of Forests, Attention Mr. N.H.S. Howcroft,
Forest Research Station,
P.O. Box 134, Bulolo,
Morobe Province,
Papua New Guinea

(With a copy of the letter addressed to: the Director, Forest Resources Division, Via delle Terme di Caracalla, I-00100 Rome, Italy).

The following information should be provided:

1. Do you wish to establish the trials on more than one site and, if so, how many?

2. What are the latitude, longitude, altitude and climatic and soil conditions of each proposed experimental site?

3. Have species or provenance trials of E. deglupta or other tropical eucalypts already been successfully established in the areas proposed? Will locally collected seed be included in the trials and, if so, what species, provenance?

4. In which month do you wish to receive the seed? (Please also be sure to specify with greatest accuracy the name of the receiver and the address).

5. Are any import permits required for research quantities of tree seed?

General information on the species is given below.

EUCALYPTUS DEGLUPTA Blume - General Information 1/

Eucalyptus deglupta, commonly known as "Kamarere" (Papua New Guinea), "Bagras" (Philippines), or "Kaju Leda" (Indonesia), has a wide pan-tropic distribution extending from Mindanao in the Philippines; Ceram, Sulawesi, Irian Jaya and - according to some accounts - Timor and Flores in Indonesia; to Papua New Guinea (Coastal New Britain, Vanimo region, Morobe region, Raba Raba, Papuan South Coast and parts of the Highlands).

The species occurs naturally on soils from a wide range of parent materials, from acidic pumice to alluviums, but the optimum conditions appear to be on deep, rich, well-drained soils, with a non-seasonal rainfall of around 3 000 mm, temperature ranges of 20 to 32° C and an altitudinal range of 0-1,800 m a.s.l. It is not frost tolerant, and is highly susceptible to fire.

Eucalyptus deglupta grows into a large, usually straight tree up to 75 metres high and 2.5 metres in diameter.

In Papua New Guinea, E. deglupta is the main species grown on clear-felled rain-forest sites in the coastal lowlands. It is a pioneer species and regenrates well on disturbed sites and natural clearings such as river, pumice or gravel beds, landslides and volcanic blast areas. On good sites it is capable of maintaining a mean annual increment of 2-3 cm in diameter during the first 10 years.

1/ Based on note prepared by the Office of Forests, Papua New Guinea.

The wood of E. deglupta saws, planes and polishes well and is useful for general construction, boat-building, furniture joinery, plywood, panelling, flooring, poles and pulp. It is amenable to pressure treatment.

E. deglupta ranks high among the fastest growing tropical lowland forest species.

Table 1. EUCALYPTUS DECLUPTA

Seedlots available 1983

Seedlot No.	Provenance	Lat. (°S)	Long. (°E)	Altitude (m)	Soil pH	Nbr. of mother trees
H 1	Malalimi River	5°38'	150°26'	40 - 60	6.5	13
H 2	Mopili River	5°42'	150°27'	40 - 80	5.7 - 6.1	16
H 3	Tiaru River	5°42'	151°01'	40	6.4	30
H 4	Balimo (Wilileo)	5°12'	151°07'	40	6.0 - 8.0	60 +
H 5	Koasa River	5°08'	151°08'	80	6.3 - 6.4	53
H 6	Uluwan (Ulamona)	5°00'	151°15'	20 - 120	5.4	37
H 7	Sai River	4°55'	151°43'	40	6.0 - 6.8	49
H 8	Asarogi River	4°43'	151°48'	40 - 80	6.0	13
H 9	Saru River	7°56'	147°14'	600	6.0	11
H 11	Yanuli River.	5°25'	151°05'	40	6.4	12
H 13	Mevelo River	4°46'	151°50'	±40	3.8 - 4.3	11
H 14	Ossima/Bewani	2°58'	141°50'	50 - 70	7.9 - 8.1	16
H 15	Toriu River	4°30'	151°52'	50 - 70	3.4 - 4.8	17
H 16	Torlu River	5°51'	151°18'	50 - 70	3.8 - 4.8	18
H 17	Warangoi River	4°27'	152°15'	50 - 70	4.8	11
H 0	Seed Orchard Seed (Composition: 28 phenotypically selected mother trees from Warangoi)					

SEED OF ACACIA SPECIES FOR HUMID TROPICAL AREAS [1]

Within the framework of the cooperative seed collection programme between the Office of Forests, Papua New Guinea and FAO's Forestry Department, a range of provenances have been collected over the past few years of humid tropical Acacia species. Seed of Acacia mangium from these collections, together with seed of this species collected by the Directorate-General of Forestry, Indonesia; and the CSIRO Division of Forest Research, Australia, is presently being distributed for international provenance trials by the Seed Centre of CSIRO in collaboration with FAO's Forestry Department (see page 15).

In addition to A. mangium, small amounts of seed of A. auriculiformis, A. aulacocarpa and A. crassicarpa have been collected by the Office of Forests in the Oriomo Plateau area of South West Papua New Guinea. Part of the seed collected will be used for the establishment of conservation cum seed production stands in Papua New Guinea, which will serve as a future source of genetic material.

The collection work is continuing, however, small quantities of seed from the original stands can already now be made available to developing countries for the establishment of species and provenance trials of limited scale.

Requests for such seed (for a maximum of one to two sites per country) should be addressed to: The Director, Office of Forests, P.O. Box 5055, Boroko, Papua New Guinea, and copied to the Director of FAO's Forest Resources Division (Via delle Terme di Caracalla, I-00100 Rome, Italy).

Each request should be accompanied by short information on earlier experiences with tropical Acacia species, climatic information on the proposed trial sites, and details on import and/or phytosanitary certificates needed. Please also make sure that the exact address of the receiving institute is shown clearly on the request, together with any possible other suggestions as to e.g. best routing for safe despatch.

The seedlots are valuable and seed is scarce; it is therefore essential that the seed received is treated with utmost care, and that the experiments are laid out in replicated, statistically sound designs, to give reliable information on relative performance and variation patterns in the species tested.

Basic information on the seedlots available is given below. Rainfall data from two nearby meteorological stations, Morehead and Daru, can be found in the article by Turnbull et al. (Table 1, p. 13). (See also Map 2, p. 11 for location of some of the collection sites).

(i) ACACIA AURICULIFORMIS

Bula provenance (Morehead) [2]

Collection from 10 mother trees.
9°09'S, 141°20'E, 5 m a.s.l.
Silt clay loams, alluvial (subject to wet-season flooding).

1/ Includes extracts and information from: Skelton, D.J. and Cole, E.G. (1983). Acacia Tree Seed Collections in South West Papua New Guinea (unpublished progress report, submitted to FAO by the Office of Forests, Papua New Guinea, in September 1983).

2/ Closest meteorological station: Morehead.

Balamuk provenance (Morehead) 1/

Collections from 17 mother trees.
8°54'S, 141°18'E, 18-20 m a.s.l.
Silt clay loams, alluvial, pH 4.5 - 5.5

Iokwa provenance (Morehead) 1/

Seed collected from 10 mother trees.
8°41'S, 141°29'E, 35 m a.s.l.
Soils lateritic, pH 5 - 5.5

(ii) ACACIA AULACOCARPA

Iokwa provenance (Morehead) 1/

Seed collected from 9 mother trees.
8°41'S, 141°29'E, 35 m a.s.l.
Soils lateritic, pH 5 - 5.5

Keru provenance (Morehead) 1/

Seed collected from 6 mother trees.
8°32'S, 141°45'E, 40 m a.s.l.

Oriomo River provenance (East of Morehead) 2/

Seed collected from 5 mother trees.
8°48' - 8°51'S; 143°09' - 143°10'E; 20 m a.s.l.
pH 4 - 4.5

(iii) ACACIA CRASSICARPA

Wemenever provenance (Morehead) 1/

Collection from 21 mother trees.
8°41'S; 141°26'E, 30 m a.s.l.
Silt clay loam soil, pH 4.5 - 5.5

Mata provenance (Morehead) 1/

Collection from 10 mother trees.
8°40'S, 141°45'E, 30 m a.s.l.
Silt clay loam soil, pH 4.5

Oriomo River provenance (East of Morehead) 2/

Seed collected from 11 mother trees.
8°48' - 8°51'S; 143°09' - 143°10'E; 20 m a.s.l.
pH 4 - 4.5

Woroi/Wipim provenance (East of Morehead) 2/

Seed collected from 15 mother trees.
8°48' - 8°50'S; 142°53' - 143°08'E; 20 m a.s.l.
pH 4.5.

1/ Closest meteorological station: Morehead.

2/ Closest meteorological station: Daru.

