Wood Anatomy Of Albiziaprocera Correlation Between Tropical And Subtropical From Different Geographical Zones Of Indian Subcontinent

Vikram Singh Meena, Sangeeta Gupta

ABSTRACT: Wood, being a natural material is very variable. This variability is attributed mostly to variations in the anatomical structure of wood. This investigation was carried out as part of a long term program which aims at finding quantitative analysis of wood microstructure. This type of quantitative analysis facilitates the establishment of relationships between different microscopic feature wood anatomy such as vessels diameter, wood specific gravity, vessels frequency, vessels length, ray height, ray seriate, ray frequency, fiber diameter, fiber length, type of parenchyma and cell wall thickness etc. *Albiziaprocera*has found throughout of India as well as sub continent. The present study deals with microstructure of*Albiziaprocera*under this experiment sample was take from 22 localities. The results revealed significant differences in most microscopic feature between localities, as well as correlations between many of microscopic feature. The obtained mathematical models relating locality to anatomical properties indicated that the most important anatomical properties affecting wood structure as well as variation of wood were: vessel diameter, diameter of parenchyma cells, lumen fraction and diameter of fibre lumen.The high values that were for index the greater degree mesomophis nature of wood and conductive efficiency*Albiziaprocera*the entire has large vessel with few vessel per unit area indicating a preference for conductive efficiency whether they have mesic or xeric ecology. This is tree highly Ecological adaptability in temperate tropical and subtropical because vulnerability and mesomorphy relation is positive.

Key words: Albiziaprocera, vessels diameter, fibre walls, septate fibres, parenchyma, Ray, specific gravity,microscopicfeature, vulnerability, mesomorphyandwood variation.

INTRODUCTION

In India region the Mimosoideae are represented by 11 genera attaining tree size. Mimosoideae is including genera Acacia, Adenanthera, Albizia, Dichrostachys, Parkia, Piptadenia, Pithecellobium, Prosopis, Xylia, . Albizia a genus containing over 100 species mostly moderate size unarmed trees(Ali,S.I. 1973). About 16 species are indigenous to India and Burma of which wood of nine are dealt with here. Besides these species are including Albiziaamara, A. lebbek, A. julibrissin, A. lucida, A. odoratissima, A.procera, A.stipulata,and A.thompsoni, ect (S. Dasgupta, IFS.1998). Albiziaprocerais a large deciduous tree with a tall erect stem and a somewhat light crown. It is found throughout the sub Himalayan tract from Yamuna eastward and all over Assam ascending to 750m in khasiand aka hill. The tree occurs chiefly in moist places. Along river banks and in swampy lands and low lying savannahs such as the duars of Bengal and Assam. It is also distributed throughout central and south India reaching up to 600m in Travancore. It is also found in north Andaman's and Burma. The tree is often planted in the Punjab and elsewhere and as roadside tree throughout. (K. Ramesh Rao and S. K. Purkayastha 1972). Albiziaprocerais a fairly large deciduous straight stemmed tree often branching at a considerable height with large branches and around head usually attaining a height of 18-24m and a girth of 1.2 to 1.5m, oblique, oblong ovate or rhomboid oblong (Luna, R.K. 1997).

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Flowers greenish yellow in peduncle usually in reddish brown flat elliptical to nearly orbicular hard smooth dehiscent seed 6-12 flat elliptical hard greenish brown with a hard leathery testa (Arpita Banerjee, ArijitSinhababu, Rup Kumar Kar and Mandal 2004). The timer is moderately heavy to heavy and strong. Specific gravity 0.579 Based on weight oven dry and 12% moisture content in K.G. 641 per cubic meter. (Bolzo, keating 1972) Shrinkage percentage green to oven dry in different section radial 3.1%, tangential 6.9% and volumetric 8.8%. Static bending test (i) Modulus of rupture kg/cm2, green 936.80 kg/cm2 and air-dry 1023.90 kg/cm2 (ii) Modulus of elasticity kg/cm2, green90.200 kg/cm2 and air-dry 10900 kg/cm2 (Gamble, J.S. 1959). Albiziaprocera, one of the economically important sapwood is wide and white, heartwood golden brown with lighter and darker streaks. It's slightly light in weight, the strong elastic and head (Synder, 1948 Inkollonea, F.F.P. and Ctew, A. 1984). Timer is reported to stronger than Burma teak. Furniture and cabinet making, House building, Motor lorry and bus bodies, Packing cases and crates, Railway sleeper, Tool handle and helves, Toys, turnery and carved article, Veneers plywood(Purkayastha, S.K. 1996). Although a considerable amount of anatomical of anatomical data is available of Albiziaprocera, limited attempt have been made to distinguish species wood anatomically within locality (Laximi Chauhan and R. dayal1985 IAWA Bulletin). In this work, a microscopic feature of wood study of complete based on locality of wood and climate condition, the region have been divided into two categories viz. tropical and sub-tropical .(Barettakuiperrs, T. 1981) The study was aimed to affect of climate on anatomy of wood in different localities, which have wood elements change according to climate condition and adaptability of tree in their climate (Baas, Ewers, Davies and Wheeler 2004). The investigated wood sample selected from different localities and it is found throughout of subcontinent of India.Enumeration of diagnostic feature of anatomy, in this investigated of three surface of wood viz. transverse

section, tangential and radial longitudinal section these are following.Growth ring, Vessels porosity, Vessels arrangement, Vessels grouping, Vessels outline, Gum deposits, Axial parenchyma, Fibre wall thickness, Perforation plate, Inter-vessel pit arrangement, Uniseriat ray, Multiseriat ray , Parenchyma strand, Rays cellular composition, Vessels ray pitting, Ground tissue fibre, Septate& non septate fibre, Vestured pit, Mineral inclusions, The vessel cross-sectional diameter , The vessel frequency, The ray vessel pit, The inter-vessel pit , The uniseriat ray height, The mutiseriat ray height,The ray width and The ray frequency as follow the IAWA, Committee 1985, list of microscopic feature for hard wood identification. Wood, being a natural material is very variable (Thobayet, 1996).This variability is attributed mostly to variations in the anatomical structure of wood (Herenden, and Miller, 2000). This investigation was carried out as part of a long term program which aims at finding relationship between anatomical properties and other wood properties and usedthis relationship for predicting these properties from anatomical properties (Ifiu, 1983). The wood species used in this study includedAlbiziaprocera. The investigation revealed significant differences between wood species with respect to most of their anatomical properties. It also showed some high positive and negative correlations between various anatomical properties (Tageldin H. Nasroun and Thobayet S. Alshahrani,1998.) The results revealed significant differences in most properties between species, as well as correlations between many of these properties (Steele, Ifiu and Johson 1976). The obtained mathematical models relating shrinkage to anatomical properties indicated that the most important anatomical properties affecting shrinkage were: vessel diameter, diameter of parenchyma cells, lumen fraction and diameter of fiber lumen (Nasroun, T.H.I and Al.Shahrani, T.S. 1998). The size, distribution and frequency of vessels, fiber and ray have been reported to be specific to climate as well as locality and the anatomical characters are very significant parameter inAlbiziaprocera. The present revealed the microscopic feature of the wood have considerable variability value in different locality of these investigated effect of climate consideration to their locality (Chauhan, and Dayal, 1985. Wheeler, Baas, and Roodgers, 2007).

