International Journal of Trend in Scientific Research and Development (IJTSRD)
International Open Access Journal
ISSN No: 2456 - 6470 | www.ijtsrd.com | Volume - 2 | Issue – 4

Evaluation of morphological and anatomical characters on growth of *Decalepis hamiltonii* wight & arn. In selected regions of Southern Karnataka

Naveen Kumar. S. P[1], Maya. C[2]
[1]Research Scholar, [2]Professor
Department of Botany, Bangalore University, Bangalore, Karnataka, India

ABSTRACT
Decalepis hamitonii Wight & Arn plants were collected from 5 accessions [i.e., Bannerughatta, Bidadi, Devarayanadurga, Kyatasandra and Savanadurga] and analyzed for morphlogical and anatomical features. The plant exhibited milky latex which is sticky in nature, slightly thicker as compared to that of latex obtained from the members of Asclepiadacaeae and Moraceae. The external morphology of the shrub revealed an woody climber/ liana which produced roots that were pubescent in nature.

One of the interesting feature in *Decalepis hamitonii* Wight & Arn i.e., stout roots without latex but there were presence of mucilagenous fluid which was sticky. The root exhibited variation in pubescent odour which was not detected in other families and genera., ex: *Hemidesmus indicus* (L.)R.Br. do not possess pubescent odour. Leaves obovate, leaf apex obtuse, base wedge shaped which was a significant character of *Decalepis hamitonii* Wight & Arn and flowers were trichotomously branched with solitary cyme., floral tube just minute with of 1 mm length. Unlike the altered varieties resembled with those species of *Hemidesmus* as well. The cultivation of *Decalepis hamitonii* Wight & Arn in in-vivo condition incured heavy loss or change in morphological features due to climatic conditions.

Study of the characters of *Decalepis hamitonii* Wight & Arn was instantly carried out and analysis revealed that maintainence and protection of wild varieties along with respective characteristics without change in morphology can be done.

Keywords: *Decalepis hamitonii Wight & Arn., pubescent, mucilagenous fluid, trichotomously, Asclepiadaceae*

INTRODUCTION

Decalepis hamiltonii Wight & Arn. : (Family: Asclepiadaceae)

Vernacular name: San: Sariba, Shweta sariva; Kan: Makali beru, Magali beru; Mal: Nannari; Tam: Mahali Kizhangu, Mavilinga kilangu, peru nannari; Tel: Neemam theega (chenchu tribes), Maredu geddalu **(Prajapati *et al* , 2003)**.

A large hairless extensively creeping woody liana contains sticky milky latex. Branches jointed, slightly angled and with swollen nodes. Young branchlets, leaves and the leaf nerves are shiny. Distinctly greenish pink and hairless. Leaves opposite, egg-shaped to round shaped, about 7 x 5 cm, base gradually tapering to truncate, apex sub-acute to rounded, margin entire to wavy; leaf stalks about 1 cm long. Flowers yellow, small 3mm across, arranged in 3-times branched cymes. Follicles cylindrically oblong, about 5 x 3 cm and woody when dry. Seeds many, egg-shaped, about 6 x 4 mm, with long white silky hairs **(Prajapati *et al* , 2003).**

The species is endemic to Peninsular India. It is has been recorded in the dry and moist deciduous forests of Karnataka (Hassan, Mysore, Bellary, Tumkur,

Kolar) (Fig: 1 -5), Andhra Pradesh (Kurnool, Chittoor, Nellore, Anantpur, Cuddapah) and Tamil Nadu (Chengalpattu, Coimbatore, Dharmapuri, Nilgiri) **(Prajapati *et al* , 2003)**.

It grows in rocky slopes and rocky crevices of dry to moist deciduous forests. It can be propagated by seeds, stem cuttings and root suckers. The roots are of medicinal properties. It contains quercetin, kaempferol, coumarin and rutin, lupeol, β-amyrin, 2-hydroxy, 4-methoxy benzaldehyde and ferulic acid. Tuberous roots of *Decalepis* are used as a cooling agent and blood purifier, hence used to prepare refreshing drinks. Indigestion, deficient digestive power, dysentery, cough, bronchitis, leucorrhoea, uterine hemorrhage, skin diseases, fever, thirst, vomiting, poisoning, chronic rheumatism, anemia, debility, dysuria and blood diseases can be cured by root extracts of *Decalepis hamiltonii* Wight & Arn**(Prajapati *et al* , 2003)** (Fig: 7 -13)**.**

In the present study, various characters viz., morphological, anatomical and pharmacognostic, histochemical evaluation etc. was conducted to access the variation in different accessions of *Decalepis hamiltonii* Wight & Arn.

MATERIALS AND METHODS:

1. Morphological studies:

Fresh plant material were subjected for morphological studies, the growth parameters of the fullfledged development of the root, stem, leaf, inflorescence, flower, fruit and seed of *Decalepis hamiltonii* Wight & Arn was recorded and their characteristics were analyzed for a duration of three consequitive years from 2013 to 2016 (Fig: 7-13).

