A NOTE ON GENETIC VARIATION IN SEEDS AND SEEDLINGS OF FIVE PROVENANCES OF *ACACIA AURICULIFORMIS*

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Acacia auriculiformis A. Gunn. ex Benth., a vigorous species of Papua New Guinea, the islands of the Torres Strait, and northern Australia, was first introduced into south China Botanical Garden, Guangzhou from southeast Asia as an ornamental tree in 1961 (Xu & Huo 1982). This legume (Mimosoideae) is an important afforestation species in southern China because it grows fast on a variety of sites. It has been widely planted for fuelwood production and environmental management (Zheng & Huang 1982, NAS 1983, Huang 1985, Pan & Yang 1987). Although there are a number of studies on its performance, cultivation and use, its genetic variation has received little attention. A preliminary study on the variation of seeds and seedlings of five provenances from Queensland, Australia, is reported here.

Seeds of five provenances of *A. auriculiformis* were supplied by the Australian Centre for International Agricultural Research (ACIAR) through the CSIRO Tree Seed Centre in Canberra, Australia and were stored for four months in plastic bags at an average temperature of 7°*C* and relative humidity of 78%. Details of the seed sources are given in Table 1.

A completely randomized block design with six replications was used. For seed assessment, each plot consisted of 12 seeds and a total of 360 seeds was used for the five provenances. For seedling assessment, each plot consisted of eight plastic bags (1 seedling per plastic bag), and a total of 240 seedlings was used for the five provenances. The seedlings were measured at the same age of four months old; only eight seedlings per plot which emerged on the same date were assessed.

Table 1. Provenance details of the seedlots of *A. auriculiformis*

CSIRO Division of Forest Research seedlot number	Collection locality in Queensland	Latitude (S)	Longitude (E)	Altitude (*m*)	Number of parent trees
15477	Morehead River	15°02'	143°40'	70	9
15483	Archer River	12°26'	142°57'	100	5
15680	41.1 *km* E of Weipa	12°43'	142°07'	30	8
15697	S of Coen, Cape York	14°07'	143°16'	160	10
15985	Mt. Molloy, Rifle Creek	16°41'	145°17'	380	10

The seed traits assessed were height. length. width, length x width and thickness. The seedling traits assessed were total height, basal diameter, root length, shoot fresh weight, root fresh weight and total fresh weight at four months after sowing. The weights were measured using an electronic weighing balance (precision 0.01 *mg*) and seed sizes with a vernier caliper (precision 0.02 *mm*).

Seedlings were raised in the nursery of the Research Institute of Tropical Forestry in Guangzhou (23°08'N and 113°19'E) in April 1987. The seeds were treated using hot water (95°*C*) for 5 *min*, replaced with tap water and soaked for 24 *h* before sowing directly into 100 x 150 *mm* plastic bags filled with a mixture of 40% sub-soil, 40% pond sludge and 20% burnt earth (top soil with some weeds that was burnt completely). The plastic bags, with one seedling per bag, were placed on the nursery bed at a spacing of 30 x 30 *cm*. The bags were free

draining. The seedlings were kept in a greenhouse equipped with some temperature control to lessen the effects of ambient maxima and minima for three months after sowing and then placed in the open. The plants were watered once a day (evening) except on days when it rained.

A laboratory germination test using sterilized sandy medium in germination trays at a constant temperature of 25°*C* with a 12-*h* alternating period of light (cool white, fluorescent) and dark was also carried out.

Germination started for all provenances three to four days after sowing, and by the twenty-fifth day all viable seeds had germinated (Figure 1). For all provenances more than 70% germination occurred within twenty days after sowing, except the Weina Provenance which only reached 70% on day 30.

The analysis of variance shows that the seed traits assessed were not significantly different between provenances except seed weight (P = 0.05). With this exception, only a small amount (1 to 5%) of the total variation detected was between provenances; more than 72% of the variation was within provenances. The greatest variation (Table 2) was found in seed weight; there was a difference of 0.42 *mg* (26%) between the heaviest seeds (Weina provenance: 4902 seeds kg^{1}) and the lighest seeds (Coen provenance: 6173 seeds kg^{1}). Seed length x width was another trait with large variation, with a difference of 1.8 mm^2 (8%) between the largest seeds and the smallest seeds (Weina provenance c.f. Coen provenance). Weina provenance had the biggest seeds, being significantly different from the others (Student-Newman-Keul test, P = 0.05).

The seedling analysis of variance shows significant differences in the six traits assessed. As with the seeds, most of the variation was found within provenances. The shoot fresh weight showed the largest variation with a difference of 7.34 *g* (134%) between the heaviest seedlings (Coen provenance) and the lightest seedlings (Morehead River provenance) (Table 3).

Seedling dimensions did not correlate with seed measurements (Table 4).

It was difficult to relate the trial measurements to any of the site parameters of the seed collection localities, namely latitude, longitude or altitude. This could be due to the fact that small numbers of provenances were used and/or that no such interrelationships occur. Nevertheless, the preliminary study shows that variation does exist between provenances, at least for the traits assessed. It would be valuable if more provenances are included in the study.

