TAINTON, N. M., GROVES, R. H. and NASH, R. (1977)—Time of mowing and burning veld: short term effects on production and tiller development. *Proceedings of the Grassland Society of Southern Africa* 12: 59–64.
TAINTON, N. M. and MENTIS, M. T. (1984)—Fire in grassland. *In* "Ecological Effects of Fire in South African Systems". Eds P. de V. Booysen and N. M. Tainton (Springer-Verlag: Berlin), pp. 117–147.
WEST, O. (1965)—Fire in vegetation and its use in pasture management with special reference to tropical and subtropical Africa. Mimeographed Publication No. 1/1965 (Commonwealth Bureau of Pastures and Field Crops: Hurley, U.K.)

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POTENTIAL OF *ALBIZIA LEBBECK (MIMOSACEAE)* AS A TROPICAL FODDER TREE A REVIEW OF LITERATURE

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ABSTRACT

Albizia lebbeck *(Indian siris), extensively grown as a shade tree in Queensland, has attributes which make it a potentially valuable species for pasture improvement. Literature on environmental requirements, establishment and production is reviewed. Indian siris is adapted to a wide range of environmental conditions, nodulates readily and its leaves provide a palatable, high-protein fodder. It is concluded that Indian siris can make an important contribution to plant and animal production from tropical pastures and could also be of special value in areas with salinity problems.*

INTRODUCTION

Various trees have been described as fodder trees. This implies that one or more components of such trees can be used directly as feed for domestic animals. It is likely that many of these trees could effectively improve the long term production of associated pasture species and thereby increase total pasture production. Balancing forage nutrient quality during the dormant season of grass, providing wildlife habitat and shelter for livestock, control of desert encroachment, maintaining soil fertility and stability and increasing soil nitrogen in the case of nitrogen fixing species are discussed as the advantages of fodder trees and shrubs by Glencross (1978) and McKell (1980). The fact that the climax vegetation in tropical and subtropical regions is often woodland or savannah-woodland, despite moderately high populations of herbivorous animals, suggests that a tree or shrub may have an ecological advantage over a fully herbaceous sward (Gray 1970). *Albizia lebbeck* (Indian siris), a well-known leguminous fodder tree with very palatable leaves (Negi 1977; Anonymous 1980a) is potentially one of the most suitable fodder trees for Queensland. While Indian siris is widely known in Queensland (Everist 1969), no commercial use of this fodder tree has yet been reported in this state. This paper reviews various aspects of the growth and the productivity of Indian siris, concluding with an assessment of its potential for wider use in Queensland.

BOTANY

Indian siris is native to tropical Asia and Africa, and possibly Cape York Peninsula in Queensland (Everist 1969; Anonymous 1979). *Albizia* is a large pantropical genus containing 150 species, mainly shrubs and trees, closely allied to and often mistaken for *Acacia* (Allen and Allen 1981). *Albizia lebbeck* is a moderate to large sized deciduous tree, which can reach a height of 30 m. Size and shape depend on locality. In the open the shape is spreading and low branching, but in dense forest the bole is straight. The foliage, markedly pale green when young and grey-green at maturity, consists of bipinnate leaves comprising 2–4 pairs of pinnae each 50–100 mm long and with 3–11 pairs of leaflets up to 50 mm long. Cream coloured flowers are arranged in large heads 50 to 90 mm across on peduncles up to 100 mm long, resembling open, almost hemispheric pompoms. It is similar to *Acacia* in having 10 or more prominent stamen filaments per flower, but dissimilar in that these filaments are fused into a short staminal tube near the base (Anonymous 1970; Skerman 1977; Stanley and Ross 1983).

CLIMATE AND SOIL

In its native regions of India, Burma and the Andaman Islands, Indian siris grows in a great variety of climates and soils. It grows in the tropical rainforests of Burma and in the Himalayan valleys up to an altitude of 1600 metres, covering an annual rainfall range of 600–2500 mm and a temperature range from a mean monthly minimum of 5°C in winter to a mean monthly maximum of 46°C in summer (Streets 1962; Anonymous 1979).

In Pakistan, Indian siris grows well, but is cut back by frost in irrigated desert plantations. Streets (1962) noted that it is found in the valleys of the dry zone grasslands in Fiji and it regenerates on a variety of soils in an area with more than 1500 mm annual rainfall in Mauritius.

