CHAPTER - III

RESULTS

CHAPTER - 3

RESULTS

In the present investigation 67 members belonging to 29 genera of family Euphorbiaceae have been analysed for various chemical markers like flavonoids (flavones, flavonols, glycoflavones and proanthocyanidins) and phenolic acids. All these plants were tested for the presence of alkaloids, iridoids, tannins and saponins. The distribution of these chemical characters in the members screened is presented in Table - 8 .

Of the 29 genera screened 25 genera found to possess flavonoids. Four genera from which a single member each were analysed did not show flavonoids. They are Ricinus, Kirganelia Baliospermum and Sebastiania.

Out of the 25 flavonoid containing genera 16 were found to possess flavonols and 8 possessed flavones. Genus Pachranga and Jatropha had both flavones and flavonols, Genus Hevea found to contain glycoflavones.

Of the 16 flavonol containing generas 12 possessed Quercetin and its methoxylated derivatives and 4 possessed kaempferol and its methoxylated derivatives. Genus Euphorbia had both Quercetin, Kaempferol and their methoxylated

derivatives.

Out of the 8 flavone containing generas two generas possessed Apigenin and 5 possessed Luteolin and their derivatives. Genus Jatropha had both Apigenin and Luteolin.

Among the flavonol containing generas Genus Euphorbia showed the presence of both Quercetin, Kaempferol and their methoxylated derivatives. However, out of 18 members screened from this genus five members did not possess any flavonoid compound. But predominantly the genera is flavonol containing.

Genus Acalypha from which 5 members have been screened only three found to possess flavonols. Two members did not have flavonoid compounds. Another genus in which both flavonoid containing members and non-flavonoid containing members encountered is croton. In the present study out of the three members screened one member possessed flavonoids. However, the earlier chemical report shows that Croton oblongifolius also possessed flavonoid compounds. Hence the genera has been grouped under flavonoid containing.

Genus Macaranga and Jatropha were found to contain both flavones and flavonols. Two members from genus Macaranga have been studied out of which Macaranga indica possessed kaempferol 4'-ome and Luteolin 4'-ome. Sameway Genus Jatropha from which 5 members have been studied four possessed flavones and Jatropha multifida found to contain Quercetin and Luteolin 4'-ome.

A total number of 18 Euphorbias have been screened out of which 10 possessed Quercetin and their methoxylated derivatives and 3 possessed Kaempferol and its methoxylated derivatives. However predominantly Genus Euphorbia is quercetin containing.

Among the flavone containing generas Genus Jatropa possessed both Luteolin and Apigenin and its derivatives. A total number of 6 members have been screened from this Genus out of which two had only Apigenin and its derivatives and two had only Luteolin and its derivatives and Jatropha gossypifolia possessed Luteolin 4'-ome and Apigenin and Jatropha multifida possessed Quercetin along with luteolin 4'-ome.

Proanthocyanins were observed in 9 members only. They co-occurred with flavones (J.curcas and J.panduraefolia) as well as flavonols (Bridelia cernulata, Cicca acida, Pedilanthus tithymaloides Var. variegatus). In the remaining plants they were the sole flavonoids observed (Table 8).

Out of the 67 members screened from 29 genera, 57 contained Vanillic acid, 46 members showed the presence of p-OH Benzoic acid, 36 possessed p-coumaric acid. Syringic acid and gentisic acids were observed in 28 and 21 plants respectively. Other phenolic acids encountered were protocatechuic acid (13 members), O-coumaric (7 members), melilotic (16 members), Sinapic (5 members), Ferulic acid (23 members), Chlorogenic (4 members), Phloretic, O-pyrocatechuic and 3-OH, 5 CH_3 Benzoic

acid (1 member each) and α -resorcyclic acid (2 members) (Table 12).

Twenty three members gave a positive test for alkaloids. Out of the 54 flavonoid containing plants, 20 found to contain alkaloids, while out of 13 non-flavonoid containing members only three members showed the presence of alkaloids.

Presence of iridoids is very limited in the family. Out of the total number of 67 members belonging to 29 genera screened only six members showed the presence of it. They were found to be present in generas Securinega, Breynia (1 member each) and in Croton and Acalypha (2 members each).

Occurrence of saponins is widespread in the family, 41 members showed the presence of saponins out of the total number of 67 members screened. They are widespread both in flavonoid containing group as well as non-flavonoid containing group.