ACACIA 'BLAYANA' A.B. COURT - A NEW AUSTRALIAN TREE WITH A FUTURE?

by

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INTRODUCTION

A tall new species of wattle, Acacia 'blayana' A.B. Court (description in preparation) was discovered in a remote area of Wadbilliga National Park, southeastern New South Wales by Mr. John Blay on 1 May 1982. A. 'blayana' belongs to section Botryocephalae Benth., a group of about 30 bipinnate acacias which occur largely in southeastern Australia. This section includes black wattle (A. mearnsii), silver wattle (A. dealbata) and green wattle (A. decurrens), tall acacias which are cultivated successfully as exotics.

In February 1983 a team from the Division of Forest Research CSIRO and the Canberra Botanic Gardens was taken to the site by helicopter to make ecological observations and botanical collections. This article describes observations made on the visit and draws attention to the potential of this new species for fuelwood and agroforestry purposes in the cooler, highland areas of the tropics and subtropics.

DISTRIBUTION

A. 'blayana' occurs on the eastern side of the Great Dividing Range in Wadbilliga National Park about 300 km S.S.W. of Sydney and has a very restricted distribution. Several stands were sighted and mapped alongside the Brogo River and its tributary, Galoon Creek (lat. 36°37'S, long. 149°39'E); where it typically occurs along seasonally dry gullies running into these streams. The altitudinal range of the species is approximately 200-600 m.

CLIMATE

The distribution is in the warm sub-humid climatic zone. There is no meteorological station nearby but it is estimated, from a neighbouring station (Bega), that the mean maximum temperature of the hottest month is about 27°C, the mean minimum of the coolest about 0°C and approximately 30-40 frosts occur annually. The mean annual rainfall is about 900 mm with a fairly even monthly distribution but with a summer maximum.

ECOLOGY

A. 'blayana' occurs mostly in dry sclerophyll eucalypt forests and often immediately adjacent to cool-temperature rainforest. In some areas the species forms dense, almost pure stands. There is a noticeable reduction in tree size on drier sites. Typical creek-side associate species include Tristania laurina, Acacia implexa, A. mearnsii, Pittosporum undulatum and Ficus rubiginosa. The dry sclerophyllous associates include trees such as Eucalyptus wilcoxii and shrubs like Beyeria lasiocarpa. The rainforest is mostly dominated by Acmena smithii and Backhousia myrtifolia, and large trees of E. saligna/botryoides intrude. The species grows mainly on steep well-drained slopes on very shallow and slightly acidic (pH 5.5) soils derived from quartzose sandstone (Dr. M. Duggin pers. comm.)

Article received September 1983

WOOD

The sapwood is up to 2 cm wide and is probably susceptible to Lyctus attack; heartwood varies from golden to reddish brown, density is 690 kg m^3. The wood is close-textured and hard and is attractive for wood turning and joinery for which it exhibits properties similar to A. melanoxylon, Tasmanian blackwood. It finishes to a pleasing sheen.

BOTANICAL NOTES

The largest tree seen was 19.5 m tall and 36 cm d.b.h. The species has an open crown with more or less ascending leaves and leaflets. Its most distinctive feature is the compound leaves with large elliptical pinnae (leaflets), about 2.5 x 0.5 cm (Fig. 1).

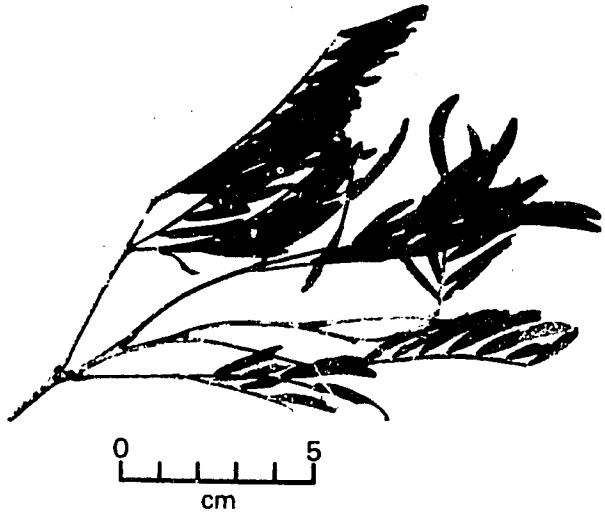

Fig. 1: Foliage of A. 'blayana' displaying the large elliptical pinnae

The new leaves and smaller twigs are covered with a surface bloom (wax) which gives the trees a distinctive blue canopy when sighted from above. The thin grey bark adheres strongly to the trunk after felling and is conspicuously speckled with lichens. Legumes collected off the ground under trees are about 6 x 1 cm (Fig. 2) and contain up to about 6 seeds. The seeds are oval (5-7 x 3-4 mm), blackish, have a small pale triangular aril and a large pleurogram (about 4 x 1 mm in surface dimension).

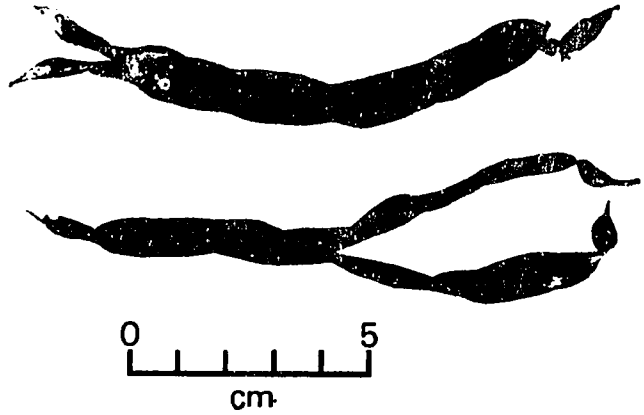

Fig. 2: Two legumes of A. 'blayana'

Blay's acacia flowered heavily in September 1982 (J. Blay pers. comm.) and at the time of the visit in mid-February 1983 nearly all legumes were shed from standing trees and the seeds dispersed. Considerable damage to the fruits had been caused by birds or animals. It is estimated that the best seed collection time is early December.

CONCLUSION

While no information is available yet on growth rate, A. 'blayana's large size, its ability to form pure natural stands and its probable nitrogen-fixing ability makes it an appropriate species for inclusion in tree species trials in the cooler highland areas of the tropics and sub-tropics. Seed collections will be attempted by the CSIRO Tree Seed Centre in December 1983.

ACKNOWLEDGEMENTS

We wish to thank Dr. K. Bamber, NSW Forestry Commission, for information on wood properties and the Royal Australian Air Force for helicopter assistance. Information of the location of the stand was provided by Messrs. J. Blay and P. Cope. Mr. A. Court helped co-ordinate and participated on the field trip.

TAXONOMY OF CENTRAL AMERICAN AND MEXICAN PINES

Over the past decade, seed of some Central American and Mexican pines has been distributed for international provenance trials and for the establishment of ex situ conservation stands. In parallel with the evaluation work underway in a large number of countries, further botanical and genecological exploration has been carried out in the regions of natural occurrence of the species. These studies have resulted in a number of proposals for taxonomic splits and changes in nomenclature, many of which are potentially of great practical importance.

Some of the provenances under review include, among others, the important Nicaraguan Pinus oocarpa seedlots from Yukul (K42,K94, K101, K128, K140); San Rafael del Norte (K44, K142); and Camelias (K1, K2); and seedlot K11, El Conacaste, from Guatemala.

In a future issue of FGRI, we hope to publish a more exhaustive account on these matters. Presently, we would like to draw your attention to the following articles and notes:

- Styles, B.T. (1976). Studies of variation in Central American Pines. I. The identity of Pinus oocarpa var. ochoterenai Martinez. Silvae Genetica 25(3-4):109-118.
- Styles, B.T., Stead, J.W., and Rolph, K.J. (1982). Studies of variation in Central American pines. II. Putative hybridization between Pinus caribaea var. hondurensis and P. oocarpa. Turrialba 32(3):229-242.
- Anon.(1982). Technical notes- Notas Técnicas. CAMCORE News No.2, December 1982, p.11 (School of Forest Resources, North Carolina State University, P.O. Box 5488, Raleigh N.C. 27650, U.S.A.).
- Anon.(1982). "Forest Botany" (p.3); and "Central American Pines and Hardwoods"(p.5). In: Annual Report 1981-1982. Unit of Tropical Silviculture, Commonwealth Forestry Institute (South Parks Road, OX1 3RB Oxford, U.K.).
- Stead, J.W. (1983). A study of variation and taxonomy of the Pinus pseudostrobus complex. Commonw. For. Rev. 62(1):25-35.
- Barnes, R.D. and Styles, B.T. (1983). The closed-cone pines of Mexico and Central America. Commonw. For. Rev. 62(2):81-84.
- Stead, J.W. (1983). Studies of variation in Central American pines. V. A numerical study of variation in the Pseudostrobus group. Silvae Genetica 32(3-4):101-115.