In India, in a low rainfall situation (400 mm annually), Indian siris was successfully established in shifting sand dunes and in shallow soil (22.5 cm deep) overlying hard calcareous pans (Kaul and Chand 1979).

It has been observed that Indian siris tolerates sea spray and that it has survived in soils with up to 0.11 per cent salt and with a pH of 8.7 (Anonymous 1979). Studies by Tomar and Yadav (1982) indicated that Indian siris would grow satisfactorily on a soil having an electrical conductivity value of 7.0 mmhos/cm and a sodium adsorption ratio value of 30.

In the researched literature the biology of the extensive adaptability of Indian siris was not discussed. However it seems likely that this ability is inherent to the species *per se* and not the result of the development of a large number of ecotypes, for in Queensland Indian siris is grown over a wide range of environments (Everist 1969). It is most probable that seed for these trees was derived from a limited number of localities.

Although Indian siris prefers moist conditions (Anonymous 1980a), it would appear that in Queensland it is suitable for regions roughly east of the 400 mm isohyet, while the climatic conditions in Cape York Peninsula and the area east of the Great Dividing Range are similar to those of its natural habitat in South East Asia (Anonymous 1980b).

SEED PRODUCTION, ESTABLISHMENT, YIELDS AND NODULATION

The following details on reproduction and establishment are based on forestry experience (Anonymous 1970). Indian siris produces abundant seed crops almost annually. Untreated seed usually commences germination 5 days after sowing, but further germination of seed can continue for months. However soaking in cold water for 48 hours or submerging seed in boiling water and allowing it to cool for 24 hours improves germination. Establishment may be by direct sowing, but growth is slow in the first year. In the following years growth is faster resulting in heights of up to 4 m after 4 years. Another method is stump planting of 15 month old plants, where plants are pruned back to 5 cm shoot and 25 cm root. This method gave up to 100 per cent survival and satisfactory growth subsequently, with plants reaching a height of 5 m after 4 years.

Misra and Singh (1981) found that seed scarification with concentrated sulphuric acid increased germination by 50% and that under nursery conditions the optimum depth for sowing was 2 cm. Under low rainfall conditions in India, where seedlings were damaged by termites, transplanting 9–12 month old seedlings resulted in a higher survival and greater average tree height than direct sowing after 12 years (Muthana *et al.* 1976).

In northern Gujarat, India, an average height of 0.7 m was recorded one year after planting seedlings, while 3 years after planting the average height was 3.99 m, compared with 3.33 m for *Eucalyptus camaldulensis*, which was the best eucalypt species for height (Cornelius *et al.* 1977). Kaul and Chand (1979) found that under arid conditions planting 24 month old seedlings gave a higher survival rate than 6, 9 and 12 month old seedlings.

In northern Thailand, Gutteridge and Akkasaeng (1985) recorded average heights of 1.59 m and 2.08 m, and average DM yields of edible material (leaves plus young stem) of 130 g and 237 g per plant for Indian siris and leucaena (*Leucaena leucocephala* cv. Cunningham) respectively, 6 months after the plants had been transplanted as 6 week old seedlings. There is anecdotal evidence that forage production may be prolific (Anonymous 1980a) and Pradhan and Dayal (1981) measured an annual leaf litter yield of 5000 kg ha^{-1} from Indian siris as compared with 1800 kg ha^{-1} from a *Eucalyptus* hybrid and 8000 kg ha^{-1} from *Acacia arabica*.

Although Indian siris is well known as a fodder tree it is only for its timber/fire wood production that more accurate yield data are available (Anonymous 1970; Kalla 1977; Kalla *et al.* 1978). Raina (1984) found that with an average annual rainfall of 326 mm Indian siris produced 11.4 kg fuel wood per tree after 8 years. This compared with 19.7 kg for *Acacia tortilis* and 3.7 kg for *Acacia nilotica*, indicating that even under very low rainfall conditions Indian siris performs relatively well.

Allen and Allen (1981) noted that *Albizia* species have potential as soil improvement plants because they nodulate abundantly. Nodulation studies by Basak and Goyal (1975; 1980a and b) identified that Indian siris is not rhizobium specific and could nodulate with native rhizobia, although more nodules were produced when inoculated with its own isolate. These studies also showed that the isolate from Indian siris belonged to the cowpea group and had optimum nodulation at a pH between 6.0 and 7.0 and at a temperature between 30 °C and 35 °C. Also, the isolate could tolerate a solution of 3% sodium chloride.

