VESSELS IN SOME ASLEPIADCEAE

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ABSTRACT: 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            | Short              | Average                  |                          |
|        |                              | L  D            | L  D              | L  D                     | Number 1 2 3 4           |
|        |                              | L  D L  D       |                  |                          | Position Median Oblique/ lateral |
|        |                              |                 |                   |                          | Sp. Bp. R. Sc |
| 1      | Cryptolepis buchanani        | - -             | 104 12            | 92 28                    | 98 20                  | c c - c r               |
| 2      | Cryptostegia grandiflora     | - -             | 108 44            | 60 20                    | 84 32                  | r c - r c               |
| 3      | Hemidesmus indicus           | 216 32          | 124 32            | 44 12                    | 128 25                 | - c o - c               |
| 4      | Asclepias cur assavica       | 364 20          | 168 20            | 84 16                    | 205 19                 | - c - c r               |
| 5      | Calotropis procera           | 1600 100        | 280 16            | 108 16                   | 663 44                 | r c - c o               |
| 6      | Oxyystela secamone           | 152 24          | 92 20             | - -                      | 122 22                 | - c o - c r             |
| 7      | Cosmostigma racemosum        | 192 24          | 120 12            | 96 16                    | 136 17                 | o c - c r               |
| 8      | Gymnema sylvestre            | 252 44          | 108 28            | 72 20                    | 144 31                 | o c - c r               |
| 9      | Marsdenia tenacissima        | 392 28          | 132 20            | 68 20                    | 197 23                 | - c - c r               |
| 10     | Pergularia daemia            | 240 20          | 160 16            | 44 16                    | 148 17                 | r c o - c r             |
| 11     | Stephanotis floribunda       | 366 102         | 246 72            | 132 36                   | 248 70                 | - c - c r               |
| 12     | Teulolosha indica (maroon flower) | 184 20          | 96 12             | 64 12                    | 115 15                 | r c - o c r             |
| 13     | T. indica (cream flower)     | 300 30          | 208 72            | 162 42                   | 233 48                 | r c - c c               |
| 14     | Telosma palida              | 450 60          | 306 24            | 144 60                   | 300 48                 | - c - c c               |
| 15     | Leptadenia pyrotechnica      | 310 68          | 112 24            | 76 12                    | 166 35                 | o c - c o               |
| 16     | Stapelia variegata           | 396 30          | 138 42            | - -                      | 267 36                 | - c - c r               |
|        | 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 Oxyystelma 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 Hemidesmus 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 Stephanotis 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 P); Shah, Nila Shah and Bhatt (1973) reported Hemidesmus indicus (Fig.1F) and Oxystelma secamone that in Pergularia daemia the average size of (Fig.1 B). In Cryptostegia grandiflora (Fig. 1 C) and short, medium and long vessels of the root Tylophora indica (maroon coloured flower) (Fig 1 A) respectively is 190, 285 and 480 µm in length there are four perforation plates, As regard the shapes and 39, 108 and 162 µm in diameter. In the of perforation plates. As regard the shape of present study these dimensions in respect of perforation plates it may be oval, lenticular, squarish stem are 44, 160 and 240 µm for length and circular and semicircular. The disposition of perforation 20-16 µm for diameter.

plates may be median or oblique or lateral.
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 (Issar 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 intervacular thickening of walls in the Asclepiadaceae. Several workers (Shah et al. 1967, Chaudle 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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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 flower
R = Hemidesmus indicus
S = Cryptostegia grandiflora
T = Marsdenia tenacissima
U = Pergularia daemia
V = Cosmostigma racemosum All x 400