IRONBARK SEED COLLECTIONS IN QUEENSLAND, AUSTRALIA

by

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INTRODUCTION

Eucalyptus species of the Ironbark group 1/ are very conspicuous in the Australian landscape because of their rugged, hard, furrowed, dark-coloured bark. They are highly prized for use wherever great strength and long durability of the wood is required, and are used commonly for railway sleepers, bridges, telephone and electrical poles and for farm fences. They are sometimes called "Kings of the Hardwoods" in Australia.

To date, most of Australia's needs for wood from this group have been met from existing extensive natural stands. However, there have recently been some indications that supplies from these stands are dwindling.

In the past, only modest attempts have been made to establish Ironwood plantations. These now total approximately 600–800 ha in Australia, and are found mainly in the states of Queensland, New South Wales, Victoria and South Australia.

Ironbarks have proved moderately successful overseas. According to Pryor (1976) the main species planted have been E. sideroxylon, E. paniculata, and E. melanophloia. About 5,000 ha of E. sideroxylon have been established in Morocco, North Africa (Turnbull and Pryor 1978). Other countries from which ironbark plantations have been reported are South Africa, India, Pakistan, China and Brazil.

Climatically, Ironbarks grow under a wide range of conditions from Mediterranean-type sites in the State of Victoria to monsoonal areas in northern Australia ; however, they are most plentiful in the subtropical regions. They often form good-sized trees on very poor quality and shallow soils.

About 14 of the approximately 20 species occur in Queensland, where they probably represent the most common group of trees in terms of numbers of individual trees.

In spite of their potential for world forestry, eucalypts in the Ironbark group have, in the past, been inadequately sampled and tested. Their uncertain taxonomy has also obstructed earlier attempts to promote their use in plantation forestry.

BACKGROUND AND OBJECTIVES OF THE 1982 COLLECTIONS

In May and June 1982, Ironbark seed was collected from 19 sites in Queensland, Australia representing seven named and three un-named species of eucalypts.

The collections ranged over eight degrees of latitude, mostly subtropical; collection sites covered a wide range of environmental conditions from wet coastal areas fringing rainforests to inland areas having a pronounced dry season.

1/ Note from the Editor:

"Eucalypt users, planters and foresters have distinguished various categories, which they have identified empirically with highly descriptive names according to outstanding characteristics. 'Ironbarks' cover a group of eucalypts with persistent, deeply fissured, hard and dark bark, such as Eucalyptus sideroxylon" (Quote from: "Eucalypts for Planting", FAO 1955).

Article received July 1982.

The trip, funded by the Department of Forestry, Queensland through the Australian Development Assistance Bureau, represents the first major attempt to systematically sample ironbark species and provenances in Australia.

The collection team involved two officers from the Division of Forest Research, CSIRO, and two officers from the Department of Forestry, Queensland; it lasted approximately three weeks.

METHODOLOGY AND RESULTS

During the trip, seed of 10 species was collected from a total of 19 sites. Generally, collections were made from 5-10 mother trees per site; a .308 calibre rifle was used to sever seed-bearing limbs for the collection (see Figures 1 and 2, page 26).

The seven named species collected were the following:

E. crebra (5 provenances; 2907 g); E. decorticans (1 provenance; 121 g), E. drepanophylla (4 provenances; 1391 g); E. fibrosa subsp. nubila (1 provenance; 110 g); E. melanoleuca (1 provenance; 153.5 g); E. melanophloia (1 provenance; 474 g), and E. whitei (1 provenance; 297 g).

In addition, seed was collected from three undescribed species, viz: E."blackdownii" (600 g), E. aff. cullenii (1290 g), and E. aff. crebra (1000 g).

SEED AVAILABILITY

Some seed of E. drepanophylla will be used by the Department of Forestry, Queensland to establish species/provenance trials of eucalypts in China under an Australian bilateral assistance programme. Research quantities of the remaining seed will be made available to interested countries upon request; the requests should be addressed to:

Seed Centre
CSIRO Division of Forest Research
(Attention Mr. J.C. Doran)
P.O. Box 4008
Canberra, A.C.T. 2600
Australia.

REFERENCES

Pryor, L.D. 1976 The Biology of Eucalypts. Edward Arnold, London.

Turnbull, J.W. and Pryor, L.D. 1978 Choice of species and seed sources. In: Eucalypts for Wood Production (Chapter 2) (Eds. W.E. Hillis and A.G. Brown). Griffin Press, Adelaide.

(FIGURES 1 AND 2 ON NEXT PAGE)

NEW LISTS OF SEED SUPPLIERS

Two new lists are available from the National Seed Co-ordinating Centre of Australia, the Seed Centre of CSIRO Division of Forest Research, P.O. Box 4008, Canberra A.C.T. 2600:

(i) Turnbull, J.W. (1983). Sources of Nitrogen Fixing Tree Germplasm for Research (lists names and addresses of some 30 suppliers worldwide, cross-referenced to species; based on replies to a circular on seed availability);

(ii) Australian Suppliers of Tree Seed 1983 (names and addresses of 27 Australian suppliers of tree seed).

Figure 1. Eucalyptus crebra, Drummond Range, Queensland (Australia).

Figure 2. Collection of seed by using a .308 calibre rifle (Clermont area, Queensland, Australia).

RECENT CIRCULAR LETTERS FROM THE DANIDA FOREST SEED CENTRE

The following Circular Letters have recently been published by the DANIDA Forest Seed Centre, Krogerupvej 3A, DK-3050 Humlebaek, Denmark (for a list of 1981/82 Circular Letters, see FGRI No.11, p.58; the full list of Circulars is given in Circular Letter No. 19 from the Seed Centre):

- Central American Pine Seed. Circular Letter No.17, April 1983 (2pp.);
- Report on Activities in 1982. Circular Letter No.18, April 1983 (10pp.);
- Seed Collection Units. I. Seed Zones. Circular Letter No.19, May 1983 (36pp.)
- Distribution of Forest Seed from DANIDA Forest Seed Centre. Circular Letter No. 20, October 1983 (14 pp + Application Form).

"GMELINA ARBOREA. FLOWERING AND SEED STUDIES" (ABSTRACT)

by
M.R. Bowen and T.V. Eusebio[1]

This document, published within the framework of FAO/UNDP Project MAL/78/009, "Seed Source Establishment and Tree Improvement" 1/, reports on recent information from Sabah, Malaysia on flowering and seed production and handling in plantation-grown Gmelina arborea. The following main subjects are disoussed: Flowering; Fruit collection and handling; Fruit yields; and Seed germination.

The inflorescence in Gmelina arborea is a terminal dichasial cyme, with older flowers at the base of the panicle and the youngest ones at the tip. Many stages of bud and fruit development are found on the same inflorescence.

Because of the morphology of the flower, self-pollination is unlikely to occur in nature. However, in controlled pollination experiments in Sepilok, Sabah, self-pollinated flowers have produced full-sized fruits; it is not yet known whether the seed produced in this way is fertile or not.

Many types of flying insects seem to be active in the crowns of flowering trees in Sabah, suggesting that these insects may act as pollen vectors.

Studies on flowering indicate a general pattern of two peak periods for flower burst, which vary somewhat from year to year and depending on the location. The main production of mature fruits takes place approximately one month after the flowering peak, spreading over a 2-month period.

Harvesting mature drupes from the crowns is expensive, especially as branch lopping is not possible without destroying subsequent seedcrops. Fallen fruits are therefore collected from the ground, selecting those which are yellow-green in colour.

The pulp can be successfully removed from the nut by tumbling the fruits in a cement mixer together with cubes of hardwood, and sieving and washing the nuts clean of debris. Care must be taken to choose blocks of wood that are heavy enough to de-pulp the fleshy drupe, but not so heavy as to crack the nuts. Coffee de-pulping machines have also been successfully used to remove the pulp from Gmelina nuts 2/.

After de-pulping and cleaning, nuts are dried at +45°C in a specially constructed kiln for approximately 17 hours, to about 8% moisture content. Satisfactory drying can also be obtained using a commercial cocoa drier.

After drying, traces of residual pulp can be removed by tumbling the nuts in a cement mixer, or using a coffee de-husker which rotates the nuts against an abrasive surface. Complete removal of the pulp appears to be necessary for good germination of the seed. Seed can satisfactorily be stored at approx. +3°C when dried.

A small 14-year old plantation of Gmelina arborea was recently culled in Sabah, leaving 36 trees for seed production purposes (equivalent to a stocking rate of 96 trees per ha). During the first 6 months after thinning, a total of 201 kg of fruits, equivalent to 10.9 kg of dried nuts, was collected from the stand. Monthly nut yields over the 6-month period in each of the 36 trees have been recorded and are reported in the document, showing a marked difference between trees in individual fruiting patterns.