MATERIALS & METHOD

The studies was based on examination of 220 wood samples Albiziaproceracollected from 22 localities that is available in the xylarium of FRI, Dehradun. The all specimens were taken to mature tree from heart wood portion and that specimens were collected from lowland forest and montane forest. The age of sample tree was between 30 to 40 year 10 samples collected from each locality. The details of the specimens are given in table 1 along with the accession number, locality and available information.For microscopic examination 15-20µm thick, radial and tangential sections were cut on Reichert microtome. The section were stained in Heidenhain's haematoxylin and safranine and laboratory schedule i.e. passing through grades of alcohol (10-100%) and xylol for making permanent slides. For determination of fibre and vessel length, small radial chips were macerated following Schultz's method (30% Nitric acid and a pinch of potassium chlorate). The macerate material was wash thoroughly with water to remove acid. Data on fibre length, vessel length, fibre diameter and lumen diameter were taken from macerated material mounted in glycerin water (50:50). Thirty measurements were taken for each parameter. The average tangential diameter of the vessel was determined from 10 measurements from transverse section taken along the radial direction. The frequency of vessel was determined from average of 10 counts per mm2 area. The ray frequency is based on an average of 10 counts in mm2 area in tangential sections. Maximum ray height and width is also determined from tangential section. Wood anatomy and fibre biometry was studied according to IAWA (12). While describing the vessel and fibre length the classification given by Metcalfe and chalk (1950) has been adopted; i.e. when the mean length of vessel member is less than 350µm, it is described as short and when the mean length is over 800 µm, it is termed as long. Similarly fibre less than 900 µm, in length are described as short and those over 1600 µm, as long. Ecological adaptability, vulnerability and mesomorphy of temperate tropical and subtropical tree were evaluated by using the following formulae.

$$\text{Vulnerability} = \frac{\text{Mean vessel diameter}}{\text{Mean vessel frequency}}$$

Mesomorphy = Vulnerability x Mean vessel length

TABLE1:- Tabular information of 22 localities

S. N	AV	Locality	Forests type
1.	220	GARHWAI, U.P.	Subtropical forest with montane
2.	326	BURMA	Tropical forest with lowland
3.	506	ANDAMAN	Tropical forest with lowland
4.	811	BURMA	Tropical forest with lowland
5.	949	EASTERN DUOR ASSAM	Subtropical forest with montane
6.	1263	TEZPUR ASSAM	Subtropical forest with lowland
7.	1955	BANGLA DESH	Tropical forest with lowland
8.	2194	NOWGONG ASSAM	Subtropical forest with montane
9.	2247	ANDAMAN	Tropical forest with montane
10.	2361	DARJEELING, WB	Subtropical forest with montane
11.	2527	BURMA	Tropical forest with montane
12.	3004	GARHWAI, U.P.	Subtropical forest with montane
13.	4441	ANDAMAN	Tropical forest with montane
14.	4763	DARJEELING, WB	Subtropical forest with montane
15.	5312	DEHRADUN	Subtropical forest with montane
16.	5777	SIWALIKS,UP	Subtropical forest with montane
17.	6525	BURMA	Tropical forest with lowland
18.	7294	NOWGONG ASSAM	Subtropical forest with montane
19.	7365	JALPAIGURI, WB	Subtropical forest with montane
20.	7422	BANGLA DESH	Tropical forest with lowland
21.	7542	KURSEONG, WB	Subtropical forest with montane
22.	7559	BUXA,BENGAL	Tropical forest with montane

RESULTS

Ecological Trends

The variation in wood anatomy with in a locality is not only determined by genetic factors but also influenced by external and growth circumstances especially climate and location. In this section, correlation between selected wood anatomical features with provenance (tropical versus subtropical) have been explored.

Correlation with macroclimate

The correlation between macroclimate and wood anatomy was simplified by distinguishing between tropical and subtropical because the geographical information on most of the sample studied was limited.

Tropical and Subtropical: Qualitative feature

The growth ring is distinct to indistinct generally inconspicuous, delimited by flattened latewood fibre scattered to fairly continuous line of parenchyma. Some semi ring porosity for example Andaman's (506), Bangladesh (7422), Burma (6525), Dehra Dun (5312), Darjeeling (4763) and Jaipaiguri (7365).

Tropical and Subtropical: Quantitative feature

The analysis of the quantitative feature of Albiziaprocera shows that there is some variation in various wood element dimensions. The vessel diameter ranges from 122.58-214.94 µm. The vessel frequency ranges from 2-4. The ray width ranges from 19.71-49.68 µm. The vessel length ranges from 284-436 µm. The fibre diameter ranges from 21.28-26.80 µm. The Multiseriat ray height ranges from 171.45-344.76 µm.

Vessel frequency and vessel diameter

The highest vessel frequency value 4/mm^2 was found in Bangladesh and Burma while the lowest value 2/mm^2 was found in Darjeeling, West Bengal. Similarly, maximum vessel diameter value 214.49 µm was found in Darjeeling, West Bengal and minimum vessel diameter value 122.58 µm was found in Buxa, Bengal.

Fibre length and vessel length

The highest vessel length value 1532.40 µm was found in Bangladesh while the lowest value 988 µm was found in Tezpur Assam. Similarly, the highest vessel length value 436 µm was found in Darjeeling, West Bengal while the lowest vessel length value 288µm Buxa Bengal and east Assam.

Vulnerability and Mesomorphy

Vulnerability and Mesomorphy are two indices proposed by carlquist (1977) as ecologicalfactor for variation in wood anatomy. A low value of vulnerability (1.0) and mesomorphy (75) indicate adaptation to xeric condition i.e. capability of with standing water stress or freezing and high value. Of vulnerability (1.0-25) and mesomorphy (>200) show adaption to mesiccondition.In the Albiziaprocera study vulnerability in tropical the maximum 85.104 in Bangladesh and the minimum 30.645 in Burma, mesomorphy in tropical the maximum 31999.104 in Bangladesh and minimum 10970. The vulnerability in the subtropical the maximum 66.93 in Nowgong, Assam and minimum 36.24 in Tezpur,

Assam, mesomorphy in subtropical the maximum 24800.680 Nowgong, Assam and minimum 12034.17 in Tezpur, Assam. The vulnerability in temperate the maximum 78.84 in Darjeeling,West Bengal and minimum 51.84 in Garhwal, mesomorphy in temperate the maximum 34374.24 in Darjeeling, West Bengal and minimum 15552 in Garhwal. Albiziaprocerathe entire has large vessel with few vessel per unit area indicating a preference for conductive efficiency whether they have mesic or xeric ecology. This is tree highly Ecological adaptability in temperate tropical and subtropical because vulnerability and mesomorphy relation is positive.

TABLE: 2 Quantitative wood anatomy features of Albiziaproceraaccording to locality