Occurrence of tannins is also limited to a few species only. Only nine members showed the presence of tannins. They were located in one member each from Breynia, Emblica, Chrozophora, Acalypha, Kirganelia, and Baliospermum, while two members belonging to genus Euphorbia possessed tannins.

Thus the 67 members screened from 29 genera has been grouped as follows on the basis of occurrence of flavonoids, saponins and alkaloids. They have been grouped generawise (Table 7).

Table 7- Grouping of generas on the basis of occurrence of Flavonoids Alkaloids and Saponins.

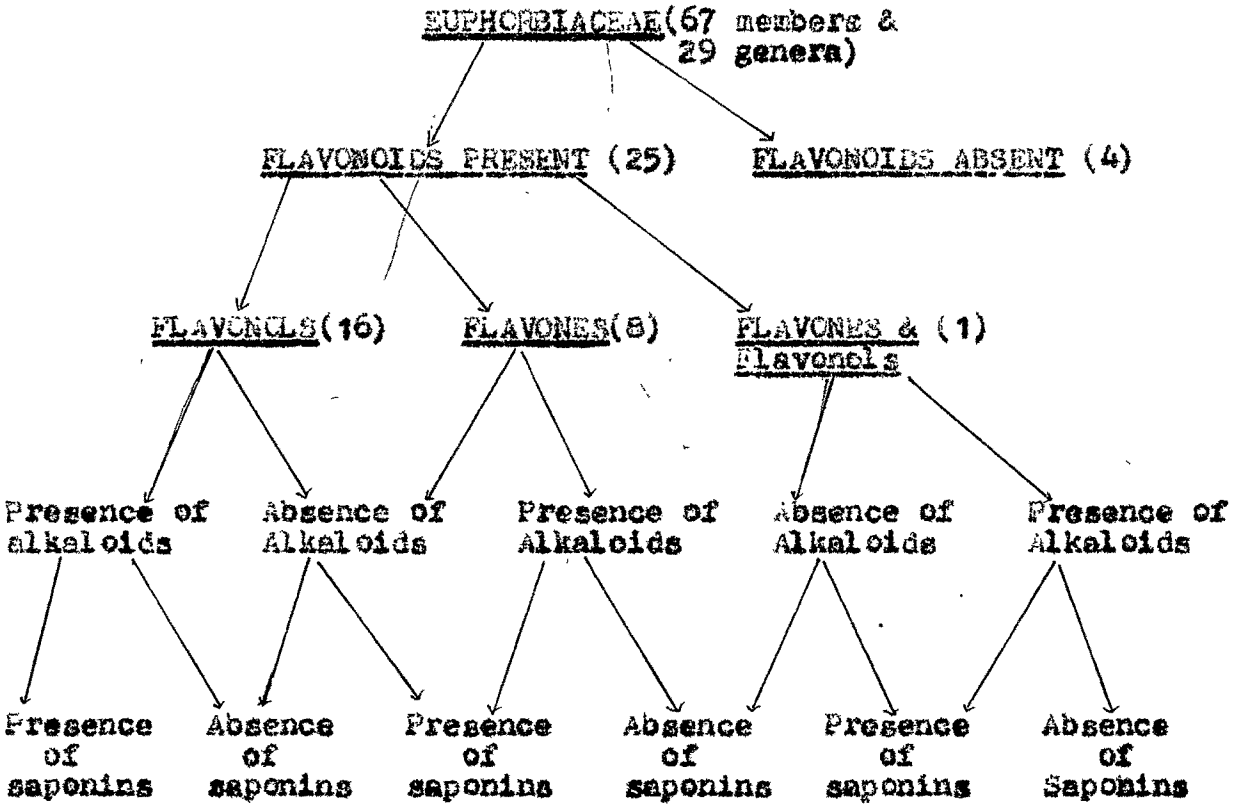

Fig1. CLASSIFICATION OF 29 GENERAS ON THE BASIS OF THE PRESENCE OR ABSENCE OF VARIOUS CHEMICAL MARKERS

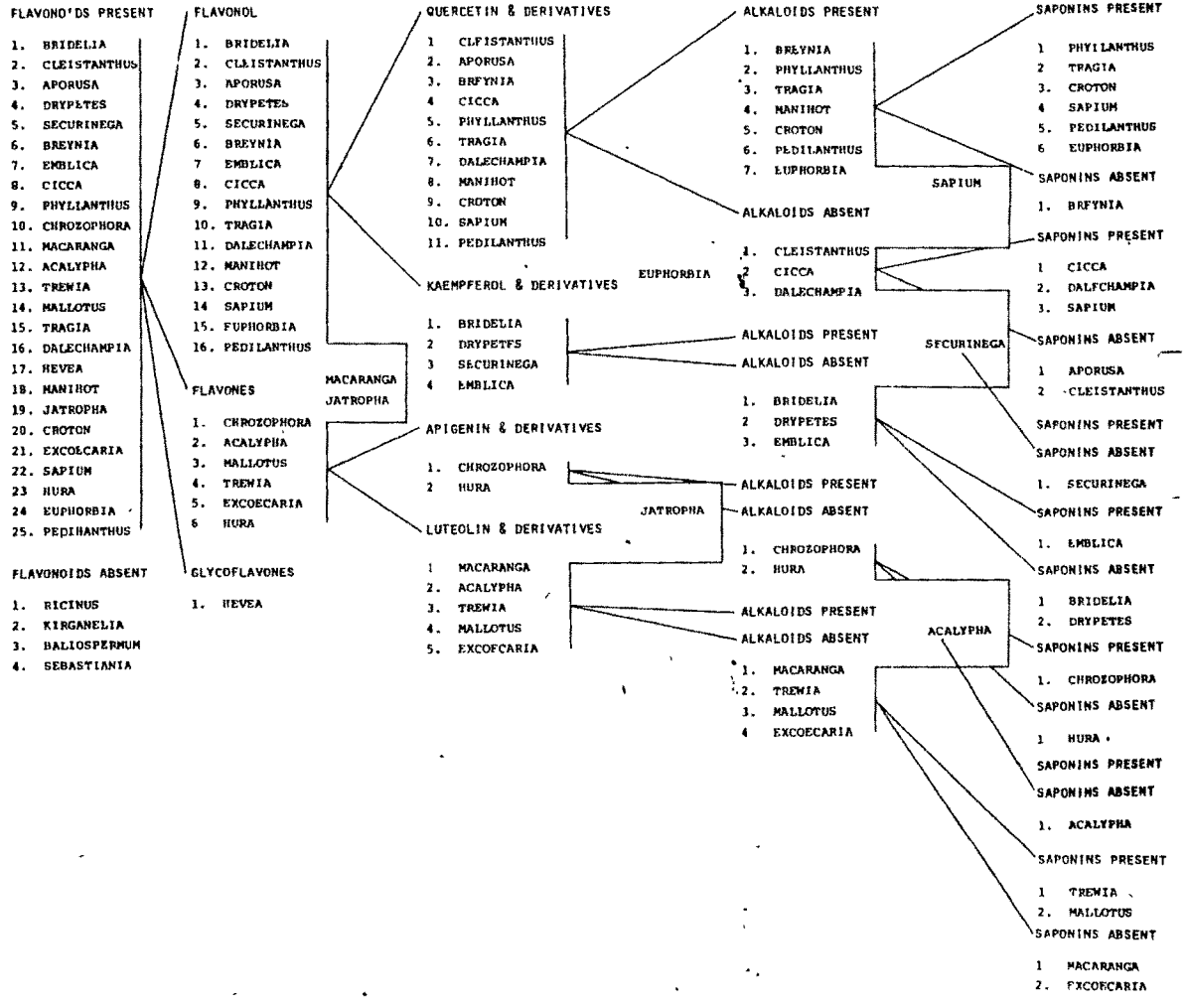

Table - 8 . The Distribution of Flavones, Flavonols, Glycoflavones, Alkaloids, Tannins, Iridoids, Saponins and Proanthocyanins in 67 members of the Euphorbiaceae

Sr. No.	Name of the plant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1.	Bridelia cernulata Roxb.					+	+												+		
2.	Cleistanthus collinus Benth.	+																			
3.	Aporusa lyndeliana (Wight.)Baillon			+	+																
4.	Drypetes roxburghii Wall.					+	+														
5.	Securinega virosa (Willd.)Baillon					+	+								+	+					
6.	S.leucopyrus (Willd.) DC.						+										+				
7.	Breynia nivosa (Bull.)Pax & Hoffman			+	+		+								+						
8.	B.rhamnoides Retz.			+											+			+			
9.	B.retusa (Dennst.)Alston			+	+											+					
10.	Emblica officinalis Gaertn.						+										+	+			
11.	Cicca acida L.			+			+										+		+		
12.	Phyllanthus virgatus Forst.	+		+											+		+				
13.	P.fractarmus webster	+													+		+				
14.	P.madaraspatensis L.			+											+		+				
15.	Chrozophora prostrata Dalz.							+	+								+				

Table - 8 (Contd.)