1/ Forest Research Centre, Sepilok, P.O. Box 1407, Sandakan, Sabah, Malaysia.
Note abstracted at FAO HQ from: "Seed Series No.6", FAO/UNDP/MAL/78/009(Sept.1982).

2/ See e.g.: Woessner, R.A. (1979). Large-scale production of Gmelina arborea Roxb. seed; a case study. Commonwealth Forestry Review 58 (2).

Investigations have also been made into seed germination, with special reference to the comparatively low germination percentage found especially in imported seed.

Cracking open the nuts showed that, on an average, each nut contains 1.8 seeds of which 85% (1.5 seeds per nut) were assessed, on appearance, as being healthy and well-developed. Soaking the nuts in water at +25°C for 17 hours, followed by drying at +45°C for 7 hours, proved to be the pre-treatment which yielded the highest number of seedlings (88%). The experiments also showed that stored nuts (i.e. nuts dried to approx. 8% moisture content and subjected to temperatures of +3°C) germinated better than freshly collected nuts.

To check the results of the laboratory germination tests against those that may be expected under nursery conditions, pre-treated nuts were sown in seed boxes containing one of 12 different media consisting of sand, forest top soil and sawdust, either pure or in mixture. Of the 3 pure media, sawdust proved to be the least satisfactory and reduced germination whenever it was added to a mixture. The most effective media were those combining soil and sand, with 2 parts of soil and 1 part of sand being optimal for germination. However, subsequent radicle growth was best in mixtures containing sawdust, which apparently decreased the compaction of soil and thus favoured the development of a healthy root system.

NEW COMMISSION ON FOREST TREE SEED, BRAZIL

Within the framework of IBDF(Instituto Brasileiro de Desenvolvimento Florestal, the Brazilian Institute of Forest Development), a new nation-wide Commision has recently been created on forest tree seeds (Commissão Técnica de Sementes Florestais). The terms of reference of this new Commission are to coordinate the production, importation, exportation and utilization of both native and exotic tree seed; the advise of the Commission will be sought by IBDF for all reforestation schemes considered for inclusion in the Federal fiscal incentives scheme controlled by them.

(Source: Brasil Florestal 12(50):71 (1982)).

RE-ACTIVATION OF IUFRO WORKING PARTY ON SEED ORCHARDS

Proposals for the re-activation of the "dormant" Working Party on Seed Orchards (S2.03.03) have recently been made by tree breeders, and the challenge to coordinate such work has been taken up by Dr. Robert Weir, U.S.A.

Anybody interested in participating in the work of the W.P. is requested to contact Dr. Weir at the following address: School of Forest Resources, North Carolina State University, P.O. Box 5488, Raleigh N.C. 27650, U.S.A.

FLOWERING OF PINUS CARIBAEA VAR. HONDURENSIS

In reference to the articles on the above subject published in Forest Genetic Resources Information numbers 10 and 11, Dr. F.S.P. Ng, Assistant Director of the Forest Research Institute at Kepong, Malaysia offers us the following observations 1/:

"In Malaysia, it has been noted that Pinus caribaea seeds reliably only in plots located on sea coasts and on mountain slopes or ridges, where dependable winds and breezes develop during pollination (see: Razali & Ng, Malaysian Forester 42 (1979), page 73)2/. The amounts of seed produced are, however, relatively low compared with figures reported from Queensland, Australia where observations on flowering and seed production have been made for a number of years; the reason may possibly be that the Malaysian plots are of sub-optimal size and shape for maximum seed production.

" For a wind pollinated species to reproduce, the species should occur at high stocking and occupy a relatively large area. A higher stocking results in larger volumes of pollen produced per unit area, increasing the probability of pollination of the ovules. At the same time, if the stand of trees occupies too small an area, pollen is easily blown out of the stand, hence there is a critical area below which a wind pollinated stand of trees cannot effectively reproduce. If the wind direction is relatively constant, the seed stand should have its long axis parallel to the direction of prevailing winds 3/.

" In Malaysia, naturally occurring, wind pollinated species like Agathis, Dacrydium and Podocarpus are generally found on mountain summits, slopes and ridges, or on sea coasts (e.g. Casuarina, Podocarpus). Such habitats are more windy and relatively speaking, less species-rich (leading to higher number of individuals of the same species per unit area and, thus, potentially higher pollen yields; and less physical barriers in the form of other vegetation, obstructing the passage of wind-borne pollen).

" In the designing of seed stands in the tropics for wind pollinated species like pines we should, accordingly, draw a lesson from nature to optimize seed production.

" An interesting additional observation is that our pine plots on the coast and on mountain ridges also appear to produce a lot more strobili than in windstill locations. Perhaps wind also has the morpho-genetic effect of promoting the production of strobili?"

1/ The points presented have been freely adapted from a letter on the subject received from Dr. Ng in September 1983, and are thus not direct quotes.

2/ Note from the Editor: Environmental and genetic/physiological factors contributing to the quantities of seed produced have been extensively discussed by R. Sarvas, in: Communicationes Instituti Forestalis Fenniae 53,4 (Helsinki, Finland 1962); although special reference in that publication is made to Pinus sylvestris, the observations and results are largely applicable also to other pine species.

3/ Note from the Editor: See also article by V. Koski, Forest Genetic Resources Information no.11 (1982), pp. 11-19.

FAO GUIDELINES FOR SEED ORDERING

by
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Forest Resources Division
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A prerequisite for any planting programme is an assured source of seed supply. Whether seed is collected locally or procured from elsewhere, its quality will determine not only the number of sound seedlings raised but also their subsequent survival and growth. "Quality" refers to: (i) the physiological quality of the seed, which depends on factors such as timing and methodology of collection and the handling and treatment of the seed; and (ii) the genetic quality, which depends on inherent characteristics of the stand from which seed is collected, the number of trees involved in pollination of the ovules (and, thus, the probability of inbred or "selfed" - i.e. self-pollinated - seed), and the number of mother trees used as sources. The genetic quality of the seed will also determine the value of the stand grown from it for subsequent seed collection and for selection and breeding work. It will thus have long-term effects on the development of additional local plantation programmes.

For many species the demand for forest tree seed on the world market exceeds supply. Moreover, the majority of seed of tropical/sub-tropical arboreal species moving in international trade today is poorly documented or not documented at all. This is partly because of a tendency to accept whatever seed is available, but mainly because of lack of realization of the fundamental importance of adequate documentation on seedlots used for plantation establishment, tree planting and experimental work.

In view of the above and other commonly encountered ambiguities in seed orders, FAO's Forestry Department strongly recommends that the following points be taken into consideration when procuring seed:

1. If a species has not been tried before, order only small quantities of seed for use in statistically sound experiments, and always include local species as "controls" in such trials. If the urgency for planting is great, use proven species. Experiences on species behaviour from other countries or planting regions can give some indications of which species are of potential value for specified conditions and uses and therefore should be included in experimental work, but can never serve as a substitute for locally established trials.
2. Pay attention to number of seeds per kilogram and do not over-order.

3. Always demand a certificate from the supplier which gives information on origin and provenance (latitude, longitude and altitude, as a minimum) and, ideally, the number of mother trees used as sources. If the seed is to be used for experimental purposes or for the development of local seed production or breeding populations, additional information is needed on stand characteristics and earlier treatments.

4. If an introduced species is to be used on a large scale and the best or most likely provenances for each planting zone have been experimentally determined, give top priority to the procurement of semi-bulk quantities of seed from a reliable supplier for the establishment of local seed stands, managed for maximum seed production and aimed at making the country or planting region self-sufficient in seed.

CONSERVATION OF FOREST GENETIC RESOURCES

Ideally, work in forest genetic resources follows the logical sequence of botanical and geneecological exploration; collection for evaluation and evaluation; collection for conservation and conservation ex and in situ; and utilization. However, because of pressures on existing resources from increasing human populations and from domestic animals, stands of potential importance are often under threat of genetic depletion or extinction even before results on their genetic characteristics and variation are at hand.

Results from comprehensive provenance trials are of little value if the proven provenances have disappeared when the results are known. Therefore, it would be important, in all provenance collections, to:

(i) collect as much reproductive material as possible from any stands likely to be lost in the near future;

(ii) take steps for safeguarding all stands from which provenance collections are made, at least until such a time when variation patterns and the potential value of the various provenances are known.

As an example of positive action taken in this respect, we publish below an extract from a copy of a letter received by the coordinator in Rome of the FAO Project on Genetic Resources of Arid and Semi-Arid Zone Arboreal Species for the Improvement of Rural Living (see p.32); the letter was sent in September 1983 by Dr. R.S. Mathur, Director of Forestry Research at the Forest Research Institute in Dehra Dun, India and main national coordinator of the above project, to "Nodal Officers" of the project in Forest Services in 8 Indian States and 2 Forestry Research Institutes:

" During recent discussions with an FAO Consultant, it was realized that seed sources collected by India for inclusion in international provenance trials need to be conserved at least for one decade, as agencies to whom seeds have been sent may, in due course, ask for seed supplies of those provenances which- in species and provenance trials presently under way - have proved to be promising in their conditions. Please, therefore, demarcate all these sources on the ground and ensure that this gene source is conserved properly for future use. Proper directives to protect the trees will ensure in situ conservation of our gene pool. "

We hope that other countries would follow the example laid by India in this important question.

