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STUDY OF PETAL VENATION IN *RANUNCULUS DIFFUSUS* DC. OF THE FAMILY RANUNCULACEAE

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Abstract: This paper deals with the detail variation of petal venation in *Ranunculus diffusus* DC. of the family Ranunculaceae. Out of 40 petals examined, only 4 petals shows various type as of anastomoses according to Foster's classification, and the out of 4 petals, only one petal has been noted as new type of anastomoses which has not been indicated in Foster's classification. Detailed anastomoses of the veins were observed at the same time which region of petal, anastomosis occurs. Each petal has been divided into three parts: basal, central and distal region. Similarly longitudinal portion of a petal can be divided as right costal, middle and left costal by keeping the ad axial surface of the petal upward. Among the different types of anastomosis, type IV of Foster has been noted in only two petals out of 40 studied petals, whereas type V and type I is seen only in 1 petal, each out of 40 studied petals. The 2 veins are waited to form one bundle, a new type which has not recognized earlier by Foster (1966) in his 6 types of anastomoses. This is the new type of anastomosis. The other type of anastomoses type II, type III and type VI are not seen in present studied specimens, with accordance to percentage of anastomoses. The total number of dichotomies in each petal varies from 2 to 11.

Keywords: Petal venation; *Ranunculus diffuses* DC. Ranunculaceae.



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INTRODUCTION

The vascularization pattern in petal is known as petal venation. *Ranunculus diffusus* DC. (English Name: Buttercup or Crowfoot family) is a native to Temperate Himalaya of Sikkim, altitude varies from 16,000 to 17,000 feet. It is also found in higher mountains of the Western Peninsula-Sumatra and Java and also in cool regions of Northern and Southern hemisphere. It is a wild herbs in flowering season restricted in between March to June. The plants are belonging to the family Ranunculaceae (Buttercup family) of the order Ranunculales of Eudicots (APG II, 2003) under the class Magnoliopsida. Ranunculaceae have 62 genera and approximate 2000 species in the World (Mabberley, 2008) and in India the family is represented by 30 genera and about 160 species (Hooker, 1875). From the economic point of view, the *Ranunculus diffusus* DC. Has no economic importance. These are not used in medicinal purposes. This is actually a poisonous plant. Other species of *Ranunculus* are commercially important for ornamental purposes (Singha *et al.*1983; Udayan and Balachandran, 2009). The plants are perennial, prostrate, covered with spreading hairs; nodes at times rooting. Leaves are softly hairy, 3 partite, segments cuneate, of lower leaves often stalked. Peduncles 1-flowered, terminal or leaf opposed. Flower 1/2 to 1 in diameter. Sepals hairy. Petals narrowly obovate or oblong obovate. Achenes ovate, globose heads, dotted, receptacle of fruit small, compressed, with an intramarginal rib at a variable distance from the acute margin. Style short, straight or hooked. The study of petal venation received the attention of workers in different types in tracing phylogeny after the remarks that petal venation shows diversity. Petal venation of irregular flower has been carried out by many workers (Datta and Saha, 1968; Subramanyam and Nair, 1973; Gupta, 1982), whereas petal venation of regular flower has been documented by many workers (Chartek, 1962, 1963; Arnott and Tucker, 1963, 1964; Melville, 1969; Banerjee and Mukherjee, 1970; Banerjee, 1972, 1976; Gupta, Mohini, 1983; Saha and Mukherjee, 2012). The perusal of available literature it appears that venation of petal is especially significant at the species and also in generic level too. There is no work on the petal venation of *Ranunculus diffusus* DC. Petal venation may provide important clues to evolutionary development and also important for better understanding of this plant and also important for its identify. Therefore, the present work deals with the detailed study of petal venation of this species have been under taken to show its taxonomic status.