Sr.No.	Name of the plant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
16.	Chrozophora rottleri(Geister) Sprengel								+	+							+	+			
17.	Ricinus communis L.														+		+				
18.	Macaranga indica Wight Icon.							+	+												
19.	M.peltata (Roxb.)Muell-Arg.								+	+											
20.	Acalypha ciliata Forsk.									+					+	+	+				
21.	A.hispida Burm.								+						+						
22.	A.wilkesiana Muell-Arg.															+	+	+	+		
23.	A.godseffiana L.								+	+							+				
24.	A.indica L.																+				
25.	Trewia nudiflora L.								+	+							+				
26.	Mallotus philippinensis Muell-Arg.									+							+				
27.	Tragia involcrata L.	+			+												+				
28.	T.hildbrandtii Muell-Arg.	+			+										+		+				
29.	Dalechampia scandens L.	+			+												+				
30.	Hevea brasiliensis Muell-Arg.												+	+	+		+				
31.	Manihot esculenta Crantz.				+									+	+		+				

Table -8 (Contd.)

Sr.no.	Name of the plant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
32.	Jatropha gossypifolia L.							+		+					+						
33.	J.curcas L.									+		+							+		
34.	J.penduraefolia L.							+							+				+		
35.	J.multifida L.	+						+													
36.	J.podagrica Hook.							+		+											
37.	Croton bonplandianus Baill.			+	+										+	+	+				
38.	C.tiglium L.														+						
39.	C.oblongifolius Roxb.															+	+	+			
40.	Kirganelia reticulata(poir)Baill.																	+			
41.	Baliospermum montanum(Willd.) Muell-Arg.																				
42.	Excoecaria bicolor Hassk.							+	+							+	+				
43.	Sebastiania chamaelia Muell-Arg.																+				
44.	Sapium sebiferum (L) Roxb.		+		+										+		+				
45.	Sapium insignie (Royle)Benth.		+														+				
46.	Hura crepitans L.								+						+						
47.	Euphorbia hirta L.			+											+						
48.	E.fulgens Karw ex Klotzsch.																+		+		

Table - 8 (Contd.)

Sr.No.	Name of the plant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
49.	Euphorbia dracunculoides Lamk.			+											+		+				
50.	E.heyneana sprengel														+	+	+				
51.	E.geniculata orteg.														+						
52.	E.milii De B moul.	+		+																	
53.	E.lacta heyne ex Roth.	+													+		+		+		
54.	Euphorbia tirucalli L.					+												+			
55.	E.lactea Haw.	+													+		+				
56.	E.pulcherrima Willd.	+		+													+				
57.	E.nerrifolia L.				+												+				
58.	E.prostrata Ait.																+				
59.	E.antiquorum L.					+											+				
60.	E.coccinea Roth.	+															+				
61.	E.thymifolia Burm.	+															+				
62.	E.heterophylla L.	+															+				
63.	E.elegans L.					+															
64.	E.parviflora L.	+				+															

Table - 8 (Contd.)

Sr.No.	Name of the plant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
65.	Pedilanthus tithymaloides L.poit	+				+									+		+				
66.	P. tithymaloides var. variegatus L.poit	+		+											+		+		+		
67.	P. tithymaloides var. nanus. L.poit	+		+																	

(1) Quercetin (2) Quercetin 7-ome (3) 3'-O-methyl quercetin (4) Quercetin 3',3'-di-ome
(5) Kaempferol (6) Kaempferol 4'-ome (7) Luteolin 4'-ome (8) Luteolin 3',4'-di-ome
(9) Apigenin (10) 7-OCH_3 apigenin (11) 7,4'-di-ome apigenin (12) Vitexin (13) Isovitexin
(14) Alkaloids (15) Iridoids (16) Saponins (17) Tannins (18) Proanthocyanins.