FAO PROJECT ON GENETIC RESOURCES OF ARID AND SEMI-ARID ZONE ARBOREAL SPECIES FOR THE IMPROVEMENT OF RURAL LIVING

Report on Progress

by
Christel Palmberg
Forestry Department
FAO, Rome, Italy

INTRODUCTION

In 1979, FAO's Forestry Department initiated a project on the conservation and better utilization of genetic resources of arboreal species for the improvement of rural living.

The project receives financial assistance from the International Board on Plant Genetic Resources (IBPGR) and, indirectly - through IBPGR - from the United Nations Environment Programme, UNEP. FAO's Forestry Department provides considerable inputs to the project in the form of a part-time coordinator and supporting services, consultants, and as direct, financial contributions to cooperating countries to supplement funding from IBPGR.

A note on the project, including lists of species involved, was published in Forest Genetic Resources Information No. 10 (pp. 31-33).

BACKGROUND AND AIMS

The main aims of the project are to gather information and genetic material for conservation and evaluation/characterization purposes, with the ultimate objective of better and more rational utilization on a sustained basis of existing genetic resources vitally important to rural communities as providers of fuel, food, fodder, shade and shelter in tropical arid and semi-arid areas. The project also aims at helping to build up a self-supporting network of centres concerned with conservation and seed collection activities of arid and semi-arid zone multipurpose arboreal species. Field activities this end towards were started in 1981.

Eight countries are presently formally cooperating in the project (Chile, India, Mexico, Pakistan, Peru, Senegal, Sudan and P.D.R. Yemen). Within its framework, seed is also collected by Australia and Israel. All exploration, collection and evaluation work is being carried out by local research institutes or by national forest services.

In addition to the above, active collaboration in collection activities is pursued with the Centre Technique Forestier Tropical, France (West African species); and the Commonwealth Forestry Institute, UK (Central and South American species).

PROGRESS 1981-83

Seed Collection

Within the framework of the FAO project and with some financial assistance provided by it, seed collections have been carried out in all cooperating countries of *Acacia*, *Atriplex* and *Prosopis* species. Some seed will also be collected in Mexico of *Cercidium* spp. and *Chilopsis* spp.

All seedlots collected are carefully documented in standard format (see copy of collection form on p. 35), cleaned and sent for further cleaning and treatment to the DANIDA Forest Seed Centre at Humlebaek, Denmark. The DANIDA Seed Centre stores the seed temporarily, and distributes it in accordance with FAO's instructions for evaluation/characterization, initially to cooperating countries only.

Training and dissemination of information

Through training and the dissemination of information, the project hopes to help build up an increased awareness of the urgent and vigorous action needed to protect, conserve and efficiently utilize existing natural resources in the ecologically fragile arid and semi-arid zones; simultaneously, it is working towards an increased level of technical knowledge and local expertise in matters related to forest genetic resources work.

During 1981-1983, the training component has involved study tours by technical staff directly involved in the project to other countries with similar ecological conditions and problems, and the organization of national seminars and courses on specific, practical aspects, such as seedcollection in arid zones.

In 1983, 6 technical manuals were prepared, dealing with (i) taxonomy; (ii) seed insects; and (iii) seed collection, handling and storage of species of the genera Acacia and Prosopis (see p.40 of this issue of FGRI). The manuals fill a well-acknowledged information gap, as evidenced by the large amount of requests received for them.

Information on the Project and the urgence of work on forest genetic resources in the arid and semi-arid zones is regularly disseminated, mainly through "Forest Genetic Resources Information" and "Unasylva" (see list of references at the end of the article).

PLANED ACTIVITIES IN 1984/85

Active cooperation and commitment to this important Project are steadily increasing in the cooperating countries, as is collaboration between these countries and others with similar ecological conditions. Although small in terms of monetary contribution, the Project is often getting a special mention from the countries involved,in programming and policy discussions.

In 1984/85, seed collections will be continued to meet the established collection targets both as regards provenance coverage and quantities of seed required for conservation and evaluation purposes. The opportunity will also be taken to collect samples of seed of other important, sympatric species suitable for village woodlots and firewood, whenever possible.

Cooperating countries will be visited when necessary to discuss (i) gaps of coverage recorded in connection with botanical exploration; (ii) conservation action needed due to increased pressures on existing resources; and (iii) possible additional species/provenances to be included in the collection programme.

Samples of the seedlots collected to date will be transferred for long-term storage to Kew Gardens, UK, where a base collection of all seedlots available will be conserved. Based on results from the evaluation trials described above, it is also planned to establish ex situ conservation stands of important species and provenances in a number of countries.

It should be noted that the evaluation trials can also, to a limited extent, be considered as sources for future genetic material.

Seed will continue to be distributed to cooperating countries for evaluation trials in a range of environmental conditions, using standardized design, treatments and measurement schedules.

Any surplus seed available will be distributed for further evaluation to countries which have expressed an interest in joining the programme but which have not to date been formally coopted, as well as to other interested countries. The recipient countries will be requested to provide exchange seedlots for the material received, thus augmenting available collections of genetic material.

The practical value of study tours by officers from cooperating institutes in one country to an institute in another country will be compounded once the evaluation trials have been established. Although these trials will still be young in 1984/85, many lessons can be learned regarding establishment, lay-out and measurements, and such trips will help ensure standardization of approach and render overall results from the trials more reliable. Locally organized courses will also be essential in the use of measuring equipment, methodology of evaluation and data recording.

CONCLUDING REMARKS

The overall, general goal of FAO and its Forestry Department, is to assist member countries in meeting the basic needs of, and securing general progress for, rural communities. In line with this policy, ongoing genetic resources programmes are concentrating on assistance to the rural poor, and aim at promoting the use of well-adapted but robust genetic material suitable for village woodlots, shelterbelts, fodder, land rehabilitation, etc. Top priority is given to the conservation and evaluation of existing stands of shrubs and trees which are presently in danger of extinction or genetic depletion but whose adaptation to prevailing environmental conditions and acceptability to local populations are unquestioned; and to the establishment of systematic species and provenance trials in which local and introduced species can be compared under uniform management systems.

The on-going FAO Project, which has been steadily gaining acceptance and momentum since its initiation, supports the above principles.

We are aware of the fact that much more work is still needed in this field: the species covered form only a small fraction of those which merit urgent attention, the number of countries which we have been able to include as direct cooperators is very small. However, through this and related work we hope to catalyze action elsewhere in the world, to show one of the ways of going about the problems which we all should be determined to solve: the conservation of our heritage of genetic resources and the utilization of these resources for the betterment of life particularly of rural communities dependent on them.

LITERATURE REFFRENCES TO THE PROJECT

Anon. 1981 FAO/IBPGR Project on genetic resources of arboreal fuelwood species for the improvement of rural living. Forest Genetic Resources Information No. 10: 31-33. FAO, Rome, Italy.

Anon. 1983 The Fuelwood Crisis in Africa: an FAO Round Table Discussion. Unasylva 35 (141):22-25.

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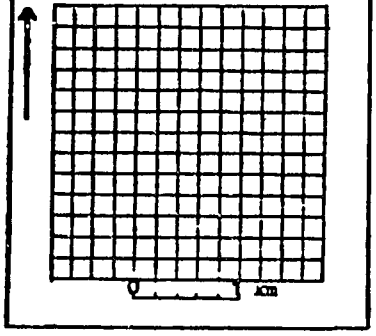
Palmberg, C. 1983 Conservation and variation in tropical tree species. Plant Genetic Resources Newsletter 55/September 1983. FAO/AGP, Rome, Italy.

FAO PROJECT ON GENETIC RESOURCES OF ARID/SEMI-ARID ZONE ARBOREAL SPECIES:

Location

N Sketchmap



SEED COLLECTION REPORT

Collection No. .....

Species: .....

Country: .....

Province: ..... District: .....

Lat: .....°.....' Long: .....°.....' Elev: .....m

Topography: Flat/hilly

Slope: steep/medium/gentle

Soil: Deep/shallow/intermediate

Drainage: .....

.....

Stoniness: .....

Texture: .....

.....

pH: Acid/neutral/alkaline

Rainfall: Mean annual ..... mm; Wet months: ..... Dry months: .....

Temperature: Mean annual: .....°C; Mean max: .....°C; Mean min: .....°C

Frost: .....days/year

Stand: Natural: Groups/open Thin/dense

Young/middle-aged/old

Plantation: Age ..... years Height ..... m Diam .....cm

Original source: .....

