

## **Stem and Leaf Anatomy of *Searsia glutinosa* subsp *abyssinica* ( synonym: *Rhus abyssinica*) ( Anacardiaceae) from Erkwit, Sudan**

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### **Abstract**

*In this paper the anatomy of *Searsia glutinosa* subsp *abyssinica* from the family Anacardiaceae was studied. Plant specimens were collected from its natural habitat in Erkwit area in the Red sea state, Sudan. Fresh samples of stem and leaf parts were preserved using a fixative solution containing formalin, acetic acid, and alcohol. Transverse sections of stem and leaf were prepared using standard sectioning technique. Staining was done using Haematoxilin mier's stain. General and characteristic features of the stem and leaf were studied under the light microscope and documented by coloured photographs. Results of this study revealed that some features are of taxonomic value such as the shape and position of the resin canals, the shape of the ducts Lumen, and types and distribution of hairs and glands. The resin canals are located in the past fibers of the vascular bundles and in the pith. Short- stalked glandular hairs are observed in lower surface of the leaves near the midrib. Stem possesses equally active cambium.*

**Key words:** Anatomy; *Searsia glutinosa*; Anacardiaceae; Erkwit; Sudan

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## **INTRODUCTION:**

*Searsia glutinosa* subsp *abyssinica* ( Synonym: *Rhus abyssinica*) of the family Anacardiaceae is a shrub up to 7 m high. Bark: Dark grey to brown or reddish, rough. Leaves: Three, sessile, oval leaflets; the central leaflet is longer, both surfaces softly hairy, edge wavy. Flowers: Small, brown-white. Fruits: Small, rounded, shiny, light to dark brown. As characteristic feature of all true Anacardiaceae, this plant have a turpentine smelling, blackening when wounded. Metcalfe and Chalk (1950), in their study of the general anatomical features of the dicotyledons, reported the occurrence of resin-canals, which are situated in the bast of the vascular bundles of stem, root, and leaf, in all Anacardiaceae genera except *Corynocarpus* and *Juliania*.,Wilkinson ( 1983) studied the anatomical features of the leaves of 21 species of of the genus *Gluta*. His study reveals two major groups of species which reflect the original groups of *Gluta* L. and *Melanorrhoea* Wall., and a smaller group showing intermediate, or an admixture of, characters. The anatomical characters found to be of most use in his study are: stomatal outline in surface view; stomatal density; glandular trichomes, resin ducts present/absent in medullary, parenchyma of midrib. These characters have been used in a key to the species. EL-Oqlah, (1996) found differences between *Pistaci. khinjuk* and *Pistacia vera* in their leaflet anatomy. He reported that *P. khinjuk* adaxial palisade is one-layered and makes up most of the lamina thickness compared to a much smaller portion in *P. vera*.

## **MATERIAL AND METHODS:**

Plant specimens were collected from its natural habitat in Erkwit and identified consulting available flora (Andrews, 1952). Species name was updated and revised for its synonyms (The plant list, 2019). Transverse sections through the stems

and leaves of the studied species were done using standard technique steps recommended by Johansen, 1940. These are: Fixation, dehydration, cleaning, Sectioning, and staining using Haematoxin mier's stain which was prepared according to Mahony ( 1973).

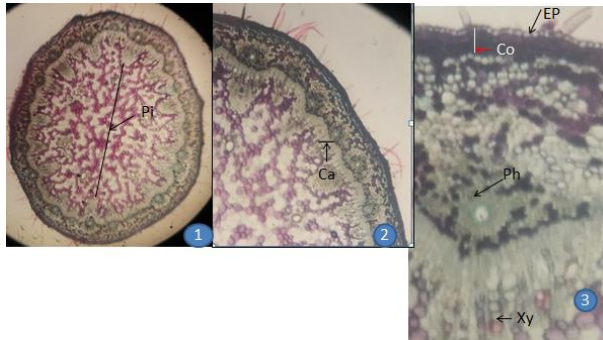
## **RESULTS:**

### **A) Stem anatomy of *Searsia glutinosa*:**

The stem section of the studied species is oval and consists of outer layer of epidermis follow by (4-5) -cell thick collenchymas. The cortex is about (8 - 10) - cell thick parenchyma. The cambium is equally active producing about 29 vascular bundles. The stem also characterized by large pith. Figure 1 shows stem general features of the studied species. Resin ducts or canals are located in the pith and in the bast fiber of the vascular bundles. In each phloem patch there is only one duct. Ducts have oval lumens and in some sections they show red translucent excretion. Stem also possess unicellular hairs as well as short- stalked glandular hairs. . Figure 2 and Figure 3 shows stem characteristic features of the studied species.

