



ISSN 2250-0774

Advance Research in Pharmaceuticals and Biologicals

(A Peer Reviewed International Journal for Pharmaceutical and Allied Research)



USA CODEN: ARPBZ

A COMPARATIVE STUDY OF PETAL VENATION BETWEEN *BRASSICA NIGRA* L. AND *BRASSICA CAMPRESTRIS* L.

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Received on 11/04/2013

Revised on 21/04/2013

Accepted on 12/05/2013

ABSTRACT:

Petal venation of *Brassica campestris* L. and *Brassica nigra* Koch have been worked out in details. Among the different types of anastomoses, the type II is most frequent in *Brassica campestris*, and type II and type V are most frequent in *Brassica nigra*. Type III and type IV absent in both species. The type I is intermediate in both species. It is based in accordance with the percentage of anastomosis. Total number of dichotomies in *Brassica campestris* varies from 12-20 and total number of dichotomies in *Brassica nigra* varies from 15-33.

Keywords: Comparative study, Petal venation, *Brassica nigra* L., *Brassica campestris* L.

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INTRODUCTION

The venation pattern in petal is known as petal venation. *Brassica campestris* L. (Hindi:- Sarson, Bengali:- Swet Sarisha) and *Brassica nigra* (Hindi:- Sarson, Bengali:- Kalo Sarisha) a very common cultivated plant of West Bengal abundently grows in field from Nov – Dec to Feb – March. This both plants are known as “Rabi Fasal” in Bengali. The both plants belongs to the family Brassicaceae or Cruciferae. Cruciferae have 321 genera and about 3400 species. From the economic point of view, both plants have many medicinal properties and this is major oil yielding plant in India as well as in West bwngal. The oil produced from the seeds of the fruit. Flower and young part of the plants are used as vegetable and rich with vitamins. The study of petal venation recived the phylogeny after the remark the petal venation shows diversity. Petal venation of irregular flower has been carried by many workers^{1,2,3}. Petal venation of regular corolla has been documented by many workers^{4,5,6}. The perusal at available literature it appears that venation of petals are specially significant at the species level and no work is available on the petal venation of *Brassica nigra* and *Brassica campestris*. Petal venation may provide important clues to the evolutionary development and for better understanding of this plants and also important for it's identity. Therefore, the

present work on the detailed study on petal venation of *Brassica campestris* and *Brassica nigra* have been undertaken.

MATERIALS & METHODS

Fully open flowers of *Brassica campestris* L. and *Brassica nigra* were collected during the period Feb – March, 2011. The material preserved in FAA solution (Formalin : Glacial acetic acid and 70% ethyle alcohol in 0.50 : 0.5 : 9 ratio). Later, petals were stained in 0.5% aqueous safranin solution and mounted in phenol glycerine solution and were selated by paraffin wax at 58°C – 60°C. The petals of the both specimens were studied under the simple dissecting microscope and have draw the venation pattern with the help of prism type camera lucida. Fifteen petals of every specimens were selected from the mass of petals in differrent localities for this study. Number of dichotomies and types of anastomoses were calculated in each petal after the work at Foster⁷.

RESULTS

In both species each flower consist of 4 obvate to cureate free petals with retuse apex, unequally developed cuneate base, with entire margin, but the size of petal slightly variable (fig: 1 – 15) & (fig: 16 – 30). The largest petal is 9mm x 5mm and smallest petal is

5mm x 2mm. The petal size is not much variable in both species. The basic pattern of petal venation consists of a single vascular trace at the base. After a short distance it divides and redivides and produces 1 medial vein and 3 – 5 costal veins in each side of medial vein of both species. The medial vein is divided in upper portion in both species. Number of right costal vein is often greater than the left costal vein in both species. The basic venation pattern in each petal is an open dichotomous type in both species. The total number of dichotomies in lateral vein is often greater than branching dichotomies of medial vein in both species. The total dichotomies in each petal of *Brassica campestris* is varies from 12 – 20 and each petal of *Brassica nigra* is varies 15 – 33. Average percentage of dichotomies is high in distal region of petals (in *Brassica campestris* is 55.905% and in *Brassica nigra* is 59.439%), which is minimum in central or medial region of petals in *Brassica campestris* is 27.952% and in *Brassica nigra* is 25.471% but basal region of petals it is about 16.142% in *Brassica campestris* and 15.094% in *Brassica nigra*. So, dichotomies are prevalent in distal region of petals of both the species. Most interesting feature of two species are-

- Veins don't reach the margin of petals in *Brassica nigra*.
- Veins diverge towards the apex in both species.
- Anastomoses are prevalent towards the peripheral region of petals of both species.