Table - 9 . Arrangement of 67 members on the basis of presence or absence of flavonoid compounds

Group-I (PRESENCE OF FLAVONOIDS)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Bridelia cernulata Roxb.					+	+												+		
2. Cleistanthus collinus Benth.	+																			
3. Aporusa lyndeliana (Wight)Baillon			+	+																
4. Drypetes roxburghii Wall.					+	+														
5. Securinega virosa (Willd.)Baillon					+	+								+	+					
6. S.leucopyrus (Willd.) DC.						+									+					
7. Breynia nivosa (Bull.) Pax & Hoffn			+	+		+								+						
8. B.rhamnoides Retz.			+											+				+		
9. B.retusa (Dennst.) Alston			+	+											+					
10. Emblica officinalis Gaertn						+										+	+			
11. Cicca acida L.			+			+										+		+		
12. Phyllanthus virgatus Forst.	+		+											+		+				
13. P.fractarnus Webster	+													+		+				
14. P.madaraspatensis L.			+											+		+				
15. Chrozophora prostrata Dalz.							+	+								+				
16. C.rottleri (Geisler)Sprengel							+	+								+	+			

Table - 9 (Contd.)

GROUP-I (PRESENCE OF FLAVONOIDS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
17. Macaranga indica Wight Icon.						+	+													
18. M.peltata (Roxb.)Muell-Arg.							+	+												
19. Acalypha ciliata Forsk.									+					*	*	*				
20. A.hispida Burm.							+							+						
21. A.godseffiana L.							+	+								+				
22. Trewia nudiflora L.							+	+								+				
23. Mallotus philippinensis Muel-Arg								+								+				
24. Tragia involucrata L.	+			+												+				
25. T.heldbrandtii Muell-Arg	+			+	+									+		+				
26. Dalechampia scandens L.	+			+												+				
27. Heva brasiliensis Muell-Arg												+	+			+				
28. Manihot esculenta Cranz.			+											+		+				
29. Jatropha gossypifolia L.							+	+						+						
30. J.curcas L.								+		+								+		
31. J.panduraefolia L.							+							+				+		
32. J.multifida L.	+						+													

Table - 9 (Contd)

GROUP-I (PRESENCE OF FLAVONOIDS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
33. J. podagrica Hook.							+		+											
34. Croton bonplandianus Baill.			+	+										+	+	+				
35. Excoecaria bicolor Hassk.							+	+								+				
36. Sapium sebiferum(L.)Roxb.			+		+									+		+				
37. Sapium insignis (Royle.)Benth.			+													+				
38. Hura crepitans L.									+					+						
39. Euphorbia hirta L.			+											+						
40. E.dracunculoides Lamk.			+											+		+				
41. Euphorbia milii Des moul	+			+																
42. E.tirucalli L.					+												+			
43. E. lactea Haw.	+													+		+				
44. E.pulcherrima Willd.	+		+													+				
45. E.nerrifolia L.				+												+				
46. E.antiquorum L.					+															
47. E. coccinea Roth.	+																			
48. E.thymifolia Burm.	+																			
49. E.heterophylla L.	+																			
50. E.elegans L.					+															

Table - 9 (Contd.)

GROUP-I (PRESENCE OF FLAVONOIDS)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
51. Euphorbia parviflora L.	+			+																
52. Pedilanthus tithymaloides L.Poit	+			+										+		+				
53. P.tithymaloides var.variegatus L. Poit	+		+											+		+		+		
54. P. tithymaloides var. nanus L.Poit	+		+																	
GROUP-II (FLAVONOIDS ABSENT)																				
1. Ricinus communis L.														+		+				
2. Acalypha wilkesiana Muell-Arg.															+	+	+	+		
3. A.indica L.																+				
4. Kirganelia reticulata (Poir.)Baill.																	+			
5. Croton tiglium L.														+						
6. Croton oblongifolius Roxb.															+	+	+			
7. Baliospermum montanum(Willd.) Muell-Arg.																	+			
8. Sebastienia chamaelia Muell-Arg.																+				
9. Euphorbia fulgens Karw ex Klotzsch																+		+		
10. E.heyneana sprengel																+				

Table - 9 (Contd.)

GROUP-II (FLAVONOIDS ABSENT)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
11. Euphorbia geniculata Ortega.																+				
12. E.laeta Heyne ex Roth.														+		+		+		
13. E. prostrata Ait.																+				

(1) Quercetin (2) G-7-ome (3) G-3'-ome (4) G-3'-4'-di-ome (5) Kaempferol (6) Kaempferol 4'-ome (7) Luteolin 4'-ome (8) Luteolin 3'-4'-di-ome (9) Apigenin (10) 7-OCH_3 Apigenin (11) 7,4'-di-ome ( )apigenin (12) Vitexin (13) isovitexin (14) Alkaloids (15) Iridoids (16) Saponins (17)Tannins (18) Proanthocyanins.