MATERIALS AND METHODS

Plant material of *Ranunculus diffusus* DC. was collected from Sikkim at altitude about 16,000 to 17,000 feet by Professor G. G. Maiti, Department of Botany, University of Kalyani and plant material was kept in the Departmental Herbarium for the study. This study was done by the following classification of Foster (1966). For this study randomly selected petals were preserved in FAA (5ml. Formalin, 5ml. Acetic acid and 90ml 70% Ethyl alcohol), the preserved petals were

taken in different (2%,3%,4% and 5%) concentration of NAOH solution for 2 days, then the solution was warmed to clear the petals. In another process, preserved materials were taken in saturated chloral hydrate solution for 3 days. After aforesaid procedure, studied materials or petals stained in 0.5% aqueous safranin solution and mounted in 70% phenol glycerin solution and were sealed with 58-60 degree centigrade(paraffin wax).Randomly selected petals were studied under the simple dissecting microscope and drawn the venation pattern with the help of prism type Camera Lucida. About 40 petals were selected from the mass of petals in different localities for this study. Number of dichotomies in proximal, median and distal end, anastomoses in different petal was calculated in each petal after the work of Foster (1966).

OBSERVATION

This petal has peduncles with 1 flower with terminal or leaf opposed. Flower 1/2 to 1 in diameter flowers are solitary and pale yellow. Each flower consist of 5 narrowly obovate or oblong obovate free petals with rounded apex, cuneate base and entire margin The petal size more or less equal The size 5-7mm x 2-4mm.The basic pattern of petal venation at the base, varies from 2-3 traced condition .After short distance it divides and re divides dichotomously and some parts of petal show anastomoses, but the number of anastomosis is extremely low Types of anastomoses of the studied petals are shown in table-I having 40 figures of petals.

The total number of dichotomies in each petal varies from 2 (Fig.39) to 11 (Fig. 4). Average percentage of dichotomies is highest in Basal region (58.22%) which is minimum in distal region (7.11%). But central region of petal has about 34.66% dichotomies.

The interesting feature of petal venation of *Ranunculus diffusus* DC. is that veins do not reach the margin of the petals.

The number of anastomoses in each petal varies from one to two only and even no anastomoses have been observed in some petals (36 petals out of 40 petals).

The majority types of anastomoses (type IV, and one petal type I and one petal in type V, the type II,III and type VI are absent) of veins are recognized by Foster (1966,1968) are seen in the studied petals. The one petal (Fig.28) shows the 3 anastomoses; one anastomoses is type IV another 2 anastomoses are new type (two veins are form one bundle) which has not reported earlier by Foster in his 6 types of anastomoses.

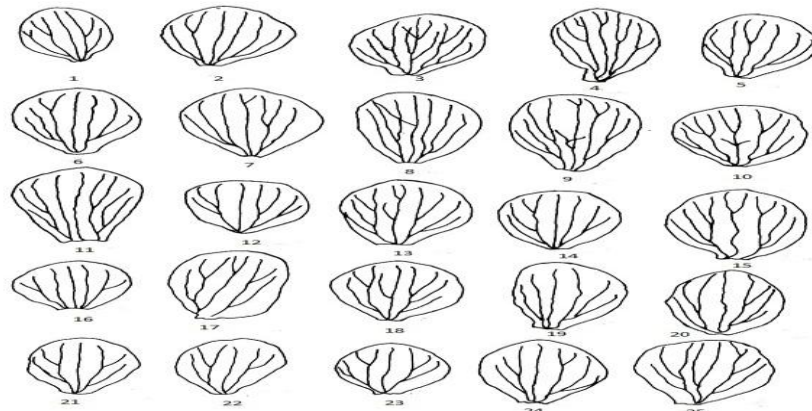
Table 1: Showing the number of dichotomies and anastomoses and types of anastomosis in studied *Ranunculus diffusus* DC. Petals.

