Chemotaxonomic studies on some members of Anacardiaceae

I UMADEVI, M DANIEL* and S D SABNIS
Phytochemistry Laboratory, Department of Botany, Faculty of Science, Maharaja Sayajirao University of Baroda, Baroda 390 002, India

MS received 10 August 1987; revised 20 April 1988

Abstract. Nineteen taxa belonging to 13 genera of the Anacardiaceae have been screened for leaf flavonoids, phenolic acids, saponins, tannins, alkaloids and iridoids. The family characteristically contains highly hydroxylated compounds like myricetin and gallic acid. It is also rich in proanthocyanidins and flavonols such as quercetin, kaempferol and their methoxylated derivatives. Tannins are common, saponins rare and alkaloids and iridoids are absent. The chemical differences among the various tribes are not very pronounced. However, the tribe Mangifereae does not contain any flavone whereas the tribe Spondieae is comparatively rich in these compounds. The tribes Rhoideae and Semecarpeae are similar in many chemical features. The separate identity of Chaerospondias away from Spondias is also established in the light of chemical evidences.

Keywords. Anacardiaceae; chemotaxonomy; flavonols.

1. Introduction

The family Anacardiaceae is distinguished from the related families by the presence of intrastaminal disc, resin ducts, unilocular ovary and drupaceous fruits. This family includes a number of economically important plants which yield edible fruits, gums, resins, tan-dyes and wood. It is also known for their toxic long chain aliphatic phenolic compounds such as anacardol, anacardic acid, urushol and hydourushol; which possess irritant and allergenic properties.

Anacardiaceae are customarily placed in Sapindales alongwith the closely related families such as Sapindaceae, Aceraceae, Hippocastanaceae, Julianaceae and Sabiaceae (Bentham and Hooker 1862; Benson 1970; Hutchinson 1973). Cronquist's (1981) Sapindales include, in addition to the above mentioned families, Burseraceae, Simaroubaceae, Meliaceae and Rutaceae. Almost all these families were grouped by Takhtajan (1980) in his Rutales. The family Anacardiaceae is divided into two tribes namely Anacardieae and Spondieae by Hooker (1872) based on the number of locules in the ovary. The tribe Spondieae was accepted by Engler and Prantl (1895) but they redistributed the taxa belonging to the tribe Anacardieae into 4 smaller tribes (i) Mangifereae (Anacardieae), (ii) Rhoideae, (iii) Semecarpeae and (iv) Dobineae.

The various taxa included in this family show a considerable variation and reduction especially in the number of stamens and carpels. According to Hallier (1905), Anacardiaceae have been evolved from Rutaceae and form the basic stock from which the families of Amentiferae and Aceraceae have been originated. Due to the tendency of the taxa to evolve unisexual flowers and compound leaved members, Hutchinson (1973) recognised Anacardiaceae as one of the advanced families of Sapindales. Within the family, the genus Buchanania is the most primitive genus in

*To whom all correspondence should be addressed.
having pentamerous flowers with apocarpus pistil, 10 fertile stamens and simple alternate thickly coriaceous leaves. Between the monocarpellate members, *Anacardium* and *Mangifera*, the latter, due to the higher degree of sterility, is considered more advanced. Among the syncarpus group, *Semecarpus*, having 5 pistils (indicating the number of carpels) is primitive to *Schinus* and *Choerospondias*. Due to derived tetramerous conditions, *Lannea* is also considered one of the most advanced taxa.

Earlier chemical reports from the family are: mangiferin from the root bark of *Mangifera*; quercetin, myricetin and apigenin glycosides from the leaves of *Rhus* spp., robustoflavone from seed kernel of *Rhus* (Yuh-Meei and Fa Ching 1974), biflavones of *Rhus* (Fa-Ching and Yue-Meei 1975) and *Semecarpus* (Rao et al 1973) and fustin and fisetin from heartwood of *Rhus* (Fa-Ching et al 1974).

In the present work, 19 members belonging to Anacardiaceae have been analysed for phenolic compounds such as flavonoids, coumarins and phenolic acids. These plants have also been screened for tannins, saponins, alkaloids and iridoids.

2. Materials and methods

The plants were collected from various localities of India, such as Baroda, Panchamarhi, Kashmir, Kerala and Calcutta. Voucher specimens are deposited in the Herbarium of the University. Mature leaves were selected for the studies and standard procedures (Mabry et al 1970; Harborne 1984) were followed for the isolation and identification of various compounds.

3. Results

The distribution of various flavonoids, phenolic acids, saponins and tannins in 19 members of the Anacardiaceae is presented in table 1.

All the 19 taxa screened contained flavonoids in the leaves. Flavonols form the major pigments in the family. The various flavonols encountered are kaempferol, fisetin, quercetin, myricetin and their methoxylated derivatives. Quercetin and its derivatives are located in most of the taxa studied. Myricetin is fairly common and fisetin, kaempferol and its derivatives are less frequent. Flavones such as apigenin and its 7- and 4'-methoxylated derivatives are obtained from *Rhus paniculata*, *Dracontomelum mangiferum* and *Pleiogynium timoriense*. Glycoflavones are located in *Rhus paniculata*, *Semecarpus subpanduriformis*, *Dracontomelum mangiferum* and *Choerospondias axillaris*. The glycoflavones identified are 4'-OCH₃ vitexin and its isomer 4'-OCH₃ isovitexin. Mangiferin- the C-glycosyl xanthone is present in both the species of *Mangifera*. Except *Pleiogynium* all the taxa contain proanthocyanidins. Tannins are common, saponins rare, alkaloids and iridoids are absent.

4. Discussion

The common constituents of the Anacardiaceae are the highly hydroxylated phenolic compounds such as quercetin, myricetin and gallic acid. The most obvious feature which the members of this family have in common is the presence of proanthocyanidins and flavonols. Though the number of plants screened is not quite large, the