Associated species: .....

Form: Boles: Single/multiple Straight/fair/poor

Crowns: Flat/narrow/average/wide

Seed crop: Light/medium/heavy

Seed collection: No. of trees ..... Min. distance apart: .....m; Kg: .....

Remarks: .....

.....

.....

Date of collection: .....

.....
Officer in Charge

NOTES FROM THE IUFRO MEETING ON FROST-RESISTANT EUCALYPTS

FRANCE, SEPTEMBER 1983

Of the approximately 500 species of eucalypts, less than 1/10 occur in their natural habitat in areas which experience sub-zero temperatures; the limit of occurrence in Australia of the genus is 45°S latitude and, at higher altitudes (2000 m a.s.l.), 35°S latitude.

In their natural environment, the species of the genus Eucalyptus are highly adapted to the sites on which they occur. Frost damage in the genus in Australia is extremely rare and only about half a dozen cases of such damage (of limited and localized extent) has ever been recorded. However, when grown as exotics, damage by low temperatures is a common problem in eucalypt plantations in many countries, including developing countries in southern, eastern and northern Africa; the Mediterranean; and South America.

The meeting, organized by two IUFRO Working Parties on eucalypts in collaboration with AFOCEL, France and CSIRO, Australia, had been convened to discuss problems related to plantations grown in adverse conditions, with special emphasis on eucalypts grown as exotics in climates with occasional sub-zero temperatures. The meeting itself, preceded by two Study Tours, was divided into 7 Sessions. Some 40 papers were presented to the meeting, and they will - in due course - be published by AFOCEL (Association Forêt-Cellulose, Domaine de l'Etançon, F-77370 Nangis, France).

Some points of interest and general conclusions are given below:

- Few countries in the world plant eucalypts in cold areas, except for on an experimental scale.
- Adequate exploration/evaluation for frost resistance has not yet been done. Eucalypts possess resistance greater than that implied by their present, natural ranges in Australia, and only range-wide, locally established trials in potential plantation areas in the introducing country can determine this resistance.
- The causes and mechanisms of frost damage are poorly understood; a species may be highly tolerant on one site, yet suffer considerable damage in non-severe temperatures on others. In addition to adequate hardening in advance of the frosts (in which minimum night temperatures during the days preceeding the frost seem to be of decisive importance), factors related to soil and soil temperatures, soil and air moisture, and the general physiological state of the plant, seem to play an important role in frost resistance and tolerance. It was generally felt that only through understanding the physiological causes leading to frost damage and/or tolerance (which are symptoms rather than absolute processes), can any progress be made in this field.
- Discussions on breeding strategies, which formed the subject of one of the Sessions, were of particular interest. In addition to the "classical path" of exploration, collection, evaluation and improvement of seed and seedling material, recent advances in vegetative propagation techniques have lead to alternative strategies including the use of inter and intraspecific hybrids and clonal forestry. Intensive nursery and management methods have, as a consequence, been developed in a number of countries to cater for the appropriate use of material in which per-unit value is very high as compared to normal seedlings, but in which potential returns could also be manifold. Some specific observations on these points are:

(i) Vegetative and sexual reproduction are always complementary paths;

(ii) Conservation of a base population with broad genetic base is of fundamental importance irrespective of strategy, but the needs are highlighted if vegetative propagation and clonal forestry (which minimizes genetic variation in the plantations) are used;

(iii) All countries which presently use clonal forestry, plant a mosaic of monoclonal blocks of up to 50 or more hectares of one single clone, rather than a mixture of clones. New selections are made continuously, with the expected "life-time" for the use in plantation forestry of any one clone of no more than 5 years (i.e. , in the best of cases, equivalent to 1 rotation);

(iv) Micropropagation in vitro is used generally to propagate material of particular value, followed by "classical" vegetative propagation methods to further increase the material; and in some cases for rejuvenation purposes. A notable exception to this is reported from USA (mass-propagation through in vitro methods),

however, on a very limited, experimental scale only.

(v) Most older (10-15 years+) introduced genetic material is of unknown origin. Returning to the original populations in Australia and selection of the best provenance(s) followed by selection and breeding, has generally given better results than further work on the unknown and often haphazardly introduced "land race". This point is accentuated by the fact that early introductions of eucalypts often originate from one mother tree only, rather than being a representative sample of a specific population with a wide range of inherent variation which can be used as a basis for local selections and further breeding. Commercial collections by seed dealers often still today suffer from this grave defect. The indispensable value of knowledge of both origin/provenance and number of mother trees represented in the material to be introduced into a country, cannot be overly emphasized;

(vi) The question of (i) selecting a frost resistant species/provenance as a basis for further selection and breeding for growth and yield, versus (ii) the breeding of frost resistance into a highly productive species/provenance, was discussed at length without much consensus. In some cases, intraspecific hybridization has been used to compromise the two, especially in countries like Brazil where rotations, and therefore breeding cycles (and results), are fast. In most cases, however, the expected occurrence of bad frosts versus rotation and expected yields must be considered, and an economically viable choice of genetic material made on calculated risks, on a case-to-case basis.

(vii) Although generally overcome to date (however, often at a considerable cost), insect and disease damage to eucalypts must be considered as a highly probable event if large plantations of single species are grown, especially if these are established in marginal conditions. Good examples of such damage are the stem canker (Cryphonectria cubensis syn. Diaporthe cubensis) in E. grandis in Brazil (now largely overcome by change of provenance, selection within the new provenance, and breeding); and the widespread damage by the borer, Phorocantha semipunctata in the Mediterranean, triggered by a series of drier-than-usual years in Tunisia/Morocco (the insect has recently also spread to Italy).

(viii) The recently steeply increasing use by florists in other continents of live branch material air-freighted from Australia for flower arrangements and as decoration, is seriously increasing the risk to forest plantations of introduced pests and diseases from Australia into earlier disease-free areas, and should be vigorously opposed in favour of local cultivation of such material to decrease this risk.

(ix) Recent taxonomic studies in Australia, to be published within the next few years in Flora Australiensis, will botanically decimate the genus Eucalyptus, and only maybe 1/5 of the present Eucalyptus species will in the future bear that name. Even with the compromise of continuing to refer to the species as "eucalypts", strong feelings were expressed in the meeting against this massive reorganization and changes in established nomenclature.

Christel Palmberg
Forestry Department
FAO, Rome

SYMPOSIA ON NATIVE SPECIES IN LATIN AMERICA

1. BRAZIL: CONGRESO NACIONAL SOBRE ESSENCIAS NATIVAS

In September 1982, a national symposium was held at Campos do Jordão, São Paulo (Brazil), on the distribution, ecology, variation, management and utilization of native species. The Proceedings of the meeting have recently been published as a special issue of Revista do Instituto Florestal (Vol. 16A, 1982; 2010 pp.; in Portuguese, some papers with English abstracts).

The three books contain a wealth of information on little - known tropical and subtropical tree and shrub species, bringing together basic information necessary for their conservation and sound utization. They convincingly demonstrate the applicability of proven methodologies, used for widely-grown plantation species, to the natural vegetation of Brazil, and encourage further studies and experiments in this respect.

The proceedings of the meeting are divided into 8 sections, as follows: (i) General (10 papers); Session 1. Anatomy, taxonomy, physiology, biochemistry and pharmacology (7 invited, 13 voluntary papers); Session 2. Phytogeography, ecology and inventory (5 invited, 33 voluntary papers); Session 3. Silviculture, management, agrosilviculture and improvement (7 invited, 59 voluntary papers); Session 4. Parasitology, pests and diseases, damage caused by inorganic factors (fire, pollution, floods, etc.) (2 invited, 5 voluntary papers); Session 5. Timber and pulping quality of native species (5 invited, 10 voluntary papers); Session 6. Legislation, economic aspects, planning (7 invited, 4 voluntary papers); Session 7. Wildlife, watershed management, national parks and protected areas (5 invited, 15 voluntary papers); Session 8. Land use planning and landscaping, urban forestry (6 invited, 14 voluntary papers).

The address of the Editorial Committee is: Instituto Florestal, Caixa Postal 1322, São Paulo (S.P.), 01000 Brazil.

2. MEXICO: PRIMERA REUNION NACIONAL SOBRE ECOLOGIA, MANEJO Y DOMESTICACION DE LAS PLANTAS DEL DESIERTO

In January 1980, a meeting was held in Monterrey, Mexico on the ecology, management and domestication of desert plants. The proceedings of the meeting were published as Special Publication No. 31 (November 1981; 527 pp.; in Spanish) of the Mexican Forest Research Institute, INIF (see address below).

