Indian Journal of Fundamental and Applied Life Sciences ISSN: 2231-6345 (Online) An Online International Journal Available at http://www.cibtech.org/jls.htm
2012 Vol. 2 (4) October-December, pp.162-165/Sharma et al.
Research Article

STUDIES ON VASCULAR SUPPLY TO THE RACHIS AND FOLIAR NECTARIES IN SOME *ACACIA* SPECIES

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ABSTRACT
The internodal vasculature supplying the leaves particularly primary and secondary rachii and extrafloral nectaries present on them was studied in five species of *Acacia*. The three traces to a leaf become anastamosed and reorganised in the primary and secondary rachii and become siphonostelic. Foliar nectaries are supplied from the adaxial sector of the primary and/or secondary rachii vasculature.

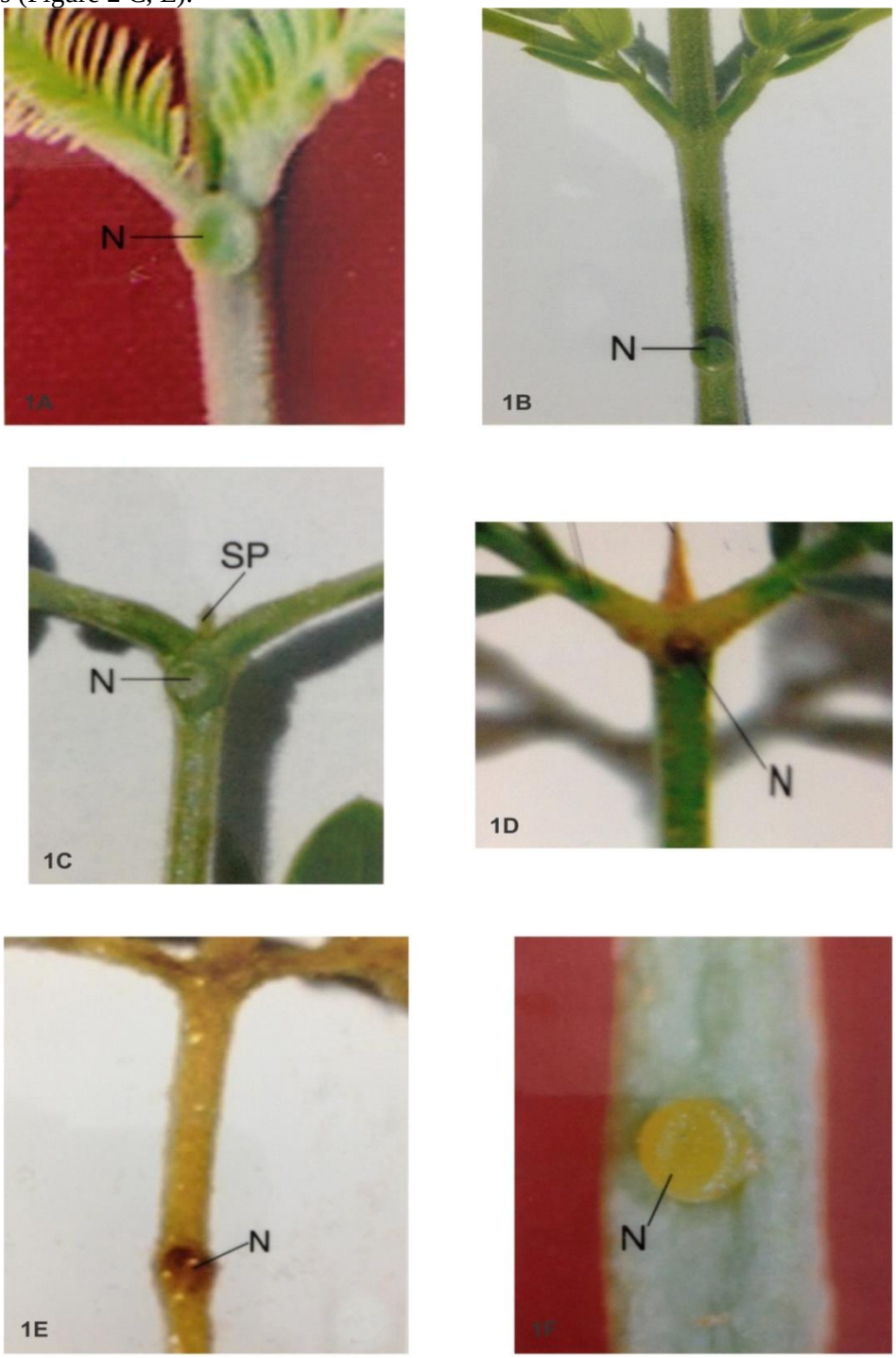
Keywords: *Primary and Secondary rachii, Foliar/ Extrafloral Nectaries, Vascular Supply*

INTRODUCTION
Extrafloral nectaries are of ecological, evolutionary and taxonomic importance in many plants. Since their introduction by Linnaeus (1735, 1751) many definitions and conceptions on nectary have been given. Zimmerman (1932) gave a classification of "extrafloral" nectaries while Schmidt (1988) used the term "reproductive" and "extra reproductive" over other terms and subdivided the later into stem, foliar or cotyledonary nectaries depending upon their presence on these organs. The nectaries studied in *Acacianilotica* were located on primary and secondary rachii and were seen to be of taxonomic significance by Sharma and Pillai (1985). Data gathered on these lines in five species of *Acacia* are presented here.

