one reported by Prasad *et al*[1] from Muzzaffarpur (U.P.) on *C. asiaticum* in which adequate morphological and taxonomical characters were not described.

15 May 1985; Revised 20 September 1985

1. Prasad, S. S., Acharya, B. and Verma, A. B., *Proc. Natl. Acad. Sci., India*, 1966, **36,** 380.

CHEMOTAXONOMY OF TWO GENERA OF CYNOMETREAE

G. NAGESHWAR, M. RADHAKRISHNAIAH and L. L. NARAYANA*

Department of Botany, Nizam College, Osmania University, Hyderabad 500 001, India.
** Department of Botany, Kakatiya University, Warangal 506 009, India.*

THE chemotaxonomy of the representatives of the tribes Amherstieae, Bauhinieae, Cassieae and Eucaesalpinieae of the Caesalpiniaceae R Br has been studied earlier[1-4]. The present note is on the chemotaxonomy of two hitherto uninvestigated taxa, *Cynometra* L and *Hardwickia* Roxb of the tribe Cynometreae *sensu* Bentham and Hooker[5]. The former is represented by sixty species and the latter by two[6].

The aerial parts consisting of branches and mature leaves of *Cynometra polyandra* Roxb and *Hardwickia binata* Roxb collected from the Indian Botanic Garden, Howrah, were analysed for the study of distribution pattern of various secondary metabolites, free amino acids and phenolic acids by standard phytochemical qualitative tests[7], uni- and bidirectional ascending paper chromatographic techniques respectively.

In the distribution of the secondary chemical constituents, the two taxa resemble one another in the absence of alkaloids, aucubin compounds, cyanogenic glycosides, juglone, lignans, saponins and syringin and presence of catecholtannins, syringyl radicals and similar broad flavonoid patterns. However, *Cynometra* differs from *Hardwickia* in the possession of anthraquinones, indoles, leucoanthocyanins, steroids and tannins, absence of methylene dioxy compounds and in being positive to the activity of the enzyme polyphenolase.

Such free protein aminoacids as γ-aminobutyric acids, glutamic acid, threonine and tyrosin besides the unknown, presumably non-protein ones of hRf (hundred × Rf) values 30 and 50 are found common to both the taxa studied. The aminoacids such as alanine, nor-leucine, lysin and tryptophan spotted in *Cynometra*, however, could not be found in *Hardwickia*. The unknown aminoacids of hRf 54 has been found exclusive to *Hardwickia*, besides leucine, phenyl alanine and serine. The apparent absence of otherwise ubiquitous protein aminoacids in the two taxa may be inferred due to their extreme low concentration in the free pool.

Of the several phenolic acids spotted, *p*-hydroxy benzoic and vanillic acids, besides the unidentified ones of hRf values 42/27, 42/55 and 66/70 are shared by both the taxa. While salicylic acid and an unknown phenolic acid of hRf value 52/50 are found in *Cynometra*, *Hardwickia* stands apart in possession of phenolic acids of hRf values 32/30, 68/25 and 68/50.

A numerical assessment of chemical characters is made according to the Jaccard coefficient of similarity[8] $(S_J) = nJK/(nJK + u)$ where nJK = number of positive matches in both OTUs and u = number of characters unmatched in both OTUs. The data on the distribution of protein aminoacids in the free pool, are, however ignored since they are dependent upon the metabolic threshold of the tissue and environmental conditions[9], unlike the other constituents studied, which accumulate in plant tissues, and remain stable under varied environmental conditions[10]. It has been found that this pair of taxa has only 0.43 similarity to each other and hence seem to be uneasy tribemates.

The taxonomic treatment of *Cynometra* and *Hardwickia* bracketed under Cynometreae by Bentham and Hooker[5] has been dispensed with by Hutchinson[11], who rearranged the members of Caesalpiniaceae under five groups placing *Cynometra* in close association with such genera as *Bauhinia* L., *Trachylobium* Hayne and *Intsia* Thou in one group and *Hardwickia* with *Ceratonia* L and *Saraca* L etc in the other. The pattern of distribution of various chemical constituents in *Cynometra* and *Hardwickia* (present study) along with their putatively allied genera such as *Bauhinia* (17 species) *Intsia bijuga* (1 species) *Trachylobium hornemannianum* (monotypic) *Ceratonia siliqua* (monotypic) and *Saraca* (3 species) is presented in table 1.