Major chapters in the publication, each containing a number of papers, include information on the following species:

(i) Jojoba (Simmondsia chinensis); (ii) Yucca (Yucca spp.); (iii) Nopal (Opuntia spp.); (iv) Guayule (Parthenium argentatum); (v) Candelilla (Euphorbia antisyphilitica); (vi) Lechugilla (Agave lechugilla).

In addition, general information on ecology, taxonomy and management is included in one chapter; "Other species", in the last chapter, includes information on Jatropha, Atriplex, Nolina, Agave, Cucurbita, Larrea, Pistacea, Phoenix and Ceratonia spp.

The address of the publishing institute is:

Instituto Nacional de Investigaciones Forestales,
Avenida Progreso 5, Coyoacán 04110 D.F., Mexico

TECHNICAL INFORMATION FROM THE DANIDA FOREST SEED CENTRE, HUMLEBAEK (DENMARK)

The DANIDA Forest Seed Centre has recently started the publication of three new series of technical information: Technical Notes; Seed Leaflets; and Seed Handling Notes (published in English). To date, the following have been issued:

Technical Notes

No. 1. Measurement and Management of Tree Seed Moisture (prepared by F.T. Donner, June 1982. 10 pp.)

No. 2. The pilodyn wood density tester in provenance research (prepared by E.B. Lauridsen, Khongsak Pinyopusarek and Chamnong Kanchanaburagura, May 1983. 10 pp.).

No. 3. Climbing into the crown by way of the bole - 1: Portable ladders (prepared by H. Barner and K. Olesen, June 1983. 8 pp.).

No. 4. Nursery techniques for tropical and subtropical pines (prepared by I.A. Napier and R.L. Willan, September 1983. 22 pp.).

No. 5. Climbing into the crown by way of the bole - 2: (prepared by H. Barner Barner and K. Olesen, October 1983. 8 pp.).

Seed Leaflets

No. 1. Introduction to the series (prepared by R.L. Willan, June 1983. 1 pp.).

No. 2. Pinus caribaea Morelet (prepared by A.M.J. Robbins, June 1983. 21 pp.).

No. 3. Pinus oocarpa Schiede (prepared by A.M.J. Robbins, June 1983. 17 pp.).

Seed Handling in the Nursery

Pinus caribaea. 1983 (9 pp.).

Pinus oocarpa. 1983 (9 pp.).

The above Notes and Leaflets are available, at request, from:

DANIDA Forest Seed Centre
Krogerupvej 3A
DK - 3050 Humlebaek
Denmark.

HANDBOOKS ON DRY-ZONE SPECIES

In 1979, FAO's Forestry Department initiated a project on the conservation and better utilization of genetic resources of arboreal species for the improvement of rural living. Based on a list of species drawn up by the FAO Panel of Experts on Forest Gene Resources, and in accordance with the wishes expressed by the future cooperators, priority has been initially given to a few selected species mainly in the genera Acacia and Prosopis (see Forest Genetic Resources Information No. 10, pp.31-33; and p. 32 of this issue).

As the species included in the project have not in the past received much attention, little information and experience are available on fundamentally important aspects such as taxonomy and seed collection, handling, storage and treatment. Where such information exists, it is often scattered and difficult to obtain. Yet, the species present a number of serious problems in these specific fields: their taxonomy is often confused and a number of inter-breeding species complexes are thought to exist, making proper identification difficult and predictability of perfomance in subsequent generations impossible; seed collection and handling are difficult because of the scattered, often remote stands in which the trees occur, irregularity of good seed years, difficulty of extraction and uncertainties on safe but efficient methods of breaking the seed dormancy. Last, but not least, there are the problems caused by insects in all stages of development and storage of the seeds.

In order to remedy at least in part these identified information gaps, it was decided to prepare a series of handbooks within the framework of the project, aimed mainly at professional staff involved in actual field operations. The handbooks have been published in English, French and Spanish, and are listed bellow:

1. Taxonomy of Acacia Species (Based on the work of J.P.M. Brenan, UK). 47 pp.

2. Taxonomy of Prosopis in Mexico, Peru and Chile (Based on the work of P.F. Ffolliott and J.L. Thames, Tucson/Arizona USA). 31 pp.

3. Seeds of Dry Zone Acacias (Based on the work of J.C. Doran, J.W. Turnbull, D.J. Boland and B.V. Gunn, CSIRO/Australia). 92 pp.

4. Collection, Handling, Storage and Pre-treatment of Prosopis seeds in Latin America (Based on the work of P.F. Ffolliott and J.L. Thames, Tucson/Arizona USA) 45 pp.

5. Seed Insects of Acacia species (Based on the work of B.J. Southgate, UK). 30 pp.

6. Seed Insects of Prosopis species (Based on the work of C.D. Johnson, Flagstaff/ Arizona USA). 55 pp.

Copies of the above books are available from FAO's Forestry Department (Forest Resources Division, Forest Resources Management Branch), Via delle Terme di Caracalla, 00100 Rome, Italy.

RECENT LITERATURE OF INTEREST

(i) Conference and Workshop Proceedings[1/ 2/]

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Puebla, M. (Ed.). 1980 Proc. IV International Conference on Jojoba (Simmondsia chinensis), Hermosille, Sonora Nov. 1980. (Internat. Council on Jojoba, Gobierno del Estado de Sonora, Hermosillo, Sonora, Mexico). (492 pp.).

Withers, L.A. and Williams, J.T. (Eds.). 1980 Crop Genetic Resources: the Conservation of Difficult Material. Proceedings of Internat. Workshop held at the University of Reading, U.K., Sept. 1980. International Union of Biological Sciences, International Genetic Federation and International Board for Plant Genetic Resources. IUBS Publication Series B/42. (134 pp.).

Anon. 1981 Primera Reunión Nacional Sobre Ecología, Manejo y Domesticación de las Plantas Utiles del Desierto. Instituto Nacional de Investigaciones Forestales, Publicación Especial No. 31. (Avenida Progreso No. 5, Coyoacán 04110 México D.F.). (527 pp.)

Anon. 1981 1a Reunión Nacional Sobre Jojoba (Simmondsia chinensis). Publicación Especial No. 30, Instituto Nacional de Investigaciones Forestales (INIF). (Avenida Progreso 5, Coyoacán 04110 D.F., México). (276 pp.).

Anon. 1981 Reunión sobre problemas en semillas forestales tropicales. San Felipe, Bacalar, Quintana Roo, México (Oct. 1980). Publicación Especial No. 35, Tomo I. INIF, México (Instituto Nacional de Investigaciones Forestales, Avenida Progreso 5, Coyoacán 04110 México D.F.). (352 pp.).

Anon. 1981 Proceedings of the U.S. Strategy Conference on Biological Diversity, Nov. 1981. (Office of Food and Natural Resources, OES/ENR, Room 7819, U.S. Department of State, Washington D.C. 20520, USA). (126 pp.)

Anon. 1981 Collogue International AFOCEL/IUFRO sur la Culture "in vitro" des Essences Forestieres, Fontainebleau, France, août - sept. 1981. (AFOCEL, Domaine de l'Etançon, F-77370 Nangis, France). (363 pp., $US 17,50).

Gusies, R.P. and Kang, H.C. (Eds.). 1981 Research Needs in Tree Breeding, Proc. 15th North Am. Quantitative Forest Genetics Group Workshop, Coeur d'Alene, Idaho, 6-8 August 1981. (School of Forest Resources, N.C. State University, P.O. Box 5488, Raleigh N.C. 27650) ($US 3/-).

Huber, R.F. (Ed.). 1981 High-quality collection and production of conifer seed. Proceedings of a Workshop held Nov. 14, 1979 in Edmonton, Alberta. Information Report NOR-X-235. Canadian Forestry Service (Northern Forest Research Centre, 5320 - 122 Street, Edmonton, Alberta T6H 355, Canada). (88 pp.).

1/ Individual papers included in Proceedings will not be listed under (iii) or (iv).

2/ Throughout the list, addresses of publishers or authors are given in brackets after the reference, when-ever possible. Please write to these addresses directly, should you wish to have a copy of the publication/article in question.

Whitmore, J.L. (Ed.). Wood Production in the Neo-tropics via Plantations. Proceedings 1981 of an International Symposium held by the IUFRO S1-07-09 Working Group at the Institute of Tropical Forestry, Rio Piedas, Puerto Rico 8-12 September 1980. IUFRO/MAB/USFS. (USDA Forest Service, International Forestry, P.O. Box 2417, Washington D.C. 20013,USA). (393 pp.).

Anon. Population Genetics of Forest Trees. Proceedings of Symposium held in Helsinki, 1982 Finland 1981. In: Silva Fennica 16(2). (246 pp.).

Anon. Anais, 10a Conferencia Internacional de Biometria, Guarujá S.P., Brazil 6-10 1982 Agosto 1979 (Papers in English and Portuguese). (EMBRAPA /DID, Edificio Super, Center Venâncio 2,000, Quadra 08 - Bloco B No. 50 - SCS, Brasilia 70333 D.F., Brazil).