PESTS AND DISEASES

In the reviewed literature there was no mention of serious non-vertebrate pests or diseases. The susceptibility of seedlings to termite attack (Muthana *et al.* 1976) has already been mentioned and in India some fungal diseases attack Indian siris leaves and pods (Anonymous 1980a).

CHEMICAL COMPOSITION AND DIGESTIBILITY

Indian siris leaves are high in protein (Table 1) and compare favourably with the leaves of *Acacia aneura* (mulga) and *Geijera parviflora* (wilga), which are two of the most prominent native pasture trees in Queensland (Everist 1969). Material collected from Indian siris trees growing near "Brian Pastures" Pasture Research Station at Gayndah, south-east Queensland, had crude protein concentrations of 23.1% in young leaves, 18% in mature leaves and 10.4% in leaf litter (J. H. Prinsen, *unpublished data*).

Dry matter digestibilities are very similar for *Albizia lebbeck*, *Acacia aneura* and *Geijera parviflora* (Table 1).

Using the nylon bag dry matter digestibility technique, Bamualim *et al.* (1980) tested leaf digestibility in 27 accessions of tropical browse plants. When ranked in order of decreasing digestibility, the two Indian siris accessions were ranked 15th and 19th, compared with 3rd and 7th for *Leucaena leucocephala* and 14th for *Cajanus cajan*. However Indian siris had the highest digestibility of edible stem. In this study it was found that fibre content and digestibility were negatively correlated, perhaps explaining the rather low digestibility in Indian siris.

Crowder and Chheda (1982) observed that low digestibility may also be caused by tannins, but Lohan *et al.* (1983) found only a low concentration of total tannins and no

TABLE 1

Chemical composition (% of dry matter) and digestibility of the leaves of some fodder trees

Species	Crude protein	Crude fibre	Nitrogen free Extract	Ash	Ca	P	Mg	Digestibility	
								Crude protein	Dry matter
Albizia lebbeck[1]	29.2	25.3	43.8	7.5	1.8	.2	.5	—	—
,, ,, [2]	16.8	—	—	—	—	—	—	69	49
,, ,, [3]	16.5	32.0	36.5	10.5	2.4	.25	—	60	44
Acacia aneura[4]	10.6–13.2	23.8–28.9	54.4–55.0	3.6	—	—	—	—	35–43
Geijera parviflora[4]	14.8–16.7	9.1–12.7	8.1–66.0	7.8–9.3	—	—	—	—	48–61

References: 1. Skerman 1977; 2. Negi 1977; 3. Gupta 1981; 4. McDonald and Ternouth 1979

condensed tannins, which are mainly responsible for reduced protein utilization, in the leaves of Indian siris. Gupta (1981) reported that the addition of molasses to leaves of Indian siris significantly increased nitrogen retention in sheep.

THE POTENTIAL OF ALBIZIA

The need for persistent legumes to lift the productivity of grazing land in tropical and subtropical regions has long been recognized. Their use is regarded as an economical way to increase available soil nitrogen (Henzell 1977; Vallis 1978; Johansen and Kerridge 1979) and thus pasture productivity.

However there is not a wide suite of persistent legumes available for Queensland. Siratro (*Macroptylium atropurpureum*) has proved productive in the 650–1000 mm rainfall spear grass zone, where it is not subjected to severe grazing pressure during periods of active growth (Jones and Jones 1978). Leucaena (*Leucaena leucocephala*) will grow in subcoastal regions, but is damaged by frost (D. G. Cooksley, *personal communication*), while fine stem stylo (*Stylosanthes guianensis* var. *intermedia*) is successful on well drained sandy soils (Bowen and Rickert 1979). Other *Stylosanthes* cultivars and accessions have promise for large areas of Queensland, but some have shown susceptibility to anthracnose (*Colletotrichum gloeosporoides*) (Anning 1980; Bishop *et al.* 1980; Graham *et al.* 1982). It is obvious that more legumes are needed to ensure a stable higher production in the future and that tree legumes should be considered. Once established, adapted tree legumes will persist for many years and simplify grazing management considerably by not being subject to overgrazing.

