CHEMOSYSTEMATICS OF THE PORTULACACEAE AND NYCTAGINACEAE

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INTRODUCTION

The Portulacaceae and Nyctaginaceae are two smaller families of the Caryophyllales. The Nyctaginaceae contain 30 genera and 300 species distributed mainly in tropical and subtropical regions of the old and new world. The Portulacaceae with 20 genera and 500 species are cosmopolitan in distribution.

Most of the members of these families are herbs or half shrubs, but in the Nyctaginaceae shrubs and small trees are not rare. The Nyctaginaceae are distinguished by their sepals united to form a distally lobed tube (that commonly simulates a sympetalous corolla) and the sepaloid bracts. Cymose and head like inflorescence often subtended by a conspicuous involucare, gynoecium of single carpel with a long slender style and a single ovule are other notable features of this family. The Portulaccaceae members are succulents, with two sepals (often a little unequal or seldom deciduous) petals distinct or sometime basally connate, gynoecium of 2-3 (-9) carpels united to form a compound ovary with distinct styles, ovary with as many locules as carpels at the early stages of development, but soon becoming unilocular by disappearence of the partitions with a free central placenta bearing 2- many ovules or rarely single ovule.

TAXONOMY

The Nyctaginaceae are divided by Bentham and Hooker (1862) into three tribes viz. the Mirabileae, Pisoneae, and Leucasteraeae. The tribe mirabileae is characterised by straight embryo and large cotyledons. Shrubby habit is the distinguishing feature of the Pisoneae, whereas the Leucasteraeae have hairy ovary and distinct filaments. The tribe Mirabileae is further classified into 4 subtribes, the Boerhavieae, Bougainvillaeae, Abronieae and Boldoeae.

Fax and Hoffmann (1934) classified Portulacaceae into two subfamilies the Portulaccoideae with sessile ovary and the Montioideae with a stalked or basally narrowed ovary.

McNeill (1974) grouped the plants of the Portulacaceae into seven tribes viz. the Portulaceae, Portulacarieae, Lewisieae, Calyptrotheceae, Palineae, Calyptridieae and Montieae.

Economically important plants in this families include (1) medicinals such as Boerhavia procumbens (2) leafy vegetables like Portulacca oleracea, Boerhavia procumbens and (3) ornamentals such as Bougainvillea, Mirabilis, Talinum and Portulaca.

PHYTOCHEMICAL WORK

Not much is known about the chemistry of these families.

Quercetin and kaempferol are the only flavonoids reported from Portulacaceae.

In the present study 3 species from Portulacaceae and 4 members of Nyctaginaceae are represented.

MATERIALS AND METHODS

Plant materials were collected from in and around Baroda. All the plants were properly identified and voucher specimens were deposited in the Herbarium of Botany department of M.S. University of Baroda, Baroda, India.

Standard procedures were followed in extraction, isolation and identification of various chemical markers (ref. Chapter-2).

RESULTS

The distribution of flavonoids, phenolic acids, alkaloids, saponins, steroids and proanthocyanidins from leaves of the Portulacaceae and Nyctaginaceae are presented in the table-10.

In Nyctaginaceae 3 out of 4 plants showed the presence of flavonols. The various flavonols encountered in this family are kaempferol (Bougainvillea spectabilis), 4'-OMe kaempferol (Boerhavia procumbens), and 3'-OMe-quercetin (Bougainvillea glabra, B. spectabilis). Altogether 10 phenolic acids have been identified in this family of which vanillic and syringic are present in all the members except Mirabilis jalapa, where

TABLE - 10 . DISTRIBUTION OF PHENOLIC ACIDS, SAPONINS, STEROIDS, ALKALOIDS AND FLAVONOIDS IN THE FAMILIES PORTULACACEAE AND NYCTAGINACEAE*

Sl.No.	Name of the plants	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	PORTULACACEAE																	
1.	Portulaca oleraceae Linn.	+	+										+	+				
2.	P.quadrifida Linn.	+	+										+	+				
3.	Talinum portulacifolium Forsk.	+		+									+	+				
	NYCTAGINACEAE																	
	TRIBE - NIRAGILEAE																	
	SUBTRIBE - BOERHAAVIEAE																	
4.	Boerhavia procumbens Banks.	+	+		+							+	+	+	+		+	
5.	Mirabilis jalapa Linn.	+		+	+								+	+				
6.	Bougainvillea glabra Choisy	+	+			+	+			+			+	+				+
7.	B.spectabilis Willd.	+	+			+		+					+	+	+	+		+

PHENOLIC ACIDS

1. Vanillic, 2. Syringic, 3. p-OH Benzoic, 4. Gentisic, 5. p-Coumaric, 6. Ferulic, 7. Synapic, 8. Chlorogenic, 9. Resorcylic, 10. Protocatachuic 11. o-Coumaric, 12. Saponins, 13. Steroids, 14. Alkaloids, 15. Kaempferol, 16. 4'-OMe kaempferol, 17. 3'-OMe quercetin.

* After Bentham and Hooker (1865).

syringic acid is absent. Saponins and steroids were located in all the plants screened. Boerhavia procumbens and Bougainvillea spectabilis contained alkaloids. None showed a positive test for iridoids, tannins, quinones or proanthocyanidins.

All the three plants screened in Portulacaceae did not show the presence of any flavonoids. Vanillic, syringic and p-OH benzoic acids were the phenolic acids identified in this family. Saponins and stereids were present in all the three members. Tannins, pronnthocyanins, quinones and iridoids were absent.

DISCUSSION

Almost uniform presence of flavonols deleneate the family Nyctaginaceae. Presence of flavonols and shruby/ woody nature in some members of this family establish their relatively primitive position in an evolutionary sequence. The tribes established on morphological grounds do not get any support from the chemical evidences generated in the present work.

Lack of flavonoid system in the mebers screened is the peculiarity of the Portulacaceae, which makes this family an advanced group. The predominant herbaceous nature of this family also support this. The lesser number of plants screened do not permit any taxonomic judgement on the existing intrafamilial classification.