S.N	AN	Locality	VF	VL	VD	IVP	FL	FD	FCWT	Sp. Gr.
1	DDW 4441	Andaman's	3.5	329	207.09	9.45	1238.8	24.6	2.756	0.62
2	DDW7559	Buxa,Bengal	3.5	288	159.3	10.26	1245.6	24.4	2.643	0.63
3	DDW506	Andaman's	3	343	198.77	7.29	1092	21.28	3.431	0.58
4	DDW2247	Andaman's	3	361	162.54	8.91	1126	23.8	3.072	0.56
5	DDW7422	Bangaladesh	4	288	201.42	8.91	1243.6	25.4	3.020	0.78
6	DDW329	Burma	4	358	122.58	9.18	1326	22.6	2.864	0.58
7	DDW2527	Burma	4	383	183.06	10.26	1365.6	26.8	2.708	0.60
8	DDW6525	Burma	3	336	184.14	9.18	1280.4	23.5	2.760	0.62
9	DDW811	Burma	3	372	204.44	8.91	1366	26	2.708	0.73
10	DDW1955	Bangaladesh	2.5	376	212.76	9.18	1532.4	22.9	2.708	0.77
11	DDW7542	Kurseong,W.B	3.5	354	145.8	9.72	1275.6	21.7	2.656	0.70
12	DDW949	East assam	4	354	208.98	8.64	1376.4	21.5	2.968	0.69
13	DDW1263	Tezpur,assam	4	332	144.99	9.72	988	21.49	2.916	0.72
14	DDW2194	Nowgong,assam	2.4	361	160.65	9.99	1346.8	22	2.812	2194
15	DDW5312	Dehradun	3.5	288	200.88	10.26	1046.4	24.8	2.656	0.71
16	DDW7294	Nowgong,assam	2.5	374	165.78	8.91	1195.2	24	2.864	0.62
17	DDW2361	Darjeeling,W.B.	2.5	436	197.1	9.45	1280	23.5	3.072	0.55
18	DDW3004	Garhwal,	2.5	369	183.6	9.72	1016.4	21.38	3.177	0.58
19	DDW4763	Darjeeling,W.B.	3	284	214.94	8.91	1332.8	22.9	2.812	0.70
20	DDW7365	Jaipaiguri,W.B.	3	384	210.56	9.18	1151.6	24.7	2.812	0.63
21	DDW220	Garhwal U.K.	3.5	300	181.44	8.91	1227.6	22.5	2.838	0.64
22	DDW5777	Siwaliks	2.5	314	161.73	9.72	1310.4	21.7	2.786	0.58

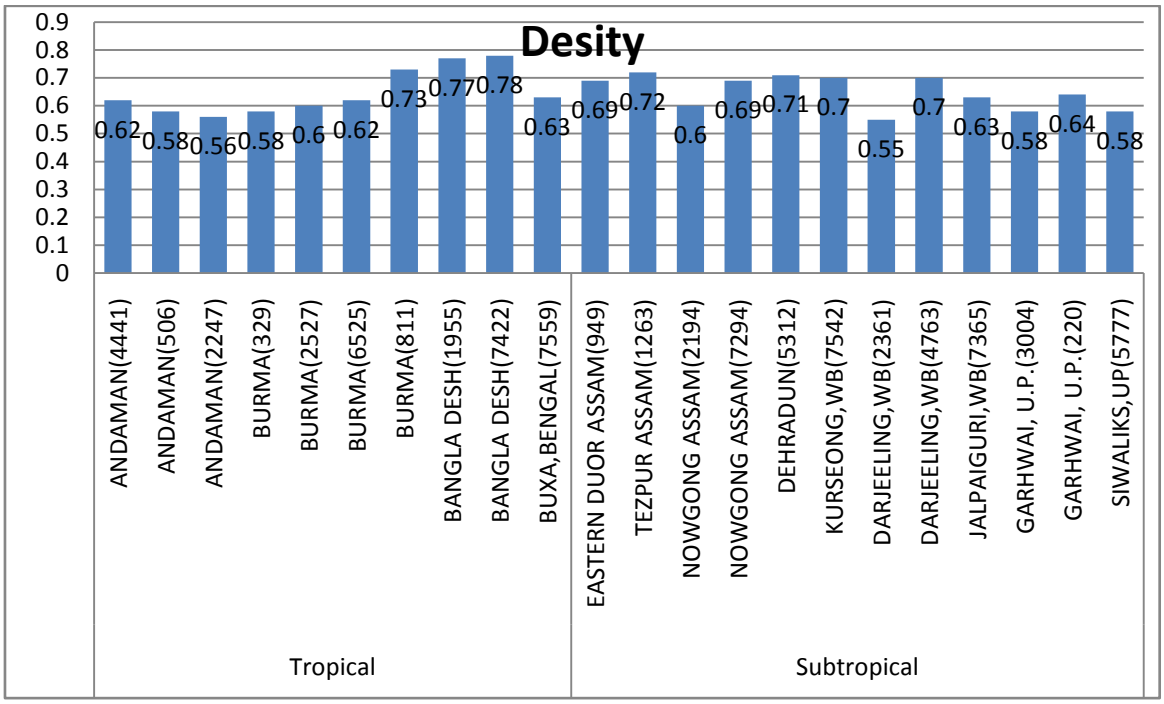
Note: - AN= Accession number; VF = number of vessels/mm^2 ;VL = mean vessel length (µm); VD = mean vessel diameter (µm); IVP = inter vessel pit (µm); FL = fibre length (µm); fibre diameter (µm); FCWT = fibre cell wall thickness (µm); WB = west Bengal; UK = Uttar khand; Sp. Gr. = specific gravity

TABLE: 3 qualitative and Quantitative wood anatomy features of Albiziaproceraaccording to locality

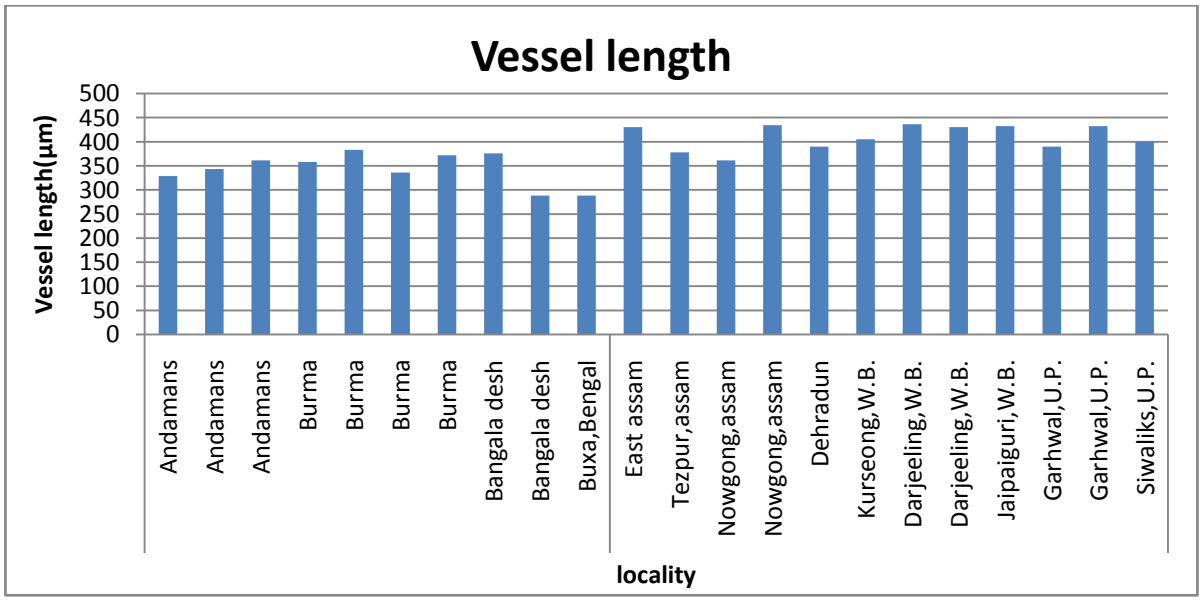
SN	AN	Locality	VP	GR	URH	RS	MRH	VR	RF	M	V
1	DDW 4441	Andaman's	Diffused	Distinct	108.27	1-3	229.77	9.45	7	19466.460	59.168
2	DDW7559	Buxa,Bengal	Diffused	-Do-	139.32	1-3	309.69	9.1	6	13108.114	45.514
3	DDW506	Andaman's	Diffused	-Do-	95.6	1-2	276.2	7.29	6	22726.037	66.257
4	DDW2247	Andaman's	Diffused	-Do-	112.05	1-3	218.7	9.45	4	19558.980	54.180
5	DDW7422	Bangaladesh	Semiring	-Do-	120.15	1-3	217.35	9.45	5	14502.240	50.355
6	DDW329	Burma	Diffused	-Do-	113.12	1-3	234.36	9.18	9	10970.910	30.645
7	DDW2527	Burma	Diffused	-Do-	114.21	1-4	311.85	9.18	8	17527.995	45.765
8	DDW6525	Burma	Semiring	-Do-	103.14	1-3	310.5	8.91	6	20623.680	61.380
9	DDW811	Burma	Diffused	-Do-	150.12	1-3	171.45	10.26	4	25350.560	68.147
10	DDW1955	Bangaladesh	Diffused	-Do-	104.49	1-2	228.42	8.91	6	31999.104	85.104
11	DDW7542	Kurseong,W. B.	Diffused	-Do-	119.61	1-3	252.18	8.91	5	14746.628	41.657
12	DDW949	East assam	Diffused	Indistinct	72.09	1-5	244.89	9.74	6	18494.730	52.245
13	DDW1263	Tezpur,assam	Diffused	Distinct	106.11	1-3	319.95	8.91	5	12034.170	36.248
14	DDW2194	Nowgong,assam	Diffused	-Do-	147.96	1-3	322.11	9.72	5	24164.438	66.938
15	DDW5312	Dehradun	Semiring	-Do-	118.61	1-3	248.94	9.18	5	16529.554	57.394
16	DDW7294	Nowgong,assam	Diffused	-Do-	93.96	1-2	371.25	9.45	5	24800.688	66.312
17	DDW2361	Darjeeling,W. B.	Diffused	-Do-	117.99	1-3	320.76	9.72	4	34374.240	78.840
18	DDW3004	Garhwal,	Diffused	Indistinct	82.08	1-3	216	9.42	5	27099.360	73.440
19	DDW4763	Darjeeling,W. B.	Semi ring	Distinct	87.21	1-4	344.79	9.45	6	20347.653	71.647
20	DDW7365	Jaipaiguri,W. B.	Semi ring	Indistinct	98.55	1-3	249.75	9.18	3	26951.680	70.187
21	DDW220	Garhwal	Diffused	Distinct	107.19	1-4	265.41	10.26	5	15552.000	51.840
22	DDW5777	Siwaliks	Diffused	-Do-	139.32	1-4	262.98	9.18	5	20313.288	64.692