Table - 10. Arrangement of euphorbiaceae members on the basis of flavonol containing flavone containing and both flavonol and flavone containing

Subgroup - I (Flavonol containing)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Bridelia cernulata Roxb.					+	+												+		
2. Cleistanthus collinus Benth	+																			
3. Aporusa lyndeliana (Wight) Baillon			+	+																
4. Drypetes roxburghii Wall.					+	+														
5. Securinega virosa(Willd.) Baillon					+	+								+	+					
6. S.leucopyrus (Willd.) DC.						+										+				
7. Breynia nivosa(Bull.)Fax & Hoffm.			+	+		+								+						
8. B.rhamnoides Retz.			+											+			+			
9. B.retusa (Dennst.) Alston			+	+											+					
10. Emblica officinalis Gaertn					+											+	+			
11. Cicca acida L.			+		+											+		+		
12. Phyllanthus virgatus Forst.	+		+											+		+				
13. P.fractarmus Webster	+													+		+				
14. P.madraspatensis L.			+											+		+				

Table - 10 (Contd.)

Subgroup-I (Flavonol containing)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
15. Tragia involucrata	+				+											+				
16. T.hildbrandtii Muell-Arg.	+				+									+		+				
17. Dalechampia scandens L.	+				+											+				
18. Manihot esculenta Crantz.				+										+		+				
19. Croton bonplandianus Baill.			+	+										+	+	+				
20. Sapium sebiferum (L.)Roxb.		+		+										+		+				
21. Sapium insigne(Royle.)Benth.		+														+				
22. Euphorbia hirta L.			+											+						
23. E.dracunculoides Lamk.			+											+		+				
24. E.milii des moul.	+			+																
25. E.tirucalli L.					+												+			
26. E.lactea Haw.	+													+		+				
27. E.pulcherrima Willd.	+		+													+				
28. E.nerrifolia L.				+												+				
29. E.antiquorum L.					+											+				
30. E.coccinea Roth.	+															+				
31. E.thymifolia Burm.	+															+				

Table - 10 (Contd.)

Subgroup-I (Flavonol containing)	1	2	3	4	5	6	7	8	19	10	11	12	13	14	15	16	17	18	19	20
32. Euphorbia heterophylla L.	+															+				
33. E.elegans L.					+															
34. E.parviflora L.	+				+															
35. Pedilanthus tithymaloides L. Poit.	+		+		+									+		+				
36. P.tithymaloides var. Variegatus	+		+											+		+				
37. P.tithymaloides var. nanus L. Poit.	+		+											+		+		+		

(1) Quercetin (2) O-7-ome (3) O-3&-ome (4) Quercetin 3',4'-di-ome (5) kaempferol (6)Kaempferol 4'-ome (7) Luteolin 4'-ome (8) Luteolin 3'-4'-diome (9) Apigenin (10) 7-OCH_3 apigenin (11) 7,4'-diome apigenin (12) Vitexin (13) isovitexin (14) Alkaloids (15) Iridoids (16) Saponins (17) Tannins (18) Proanthocyanins.

Table - 10 (Contd.)

Subgroup-II (Flavone containing)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Chrozophora prostrata Dalz.								+	+							+				
2. C.rottleri(Geisler)Sprengel								+	+							+	+			
3. Macaranga peltata (Roxb.)Muell-Arg.							+	+												
4. Acalypha ciliata Forsk.								+						+	+	+				
5. A.hispida Burm.							+	+								+				
6. A.godseffiana L.							+	+								+				
7. Trewia nudiflora L.							+	+								+				
8. Mallotus philippinensis Muell-Arg.								+								+				
9. Jatropha gossypifolia L.							+		+					+						
10. J.curcas L.									+		+							+		
11. J.panduraefolia L.							+							+				+		
12. J.podagrica Hook.							+		+											
13. Excoecaria bicolar Hassk.							+	+								+				
14. Hura crepitans L.									+					+						
15. Hevea brasiliensis Muell-Arg.												+	+			+				

Table - 10 (Contd.)

