STUDIES OF Xylem ELEMENTS IN *Crotalaria juncea* L OF FAMILY Fabaceae IN MAHARASHTRA STATE OF INDIA

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ABSTRACT

Xylem element studies IN Crotalaria juncea in Maharashtra State are described.The range of length and width of vessel elements was determined by the measurement of vessel elements and were classified as per the classification given by Radlfordet al. (1974). Which is reproduced here for further investigation. Extremely short (class A), very short (class B) moderately short (class C) medium sized (class D) vessels were observed. The frequency of moderately short vessel was higher and Extremely, short vessels shows lower frequency the average diameter of vessel element is varies in mu. Shape , Lateral wall thickening ,Tail with long blunt, short blunt, long pointed were observed. In orientation vessels with oblique and transverse perforation plate were observed. In shape of perforation plate more commonly vessels have perforation plate oval in shape. Stem fibers the length of stem fibers in between 390-445 mu. the average diameter is 420mu. the diameter of fibers in between 0.8-18 mu. and the average diameter is 13 mu. all the fibers are pointed at both ends.The length of tracheid elementin root is between 335-481mu. and the average is 396 mu. the diameter of tracheid is in between 19-20 mu. and average diameter is 19.5 mu. all the tracheid elements are spindle shaped.All the species of Crotalaria juncea shows great variation which are discuss detail in this research paper.

Keywords: *Crotalaria juncea, xylem element, Percentage and range of length, Classification*

Introduction

Xylem is the tissue in vascular plants which conducts water (and substances dissolved in it) upwards in a plant. There are two kinds of cell which are involved in the actual transport: tracheids and vessel elements. Vessel elements are the building blocks of vessels, which constitute the major part of the water transporting system in those plants in which they occur. Vessels form an efficient system for transporting water (including necessary minerals) from the root to the leaves and other parts of the plant.

The presence of vessels in xylem has been considered to be one of the key innovations that led to the success of the flowering plants. It was once thought that vessel elements were an evolutionary innovation of flowering plants, but their absence from some basal *angiosperms* and their presence in some members of the *Gymnosperms* suggest that this hypothesis must be re-examined, vessel elements in some species of order *Gnetales* may not be homologous with those of angiosperms, or vessel elements that originated in a precursor to the angiosperms may have been subsequently lost in some basal lineages, So detail study of these xylem elements in Angiosperms required .

Now a day the xylem elements size , shape, orientation, structure of perforation plate and other characters are may be used to solve complicated issue related to taxonomic related problems of the plants.

Materials and methods

For study of vessels the preserved material were made into small pieces and boiled and cooled repeatedly until free from the air. A macerated fluid was prepared by taking aqueous chromic acid (as per Jeffrey's). The pieces of wood were kept in the fluid for 24 hours and after 24 hours the material was crushed with the help of glass rod and washed with distilled water to remove excess stain. The material was stained in 1 % saffranin for 6 hours and microscopic observations. The camera Lucida of the vessels were drawn by taking measurements the illustrations were drawn with India ink and microphotographs were taken wherever possible.

Observations

The various characters of vessel elements viz,.size wall thickening, shape, tail and characters of perforation plate like number,

orientation and shape were studies. A survey of about 30-50 vessel elements of stem was carried out.

The range of length and width of vessel elements was determined by the measurement of 20-25 vessel elements and were classified as per the classification given by Radlford*et al*. (1974). Which is reproduced here for persual.

A.	Extermely short	Less than 175 um
B.	Very short	175 to 250 um
C.	Moderately short	251 to 350 um
D.	Medium size	351 to 800 um
E.	Moderately Long	801 to 1100 um
F.	Very Long	over 1900 um

Results and discussion

Vessel element of *Crotalaria juncea* L. (Family, Fabaceae)

Vessel element of root (Table no-01)

Dimension

Extremely short (class A) very short (class B), moderately short (class C) and medium sized (class D) vessels were observed the frequency of very short (class A) was higher (41.22) and medium size (class D) shows lower frequency (12.78). The average diameter of vessels element is 18mu.

Lateral wall thickening

simple pitted thickening were commonly observed, pits alternate.

Tail

Vessel with long pointed, long blunt, short pointed, short blunt are observed.

Perforation plate

In the vessel only simple perforation plate were present.

Orientation

The vessels with oval, oblique and transverse perforation plates were observed.

Shape of perforation plate

More commonly vessels have lenticular oval lin shape.

Root Fibers

The length of root fiber 524-641 mu.and average length of fibers is 568 mu. The width of fiber is between 9-17mu. and average width is 09 mu. all the fibers are pointed at both the ends.

Tracheids

Average length of tracheid element is between 315-461 mu. and average length is 346 thewith of tracheids is between 9-18 mu. and average diameter is 108 mu all the tracheids are spindle shaped.

Vessel element of stem (Table no 02)

***Crotalaria juncea* L.**

Very short (class B) moderately short (class C) medium sized (class D) vessels were commonly observed. The frequency of very short moderately short (class C) was higher (39.36) and frequency of very short vessel (30.54) shows lower frequency.

Shape

The shape of vessel element is cylindrical linear.

