



Botanical studies of *Rauwolfia serpentina* L. collected from different agro climatic regions of India

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Abstract:

Rauwolfia serpentina (L.) Benth. ex. Kurz., is indigenous to India and other tropical countries of Asia and is pantropic in distribution. Botanical aspects were reported the similarity in root transverse section, longitudinal section; seeds powder microscopy, but there were slight distinct changes found in their leaves and root characteristics in all four different agro-climate regions i.e. Jammu of Zone 1, Samastipur of Zone 4, Allahabad of Zone 5 and Jabalpur of Zone 8.

Keywords: Leaves, Seeds, LS, TS, Powder Microscopy.

Introduction:

Rauwolfia serpentina (Sarpagandha) is one of the highly valued medicinal plant species, which also requires conservation and utilization efforts for overall development and application in medicinal and pharmaceutical science. People are collecting this plant for medicinal use not only from the wild but also through agricultural cultivation. *Rauwolfia serpentina* (Indian snakeroot) is a potential source of phytopharmaceuticals for the treatment of insomnia and is known for its therapeutic uses and the production of traditional beverages (Paul *et al.*, 2022). Wakhloo *et al.*, (1963) studied variation in total alkaloid content of *Rauwolfia serpentina* with respect to ecological conditions. This is a perennial from a woody rootstock and have lanceolate or oblanceolate leaves with 13-18x6-8 cm, acute or acuminate, shining, lanceolate calyx lobes, white corolla, swollen tube above the middle, elliptic-oblong lobes, 0.5-0.7 cm across drupes, black purplish (Bhattacharyya and Sarkar, 1998). The transverse section (T.S) of *Rauwolfia* root having outermost multilayered stratified cork composed of alternate bands of 5-10 rows of a small suberized cells and 2-5 rows of big sized lignified cells; phelloderm is parenchymatous embedded with starch grains and small sized twin prismatic crystals of calcium oxalate; phloem is

narrow, parenchymatous, traversed with medullary rays, latex cells, calcium oxalate crystals and starch grains; cambium ring is distinct; xylem is lignified, composed of few small sized isolated or radially arranged xylem vessels, tracheids and fibers alternating with uni or multiseriate medullary rays, parenchymatous cells are pitted and embadded with starch grains (Tandon and Sharma, 2010; Anonymous, 2001; Kokate, 2012; Khandelwal, 2008). Powder microscopy of the plant root shows stratified cork, tracheid and vessels, starch grains, calcium oxalate crystals, xylem fibers and latex cells (Tandon and Sharma, 2010). Choudhary *et al.*, 2018 reported the root of *Rauwolfia serpentina* is the genuine source drug of Sarpagandha. A botanical study was performed to characterize the plants grown in different agroclimat region of India.

Materials and Methods:

