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VESSELS IN SOME ASLEPIADCEAE

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ABSTACT: *In the present investigation vessels of 16 species of family Asclepiadaceae have been studied. Through a lot of variation exists in the size and shape of vessels, number of perforation plates and intravascular thickening of walls in the taxa, the vessels in asclepiadaceae are found highly specified.*

INTRODUCTION

The xylem occupies a unique position among plants tissues in that the study of its anatomy has come to play an important role with reference to taxonomy and phylogeny. The lines of specialization of the various structural features have been better established for the xylem than any other single tissue (Bailey 1944; Bailey and tupper 1918; Chalk, 1933; Tippo 1940).

Dwarfed and extremely xerophytic plants frequently have abnormally short vessel members owing to excessive reduction in size of cambial initials. It should be recognized that the vessel members fluctuate more or less in size and structure within the limits of single plant (Bailey and Tupper 1918).

A few workers have worked on the tracheary elements of certain taxa of the family Asclepiadaceae. In view of this the present investigation is undertaken.

Materials and Methods:

Sixteen species (Table-1) of the family Asclepiadaceae were collected from different part of rajasthan and fixed in F.A. A. longitudinal sections of stem were cut and then tissues were macerated following the method of Jane (1956). After through washing the macerated material was stained in Saarinen and mounted in glycerin jelly.

Camera lucida drawings were made using the same magnification to depict the variation in size, shape, location and number of perforation plates. Mean values of 10 observations were taken.

Observation:

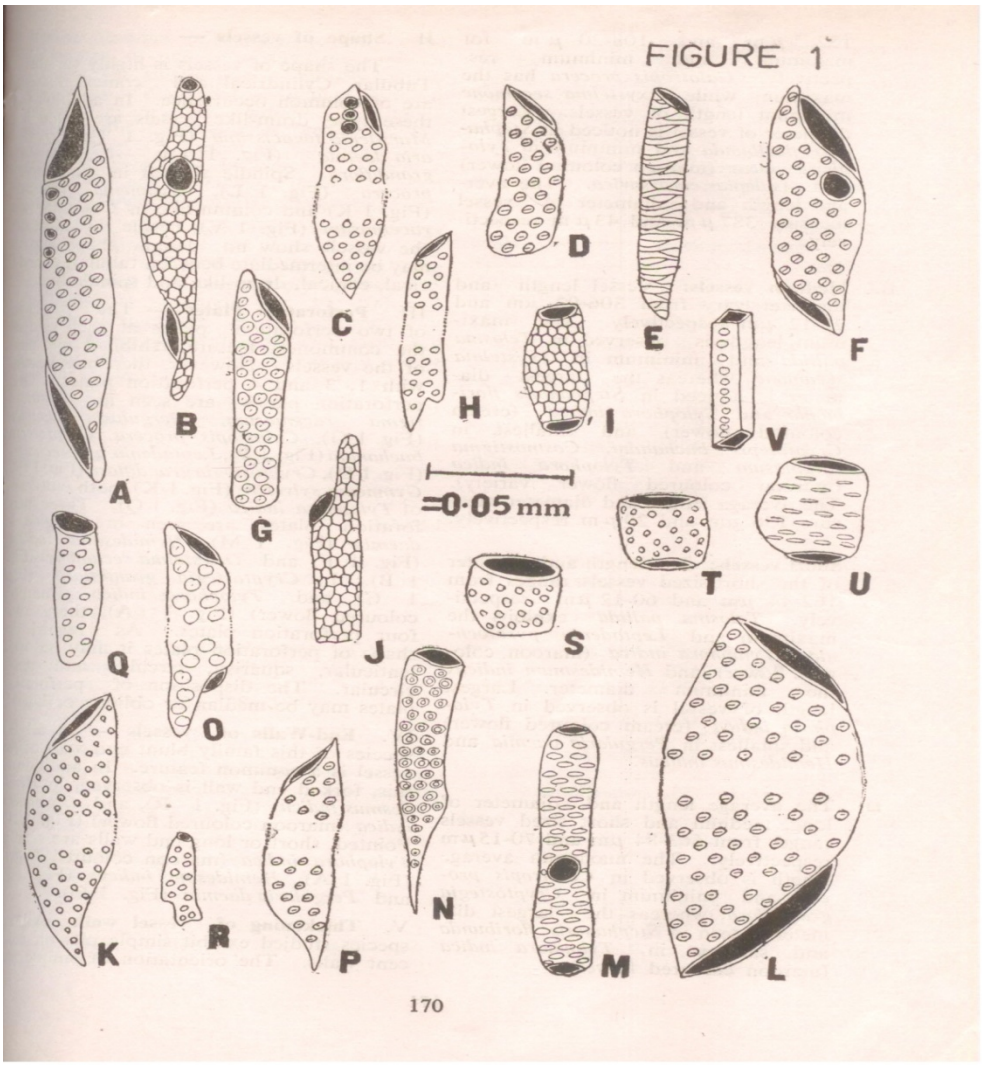
The vessels are classified into three types viz, long, medium, short. The length and diameter of vessels µm , number and position of perforation plates and nature of adjacent wall thickening are given in (Table- 1). Fig. 1 shows variations in the structure of tracheary elements in species of the family Asclepiadaceae.