2. Anatomical studies:

Fresh plant material viz., root, stem, leaf, inflorescence, flower, fruit and seed of *Decalepis hamiltonii* Wight & Arn were sectioned and the anatomical details were studied (Fig: 14-19).

3. Taxonomic studies:

The characteristics of *Decalepis hamiltonii* Wight & Arn were observed in field studies as well as laboratory conditions to check the consistency of the growth. Further, the characteristics were assessed for family characters utilizing taxonomical keys from Gamble Flora (Fig: 1-5).

4. Pharmacognostic evaluation:

The powder of the shade dried samples viz., root, stem, leaf, inflorescence, flower, fruit and seed of *Decalepis hamiltonii* Wight & Arn were subjected to powder microscopy to check the component consistency (Fig: 20-25).

RESULTS:

Table no: 1: Average of all the 12 months for 3 consequitive years, viz., measurement starting from 3 week old plants to 3 years (Rough estimation based on pot trial attributes) for every year from 2013-2016.

	Decalepis hamiltonii Wight & Arn	Length (2013-2014) in cm (for one year = average value)						Breadth (2014-2015) in cm (for one year = average value)						Thickness (2015-2016) in cm (for one year = average value)					
		D_1	D_2	D_3	D_4	D_5	Pot trials	D_1	D_2	D_3	D_4	D_5	Pot trials	D_1	D_2	D_3	D_4	D_5	Pot trials
1.	Root	18.0	18.5	17.0	19.9	20.0	13.5	3.5	2.0	2.5	2.9	3.0	1.4	7.0	4.0	5.0	5.8	6.0	5.0
2.	Stem	30.5	38.0	25.0	22.0	39.0	24.5	2.0	2.5	1.5	1.9	2.0	2.0	4.0	5.0	3.0	2.8	4.0	2.2
3.	Leaf	5.0	5.5	4.5	5.5	6.0	4.0	2.5	3.0	2.5	2.0	2.5	1.9	0.3	0.2	0.1	0.1	0.3	0.1
4.	Inflorescence	3.0	2.5	3.0	2.5	2.5	2.0	2.0	1.5	2.0	1.5	1.5	1.0	0.5	0.6	0.5	0.6	0.6	0.4
5.	Flower	1.0	1.5	1.8	1.5	1.6	0.8	0.5	0.9	0.6	0.4	0.6	0.3	0.2	0.4	0.3	0.2	0.2	0.1
6.	Fruit	5.0	4.0	5.0	4.6	4.0	3.5	3.0	2.5	3.0	2.4	2.0	1.8	2.0	3.0	2.0	2.5	2.8	2.0
7.	Seed	0.06	0.05	0.06	0.04	0.05	0.02	0.03	0.04	0.02	0.02	0.03	0.01	0.01	0.02	0.01	0.02	0.02	0.01

Table No: 2: Criteria for measurement for the morphometric studies of *Decalepis hamiltonii* Wright & Arn.

	Root	Stem	Leaf	Inflorescence	Flower	Fruit	Seed
Length	measured from the base where shoot ends till the root apex.	measured from the base where root ends till the shoot apical meristem.	measured from the nodal region to leaf apex along with pedicel.	was measured from the peduncle to the apex.	measured from the peduncle end to the stigmatal apex of the flower.	measured from the apical end to the centre to the apical end.	measured from the micropylar region to the outer curve of the seed.
Breadth	measured from the centre of the root till the epidermal edge in a sectional view.	measured from the centre of the stem till the epidermal edge in a sectional view.	measured from the midrib region tothe leaf blade at the centre of the leaf.	measured from the branched end to the apex.	measured from the central axis of the flower to the outer rim of the flower.	measured from central axis of the fruit to the outer rind if the fruit.	measured from central axis to the margin of the seed.
Thickness	measured from one end to other passing through the centre on the central axis.	measured from one end to other passing through the centre on the central axis.	measured from the Adaxial end to Abaxial end.	measured from the mid region to the circumference end.	measured from the centre of the ovary to the outer rim petal of the flower.	measured from the anterior end to posterior end.	measured from dorsal surface to ventral surface.

Note: D_1 = Bannerughatta
D_2 = Bidadi region
D_3 = Devarayanadurga region
D_4 = Kyatasandra region
D_5 = Savanadurga region