Anon. Seeds. Proceedings of FAO/SIDA Technical Conference on Improved Seed Production, 1982 Nairobi, Kenya June 1981. FAO Plant Production and Protection Paper No. 39. FAO, Rome Italy. (569 pp.; relates mainly to agricultural seeds).

Anon. IBPGR ad hoc Advisory Committee on Seed Storage. Report on First Meeting, Sept. 1982 1981 AGP:IBPGR/81/73. FAO/IBPGR, FAO, Rome, Italy.

Anon. Breeding Strategies, Including Multi-Clonal Varieties. Proc. IUFRO Joint 1982 Meeting of WPS on Genetics, Sensenstein (Escherode) Sept. 1982 (Lower Saxony Forest Research Inst., Dept. Forest Tree Breeding, D-3513 Staufenberg - Escherode, Fed. Rep. Germany) (238 pp., DMk 15).

Anon. Anais da Reunião Conjunta IPEF/Associadas "Potencialidade da Região Nordeste para 1982 a implantação de Florestas de Rápido Crescimento. Sér. Téc. V.3, N.10:1-125. Instituto de Pesquisas e Estudos Florestais. (Departamento de Silvicultura, ESALQ - Universidade de São Paulo, C.P. 9, Piracicaba 13.400 S.P., Brazil). (125 pp.).

Anon. Manejo y Mejoramiento del Bosque Cultivado: Curso de Actualización y 1982 Perfeccionamiento Profesional. (Facultad de Agronomía y Veterinaría de Esperanza, Universidad Nacional del Litoral, Santa Fé, Argentina). (230 pp.).

Anon. Algaroba. Trabalhos apresentados no I Simpósio Brasileiro Sobre Algaroba, 1982 realizado em Natal, R.N. 5-7 de outubro de 1982. Vols. I & II. Empresa de Pesquisa Agropecuária do Rio Grande do Norte S/A (Caixa Postal 188, Natal R.N., 59.000 Brasil). (407 + 96 pp.).

Heybroek , H.M., Stephan, B.R. and Weissenberg, K. von (Eds.). Resistance to Diseases 1982 and Pests in Forest Trees. Proceedings of the Third International Workshop on the Genetics of Host-Parasite Interaction in Forestry. Wageningen, 14-21 Sept. 1980. Centre for Agricultural Publishing and Documentation, Wageningen, Netherlands. (502 pp.).

Pollard, D.F.W.; Edwards, D.G.W.; and Yeatman, C.W. (Eds). Proceedings of the 18th 1982 Meeting of the Canadian Tree Improvement Association. Part 2: Symposium on Seed Orchards and Strategies for Tree Improvement, Duncan B.C. August 1981. (CTIA/ACAA, Canadian Forest Service, Petawawa National Forest Institute, Chalk River Ontario KOJ 1JO,Canada). (195 pp.).

Anon. 1983 Resource Documents on Nitrogen-Fixing Trees. A Series of 10 Resource Documents, prepared by a panel of 16 participants at Bellagio, Italy Sept. 1982. Nitrogen-Fixing Tree Association, Hawaii (P.O. Box 680, Waimanalo, Hawaii 96795, USA).

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(ii) Books

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Anon. 1982 Douglas-fir Genetic Resources. An Assessment and Plan for California. National Council on Gene Resources. California Gene Resource Programme (2855 Telegraph Avenue, Suite 216, Berkley, California 94705, USA). (275 pp.).

Anon. 1983 Pinus caribaea: wood properties and uses. Annotated Bibliography, covering literature from 1937 to 1980. Commonwealth Forestry Institute Annotated Bibliography No. F30 (South Parks Road, OX1 3RB Oxford, U.K.).

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NAS Mangium and Other Fast-Growing Acacias for the Humid Tropics. Innovations in
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Oakes, A.J. Leucaena Bibliography. (Economic Botany Laboratory, USDA, Beltsville,
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1983 (AGRICON - 325, Central Hotel Annexa, Mereweather Road, Karachi 4, Pakistan) (106 pp.).

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PLANT AND ANIMAL GENETIC RESOURCES NEWSLETTERS

The Plant Genetic Resources Newsletter is published under the joint authorship of the Plant Production and Protection Division of FAO, Rome and the International Board for Plant Genetic Resources; Animal Genetic Resources Information is published by FAO, Rome, under the joint auspices of FAO's Animal Production and Health Division and the United Nations Environment Programme (UNEP).

The following articles, which may be of interest to the readers of FGRI, have been published in recent issues of these two Newsletters:

1) Plant Genetic Resources Newsletter:

Nbr 49 (1982), pp. 19-21. "Pollen Preservation of Japanese Apricot and Mume", by M. Omura, N. Matsuta, T. Akihama and M. Yoshida.

- pp. 34-36. "A Documentation System for the Nordic Gene Bank" by F. Yndgaard.

Nbr 50 (1982), pp. 9-13. "Fruit Collecting in Baltistan, Pakistan", by M.S. Bhatti, Israr-ul-Haq, N.I. Hashmi and Z. Ahmed.

Nbr 52 (1982), pp. 7-9. "Browse and Forage Legume Collecting in Mexico", by R. Reid.

Nbr 54 (1983), pp. 14-17. "Fruit and Vegetable Collecting in Nigeria", by T. Badra, A.A.O. Ehema and P. Nath.

- pp. 28-31. "A Procedure for Packing Long-Term Storage Seed", by F. Yndgaard.

Nbr 55 (1983), pp. 2-15. "Recent Developments on Applying Sequential Analysis to Gene Bank Seed Viability Monitoring Tests", by R.H. Ellis and M. Wetzel.

- pp. 28-31. "Conservation of Variation in Tropical Tree Species", by C. Palmberg.

2) Animal Genetic Resources Information:

Nbr 1/83, pp. 24-26. "Les parcs Naturels de France et la Conservation Génétique Animale", by A. Audiot.

The Plant Newsletter is available from the Plant Production and Protection Division, IBPGR Secretariat, FAO, Via delle Terme di Caracalla, 00100 Rome, Italy; the Animal Newsletter from the Animal Production Service, Animal Production and Health Division, FAO (address as before).

NEWS ON SPECIES-SPECIFIC OR REGIONAL NEWSLETTERS

(i) Casuarina Working Group Newsletter

Compiler: M.H. El Lakany
Department of Forestry and Wood Technology
Faculty of Agriculture
Alexandria University
Egypt

(ii) BIOTROP Newsletter (SEAMEO Regional Centre for Tropical Biology)

Compiler: Director of Biotrop
Attention: Clearing House Manager
P.O. Box 17
Bogor
Indonesia

(Quarterly; Subscription Fee US$ 9, or exchange basis)

(iii) Heritage Newsletter

Compiler: Australian Heritage Commission
P.O. Box 1567
Canberra City, A.C.T. 2601
Australia

(Quarterly).

IUFRO SPECIAL COORDINATOR FOR DEVELOPING COUNTRIES

At the recommendation of the last IUFRO World Congress, a coordinator has recently been appointed to coordinate and help promote research in developing countries, within the framework of IUFRO (International Union of Forestry Research Organizations). The new coordinator, Mr. O. Fugalli (former Chief of the Forest Resources Development Branch of FAO's Forestry Department and Associate Secretary-General of the Eighth World Forestry Congress, Jakarta), can be contacted at the IUFRO Secretariat, Schönbrunn, A-1131 Vienna, Austria.

PROPOSAL FOR THE ESTABLISHMENT OF AN INTERNATIONAL GENEBANK AND THE PREPARATION OF A DRAFT CONVENTION FOR PLANT GENETIC RESOURCES

The above questions are, at the time FGRI No.12 goes to print (November 1983), being discussed at the 22nd Session of the FAO Conference, by the 156 Member Nations of the Organization. The discussions are carried out as a follow-up to Resolution 6/81 adopted by the 21st Session of the Conference in November 1981; this Resolution, which was subsequently discussed at the meeting of the Committee of Agriculture (COAG) in March 1983 and elaborated through a Working Group of 13 countries put up by the Director General of FAO following the COAG meeting to assist him in further studies in the matter for reporting to the present Session of the Conference, requests the Director General to:

(i) examine and prepare the elements of a Draft International Convention on plant genetic resources; and

(ii) prepare a study on the establishment of an International Gene Bank for Plant Genetic Resources of agricultural interest, under the auspices of FAO.

The present discussions are based on Conference Document C 83/25 (August 1983), "Plant Genetic Resources. Report of the Director General" (FAO, Rome).

An account of these discussions and possible decisions and their implications for work in forest genetic resources, will be given in the next issue of FGRI.

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III. (cont.)

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IV. (cont.)

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