Subgroup-II (Flavonol & Flavone)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Mncaranga indica Wight Icon.						+	+													
2. Jatropha multifida L.		+					+													

Table - II . Arrangement of Euphorbiaceae members on the basis of Quercetin containing, Kaempferol containing, Apigenin and Luteolin containing

Subgroup-I (Only Quercetin containing)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Cleistanthus collinus Benth.	+																			
2. Aporusa lyndelliana (Wight) Baillon			+	+																
3. Breynia nivosa (Bull.) Pax & Hoffn.			+	+		+								+						
4. B. rhamnoides Retz.			+											+			+			
5. B.retusa (Dennst.) Alston			+	+											+					
6. Cicca acida L.			+			+										+		+		
7. Phyllanthus virgatus Forst.	+		+											+		+				
8. P.fractaranus Webster	+													+		+				
9. Tragia involucerata L.	+				+											+				
10. T.hildbrandtii Muell-Arg.	+				+									+		+				
11. Dalechampia scandens L.	+				+											+				
12. Manihot esculenta Crantz.				+										+		+				
13. Croton bonplandianus Baill.			+	+										+	+	+				
14. Sapium sibiferum (L.) Roxb.		+		+										+		+				
15. Sapium insignie (Royle.) Benth		+														+				

Table - II (Contd.)

Subgroup-I (Only Quercetin containing)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
16. E. hirta L.			+											+						
17. E.dracunculoides Lamk.			+											+		+				
18. E.milii Desmoul	+			+																
19. E.lactea Haw.	+													+		+				
20. E.pulcherrima Willd.	+		+													+				
21. E.nerrifolia L.			+	+												+				
22. E.coccinea Roth.	+															+				
23. E.thymifolia Burm.	+															+				
24. E.heterophylla L.	+				+															
25. E.parviflora L.	+				+									+		+				
26. Pedilanthus tithymaloides L.poit	+				+									+		+				
27. E.tithymaloides var variegatus L.poit	+		+											+		+		+		
28. E.tithymaloides var.nanus L.poit	+		+																	
29. Phyllanthus madaraspatensis L.				+										+		+				
Subgroup-II (Kaempferol containing)																				
1. Bridelia cernulata Roxb.					+	+												+		
2. Drypetes roxburghii Wall.					+	+														

Table - II (Contd.)

Subgroup-II (Kaempferol containing)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
3. Securinega virosa (Willd.)Baillon				+	+									+	+					
4. Securinega leuopyrus (Willd.)DC.					+											+				
5. Emblica officinalis Gaertn.					+											+	+			
6. E. tirucalli L.				+														+		
7. E. antiquorum L.				+												+				
8. L. elegans L.				+																

(1) Quercetin (2) C-7-ome (3) C-3'-ome (4) C_4-3'-4'-di-ome (5) Kaempferol (6) Kaempferol 4'-ome (7) Luteolin 4'-ome (8) Luteolin 3'-4'-di-ome (9) Apigenin (10) 7-OCH_3 apigenin (11) 7,4'-di-ome apigenin (12) Vitexin (13) isovitexin (14) Alkaloids (16) Saponins (17) Tannins (18) Proanthocyanins.

Subgroup-III (Apigenin containing)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Chrozophora prostrata Dalz.								+	+							+				
2. Chrozophora rottleri (Geisler) sprengel								+	+							+	+			
3. Jatropha gossypifolia L.							+		+											
4. J. curcas L.									+		+							+		
5. J. podagrica Hook.							+		+											
6. Hura crepitans L.																				
Subgroup -IV (Luteolin containing)																				
1. Macaranga peltata (Roxb.)Muell.Arg.							+	+												
2. Acalypha ciliata Forsk.								+						+	+	+				
3. A. hispida Burm.							+							+						
4. Trewia nudiflora L.							+	+								+				
5. Mallotus philippinensis Muell.Arg.								+												
6. Jatropha gossypifolia L.							+		+					+						
7. J. panduraefolia L.							+							+				+		
8. J. multifida L.			+				+													
9. J. podagrica Hook.							+		+											
10. Excoecaria bicolor Hassk.							+	+								+				

Table - 12 The distribution of various Phenolic Acids in 67 members of the Euphorbiaceae

Sr.No.	Name of the plant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1.	Bridelia cornulata Roxb.	+	+	+	+	+				+	+										
2.	Cleistanthus collinus Benth.			+	+			+													
3.	Aporusa lydeliana (Wight)Baillon	+		+	+			+													
4.	Drypetes roxburghii wall.	+				+					+										
5.	Securinega virosa (Willd) Baillon	+						+			+		+								
6.	S.leucopyrus (Willd.)DC.			+				+			+										
7.	Breynia nivosa (Bull.) pax & Hoffmann			+		+		+		+	+										
8.	B.rhamnoides Retz.			+		+				+	+										
9.	B.retusa (Dennst.)Alston			+		+				+	+										
10.	Emblica officinalis Gaertn.	+		+				+		+	+										
11.	Cicca acida L.	+		+							+										
12.	Phyllanthus virgatus Forst.	+		+						+	+										
13.	P.fractarnus Webster			+						+											
14.	P.madaraspatensis L.			+	+																
15.	Chrozophora prostrata Dalz.			+	+	+					+										

Table - 12 (Contd.)