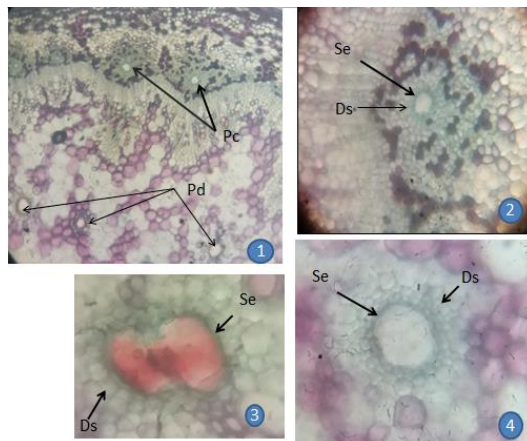
### **b) Leaf anatomy of *Searsia glutinosa***

The leaf section of the studied species shows an outer layer of cuticle followed by thin layer of epidermis. Stomata which are not accompanied by any special subsidiary cells are located mainly on the lower surface. Peltate glands are located in the lower surface of the leaf of the studied species. Also simple unicellular hairs are reported on both leaf surfaces. The majority are detected on the upper surface. Figures 4 and 5 show leaf characteristic features.

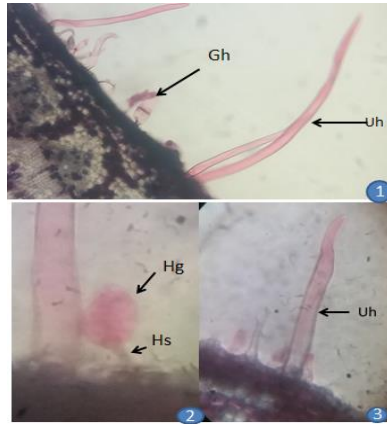


**Figure 1: Stem general features of *Searsia glutinosa* subsp. *abyssinica*.**

1. Oval stem with 29 vascular bundles and larg pith. 2. Unequally active cambium. 3. Sector showing stem layers. Ep ( Epiderms), Pi (Pith), Ca (Cambium),Co ( collenchyma), Ph (Phleom), Xy (Xylem)



**Figure 2: Stem characteristic features of *Searsia glutinosa* subsp. *abyssinica*..** 1. Resin ducts in the bast of the vascular bundle and in the pith. 2. Resin canal in the middle of the phloem 3. Lumen of the pith resin duct full of translucent secretion. 4. Pith resin duct. Pc (Resin canals in the phloem), Pd (Resin canals in the pith), Sc (secretory epithelium), Ds ( duct sheath)



**Figure 3: Stem characteristic features of *Searsia glutinosa* subsp.*abyssinica*.** 1. Unicellular and glandular hairs 2. Glandular hair 3. Simple unicellular hair. Uh (unicellular hair), Gh (glandular hair), Hg (hair gland), Hs ( hair stalk)



**Figure 4: Leaf hairs of *Searsia glutinosa* subsp.*abyssinica*.** Uh (unicellular hair), PG (Peltate gland)



**Figure 5: Leaf blade of *Searsia glutinosa* subsp.*abyssinica* showing unspecific subsidiary cells on the upper and lower blade: S: Stamata, E : epiderms, c: cuticle**

## DISCUSSION:

Leaf and stem Anatomical features have been reported in many studies as key taxonomic traits to distinguish between the highly similar species ( Inamdar ,1971; Karatela and Gill, 1985; Ugborogho *et al*, 1992 ; Essiett *et al*, 2011 Madani and Majbour, 2017). Concerning types of hairs and glands, the results of this research may support many other research findings which consider this character of taxonomic value. For example, leaf surfaces and hair features of five *Satureja* species were investigated by Husain *et al.* (1990), They found that nonglandular hairs of *S. montana* are unicellular, with small granules. Such hairs were not observed in *S. subspicata*. Also according to Bosabalidis (1990), glandular hairs on *S. thymbra* leaves are of two different forms: short glandular hairs (capitate hairs) and glandular scales (peltate hairs). AbdulRahaman *et al* (2014) found that trichome is another significant taxonomic feature in the species of the genus *Lannea*. He reported the presence of trichomes in some species and absent in others. He also added that they are present in *L. kerstingii* and *L. fruticosa* only on the abaxial surface, and in *L. schimperii* on both leaf surfaces. Concerning resin ducts, this study reported the occurrence of resin-canals, in the bast of the vascular bundles of stem and leaf which is considered by Metcalfe and Chalk (1950) as characteristic of the genus. Also resin-canals which observed in the pith of the stem of the studied species is also listed within the taxonomic character for species belonging to a large number of genera belonging to the family Anacardiaceae Wannan (2006). More studies should be conducted concerning the anatomy of other part of the studied species so as to build the necessary anatomical database for the whole genus which later used in combination with morphological and molecular data to refine the taxonomic relationships among the different *Seasaria* species.

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