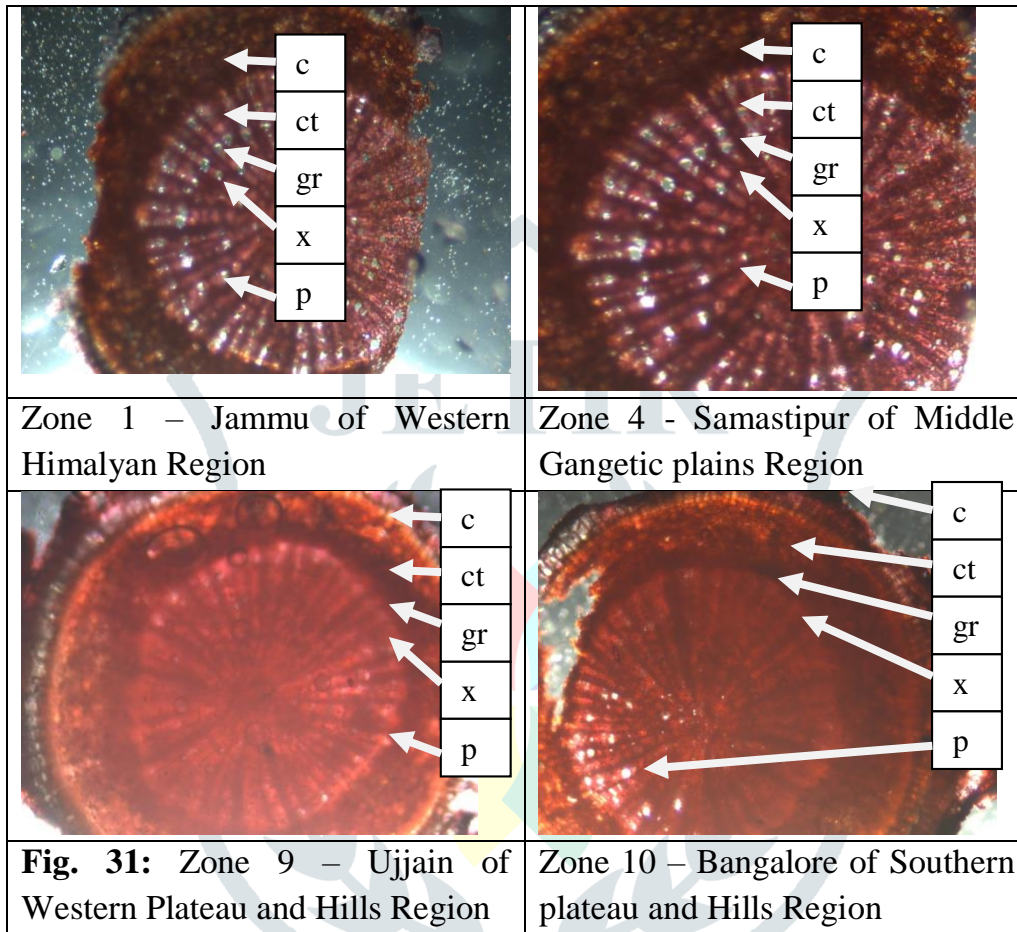
Plant and seeds of sarphgandha (*Rauwolfia serpentine* L.) were collected from four agro-climatic regions viz. Jammu of Zone 1 – Western Himalyan Region; Zone 4 - Samastipur of Middle Gangetic plains Region; Zone 5- Allahabad of Upper Gangetic plain Region; Zone 8 – Jabalpur of Central Plateau and Hills Region; Zone 9 – Ujjain of Western Plateau and Hills Region; Zone 10 – Bangalore of Southern plateau and Hills Region. 20-30cms long twigs of wild sarpgandha plants with leaves, root and flowers were collected from different agro climatic zones. Name of place, date and geo location was recorded at the time of collection of plant materials. This was performed as per prescribed method of collection of plant specimen by British Columbia Ministry of Forests (1996). Herbariums were prepared by following the method of Kottapalli *et al.*, 2016 with some required modification. Taxonomical characterization and identification of plants were done on the basis of their morphological characters as per described method of ICBN (International Code of Botanical Nomenclature) and with the help of a taxonomist. Size, colour, surface, odor, taste and shape of root and seed specimens were observed as per method of Brain and Turner (1975) with some modification. Microscopy of whole as well as powdered seeds and leaf of sarpgandha plant was performed by following the method of Joshi and Aeri, 2009; Paul *et al.*, 2017. Stomatal numbers and index, Palisade ratio and vein-islet number study in leaf were studied as per method of British Columbia Ministry of Forests (1996).

Results and Discussion:

Macroscopic and microscopic studies of collected specimens roots, seeds and leaves were performed and reported that roots length of range 7-10cm with diameter 10-14mm, greyish brown coloured, rough surface, indistinct odour bitter taste and cylindrical shape; seed size 2.5 to 4cms, brown coloured, smooth seed surface, indistinct odour bitter taste and irregular round shape. Avtar and colleague (2023); Baruah and Nath (2000) reported that *Rauwolfia serpentina* Benth Ex kurz can be identified as their root has snake like or cylindrical in shape, yellowish brown in colour, corky and friable, thick root bark and pale yellow coloured inner wood, bitter taste. The transverse section of sarpagandha root. having outermost multilayered stratified cork composed of alternate bands of 5-10 rows of a small suberized cells and 2-5 rows of big sized lignified cells (Tandon and Sharma, 2010; Anonymous, 2001; Kokate, 2012; Khandelwal, 2008). This study presented an image of TS in figure 1 and reported Cork composed with 5-7 rows of small sized suberized cells and 2-3 rows of big sized lignified cells. Phelloderm is parenchymatous embedded with starch grins and small sized twin prismatic crystals of calcium oxalate; phloem is narrow, parenchymatous, traversed with medullary rays, latex cells, calcium oxalate crystals and starch grains; cambium ring is distinct; xylem is lignified, composed of few small sized isolated or radially arranged xylem vessels, tracheids and fibers alternating with uni- or multiseriate medullary rays, parenchymatous cells are pitted and embadded with starch grains (Tandon and Sharma, 2010; Anonymous, 2001; Kokate, 2012; Khandelwal, 2008). This study reported that the