Brewbaker *et al.* (1983) published a list of 44 economically important nitrogen fixing tree (NFT) species, which was prepared for the Bellagio (Italy) workshop on NFT germplasm. By selecting from this list the non-thorny fodder species, which were suitable for arid, semi-arid or sub-humid tropics, only 6 species were found to have potential as a fodder tree in subcoastal Queensland and of these only two species, leucaena and Indian siris, have been successfully tried in Queensland (Everist 1969; Anonymous 1972; Wildin 1980).

Indian siris in particular has potential in the Queensland environment. Everist (1969) states that Indian siris is commonly grown as a shade tree in western Queensland, indicating that it is well adapted to this region. It produces a considerable amount of leaves which are shed during winter (Anonymous 1970). These may then be eaten by cattle (Everist 1969), providing feed during a critical time of the year. The chemical composition data from the Indian siris trees near "Brian Pastures" suggest that fallen leaves have a crude protein concentration slightly above 10% (J. H. Prinsen, *unpublished data*), indicating that the fallen leaves could considerably improve the diet of cattle grazing native pasture during winter. If green leaves are required during summer or autumn the branches may be lopped, as Indian siris tolerates heavy pruning (Anonymous 1979). The response to heavy pruning of Indian siris was observed near

"Brian Pastures", where six trees, all older than 10 years, were pruned back close to the main stem. All these trees regrew rapidly with one tree producing 44 shoots of up to 3.5 m length within 3 months (J. H. Prinsen, *unpublished data*). Whyte *et al.* (1953) reported that Indian siris is often cut frequently in Brazil, and then behaves as a herbaceous plant. There are also indications that Indian siris is more frost resistant than leucaena (Anonymous 1983) and it is important to note that the reviewed literature does not mention any undesirable side effects from the consumption of Indian siris leaves or pods.

Sommen (1981) refers to evidence which suggests that the change of microclimate resulting from planting trees can increase pasture herbage yield by up to 100 per cent in drought years. Apart from increasing pasture production, fodder trees may improve animal production by protecting cattle against climatic extremes (Sommen 1981; Daly 1984).

More effort is warranted to explore the potential of fodder trees, in particular Indian siris, for the pastoral industry. Indian siris requires a different method of establishment from that for herbaceous legumes, but it seems likely that forestry techniques, used successfully to establish leucaena, may prove suitable for the establishment of Indian siris. Long term but necessary research to fully exploit the potential of Indian siris and other fodder trees would include study into the interaction between Indian siris and the various herbaceous pasture species, and comparison of Indian siris with other potential fodder trees.

Apart from its potential in pasture production, Indian siris has some other attributes which make it valuable to landholders in general. Its soil-binding ability (Anonymous 1980a) and tolerance to saline soil conditions make Indian siris useful for soil conservation purposes (Sommen 1981). The timber from Indian siris is suitable for furniture production and the honey from its flowers is of high quality (Anonymous 1980a). This means that Indian siris could play a role in the diversification of the rural industry in the drier regions of Queensland.

Over the last decade rural producers have become increasingly interested in planting trees as a long term measure to improve production. Indian siris appears to be one of the most suitable species for this purpose.

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REFERENCES

ALLEN, O. N. and ALLEN, E. K. (1981)—Albizia. *In* 'The Leguminosae'. (University of Wisconsin Press: Madison), pp. 30–32.

ANNING, P. (1980)—Pastures for Cape York Peninsula. *Queensland Agricultural Journal* **106:** 148–171.

ANONYMOUS (1970)—Kokko (siris). Indian Timbers Information Series No. 6, Forest Research Institute and Colleges, Dehra Dun, India.

ANONYMOUS (1972)—"The Use of Trees and Shrubs in The Dry Country of Australia". (Forestry and Timber Bureau, Department of National Development: Canberra), pp. 197–207.

ANONYMOUS (1979)—Albizia species. *In* "Tropical Legumes: Resources for the Future". (National Academy of Sciences: Washington D.C.), pp. 171–184.

ANONYMOUS (1980a)—*Albizia lebbeck*. *In* "Firewood Crops". (National Academy of Sciences: Washington D.C.), pp. 110–111.

ANONYMOUS (1980b)—*In* "Queensland Year Book 1980". (Australian Bureau of Statistics, Queensland Office: Brisbane), pp. 1–41.