The number of anastomoses is less in number in both species.

The percentage of anastomoses of different types are stated :-

Type - I (In *Brassica campestris* is 9.090% and in *Brassica nigra* is 11.111%)

Type - II (in *Brassica campestris* is 54.545% and in *Brassica nigra* is 44.444%)

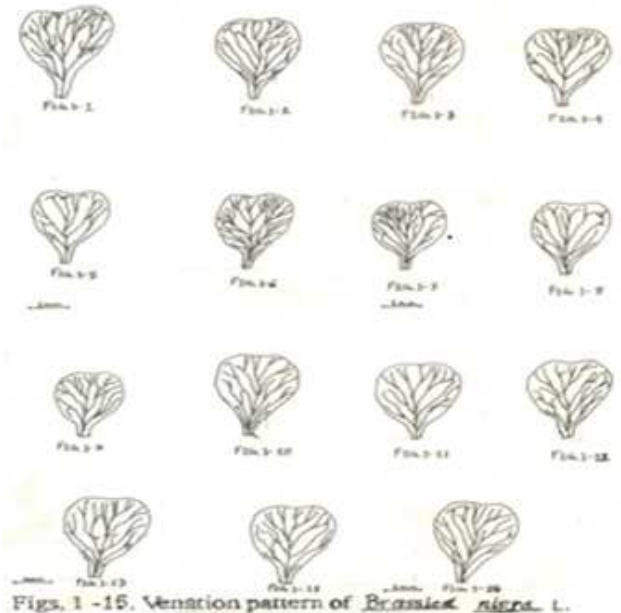
Type - V (In *Brassica campestris* is 36.363% and in *Brassica nigra* is 44.444%)

Type III and Type IV are totally absent in both species.

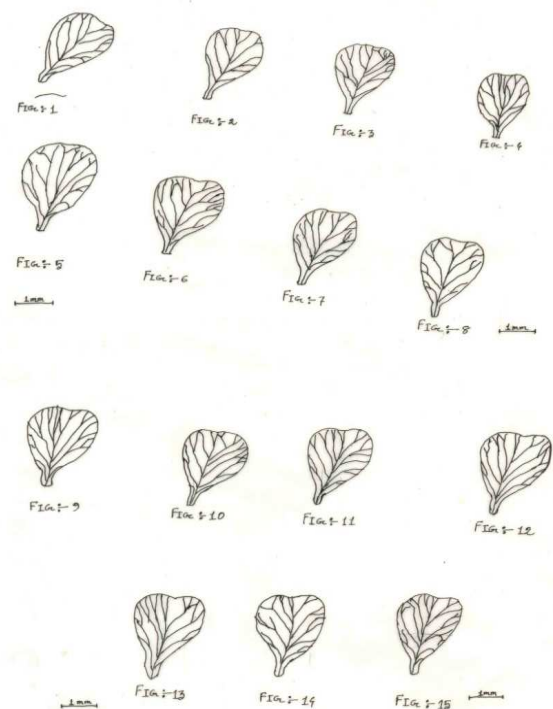
Present study also indicates the following types of anastomoses of veins :-

- i. Anastomoses between the sister branch of some costal system, Viz. Fig:- 10, (in *Brassica campestris*) and Fig:- 1 (in *Brassica nigra*)
- ii. Anastomoses between costal vein and medial vein, Viz. Fig:- 4,6,8,9,12,13 (in *Brassica campestris*) and Fig:- 5,8,14 (in *Brassica nigra*.)
- iii. Type III and Type IV are totally absent in both species.

- iv. Anastomosis between sister branches of medial vein, Viz. Fig:- 1,2,3,10 (in *Brassica campestris*) and Fig:- 4,6,11,14 (in *Brassica nigra*).



Figs. 1 -15. Venation pattern of *Brassica nigra* L.



Figs. 1 -15 Venation pattern of *Brassica campestris* L.

Table-I. Showing the number of dichotomies and anastomoses and type of anastomoses is studied in *Brassica campestris* L. petals. Table-II. Frequency of different type of anastomoses in *Brassica campestris* L. petals. Table-III. showing the number of dichotomies

and anastomoses and type of anastomoses in studied *Brassica nigra* petals. Table- IV. Frequency of different type of anastomoses in studied *Brassica nigra* petals.