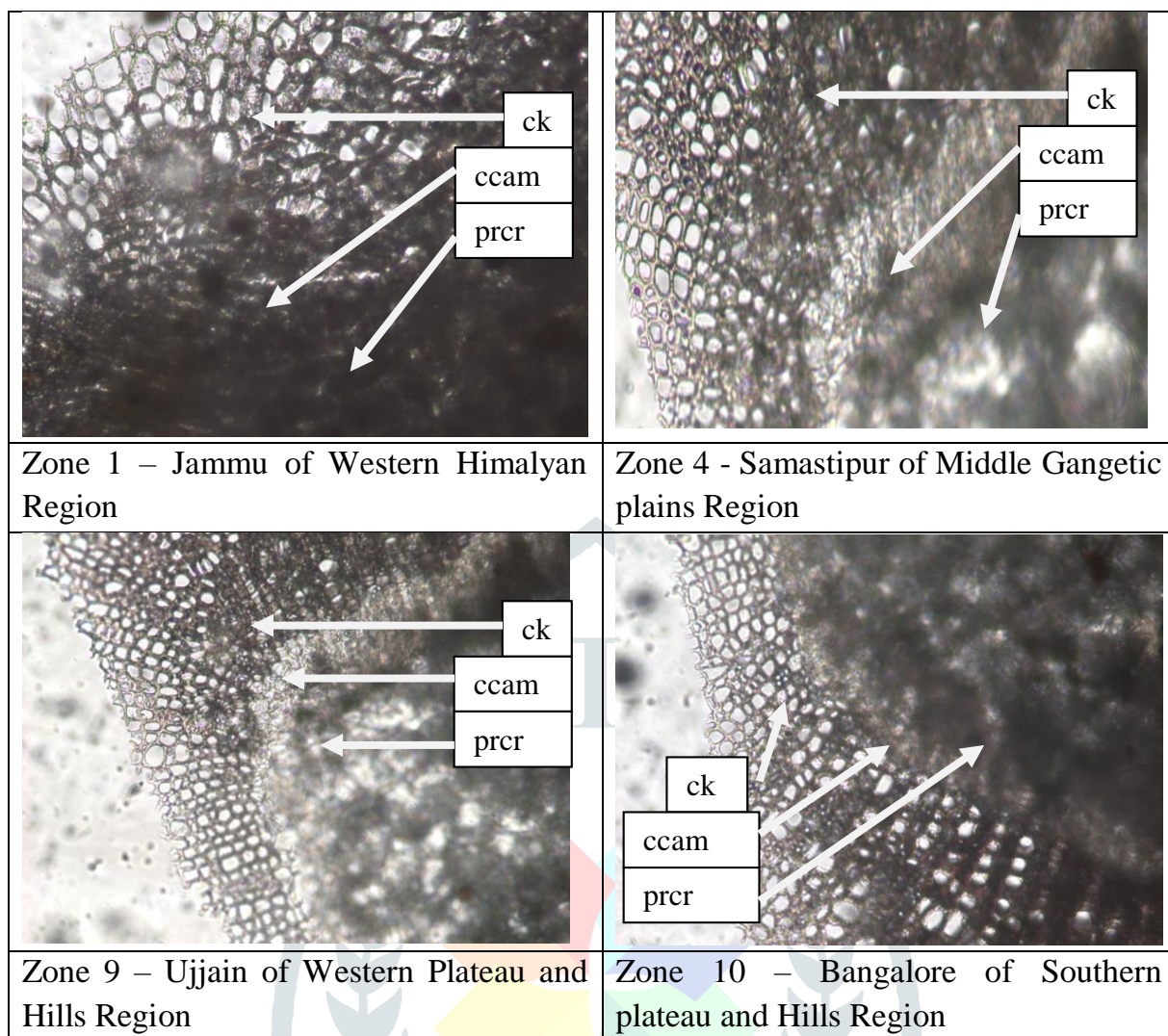
roots are circular in to oval in outline presented in figure 2. Central wood traversed with growth ring and encircle with thin bark. Phelloderm is parenchymatous; Phloem is narrow in size; Cambium ring is distinct; Xylum is lignified; Parenchymatous cells are pitted and embedded with starch grain presented in figure 3. Powder microscopy of the plant root shows calcium oxalate crystals, stratified cork, starch grains, tracheid and vessels, xylem fibers and latex cells (Tandon and Sharma, 2010). Plenty of small sized prismatic crystals of calcium oxalate and starch grain scattered as well as found embedded with parenchymatous cells reported in this study and reveals the earlier reports as presented in figure 4.