Figure No.	Number of Dichotomies			Total no. of Dichotomies In each petal	Number of Anastomosis	Types of Anastomosis
	Basal region	Central region	Distal region			
1	2	3	0	5	-	-
2	3	1	0	4	-	-
3	5	5	0	10	1	IV
4	3	3	2	8	-	-
5	4	1	0	5	-	-
6	4	1	0	5	-	-
7	3	1	1	5	-	-
8	4	2	0	6	1	I
9	4	4	2	10	1	V
10	6	4	0	10	-	-
11	4	2	0	6	-	-
12	3	3	0	6	-	-
13	5	3	1	9	-	-
14	4	1	0	5	-	-
15	5	1	2	8	-	-
16	2	2	0	4	-	-
17	3	2	1	6	-	-
18	3	3	0	6	-	-
19	3	0	0	3	-	-
20	4	1	0	5	-	-
21	3	2	0	5	-	-

22	2	2	0	4	-	-
23	4	2	0	6	-	-
24	3	2	0	5	-	-
25	3	2	1	6	-	-
26	2	1	0	3	-	-
27	3	1	1	5	-	-
28	4	2	2	8	3	IV,2 new Type
29	3	2	0	5	-	-
30	3	1	0	4	-	-
31	3	1	1	5	-	-
32	3	3	0	6	-	-
33	2	3	0	5	-	-
34	2	2	0	4	-	-
35	3	3	1	7	-	-
36	3	1	1	5	-	-
37	3	1	0	4	-	-
38	2	2	0	4	-	-
39	2	0	0	2	-	-
40	4	2	0	6	-	-
Total	131	78	16	225		
Percentage	58.22%	34.66%	7.11%			

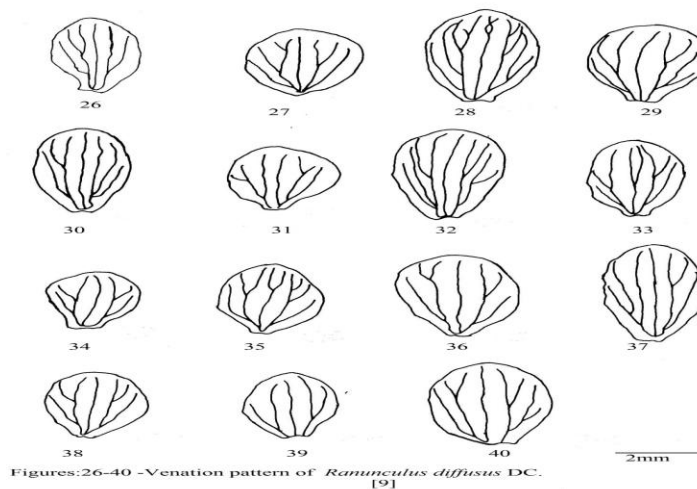
Table 2: Percentage of different types of anastomoses in studied petals.

Types of Anastomosis	Percentage of Anastomosis
Type I	16.66%
Type II	0
Type III	0
Type IV	33.33%
Type V	16.66%
Type VI	0
*New Type	33.33%
(2 new types are observed, which are not reported earlier by Foster in his 6 types of anastomoses)	



Figures: 1-25- Venation pattern of *Ranunculus diffusus* DC.

2mm



DISCUSSION

The venation of petal in *Ranunculus diffusus* DC. is essentially open dichotomous type, as has been noted in the leaves of *Circaeaster* by Foster (1971) and petal from different taxa by Arnott Tucker (1963,1964), Banerjee and Mukherjee (1970) and Banerjee (1972,1976).

Foster (1966, 1968) has reported 6 types of anastomoses in the angiospermic petals. Present study is more or less identical with the study of Foster (*l.c.*). Three types (except type II,III and VI) of petal venation has been noted from the present taxa. In this taxa 2 new types of anastomoses have been noted which has not been recognized earlier by Foster (1966). The type IV (33.33%) is prevalent type as 2 new types are also prevalent (33.33%). The higher categories are type I and type V and the percentage of anastomoses is 16.66%. The type II,III and VI has not been observed from the present taxa. It has also been seen that maximum percentage of anastomosis is seen in apical part, which is low in medial part and absent in basal part of petals.

In the studied percentage of anastomosis is very low, and such type of low percentage of anastomosis has also been reported by Banerjee and Mukherjee (1970) from another species of *Ranunculus* i.e. *Ranunculus scleratus* Linn. Petal venation of *Ranunculus diffusus* DC. Indicates that it has predominant free dichotomous types of venation which is usually seen in some primitive dicots as well as ferns. At the same time percentage of different categories of anastomosis is extremely low. Therefore, the taxon can be regarded as one of the primitive taxon on the basis of petal venation.

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