Note: - VS = vessel porosity; GR= growth ring; URH = unseriate ray height; RS = ray seriation; MRH = multiseriate ray height; VSP = vessel ray pit; RF = ray frequency; M = mesomorphy value; V = vulnerability ratio.

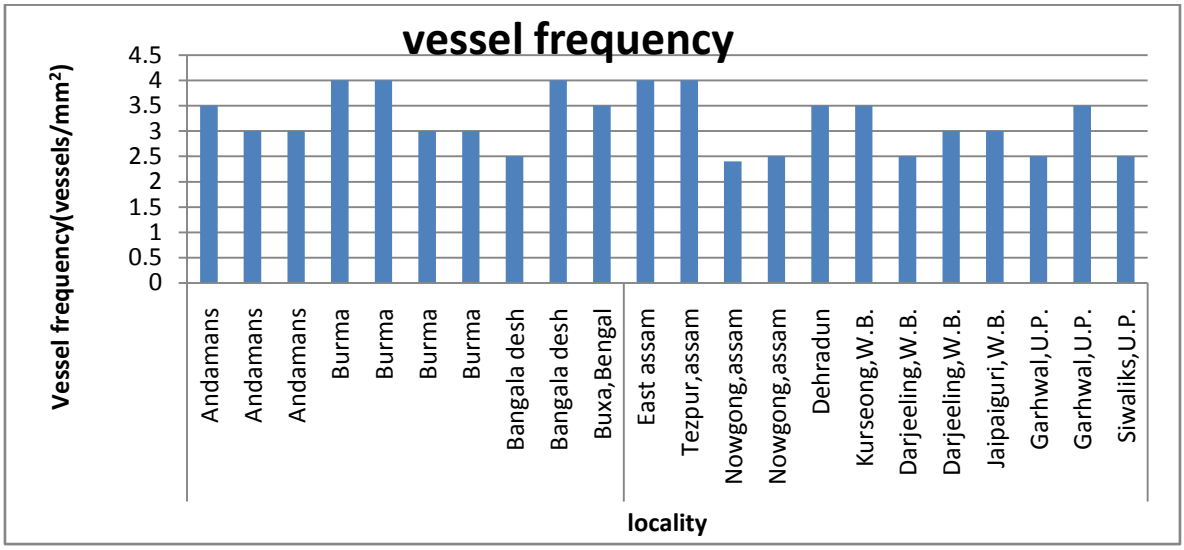
Graphical Representation



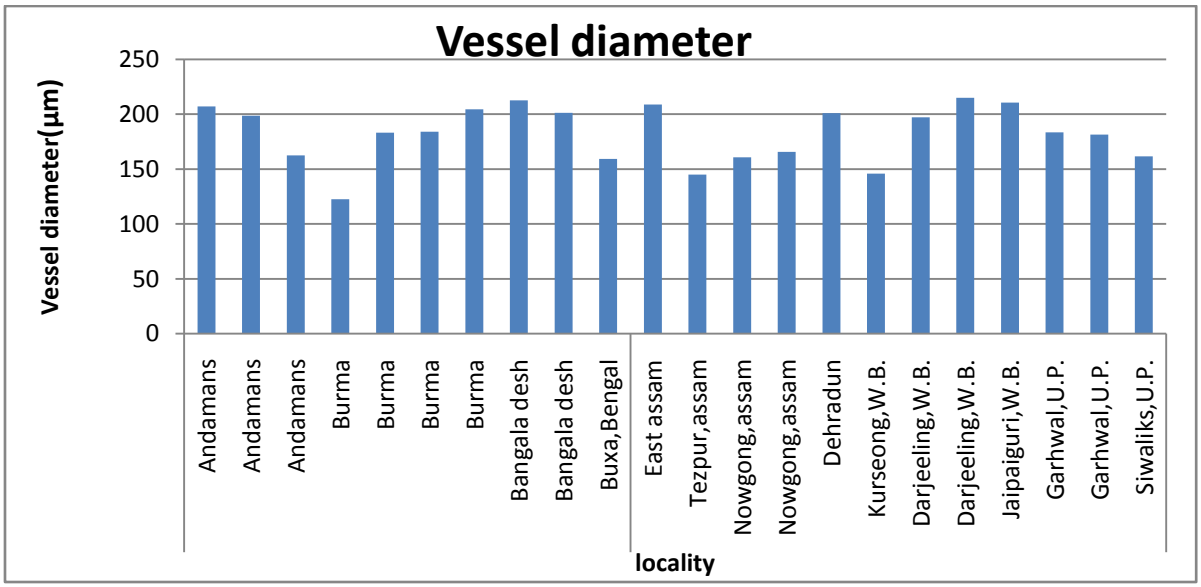
Graph 1:- Specific gravity distribution in the studies locality of Albiziaprocera.