Lateral wall thickening

Simple pitted thickening were common pits alternate.

Tail

With long blunt, long pointed, short blunt were commonly observed.

Perforation Plate

In the vessel, only simple perforation plates were observed.

Orientation

The vessel with oblique and transverse perforation plate were observed.

Shape of perforation plate

More commonly vessels have perforation plate oval in shape.

Stem Fibers

The length of stem fiber is between 390-445 mu average length is 420 mu. and the width of fibre is in between 0.8-18 mu and average width is 0.9 mu all the fibers are pointed at both ends.

Tracheids

The length of tracheid element is in between 310-390 mu and average length 15-342 mu and the diameter of tracheid element is in between 16-21 mu. and average diameter is 18 mu. all the tracheids are spindle shaped.

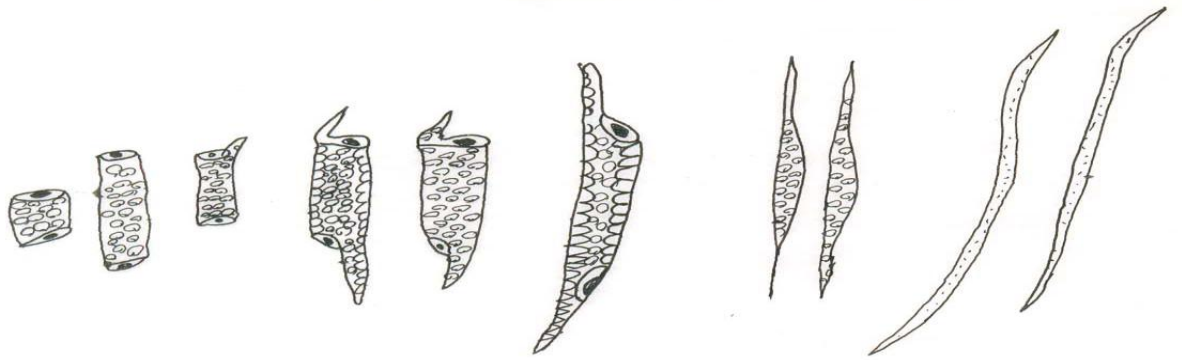
Classification (After Radford etal) and relative frequency (%) of diferent classes of vessel element in the root and stem of *Crotalaria juncea* L

Table no 01 - Vessel elements of*Crotalaria juncea* L.root shows percentage and range of length in each class :-

Class A		Class B		Class C		Class D	
Percentage %	Range of Length (mu)	Percentage %	Range of Length (mu)	Percentage %	Range of Length (mu)	Percentage %	Range of Length (mu)
41.22	72 to 144	30.54	180 to 234	19.78	252 to 260	12.78	410 to 450

Table no 02 - Vessel elements of *Crotalaria juncea* L..stemshows percentage and range of length in each class

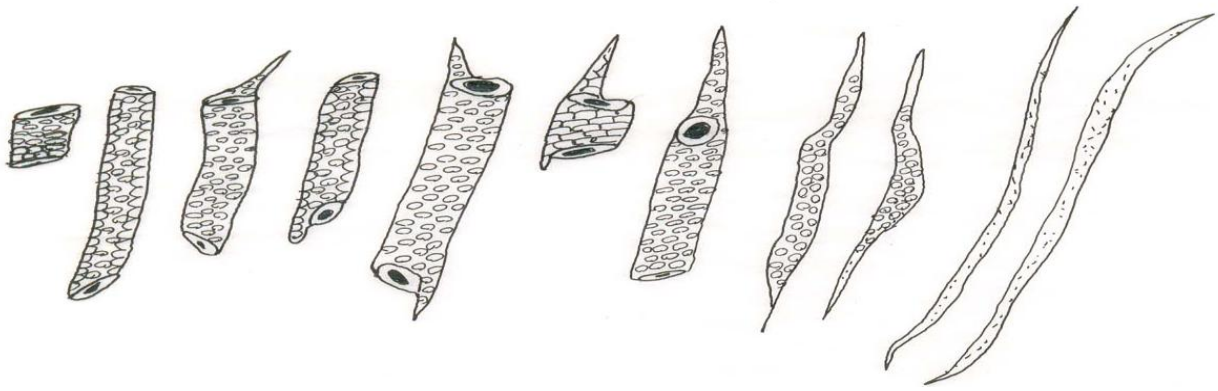
Class B		Class C		Class D	
Percentage %	Range of Length (mu)	Percentage %	Range of Length (mu)	Percentage %	Range of Length (mu)
28.54	180 to 216	39.36	262 to 324	30.54	360 to 522



a) b) c) d) d)

Camera Lucida technique Diagram - Vessel element of Stem.

a) Tail less Vessel.
b) Vessal with tail at one end.
c) Vessal tail at both end.
d) Tracheid
e) Fibre



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Conclusion

Percentage and range of length (Dimension) is varies in root and stem of ***Crotalaria juncea*** . But in crotalaria cunninghamii **L** Shape, Lateral wall thickening, Tail, Perforation Plate, Orientation, Shape of perforation plate of vessels cant shows much more differentiation.

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