TABLE – I :- Showing the number of dichotomies and anastomoses and type of anastomoses in studied *Brassica campestris* L. petals.

Fig. No.	Number of Dichotomies			Total number of Dichotomies in each Petal	No. of Anastomoses	Types of Anastomoses
	Basal Region	Central or Medial Region	Distal Region			
01	03	04	08	15	1	V
02	02	06	04	12	1	V
03	02	04	11	17	1	V
04	03	05	08	16	1	II
05	03	06	09	18	0	-
06	03	05	11	19	1	II
07	02	04	11	17	0	-
08	02	05	09	16	1	II
09	04	03	12	19	1	II
10	04	03	11	18	2	V,I
11	03	05	09	17	0	-
12	03	05	08	16	1	II
13	02	04	09	15	1	II
14	01	05	12	19	0	-
15	03	07	10	20	0	-
%	16.142	27.952				

TABLE – II:- Frequency of different type of anastomoses in studied *Brassica campestris* L. petals.

Type of anastomoses	% or frequency of anastomoses
Type - I	9.090
Type - II	54.545
Type - III	-
Type - IV	-
Type - V	36.363

TABLE – III:- Showing the number of dichotomies and anastomoses and type of anastomoses in studied *Brassica nigra* petals.

Fig. No	Number of Dichotomies			Total number of Dichotomies in each Petal	Number of Anastomoses	Types of Anastomoses
	Basal Region	Central or Medial Region	Distal Region			
01	03	05	22	29	1	I
02	07	03	15	25	0	-
03	02	05	16	23	0	-
04	02	04	15	21	1	V
05	02	04	09	15	2	II,II
06	05	08	20	33	1	V
07	04	07	14	25	0	-
08	03	02	10	15	0	II
09	02	05	09	16	0	-
10	04	07	09	20	0	-
11	02	06	09	17	1	V
12	03	05	13	21	0	-
13	04	05	09	18	0	-
14	03	07	08	18	2	II,V
15	03	08	11	22	0	-
%	15.094	25.471	59.494			

TABLE – IV :- Frequency of different Type of anastomoses in studied *Brassica nigra* petals.

Type of anastomoses	% or frequency of anastomoses
Type – I	11.111
Type – II	44.444
Type – III	–
Type – IV	–
Type – V	44.444

Discussion

The venation of petals in *Brassica campestris* L. and *Brassica nigra* are essentially open and dichotomous type, as has been noted in leaves of *circacaster* by Foster⁸ and petals from different taxa by Arnott and Tucker⁹, Banerjee and Mukherjee¹⁰, Banerjee^{11, 12}. From the study it is evident that 55.905% at the dichotomies of veins of *Brassica campestris* and 59.434% of the dichotomies of veins of *Brassica nigra* are connected in the distal region of the petals, which is minimum in the central region at both species, while the maximum number of dichotomies have been noted from the central region of petals in *Trigonella* by Gupta¹³. It is also evident that there is no correlation is observed between the frequency of anastomoses and area of petals of both species. Among the different type of anastomoses type II and type V are most frequent in both species than type I. Type III and Type VI are totally absent in both species.

Present study indicates that there are three types of anastomoses between the veins, out of them type I and

type II have also been noted by Benerjee and Mukherjee¹⁴ in *Ranunculus secleratus*. But the last type V categories has been observed for the second time from this both species (after study of *Oxalis cornicalata* L., Saha and Mukherjee of Kalyani University) where anastomoses between sister branch of the some medial branch is seen (Fig 1,2,3,10 in *Brassica campestris* and Fig 4,6,11,14, in *Brassica nigra*). Foster's¹⁵ classification of anastomoses of vein of the study of leaves of *circaester* fits well with the present observation. Arnott¹⁶, Benerjee and Mukherjee¹⁷, Subramanyam and Nair¹⁸ have express their idea that open dichotomous venation is primitive, while on the other Chrtek^{19, 20} views that anastomosed venation is primitive type. The present study indicates that dichotomous venation is primitive, since some of the petal have no anastomosis in both species, while some other petals having different point of fusion or anastomoses in veins in both species. After the whole study, we can say there is no significant differentiation exists between the petal venation of *Brassica campestris* and *Brassica nigra*, excepting their dichotomies number and maximum type of anastomoses.

Acknowledgement

Authors are thankful to Prof. Gour Gopal Maiti, Department of Botany, for his kind help, during this study.

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