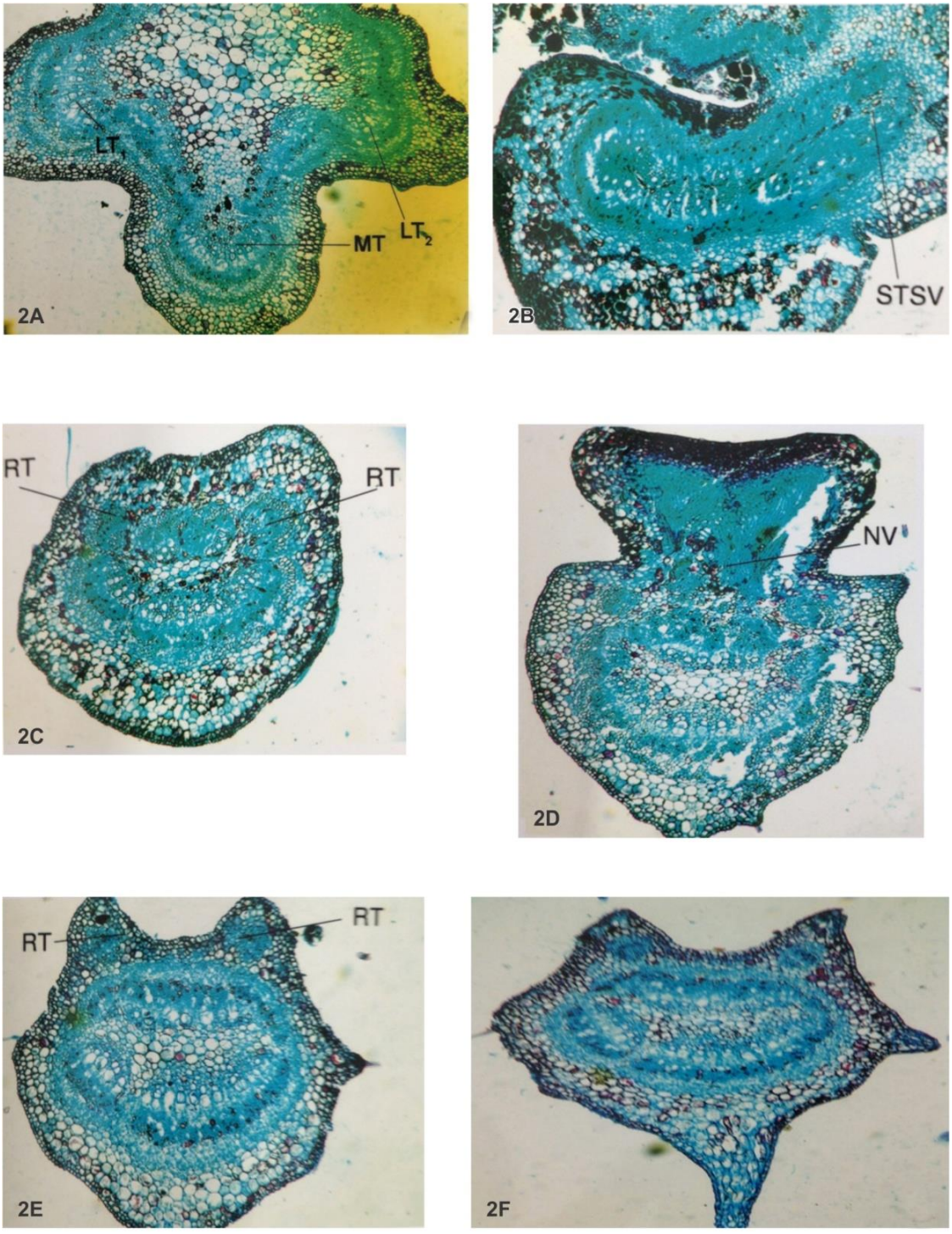
MATERIALS AND METHODS
Mature leaves of five species of *Acacia* viz., *A. catechu* Willd., *A. concinna* C. Prod., *A. leucophloea* (Roxb.) Willd., *A. senegal* (Linn.) willd and *A. tortilis* Hayne, were collected from lower, middle and upper nodes and fixed in FAA for 48 hrs. For serial transverse sections of the node, and rachis (primary and secondary) the materials were dehydrated through TBA series, sectioned at 8-10 µm and stained with morphological stains (safranin-light green) and mounted on slides. Photomicrographs were taken using Nikon E-400 (Antifungus type) microscope.