TABLE -1

Showing Vessel Characteristics in Certain Species of the Family Asclepiadaceae

Sl. No.	Name of the Species	Size of vessels								Perforation Plates						Adjacent Wall Thickening			
		Long		Median		Short		Average		Number				Position		Sp.	Bp.	R.	Sc
		L	D	L	D	L	D	L	D	1	2	3	4	Median	Oblique/ lateral				
1.	*Cryptolepis buchanani*	-	-	104	12	92	28	98	20	c	c	-	-	c	r	c	-	-	-
2.	*Cryptostegia grandiflora*	-	-	108	44	60	20	84	32	r	c	-	r	c	c	c	c	-	-
3.	*Hemidesmus indicus*	216	32	124	32	44	12	128	25	-	c	o	-	c	o	c	c	-	-
4.	*Asclepias cur assavica*	364	20	168	20	84	16	205	19	-	c	-	-	c	r	c	-	-	-
5.	*Calotropis procera*	1600	100	280	16	108	16	663	44	r	c	-	-	c	o	c	c	r	o
6.	*Oxystelma secamone*	152	24	92	20	-	-	122	22	-	c	o	-	c	r	c	r	r	-
7.	*Cosmostigma racemosum*	192	24	120	12	96	16	136	17	o	c	-	-	c	r	c	o	-	-
8.	*Gymnema sylvestre*	252	44	108	28	72	20	144	31	o	c	-	-	c	r	c	o	-	-
9.	*Marsdenia tenacissima*	392	28	132	20	68	20	197	23	-	c	-	-	c	r	c	o	-	-
10.	*Pergularia daemia*	240	20	160	16	44	16	148	17	r	c	o	-	c	r	c	c	-	-
11.	*Stephanotis floribunda*	366	102	246	72	132	36	248	70	-	c	-	-	-	c	c	c	-	-
12.	*Tylophora indica* (maroon flower)	184	20	96	12	64	12	115	15	r	c	-	o	c	r	c	r	r	-
13.	*T. indica* (cream flower)	300	30	208	72	162	42	233	48	r	c	-	-	c	c	c	-	-	-
14.	*Telosma pallida*	450	60	306	24	144	60	300	48	-	c	-	-	c	c	c	-	-	-
15.	*Leptadenia pyrotechnica*	310	68	112	24	76	12	166	35	o	c	-	-	c	o	c	o	o	-
16.	*Stapelia variegata*	396	30	138	42	-	-	267	36	-	c	-	-	c	r	c	-	-	-
	Average	387	43	156.38	29.1	89	23.28	203.4	31.4										

Explanation of Letters: C= common, r=rare, o=occasional L= length, D=diameter, Sp=Simple pitted, BP= Border pitted, R=reticulate Sc= Scalari form



Discussion:

The stems of 15 genera of Asclepiadaceae were macerated for studying the wood anatomy.

1. Size of vessels –

   A. **Long vessels**: the length and diameter of the vessels varies from 1600-152 µm and 108-20 µm for maximum and minimum respectively. Calotropis procera has the maximum while Oxystelma Secamone minimum length of vessels is noticed in stepha-notis floribunda and minimum in Tylophora indica (maroon colored flower) and Asclepias Curassavica. The average length and diameter of vessel measure 387 µm and 43 µm respectively.

   B. **Medium vessels**: Vessel length and diameter vary from 306-92 µm and 72-12 µm respectively. The maximum length is observed in Telosma pallid and minimum in Oxystelma secamone whereas the largest diameter is noticed in Stephanotis floribunda and Tylophora indica (cream colored flower) and smallest in Cryptolepis buchanani, Cosmostigma racemosum and Tylophora indica (maroon colored flower variety). The

average length and diameter measure 156 µm and 29 µm respectively.

C. **Short Vessels**: The length and diameter of short sized vessels ranges from 162-44 µm and 60-12 µm respectively. Telosma pallid exhibits the maximum and Leptadenia pyrotechnica, Tylophora indica (Maroon colored flower) and Hemidesmum indicus the minimum diameter. Largest length of vessel is observed in Tylophora indica (cream colored flower) and smallest in Pergularia daemia and Hemidesmus indicus.

D. The average length and diameter of long, medium, short sized vessels ranges from 663-84 µm and 70-15 µm respectively the maximum average length is observed in Calotropis procera and minimum in Cryptostegia grandiflora whereas the largest diameter is seen in Stcphanotis floribunda and smallest in Tylophora indica (maroon colored flower).