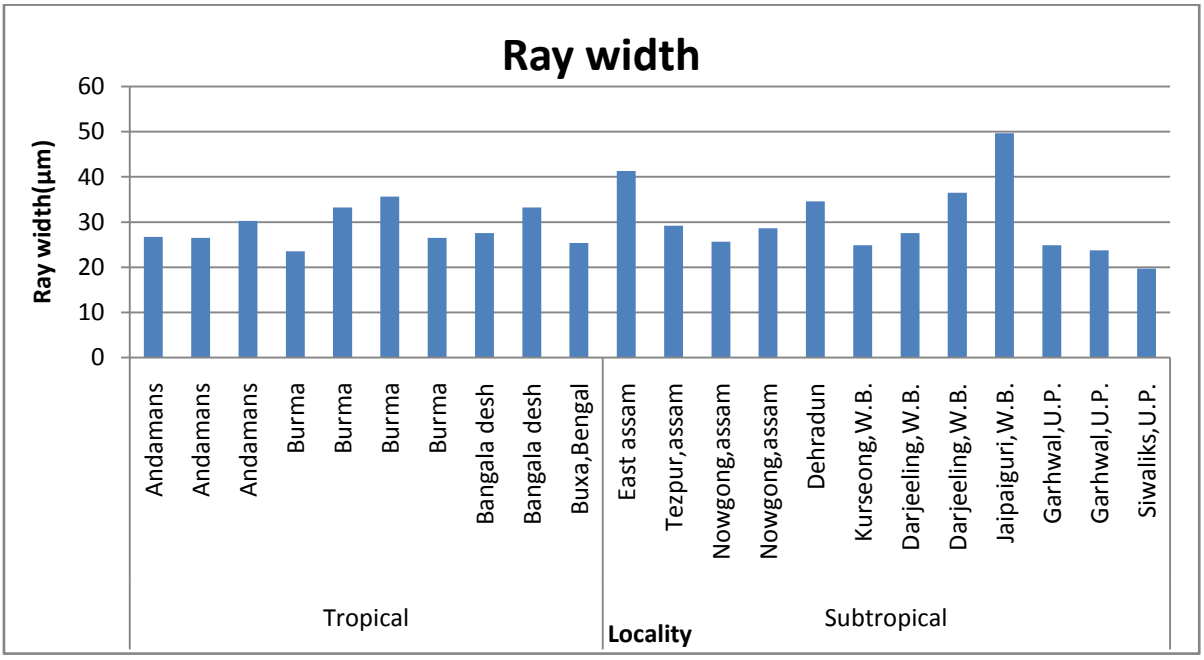
Graph 2:- Vessel length of Albiziaprocerain different localities.



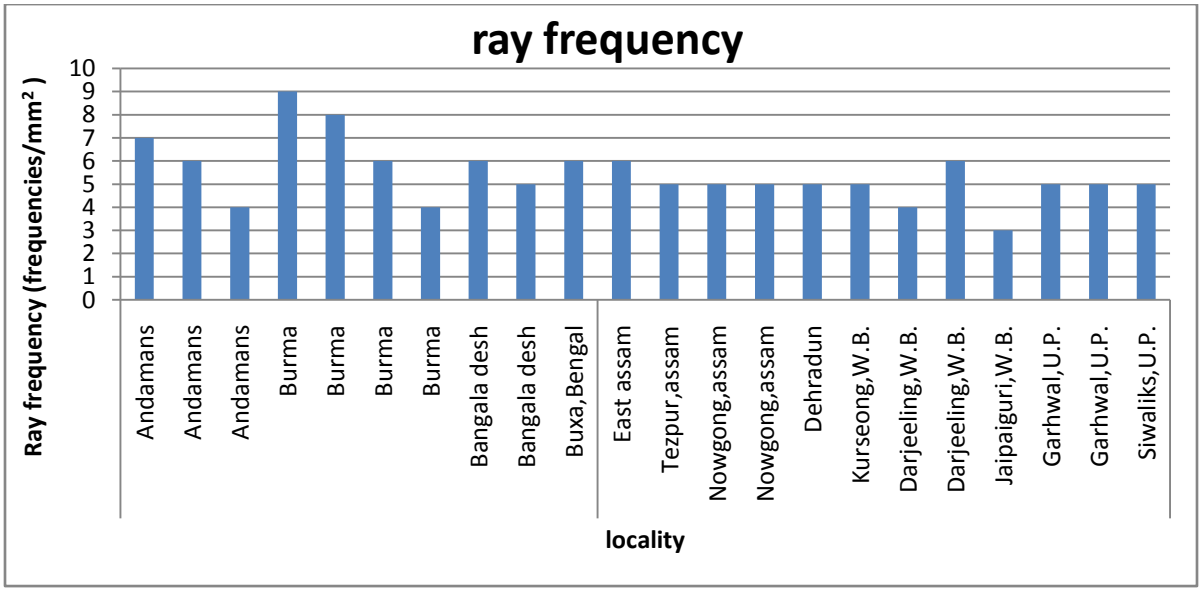
Graph 3:-. Vessel frequency of Albiziaprocerain different localities



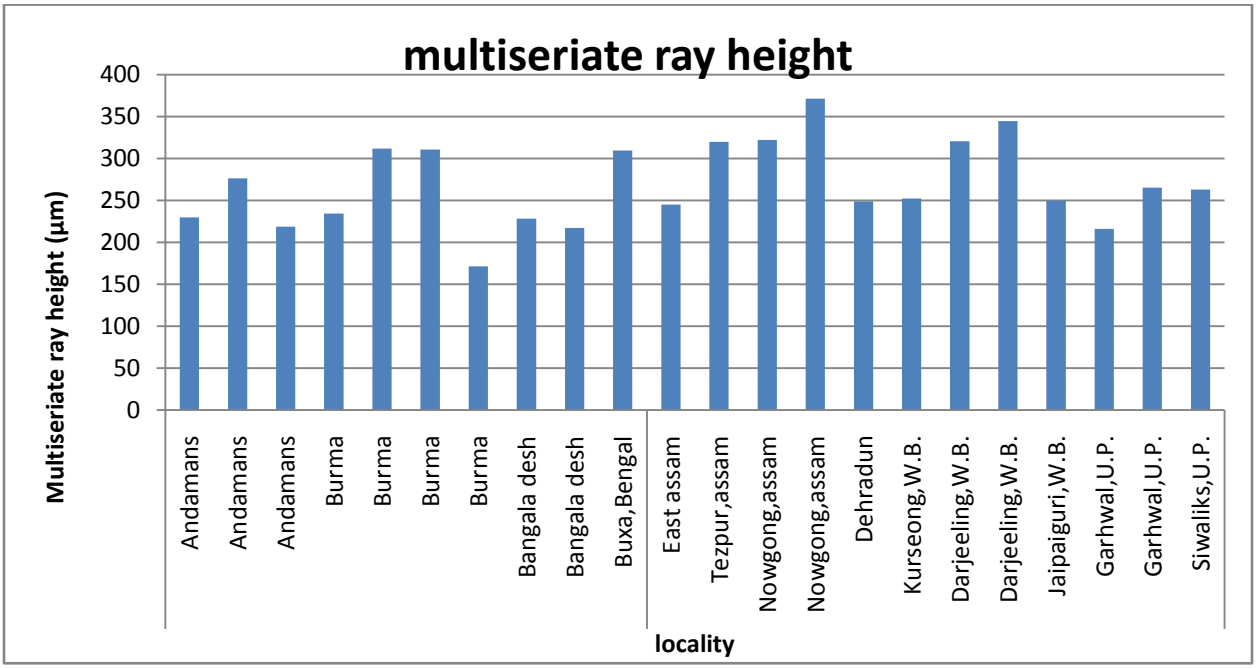
Graph 4:-Vessel Daimeter of Albiziaprocerain different localities.