ANONYMOUS (1983)—Summary of characteristics by climatic zones. *In* "Firewood Crops". (National Academy Press: Washington D.C.), Vo. 2: pp. 68–74.

BAMUALIM, A., JONES, R. J. and MURRAY, R. M. (1980)—Nutritive value of tropical browse legumes in the dry season. *Proceedings of the Australian Society of Animal Production* **13:** 229–232.

BASAK, M. K. and GOYAL, S. K. (1975)—Studies on tree legumes. I. Nodulation pattern and characterization of the symbiont. *Annals of Arid Zone* **14:** 367–370.

BASAK, M. K. and GOYAL, S. K. (1980a)—Studies on tree legumes. II. Further additions to the list of nodulating tree legumes. *Plant and Soil* **56:** 33–37.

BASAK, M. K. and GOYAL, S. K. (1980b)—Studies on tree legumes. III. Characterization of the symbionts and direct and reciprocal cross inoculation studies with tree legumes and cultivated legumes. *Plant and Soil* **56:** 49–51.

BISHOP, H. G., MCIVOR, J. G. and RUTHERFORD, M. T. (1980)—Yield and persistence of perennial *Stylosanthes* species on the Mackay wet coast. *Tropical Grasslands* **14:** 57–62.

BOWEN, E. J. and RICKERT, K. G. (1979)—Beef production from native pastures sown to fine stem stylo in the Burnett region of south-eastern Queensland. *Australian Journal of Experimental Agriculture and Animal Husbandry* **19:** 140–149.

BREWBAKER, J. L., HALLIDAY, J. and LYMAN, J. (1983)—Economically important nitrogen fixing tree species. *Nitrogen Fixing Tree Research Report* **1:** 35–40.

CORNELIUS, D. R., BHATT, B. H. and PATHAK, R. L. (1977)—Windbreak plantation on sandy land in Northern Gujarat. *Indian Forester* **103:** 251–259.

CROWDER, L. V. and CHHEDA, H. R. (1982)—'Tropical Grassland Husbandry', (Longman: London), pp. 357–447.

DALY, J. J. (1984)—Importance of trees for cattle. *Tropical Grasslands* **18:** 154–156.

EVERIST, S. L. (1969)—Use of Fodder Trees and Shrubs. Queensland Department of Primary Industries Advisory Leaflet No. 1024: 36.