RESULTS
Adaxially located foliar nectaries on the primary rachis at/or below the attachment of first pair of secondary rachii, were observed in all the five species of *Acacia* studied here. Number and position of these nectaries as well as their vascular supply varied slightly. The leaves are pinnately compound in all the five species and are borne in a alternate phyllotaxy.In *A. catechu* the green nectaries are present on primary rachis at insertion point of lowest pair and three uppermost pairs of secondary rachii. In *A. concinna* they are borne on primary rachis just below the lowest pair, at insertion point of last pair of secondary rachii and at insertion point of last pair of leaflets on the secondary rachis. They are green at maturity. In *A. leucophloea* the nectaries become red at maturity and are present on the primary rachis at insertion point of lowest and last pair of secondary rachii. In *A. senegal* and *A. catechu* the green nectaries are present on the primary rachis just below the lowest pair and at insertion point of last pair of secondary rachii (Figure 1 A-F). They are sessile in all the taxa and are two (*A. leucophloea*, *A. senegal* and *A. tortilis*) three (*A. concinna*) and four (*A. catechu*) in number.
Three larger bundles placed inside three larger ridges of the axis form the vasculature of a leaf at each node in all the five species (Figure 2 A). The three traces anastamose with each other at the base of petiole. These form a semilunar ring of vasculature (Figure 2B) and at higher levels, in the primary rachis, become organised into a large abaxial bundle and two latero-adaxial arcuate bundles in *A. concinna*, *A. senegal*and *A. tortilis*. In *A. leucophloea* it is recognisable into one small abaxial, two larger arcuate

latero-abaxial and two larger arcuate latero-adaxial bundles. Whereas in *A. catechu* it remains as a semilunar ring of undivided collateral vasculature. But in all the five species, two small bundles separate from the latero-adaxial sector and move as two ridges bundles and place themselves below the two adaxial ridges (Figure 2 C, E).



Figures (1A to F): Figures showing foliar nectaries in *A. catechu* at first pair of secondary rachii (Figure 1A), *A concinna* at primary rachis (Figure 1B) and last pair of secondary rachii (Figure 1C), *A. leucophloea* at primary rachis (Figure 1D), *A. senegal* at primary rachis (Figure 1E) and *A. tortilis* at primary rachis (Figure 1F)



Figures (2A to F): Transverse sections of node, petiole, rachis in *A. catechu* showing course of vasculature. Three traces to a leaf (Figure 2A), vasculature at base of petiole (Figure 2B), Rachis vasculature in primary rachis showing departure of ridge traces (Figure 2C), supply to the foliar nectary (Figure 2D), Rachis vasculature after supplying the nectary (Figure 2E) and rachis vasculature prparing to supply the pair of secondary rachii (Figure 2F)
(N - nectary, NV - nectary vasculature,SP - spinnle, MT, LT1 and LT2 - Median and lateral traces, STSV - Stipular supply, RCV - Rachis vasculature, RT - Ridge bundles)

Branches from the two ridges bundles and from adaxial sides of the rachis stele supply the adaxially located foliar nectaries in all the five species (Figure 2D). After supplying the nectaries the rachis stele vasculature and the ridges bundles regain their original shape and position (Figure 2E). Similarly branches from either sides of the adaxio-lateral vasculature of the rachis stele and branches from the ridges bundles also join them and supply the first pair of secondary rachii (Figure 2F). All the successive pairs of secondary rachii are supplied in the similar manner. The nectaries present on the adaxial surface of primary rachis below the first pair of secondary rachii and the nectaries present elsewhere on the primary rachis are supplied in the similar manner. The vasculature after entering into the base of secondary rachis is organised into a stele similar to that of primary rachis. The adaxially located nectaries on the secondary rachii in *A. concinna* also receive vascular supply in the manner nectaries of the primary rachis are supplied.

DISCUSSION

The rachis vasculature in all the five species reported here is of siphonostele type and showed that there are two ridges bundles, which after supplying the nectary generally run below the small ridges of the rachis till they approach the main vasculature of the rachis stele prior to supplying the leaflets. The ridges bundles along with rachis stele vasculature are also involved in supplying the leaflets and after that they regain their original position. The data are in accord with observations made by Sharma and Pillai (1985) in *Acacia nilotica*.

The number and position of foliar nectaries differ considerably in the five species studied here. But the nature of their vascularisation from the primary or secondary rachii is same. The nectary is seen on the primary rachis at or below the attachment of first pair of secondary rachii. The nectary is also seen at the insertion point of upper most pair of secondary rachii in all the species and at the insertion points of uppermost three pairs of secondary rachii in *A. catechu*. In *A. concinna* nectaries are also present at the insertion points of last pair of leaflets. In all the species ridges bundles together with some part of rachis stele bundles or adaxial sector of vasculature supply the nectary. Sharma (1981) while studying petiolar anatomy in some mimosodeae found less specialized nectaries in *Albizzia* and *Pithecollobium*. Sharma and Pillai (1985) observed that though the nectaries present in *Acacia* resembled those in *Pithecollobium* but were smaller than those in the later species. The occasional presence of smaller nectaries elsewhere on the rachis in the three genera and the total absence of nectaries in *Mimosa*, a herbaceous species (Sharma, 1981), may be suggestive of a trend towards gradual elimination during evolution. Elias (1972) was of the view that the specialized or unspecialized nature of the foliar nectaries in mimosoid legumes may be useful in considerations of taxonomy. The data presented here are in support of these observations.

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