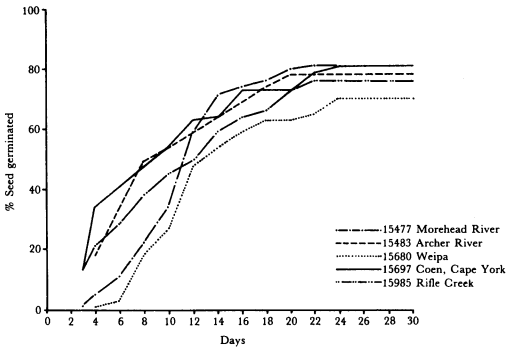

Figure 1. Rate of germination for five provenances of *A. auriculiformis* seeds

Table 2. Summary of averages (x) and coefficients of variations (cv) for five seed traits assessed in *A. auriculiformis*

Seedlot origin	Seed traits									
	Weight		Length		Width		Length x width		Thickness	
	x (*mg*)	cv (%)	x (*mm*)	cv (%)	x (*mm*)	cv (%)	x (mm^2)	cv (%)	x (*mm*)	cv (%)
Morehead River	1.63	23	4.66	9	3.38	9	15.8	15	1.53	10
Archer River	1.75	23	4.68	12	3.36	11	15.8	20	1.45	14
Weipa	2.04	25	4.84	12	3.50	10	17.0	19	1.49	15
Coen	1.62	22	4.49	9	3.59	8	15.2	14	1.41	12
Rifle	1.91	23	4.64	10	3.38	8	15.7	16	1.58	11

Table 3. Summary of averages (x) and coefficients of variations (cv) for six seedling traits assessed in *A. auriculiformis*

Seedlot origin	Seedling traits											
	Total height		Basal diamater		Root length		Shoot fresh weight		Root fresh weight		Total fresh weight	
	x (*cm*)	cv (%)	x (*mm*)	cv (%)	x (*cm*)	cv (%)	x (*g*)	cv (%)	x (*g*)	cv (%)	x (*g*)	cv (%)
Morehead River	25.0	32	3.3	24	39.0	26	5.47	57	1.78	72	7.25	59
Archer River	30.3	33	3.7	24	39.0	27	8.60	63	3.12	51	11.72	57
Weipa	32.9	25	4.3	20	41.6	27	12.16	51	3.95	47	16.11	48
Coen	40.1	21	4.5	16	50.1	27	12.81	40	4.08	39	16.89	39
Rifle Creek	35.7	22	4.1	17	49.2	23	10.18	39	3.19	36	13.34	37

Table 4. Correlations between seed and seedling traits of *A. auriculiformis*

Seed traits	Seedling traits					
	Total height	Basal diameter	Root length	Shoot fresh weight	Root fresh weight	Total fresh weight
Weight	0.1160	0.3586	-0.0033	0.4010	0.3997	0.4007
Length	-0.4707	-0.1617	-0.6127	-0.0807	-0.0356	-0.0699
Width	0.1065	0.4572	-0.0841	0.5034	0.4776	0.4996
Length x width	-0.3022	0.0469	-0.4787	0.1232	0.1485	0.1302
Thickness	-0.3545	-0.3654	-0.0122	-0.4226	-0.5137	-0.4481

All not significant

Acknowledgements

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LETTERS TO EDITOR

Dear Editor,

In the paper "Effect of nitrogen and phosphorus on the early growth of three exotic plantation species in Peninsular Malaysia" by Wan Rasidah *et al.*, JTFS 1(2): 178 - 186, the authors have merely carried out an analysis of variance (mentioned in the paper) and presumably partitioned the treatment sum of squares for several comparisons (not mentioned in the paper) and found that some fertilizer treatments are better than others. This method of analysing data is appropriate for several discrete entities but not suitable for factorial experiments such as the one carried out by the authors. The correct statistical analysis should be the response curve (for this experiment) or response surface (for more than one factor with more than two levels) methods, which are well documented in statistical textbooks.

Also, several botanical names were printed or written wrongly if the International Code of Botanical Nomenclature is adhered: In paragraph two of text, *Pinus caribea* var Hondurensis should be *Pinus caribaea* var hondurensis; and in References, *Eucalyptus obliqua* (L'Herit) in the first reference should be *Eucalyptus obliqua* L'Herit.

Most of the Australian acacias (including all species bearing phyllodes) have been renamed *Racosperma* as a result of the work by Pedley (1986). Even though the names *Acacia mangium, A. auriculiformis et cetera* are still acceptable to foresters, an editorial note on the nomenclatural change would help those who are more familiar with the new names.

Thank you.

References

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Yours sincerely,

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ERRATA

In JTFS 1 (3), the correct text of:

Page 211, Table 6, "Bruijnzeel 1988" should read "Bruijnzeel 1989".
Page 235, line 28 "in example also during the dry season," should read "that is, also during the dry season."