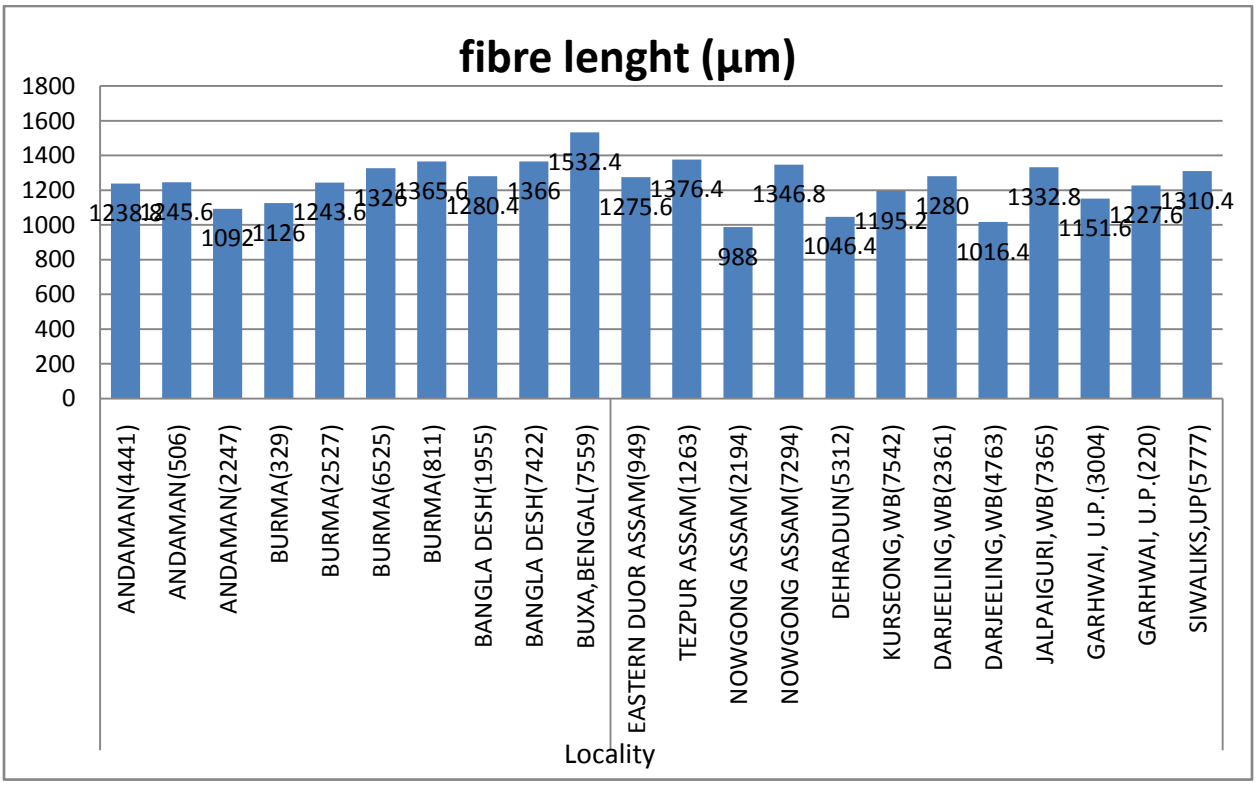
Graph 5:-Ray width of Albiziaprocerain different localities.



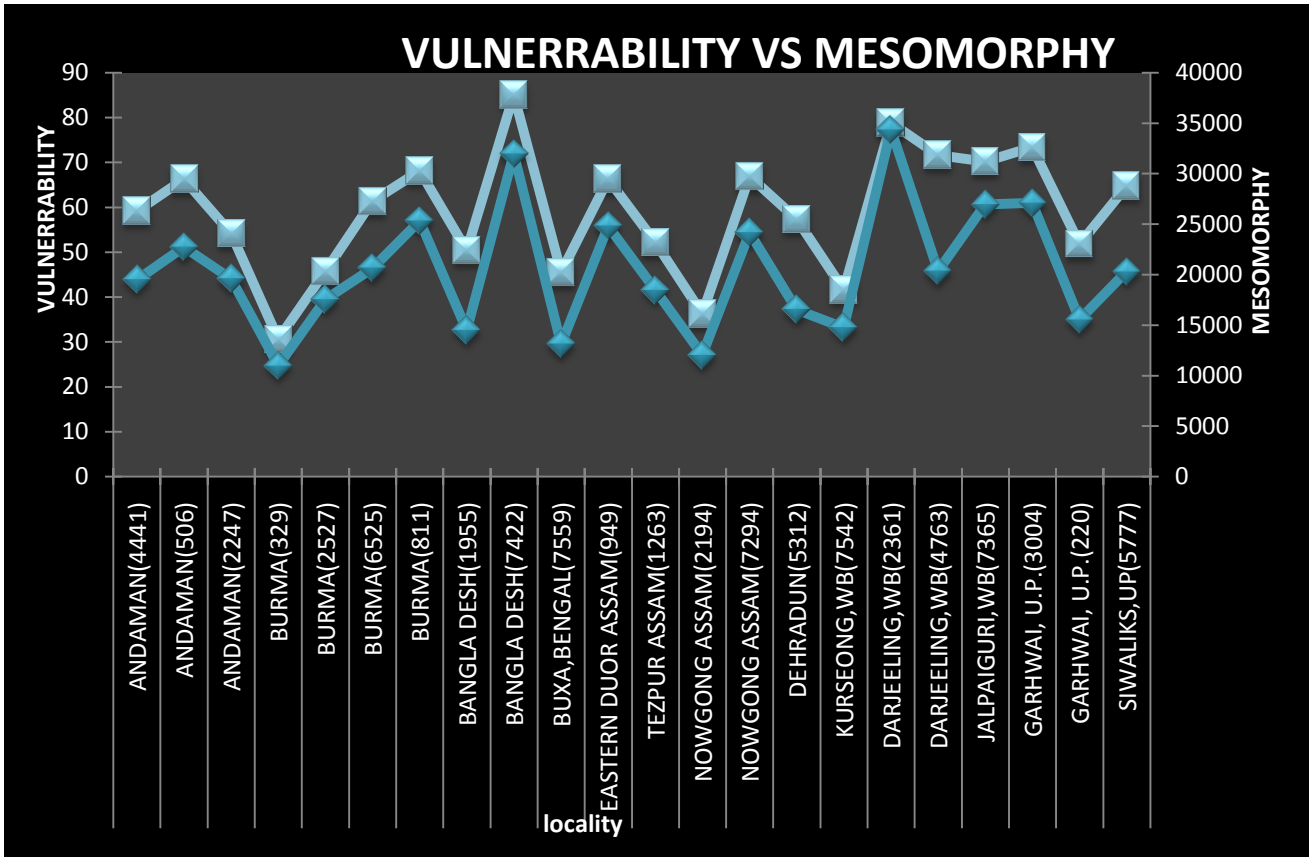
Graph-6:-Ray frequency Albiziaprocerain different localities.



Graph-7:- Multiseriate ray height Albiziaprocerain different localities.



Graph-8:- fibre length Albiziaprocerain different localities.



Graph8:- Relation between vulnerability and mesomorphy of the studiedAlbiziaprocera.