The percentage of affinity of *Cynometra* with *Bauhinia*, *Intsia*, *Trachylobium* and *Hardwickia* calculated according to Ellison *et al*[12] is 70, 57, 75 and 43

Table 1 *Distribution of various chemical constituents.*

Chemical constituents	*Name of the taxon** 1	2	3	4	5	6	7
Secondary metabolites							
Alkaloids	−	−	−	−	−	−	−
Anthraquinones	+	+	−	+	−	−	−
Aucubin-compounds	−	−	−	−	−	−	−
Catechol-tannins	+	+	+	+	+	−	+
Flavonoids	+	+	+	+	+	+	+
Indoles	+	+	−	−	−	−	+
Juglone	−	+	−	−	−	+	−
Leucoanthocyanins	+	+	−	+	−	+	+
Lignans	−	−	−	−	−	−	−
Methylene-dioxy compounds	−	+	−	−	+	−	−
Activity of Polyphenolase	+	+	−	+	−	−	+
Saponins	−	+	−	−	−	+	−
Steroids	+	+	−	+	−	+	+
Syringin	−	−	−	−	−	−	−
Syringyl radicals	+	+	+	+	+	+	+
Tannins	+	+.	−	+	−	+	−
Free Aminoacids							
hRf 30	+	+	+	+	+	+	+
hRf 50	+	+	+	−	+	+	+
hRf 54	−	−	−	−	+	+	−
Phenolic acids							
p-hydroxybenzoic acid	+	+	+	+	+	+	+
Salicylic acid	+	+	+	+	−	+	+
Vanillic acid	+	+	+	+	+	+	+
hRf 32/30	−	+	+	−	+	−	+
hRf 42/27	+	+	+	+	+	+	+
hRf 42/55	+	+	+	+	+	+	+
hRf 52/50	+	−	−	−	−	−	−
hRf 66/70	+	+	+	+	+	+	+
hRf 68/25	−	+	−	+	+	−	+
hRf 68/50	−	+	−	+	+	−	+

*1 = *Cynometra*, 2 = *Bauhinia*, 3 = *Intsia*, 4 = *Trachylobium*, 5 = *Hardwickia*, 6 = *Ceratonia*, 7 = *Saraca*.
+ = Present. − = Absent.

respectively. Similarly the percentage of affinity of *Hardwickia* with *Ceratonia*, *Saraca* and *Cynometra* works out to be 47, 65 and 43 respectively. Though a perusal of available chemical data of these two taxa seem to indicate that they are more coherent and concurrent with the phylogenetic grouping of Hutchinson[9], than with traditional Cynometreae, a detailed study of a large number of species, on various aspects, is imperative, before any final conclusion, regarding the proposed taxonomic shift is drawn.

The authors are grateful to the Director, Botanical Survey of India, for permission to collect the live material from the Indian Botanic Garden, Howrah. GN is grateful to CSIR for the award of a fellowship.

5 July 1985; Revised 23 August 1985.

1. Nageshwar, G., Radhakrishnaiah, M. and Narayana, L. L., *Indian J. Bot.*, 1985 (in press).
2. Nageshwar, G., Radhakrishnaiah, M. and Narayana, L. L., *Proc. Indian Acad. Sci (Plant Sci.)*, 1984, **93**, 621.
3. Nageshwar, G., Radhakrishnaiah, M. and Narayana, L. L., *J. Econ. Tax. Bot.*, 1984, **5**, 1189.
4. Nageshwar, G., Radhakrishnaiah, M. and Narayana, L. L., *Curr. Sci.*, 1984, **53**, 813.
5. Bentham, G. and Hooker, J. D., *Genera Plantarum*, R. Reeve & Co., London, 1862–1893.
6. Willis, J. C., *A dictionary of the flowering plants and ferns* (Revised by H. K. Airy Shaw) Univ. Press, Cambridge, 1973.
7. Gibbs, R. D., *Chemotaxonomy of flowering plants.* I, McGill Queen's Univ. Press, Montreal and London, 1974.
8. Sokal, R. R. and Sneath, P. H. A., *Principles of numerical taxonomy*, W. H. Freeman, San Francisco and London, 1963.
9. Smith, P. M., *Chemotaxonomy of plants*, Edward Arnold, London, 1976.
10. Flück, H., *Chemical plant taxonomy* (ed.), T. Swain, Academic Press, London, 1963.
11. Hutchinson, J., *Genera of flowering plants*, Clarendon Press, Oxford, Vol. 1, 1964.
12. Ellison, W. L., Alston, R. E. and Turner, B. L., *Am. J. Bot.*, 1962, **49**, 599.

METABOLISM OF EXOGENOUS PROLINE IN SUGARCANE VAR CO 740 UNDER SALINITY AND PEG STRESS

G. R. NAIK* and G. V. JOSHI
Department of Botany, Shivaji University, Kolhapur, 416 004, India.
** P.G. Department of Studies in Botany, Gulbarga University, Gulbarga 585 106, India.*

RAPID and extensive accumulation of free proline in water and salt-stressed plants has been fairly documented[1]. However, the mechanism of proline accumulation and the role of proline are unresolved although several papers have been published since it was first reported by Kemble and Macpherson[2]. Our earlier communication[3] on proline metabolism in salt-sensitive sugarcane var reported lack of this adaptive mechanism under stress conditions. There are reports[4–6]