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SHORT COMMUNICATION

DISTRIBUTION OF MANNITOL AND FLAVONOLS IN SOME RUBIACEOUS PLANTS

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Abstract—The sugar alcohol, D-mannitol has been identified in twenty members of the Rubiaceae while quercetin and kaempferol have been found to be the major flavonols in five species.

INTRODUCTION

MANY plants of the Rubiaceae are used in Indian medicine and a number of them have been chemically examined.[1-3] The flavonols quercetin and kaempferol, have been recorded[4] but their glycosides have not been fully studied in this family. The present survey is concerned with the flavonol glycosides and of the occurrence of D-mannitol in these plants.

RESULTS

Fresh plant material was extracted and separated into flavonol and sugar fractions by standard procedures. The identity of D-mannitol in sugar fractions was established by m.p., m.p. of acetate, benzoate and mixed m.p. determination of the samples with authentic D-mannitol and its derivatives. In cases where insufficient material was available for isolation, the identification was made by means of R_f values and co-chromatography on paper.

TABLE 1. DISTRIBUTION OF D-MANNITOL IN THE RUBIACEAE

Name of the plant	Part tested	Identification
Borreria hispida K. Sch.	whole plant	+
Cephaelis ipecacuanha Rich.	roots	+
Gardinia florida L [5]	not mentioned	++
G. jasminoides[5]	fruits	++
G. latifolia Thw.[6]	barks	++
G. turgida Roxb [5]	not mentioned	++
Hamelia patens Jacq.	flowers	+
	stem bark	++

[1] R. N. CHOPRA, I. C. CHOPRA, K. L. HANDA and L. D. KAPUR, *Chopra's Indigenous Drugs of India*, U.N. Dhur & Sons, Calcutta (1958).
[2] R. N. CHOPRA, I. C. CHOPRA and B. S. VARMA, *Supplement to Glossary of Indian Medicinal Plants*, C.S.I.R., New Delhi (1969).
[3] J. M. WATT and M. G. BREYER-BRANDWIJK, *Medicinal and Poisonous Plants of Southern and Eastern Africa*, E. and S. Livingston, London (1962).
[4] J. B. HARBORNE, *Comparative Biochemistry of Flavonoids*, pp. 209 and 187, Academic Press, London (1967).
[5] K. PAECH and M. V. TRACEY, *Modern Methods of Plant Analysis*, Vol. 2, p. 62, Springer-Verlag (1955).
[6] T. R. GOVINDACHARI *et al.*, *Indian J. Chem.* **7**, 308 (1969).

TABLE 1 (*cont.*)

Name of the plant	Part tested	Identification
Ixora coccinea L.	flowers	++
	stem bark	++
I. parviflora Vahl.	roots[7]	++
	stem bark	++
	leaves	++
	flowers	++
Morinda tinctoria Roxb.	roots	++
	stem bark	++
	leaves	+
Oldenlandia corymbosa L.	whole plant	+
O. stricta L.	whole plant	++
O. umbellata L.	whole plant	+
Pachystigma pygmaeum Hochst.[8]	not mentioned	+
Pavetta indica L.	fruits	++
	stem bark	++
	roots	++
P. tomentosa Roxb [9]	whole plant	++
Randia dumetorum Lamk.[7]	roots	++
Tarenna asiatica[10]	roots	++
Vangueria tomentosa[11]	root bark	++
Webera compuliosa[6] (Syn. *Tarenna compuliosa*)	leaves	+

Key: + indicates identification by PC and ++ indicates isolation

TABLE 2. DISTRIBUTION OF FLAVONOIDS IN RUBIACEAE

Plant	Part examined	Flavonoids identified
Ixora parviflora Vahl.	leaves and flowers	rutin and kaempferol-3-rutinoside
I coccinea L	leaves	rutin
	flowers	cyanidin-3-rutinoside (traces) leucocyanidin glycoside
I. johnsonii[12]	flowers	glycosides of cyanidin and delphinidin
Hamelia patens Jacq.	flowers	cyanidin-3-rutinoside
Morinda tinctoria Roxb.	leaves and flowers	rutin and kaempferol-3-rutinoside
Oldenlandia stricta L.	whole plant	kaempferol-3-rutinoside
Crusea calocephala[13]	leaves	quercetin-3-rhamnoside

[7] B. ANJANEYULU *et al.*, *Indian J. Chem.* **3,** 237 (1965).
[8] D. P. NELDSMAN, *Onderstepoort J. Vet. Sci.* **32B,** 112 (1950).
[9] P. D. DESAI *et al*, *Indian J. Chem.* **5,** 523 (1967)
[10] P. D. DESAI *et al.*, *Indian J. Chem.* **4,** 457 (1966)
[11] K. W. MERZ *et al.*, *Ber. Dtsch. Chem. Ges.* **72B,** 1017 (1939).
[12] R. M. BROOKER and J. N. EBLE, *Lloydia* **29,** 230 (1966).
[13] V. KRISHNAMOORTHY and T. R. SESHADRI, *J. Sci. Ind. Res.* **21B,** 591 (1962).

The flavonoid pigments were purified through paper chromatography on a preparative scale and the identity established by colour reactions, λ_{max}, R_f and co-chromatography with authentic samples. Glycosides were hydrolysed (10% H_2SO_4 for flavones and 2 N HCl for anthocyanin) and the aglycone and sugar residues were identified.

The distribution of mannitol in some rubiaceous plants is given in Table 1. The distribution of flavonoids in seven species of this family are recorded in Table 2. From the above examination, it may be observed that D-mannitol is a common constituent of the Rubiaceae, as it is in the Umbelliferae, Oleaceae and Scrophulariaceae.[14] Our results substantiate the earlier observation[4] of the occurrence of quercetin and kaempferol and cyanidin-3-rutinoside in this family.

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[14] T. SWAIN, *Chemical Plant Taxonomy*, p. 319, Academic Press, London (1963).