DISCUSSION

The present revealed that microscopic feature of wood have considerable variability value in locality and climate variation of these investigated of wood anatomy change within locality. But more importantly this study anatomical data on the microscopic feature that can well be considered as marker for variation of wood anatomy with climate. Laxmi Chauhan and R. dayal (1985) had observed the wood shows a great range of variation in anatomical characteristics. Different wood anatomical features viz. specific gravity vessel frequency, vessel diameter, vessel length, ray frequency, ray width, ray height, ray seriate, fibre length, fibre diameter and fibre cell wall thickness are vary with the change in climate of different geographical areas from Indian subcontinent. Quirk (1983) employed specific gravity, vessel porosity, vessel diameter, pit size, parenchyma type, ray width and fibre to distinguish some species of Albizia. Joshi and Suzuki (1992) have been observed a correlation between wood structure and plant habitat in the genus Juglansand Engelhardtia. Rao et al. (1972) Separated A. amara and A.chinesis on the basis of specific gravity and A.procera by the presence of non-septate fibre.Laxmi Chauhan and R. dayal (1985) also observed that considering the variation in nature, locality and soil conditions the specific gravity is more variable as compared to conservative anatomical characters. In this investigation is shows the specific gravity change within locality as well as climatic conditions. The specific gravity of wood have showed the variation which show in graph no. 1 and table no 2. Therefore, the specific gravity ismaximum specific gravity 0.78 in Bangladesh (7422) and minimumspecific gravity 0.56 in Andaman's (2247).Growth ringis distinct to indistinct generally inconspicuous, delimited by flattened latewood fibre scattered to fairly continuous line of parenchyma.Growth ringdistinct toindistinct such as Jaipaiguri,W.B (7365), Garhwal (3004) and East Assam (949)(given inTable 3,fig-7). Wood is show diffuses porosity to semi ring porosity for example Andaman's (506), Bangladesh (7422), Burma (6525), Dehra Dun (5312), Darjeeling (4763) and Jaipaiguri (7365) (given in Table 2 andFig. 6). Wood has vessels solitary to radial multiples with 2-3 groupround (Fig.7) and perforation plate simple. Inter vessels pits alternate, small to medium 7.29-10.26µm diameter (given in Table 2, Fig.4) and vessel ray pit similar to inter vessel pit (Fig.5). Prismatic crystals in the ray cells as depicted (Fig.) According to Zimmermann, (1987) vessels diameter and vessels diameter have effected on water conduction efficiency. Therefore within locality vessels diameter varies. Average tangential diameter of vessels is 160 (122.49 -214.94µm) maximum vessel diameter value 214.49 µm was found in Darjeeling, West Bengal and minimum vessel diameter value 122.58 µm was found in Buxa, Bengal (given in Table 2), the range of average vessel element length1260.2 (988-1532.40µm)The highest vessel length value 1532.40µm was found in Bangladesh while the lowest value 988µm was found in Tezpur Assam. Average distribution of vessels 2.4 to 4 vessels/mm^2 maximum average vessels distribution 4 vessels/mm^2 Bangaladesh (7422), Burma (329) and Burma and minimum average vessels distribution 2.4 vessels/mm^2 in Nowgong,Assam. Some features were varies such asFibre is septate and non septate (fig-3); fibre

wall thickness thin to thick walled, rage of fibre diameter 21.7-24.8µm, range of fibre length 1016.40-1376.40µm, ground tissue fibre is simple and minutely bordered pit and wall thickness 2.916µm.Axial parenchyma is aliform to aliform confluent (Fig. 1), in strands of 2-9 cells. Ray frequency 2-9/mm, range of ray width 19.71-49.68 µm, range of uniseriate ray height 82.08-150.12 µm, range of multiseriate 171.45- 344.79µm, ray seriation 1-4, number of ray cells 3-43(fig-2); and body ray cell procumbent with 5-9 row(fig-3);Gum deposits is present(fig-7);, vestured pit is present(fig-4); and chambered crystals are present in axial parenchyma(fig-3); these type of feature were alsoobserved by laxmi Chauhan and R. Dayal (1985) similarly Zhang et al (1992) also found the effect of microclimate and moisture availabity on some wood anatomical character such as vessels diameter, vessels distribution, wall thickness and ray height. Baas (1973), Graaff et al,Van den and Baas (1974) have also no direct influence of altitude and latitude on wood structure but they have an indirect effect through other factors of which the most important are the temperature water availability.The tree shows highly ecological adaptability to the tropical and subtropical geographical zones as vulnerability and mesomorphy relation is positive. The statically analysis was found that the correlation(correlation factor0.933611836) very strong relation in between vulnerability and mesomorphy. Albiziaprocerathe entire has large vessel with few vessel per unit area indicating a preference for conductive efficiency whether they have mesic or xeric ecology.Nooshin et al. (2012) were studied on vulnerability and mesomorphyratio on Saxaul was showing tree very resistance to drought condition. The vessels density is inversely proportional with the vessels diameter and fully effective on determining the mesomorphy and vulnerability (Carlquist 1988: 1977b). Both vessel diameter and vessel density can be easily changed evolutionarily, in contrast to vessel element length. Vessel element length is controlled entirely independently, by length of fusiform cambial initials (Carlquist 1977b; 1982c). Lajmina et al. 1996 had observed wood structure in term of its quantitative wood character is found to change with in plant habitat. In this study was found the wood anatomical features change with locality. Similarly correlation of wood structure with plant habitat has been studied by Carlquist (1977, 1975), Miller (1975) and Zimmermann (1978, 1989). Qualitative and quantitativewas found wood anatomical characters inAlbiziaprocera reveal the mesomorphic and vulnerability of tree which in turn are related to mesic ecology.Generally long and wide vessel elements are adaptive value only in mesic locality where soil moisture and relative humidity are high (Carquist 1975, 1977). Vessel element diameter and length decrease with aridity (Carquist 1966 and Hockma 1985). Xeromorphy is indicated by more numerous vessels per mm, narrow vessels, shorter vessel element (Carquist 1977a; 1977b; 1988).

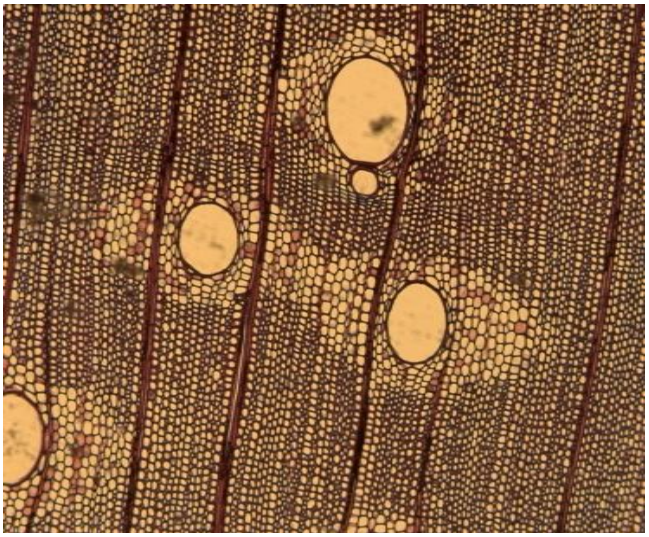


Fig. 1:- Cross-section of Albiziaprocerashowing aliform to aliform-confluent parenchyma,; also terminal and diffuse. Scale bar = 300µm

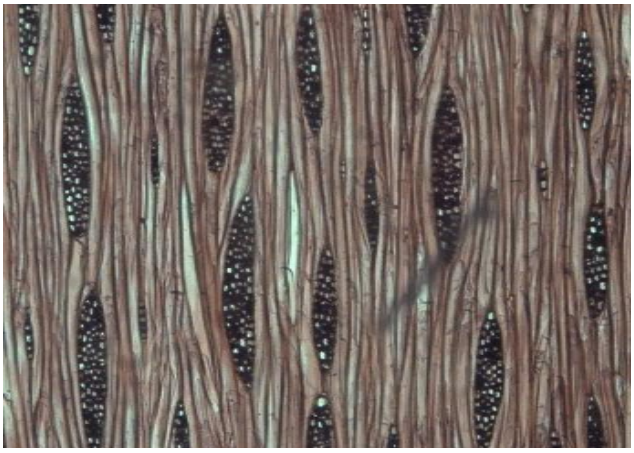


Fig.2:-TLS ofAlbiziaprocera showing uniseriate rays with multiiseriate rays Scale bar = 300µm

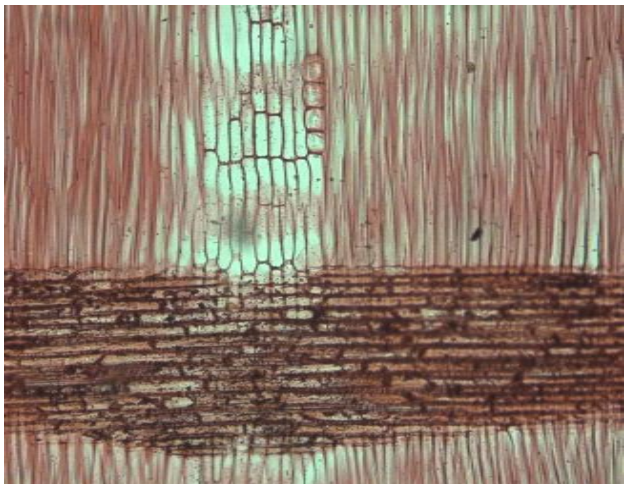


Fig. 3:-RLS ofAlbiziaprocera showing Homogeneous ray, Parenchyma crysetal and Fibre is septate and non septateScale bar=300µm.