Figure 1 TS of collected roots specimens



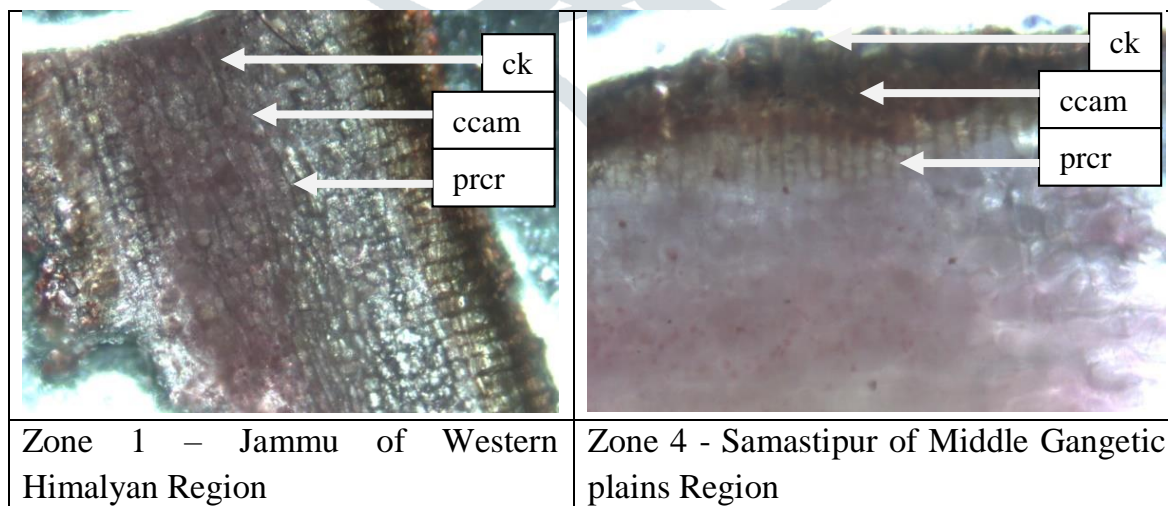
Where: ck : cork; ct : cortex; gr :growth ring; xy : xylum; ph : phloem

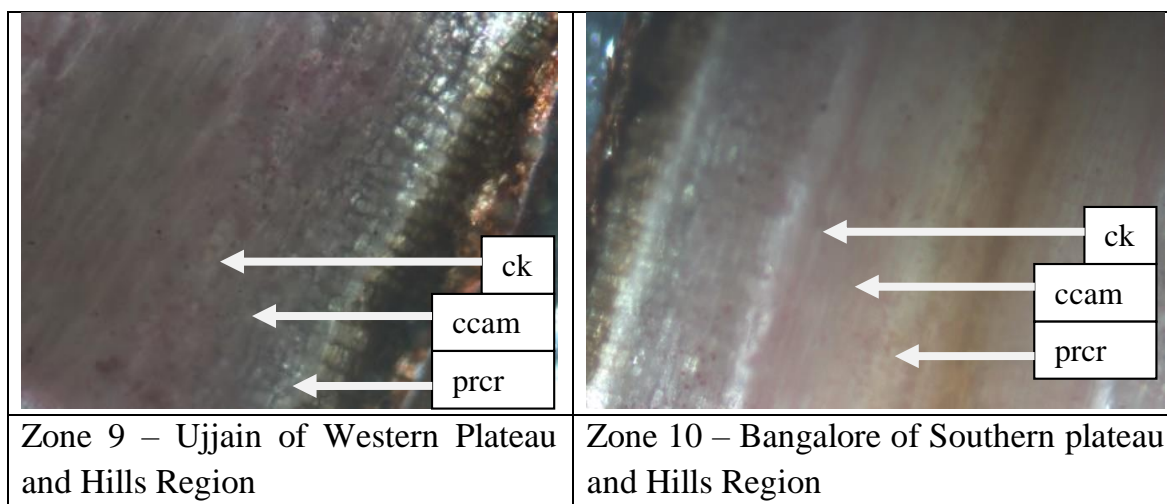
Figure 2. TS of collected roots specimens