Sr.No.	Name of the plant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
16.	Chrozophora rottleri(Geisler) Sprengel		+	+	+					+											
17.	Ricinus communis L.	+		+		+	+	+			+										
18.	Macaranga indica Wight Icon.			+	+		+			+	+										
19.	M.peltata (Roxb.)Muell-Arg.			+						+	+										
20.	Acalypha ciliata Forsk.	+		+	+	+		+			+										
21.	A.hispida Burm.	+		+			+			+	+										
22.	A.Wilkesiana Muell-Arg.	+		+							+										
23.	A.godseffiana L.	+									+			+							
24.	A.indica L.	+		+	+					+	+										
25.	Trewia nudiflora L.	+		+	+																
26.	Mallotus philippinensis Muell-Arg.	+			+	+		+													
27.	Trewia involucrata L.			+	+																
28.	T.hildbrandtii Muell-Arg.			+	+																
29.	Dalechampia scandens L.	+		+		+		+													
30.	Hevea brasiliensis Muell-Arg.			+	+	+		+							+						
31.	Manihot esculenta Crantz.	+		+		+															
32.	Jatropha gossypifolia L.	+	+	+	+									+							

Table - 12 (Contd.)

Sr.No.	Name of the plant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
33.	Jatropha curcas L.	+		+		+					+										
34.	J.panduraefolia L.	+		+		+															
35.	J.multifida L.	+		+	+	+					+										
36.	J.podagrica Hook	+		+					+												
37.	Croton bonplandianus Baill.	+		+						+	+										
38.	C.tiglium L.	+		+						+	+										
39.	C.oblongifolius Roxb.	+		+							+										
40.	Kirganelia reticulata(Poir.) Baill.	+		+						+	+										
41.	Sebastiania chamaelia Muell-Arg.	+	+	+																	
42.	Balliospermum montanum(Willd.) Muell-Arg.			+	+																
43.	Excoecaria bicolor Hassk.	+	+		+																
44.	Sapium sebiferum (L.) Roxb.	+	+	+	+																
45.	S.insigne (Royle)Benth.	+		+	+																
46.	Hura crepitans L.			+		+	+														
47.	Euphorbia hirta L.		+	+	+																
48.	E.fulgens Karw ex Klotzsch					+															

Table - 12 (Contd.)

Sr.No.	Name of the plant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
49.	Euphorbia dracunculoides Lamk.	+	+	+			+														
50.	E.heyneana sprengel	+	+	+			+	+													
51.	E.geniculata orteg	+			+		+	+													
52.	E.milii Des moul	+		+	+					+	+										
53.	E.laeta Hayne. ex Roth.	+		+																	
54.	E.tirucalli L.	+	+	+			+			+	+										
55.	E.lactea Haw	+			+			+				+									
56.	E.pulcherrima Willd.	+	+	+	+					+	+										
57.	E.nerrifolia L.	+	+	+	+		+			+	+										
58.	E.prostrata Ait.			+	+																
59.	E.anticuorum L.				+																
60.	E.coccinea Roth.	+		+							+										
61.	E.Thymifolia Burm.	+								+	+										
62.	E.heterophylla L.	+		+						+	+										
63.	E.elegans L.	+		+					+	+	+										
64.	E.parviflora L.	+	+	+					+	+	+										

Table - 12 (Contd)

Sr.No.	Name of the plant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
65.	Pedilanthus tithymoloides (L.) Poit			+	+	+		+		+	+										
66.	var variegatus (L.) Poit.			+		+					+										
67.	var nanus (L.) Poit.	+		+		+		+		+	+										

(1) P-OH Benzoic acid (2) Protocatchuic (3) Vanillic (4) Syringic (5) Gentisic (6) O-coumaric (7) Melilotic (8) Sinapic (9) Ferulic (10) P-coumaric (11) Phloretic (12) O-pyrocatechuic (13) Chlorogenic (14) 3-OH 5-CH_3 Benzoic acid (15) ∞ -resorcylic acid.