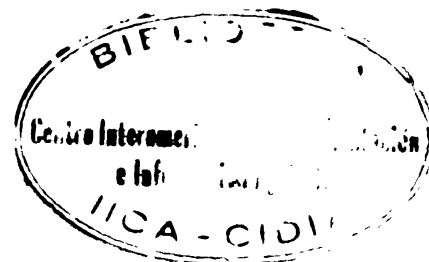


EARLY GENETIC VARIATION OF 16 PROVENANCES OF *ACACIA MANGIUM* IN TURRIALBA, COSTA RICA

R. Salazar
CATIE, Turrialba
COSTA RICA



INTRODUCTION

A member of the Leguminosae family and Mimosoideae subfamily, *Acacia mangium* Eildd was previously classified as *Acacia mangium* Rumph., commonly known as brown salwoo in Australia, Tongke Hutan in Indonesia and Mangium in Central America. Naturally it grows in the north of Queensland, Australia, in the west of Papua New Guinea and in the Indonesian provinces of Irian Jaya, Maluku and Sabah from sea level to 800m. The precipitation varies from 1,500 to 4,500mm a year, with a dry period from July to October. The maximum temperature varies from 31°C to 34°C and the minimum from 12°C to 16°C. The species is usually found on acidic soils (pH 4.5-5.5) of low fertility, low in phosphorus, shallow and sandy and in some sites it tolerates passing floods.

Due to adaptation to the humid tropics and sites low in fertility or with physical limitations, it is an excellent alternative for large expanses of land that now lie abandoned on account of low productivity. This study is an attempt to quantify the genetic variation between provenances, in respect of seed characteristics and variables of growth at the nursery level, so that they may be related to the field behaviour of the trees.

In Central America, it has been introduced at an experimental level, firstly in Costa Rica in 1979, then in Panama and Honduras. In Costa Rica, following the initial results of the experimental plots, the species has been studied more extensively.

DESCRIPTION OF THE TRIAL

This was subdivided into three stages: a study of seed characteristics, seedling characteristics at nursery level, and in the last stage, which is still underway, the characteristics of the trees at field level are being studied.

The first two stages took place in the experimental nursery at the Tropical Agronomical Centre for Research and Training (CATIE) in Turrialba, Costa Rica, and the field trial or third stage was established in 1984 in four sites in Costa Rica, with the cooperation of CATIE and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). Table 1 summarises the information of the 16 provenances supplied by CSIRO Forest Research Division.

The characteristics of the seeds were studied under a randomised complete block design, with 16 provenances, four replications, and 25 seeds per provenance; and to quantify the variation between provenances of length (e), width (d) and area (a) of the seeds, a mixed statistical model was used.

$$Y_{ij} = N + P_i + R_j + E_{ij}$$

During the 3.5 months in the nursery were studied under a randomised complete block design, with 16 provenances, five replications, five plants, with two buffer lines; and the same mathematical model was used to assess variation in total height (ht) every 15 days and basal diameter (db) after 106 days.

To study the morphological variation of the true leaves at 3.5 months, a randomised complete block design was used, with 16 provenances, five replications,

five trees per plot and one leaf per tree. The same mathematical model was used to study the variation in number of true leaves (hy) per plant, 76 and 106 days after germination, leaf length (lh) in cm, leaf width (ah) and foliar area (af) in cm².

Table 1. Provenance site origin

Provenance	CSIRO Code	CATIE Code	Lat. (°S)	Long. (°W)	Alt. (m)	Seeds /kg
Rex Range near Mossman (QLD)	12992	1547	16°30'	145°32'	30	107800
Claudie River (QLD)	13229	1559	12°44'	143°13'	60	90333
Cowley Beach Road (QLD)	13232	1548	17°41'	146°05'	05	158500
Walsh's Pyramid (QLD)	13233	1549	17°06'	145°48'	20	96000
Trinity Inlet (QLD)	13234	1550	17°02'	145°48'	20	104833
Mourilyan Bay (QLD)	13235	1551	17°35'	146°05'	20	120167
Kurrimine (QLD)	13236	1552	17°46'	146°05'	10	149333
El Arish (QLD)	13237	1553	17°50'	146°01'	20	138000
Tully Mission Bch Rd (QLD)	13238	1554	17°56'	146°02'	70	120333
Syndicate Rd Tully (QLD)	13239	1555	17°55'	145°52'	50	136000
Ellerebech Rd Cardwell (QLD)	13240	1556	18°14'	145°58'	60	98333
Broken Pole Creek (QLD)	13241	1557	18°21'	146°03'	50	81500
Albergowric SF (QLD)	13242	1558	18°26'	146°01'	60	85667
W. of Morehead (PNG)	13459	1560	08°45'	141°18'	30	89333
Piru, Ceram, Indonesia (IND)	13621	1562	03°04'	128°12'	150	145000
Oriomo River (PNG)	13460	1561	08°50'	143°08'	10	86167

* Evaluated in Costa Rica.

CONCLUSIONS

The results indicated that considerable genetic variation exists between the sources of seed in seeds and seedling traits. Nevertheless, on the basis of the available information of the sites of origin (Table 1), it was not possible to determine any kind of relationship, since there were provenances which had the best growths in sites with high and low latitudes, and in sites with high and low altitudes. It will be very important in the future to consider other characteristics of site such as climate and soil, and relate them to provenance results.

Even though large differences were found between provenances with respect to foliar area per tree, this does not appear to be influencing the growth of the seedling at nursery level. It will be very interesting to determine if this growth is more influenced by the quantity of nitrogen fixing nodules.

As the initial growth seems to be constant for each provenance during the nursery stage, this should be related to growth in the field; if this is so, it could be a very important initial selection mechanism.

In future studies, the possibility of including material from the complete range of the natural distribution of the species should be considered, taking into consideration not only the latitude, but the elevation and climatical characteristics such as precipitation and temperature.