Where: ck: cork; ccam : cork cambium; prcr: prismatic crystals of calcium oxalate

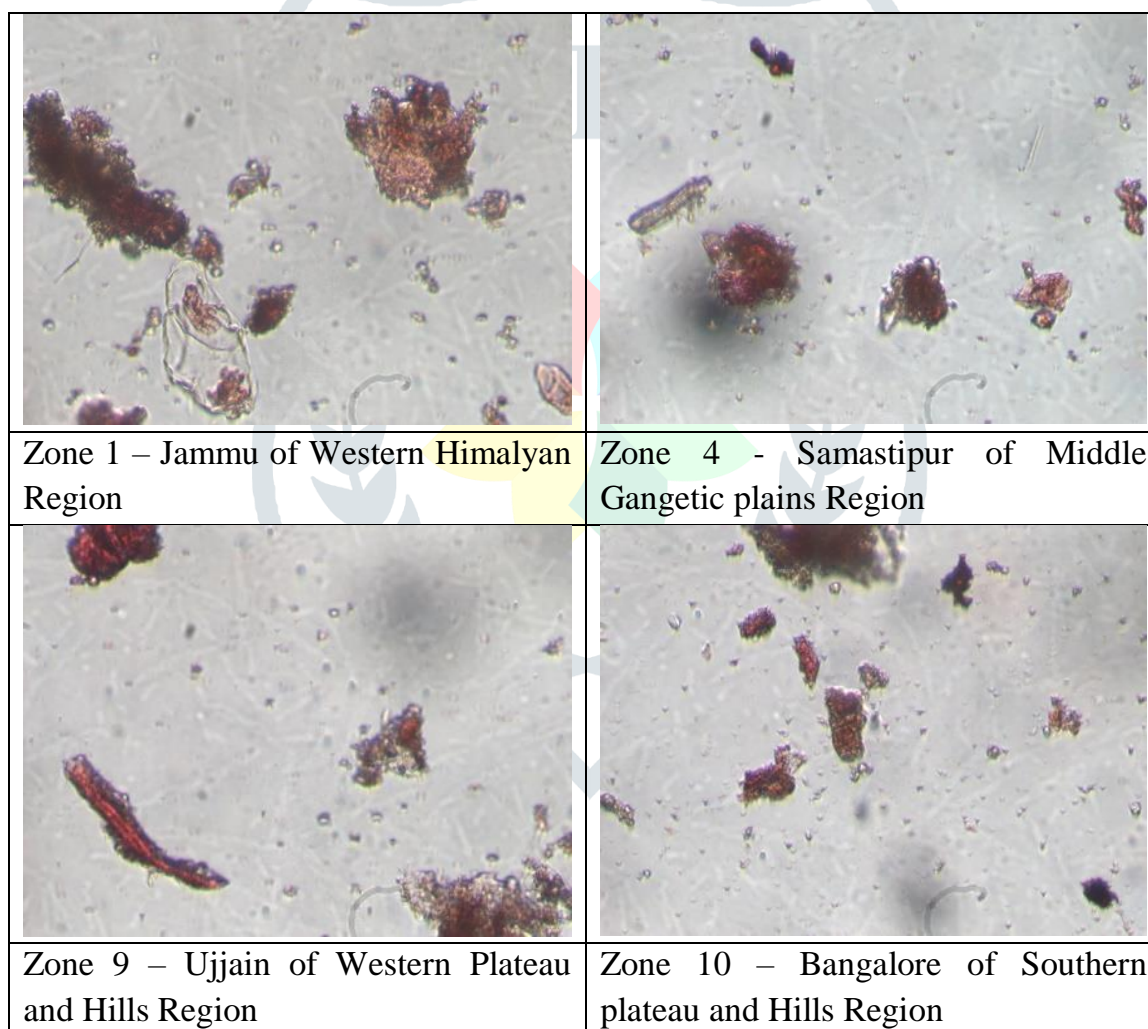
Figure 3: LS of collected roots specimens





Where: ck : cork; ccam : cork cambium; prcr: prismatic crystals of calcium oxalate

Figure 4: Powder microscopy of seeds



Conclusion:

This is clear indication in this study that there is no evidence of botanical diversity reported.

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