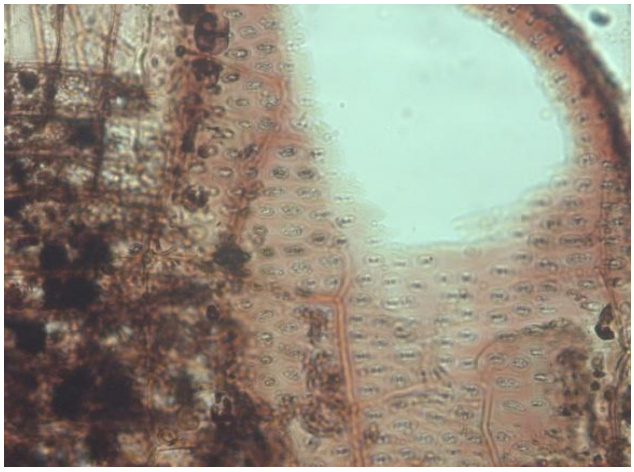


Fig. 4:-LS of Albiziaprocera showing inter vessel pit and Vesturad pitScale bar = 100 µm.

Fig. 5:- LS of Albiziaprocera showing ray vessels pit Scale bar = 100 µm.

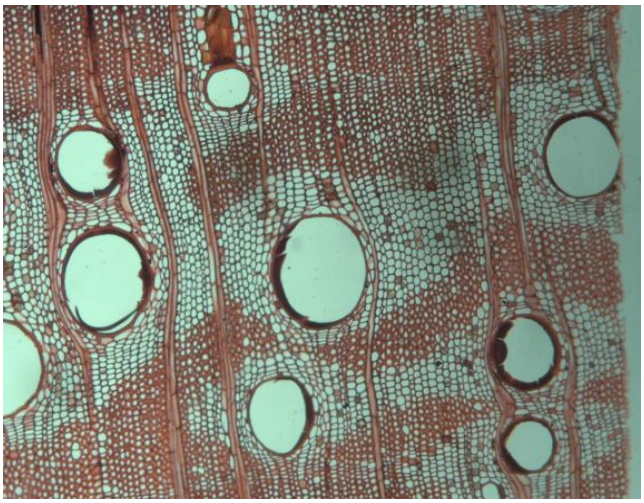


Fig. 6 :- Cross-section of Albiziaprocerashowing Semi ring porosityScale bar = 300µm

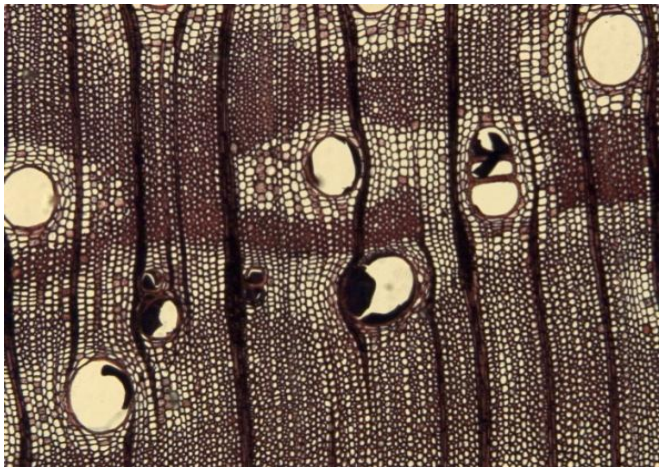


Fig. 7 :- Cross-section of Albiziaprocerais showing Growth ring distinct, radial multiples with 2-3 group and gummy deposits in vessels. Scale bar = 300µm

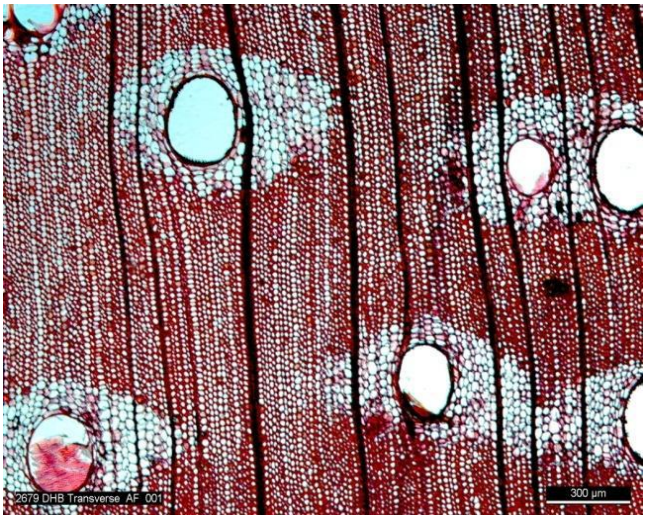


Fig. 8:- Transverse section of wood of Albiziaprocerais showing a vessel with tylosis and axial parenchyma aliform and confluent paratracheal. Scale bar = 300µm

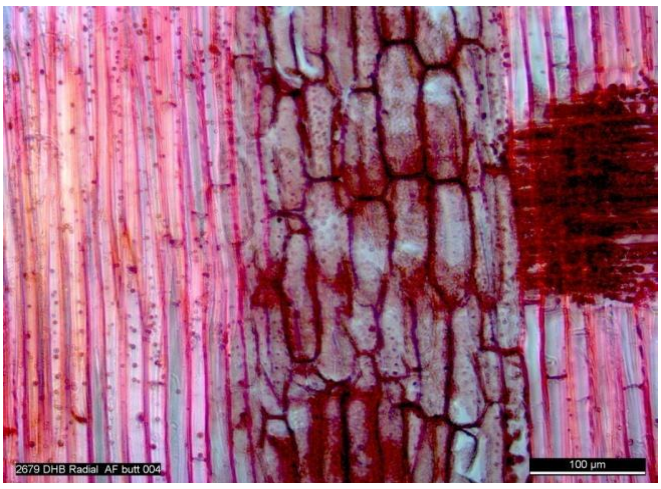


Fig. 9:- Radial section of Albiziaprocerais showingmutiseriate rays with inclusions. Scale bar = 100 µm.

CONCLUSION

In this study was found that wood anatomy features change with according to the climate and locality.The statically analysis reveals that the variation in vessels diameter, uniseriate ray height,multiseriateray height, ray width, fibre length, fibre diameter, fibre cell wall and vessel length with the site is significant that it is affected by locality and climate. There is very strong relation (correlation factor 0.933611836) in between vulnerability and mesomorphy. Albiziaprocerathe entire has large vessel with few vessel per unit area indicating a preference for conductive efficiency whether they have mesic or xeric ecology. Therefore the species shows highly ecological adaptability to the tropical and subtropical geographical zones such as vulnerability and mesomorphy relation is positive.

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