GLENCROSS, R. H. (1978)—Have fodder trees a place in modern grazing industries on semi-arid lands? *In* "Integrating Agriculture and Forestry". (CSIRO Division of Land Research Management: Perth). pp. 194–197.
GRAHAM, T. W. G., WALKER, B. and MULLER, F. W. (1982)—Fitzroy stylo, a pasture legume for northern brigalow soils. Proceedings of the 2nd Australian Agronomy Conference, Wagga Wagga, p. 187.
GRAY, S. G. (1970)—The place of trees and shrubs as sources of forage in tropical and subtropical pastures. *Tropical Grasslands* **4:** 57–62.
GUPTA, B. S. (1981)—Studies on the effect of molasses feeding on the nutritive value of siris (*Albizia lebbeck*) tree leaves. *The Indian Journal of Nutrition and Dietetics* **18:** 144–147.
GUTTERIDGE, R. C. and AKKASAENG, R. (1985)—Evaluation of nitrogen fixing trees in Northeast Thailand. *Nitrogen Fixing Tree Research Report* **3:** 46–47.
HENZELL, E. F. (1977)—Nitrogen nutrition of tropical pastures. *In* "Tropical Forage Legumes". Ed. P. J. Skerman (FAO: Rome), pp. 86–102.
JOHANSEN, C. and KERRIDGE, P. C. (1979)—Nitrogen fixation and transfer in tropical legume-grass swards in south-eastern Queensland. *Tropical Grasslands* **13:** 165–170.
JONES, R. J. and JONES, R. M. (1978)—The ecology of Siratro-based pastures. *In* "Plant Relations in Pastures" Ed. J. R. Wilson (CSIRO: Melbourne), pp. 253–367.
KALLA, J. C. (1977)—Statistical evaluation of fuel yield and morphological variates for some promising energy plantation tree species in Western Rajasthan. *Annals of Arid Zone* **16:** 117–126.
KALLA, J. C., CHAND, G., VYAS, D. L. and GEHLOT, N. S. (1978)—Techno-economic felling cycles for selected energy plantation species in the arid areas of Western Rajasthan. *Annals of Arid Zone* **17:** 42–51.
KAUL, R. N. and CHAND, G. (1979)—Forest-tree planting in arid zones. Proceedings of the UNEP Desertification Conference, Nairobi, pp. 196–202.
LOHAN, O. P., LALL, D. and NEGI, S. S. (1983)—Partitioning of total tannins in some tree fodders in condensed and hydrolysable forms. *Indian Journal of Animal Science* **53:** 1333–1335.
MCDONALD, W. J. F. and TERNOUTH, J. H. (1979)—Laboratory analyses of the nutritional value of western Queensland browse feeds. *Australian Journal of Experimental Agriculture and Animal Husbandry* **19:** 344–349.
MCKELL, C. M. (1980)—Multiple use of fodder trees and shrubs—A world wide perspective. *In* "Browse in Africa". Ed. H. N. le Houerou. (ILCA: Addis Ababa), pp. 141–149.
MISRA, C. M. and SINGH, S. L. (1981)—Seed germination studies on three predominant tree species of southern Uttar Pradesh. *Annals of Arid Zone* **20:** 193–198.
MUTHANA, K. D., ARORA, G. D. and CHAND, G. (1976)—Comparative performance of indigenous trees in arid zone under different soil working techniques. *Annals of Arid Zone* **15:** 67–76.
NEGI, S. S. (1977)—Fodder trees in Himachal Pradesh. *Indian Forester* **103:** 616–622.
PRADHAN, I. P. and DAYAL, R. (1981)—Farm forestry in agricultural economy. *Indian Forester* **107:** 665–667.
RAINA, A. K. (1984)—Acacia for arid zones. *Nitrogen Fixing Tree Reports* **2:** 9–10.
SKERMAN, P. J. (1977)—'Tropical Forage Legumes'. (FAO: Rome), pp. 479–481 and 583–591.
SOMMEN, F. VAN DER (1981)—Farm Forestry. *In* "A Manual of Australian Agriculture". Fourth Edition. Ed. R. L. Reid (William Heinemann: Melbourne), pp. 277–280.
STANLEY, T. D. and ROSS, E. M. (1983)—Flora of South-Eastern Queensland. Vol. 1, p. 384. Qld Dept Primary Industries Misc. Pub. 81020.
STREETS, R. J. (1962)—Exotic Forest Trees in the British Commonwealth. (Clarendon Press: Oxford). pp. 169–170.
TOMAR, O. S. and JADAV, J. S. P. (1982)—Effect of irrigation with saline and sodic waters on the growth of *Albizia lebbeck* and soil properties. *Indian Journal of Forestry* **5:** 290–297.
VALLIS, I. (1978)—Nitrogen relationships in grass/legume mixtures. *In* "Plant Relations in Pastures". Ed. J. R. Wilson (CSIRO: Melbourne), pp. 190–201.
WHYTE, R. D., NILSSON-LEISSNER, C. and TRUMBLE, H. C. (1953)—'Legumes in Agriculture'. FAO Agricultural Studies No. 21, p. 252.
WILDIN, J. H. (1980)—A management system for leucaena. *Queensland Agricultural Journal* **106:** 194–197.

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PROCEEDINGS

LEUCAENA—A LEGUME OF PROMISE

Field Meeting—November 15, 1985

The final field day of the year for the Tropical Grassland Society was held at "Arnwood", the property of Mr and Mrs J. Humphreys, at Harlin, south-east Queensland. The morning program began with talks on the usage and value of Leucaena as a forage and concluded with demonstrations of treating seed prior to sowing and drenching animals with the new "bug". Demonstrations of planting Leucaena seedlings and discussions of its benefits for animal production and the economics of its use followed in the afternoon. The day concluded with the Annual General Meeting of the Society and a BBQ catered by the Harlin P & C.

The Society launched a booklet "Leucaena the Shrub Legume for Cattle Feed" which is available for purchase from the Society at a small fee.

LEUCAENA—INTERNATIONAL EXPERIENCE

R. J. JONES

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Leucaena is a native of Mexico and Central America but has spread widely throughout the tropics. In many areas of the Pacific and South-East Asia, the plant occurs in thickets, particularly on calcareous islands where it may be the dominant vegetation. This weedy type of leucaena was known as the Hawaiian type or the