II. Shape of vessels –

The shape of vessels is highly variable, Tubular, Cylindrical and Conical vessels are common of occurrence. In addition to these type, drum-like vessels are found in Marsdenia tenacissima (Fig 1 T); Pergularia daemia (Fig. 1 U); Cryptostegia grandiflora. Spindle shaped in Calotropis procera (Fig. 1. L), Gymnema sylvestre (Fig. 1 K) and column-like in Cosmostigma racemosum (Fig 1.V), beside this most of the vessels show no definite shape and it may be intermediate between tubular, cylindrical conical, drum-like and spindle-like.

III. Perforation Plates – The presence of two perforation plates at each end is the commonest feature exhibited by most of the vessels. However, there are vessels with 1,3 and 4 perforation plates, One perforation plates are seen in cosmostigma racemosum, pergularia daemia (Fig 1 G), Calotropis procera, cryptolepis buchanani (Fig. 1 P), Leptadenia pyrotechnica (Fig.1D), Cryptostegia grandiflora (Fig.1G), Gymnema sylvestre (Fig. 1K), both cultivars of Tylophora indica (Fig 1.Q). three perforation plates are seen in pergularia daemia (Fig.1 M), Hemidesmus indicus (Fig.1F) and Oxystelma secamone (Fig.1 B). In Cryptostegia grandiflora (Fig. 1 C) and Tylophora indica (maroon coloured flower) (Fig 1 A), there are four perforation plates, As regard the shape of perforation plates. As regard the shape of perforation plats it may be oval, lenticular, squarish, circular and semicircular. The disposition of perforation plates may be median or oblique or lateral.

IV. End-Walls of vessels – in all the species of this family blunt end wall of the vessel is a common feature. In addition to this, forked end wall is observed, in Hemidesmus indicus (Fir.1 R), and Tylophora indica (maroon coloured flower) (Fig. 1 H) Pointed, short or long end walls are seen in Tylophora indica (maroon coloured flower) (Fig.1 A), Hemidesmus indicus (Fig 1 F) and Pergularia daemia (Fig. 1. O).

V. Thickening of vessel wall: All the species studied exhibit simple pits on adjacent walls. The orientation of simple pits is either alternate or scattered regularly. The orientation of pits is mostly transverse or oblique. The simple pits are mostly spherical but rarely elongated. Reticulate pitting is observed in Telosma pallida, Oxystelma secamone and Calotropis buchanani, Asclepias curassavica and Tylophora indica (cream coloured flower) exhibit bordered pits.

"Shah, Nila Shah and Bhatt (1973) reported that in Pergularia daemia the average size of short, medium and long vessels of the root respectively is 190, 285 and 480 µm in length and 39, 108 and 162 µm in diameter. In the present study these dimensions in respect of stem are 44, 160 and 240 µm for length and 20-16 µm for diameter.

Prasad, Wahi and Jonaja (1961) recorded the size of the vessel of root in Marsdenia to be 225-450 µm in length and 35-150 µm in diameter.

A few more species have been worked out by other workers. Calotropis procera (Israili and Issar, 1977), Hemidesmus indicus (Prasad and Wahi, 1965) and Cryptolepis buchanani (Wahi, Ansari and Prasad, 1971b)".

From the above discussion it is clear that there is lot of variation in size and shape of vessels, number of perforation plates and intervascular thickening of walls in the Asclepiadaceae, Severalworkers (Shah et al. 1967, Chaedle and Kosakai, 1975, 1976; Abbe and Abbe, 1971; Bailey, 1944; Inamdar and Murthy, 1977; Nag & Kshetrapal, 1988) have reported variations in vessel characters in different taxa of Angiosperms. The vessels in Asclepiadaceae are highly specialized in having simple perforation plates. Apocynaceae are also highly specialized in having simple perforation plates. Apocynaceae are also highly specialized in having simple perforation plates (Nag & Kshetrapal, 1988.

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Figure - 1

A = *Tylophora indica* **(maroon coloured flower)**

B = *Oxystelma secamone*

C = *Cryptostegia grandiflora*

D = *Leptadenia pyrotechnica*

E = *Calotropis procera*

F = *Hemidesmus indicus*

G =*Pergularia daemia*

H = *Tylophora indica* (maroon coloured flower)

I = *Telosma pallida*

J = *Calotropis procera*

K = *Gymnema sylvestre*

L = *Calotropis procera*

M = *Pergularia daemia*

N = *Cosmostigma racemosum*

O =*Pergularia daemia*

P = *Cryptolepis buchanani*

Q = *Tylophora indica* **(maroon coloured** flow

R = *Hemidesmus indicus*

S = *Cryptostegia grandiflora*

T = *Marsdenia tenacissima*

U = *Pergularia daemia*

V =*Cosmostigma racemosum* **All** x **400**

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