FIGURES: 1-5 : REGIONS OF PLANT COLLECTION: **Figure: 6: IN-VIVO CONDITION**

Fig:1 : D_1 = Bidadi region

Fig:2: D_2 = Bannerughatta region

Fig:3: D_3 = Devarayanadurga region

Fig:4: D_4 = Kyatasandra region

Fig:5: D_5 = Savanadurga region

Fig: 6 : Pot Trials

FIGURES: 7 – 13: MORPHOLOGY OF *Decalepis hamiltonii* Wight & Arn

Fig: 7: ROOTS

Fig: 8: STEM and LEAF

Fig: 9: INFLORESCENCE

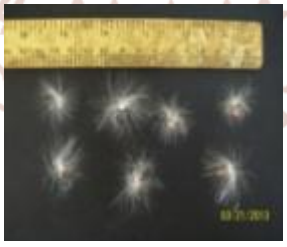

Fig: 10: FRUIT **Fig:11: DEHISCED FRUIT** **Fig: 12: HAIRY SEEDS** **Fig:13: SEEDS WITHOUT HAIR**

FIGURES: 14-19: TRANSVERSE SECTIONS SHOWING CORTEX AND VESSELS

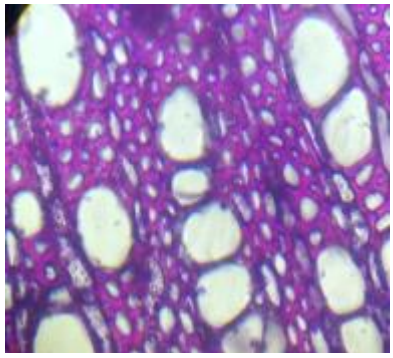

Fig: 14: CORTICAL CELLS

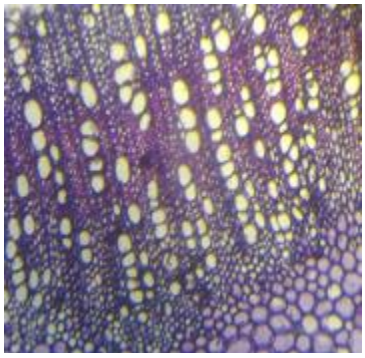

Fig: 15: CORTEX

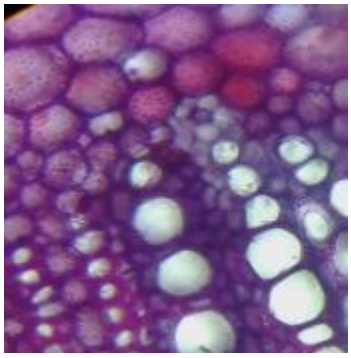

Fig: 16 : XYLEM

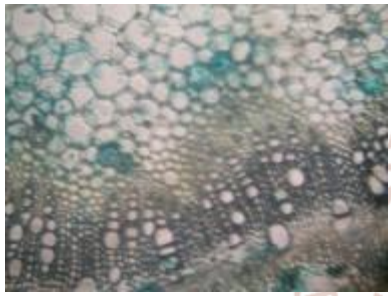

Fig: 17: STEM

Fig: 18: ROOT

Fig:19: LEAF

FIGURES: 20-25: PHARMACOGNISTIC STUDIES OF *Decalepis hamiltonii* Wight & Arn ROOT POWDER.

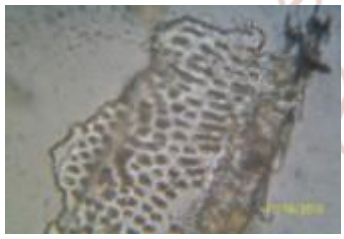

Fig: 20: PITTED VESSEL

Fig: 21: CALCIUM OXALATE CRYSTAL

Fig: 22: TANNIN

Fig: 23 :STOMATA

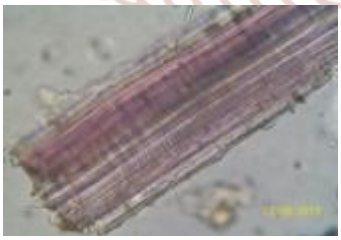

Fig: 24: SPIRAL VESSEL

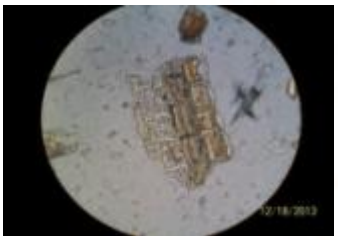

Fig: 25: PHLOEM PARENCHYMA

DISCUSSION:

From the present studies, it was evident that though the growth rate of ***Decalepis hamiltonii*** **Wight & Arn** varies from one region to another irrespective of the climatic conditions. A similar work carried out by Henderson ***et al*** (2006) on palm systematics stated that the data used in traditional morphometric studies of palms were morphological or anatomical and was collected from herbarium specimens and that often data were taken directly from living plants.

Kapla ***et al*** (2012) in their work indicated the same protocols standardized for character acronyms through the morphometric studies in *Potamogeton compressus* L. which may be comparable to the present morphological studies on *Decalepis hamiltonii* Wight & Arn.

In the present investigation, a cross study of the taxonomical characters of *Decalepis hamiltonii* Wight & Arn was carried out to check the pharmacognistic character and anatomical study, which was quite different to the analysis carried out by Reddy ***et al*** (2018) on Terminalia arjuna flowers and anatomical features were elucidated through Camera lucida studies. According to Sharma ***et al*** (2014) the roots of ***D. hamiltonii*** Wight & Arn come to maturity in about 12-14 months after planting depending upon the soil and climatic conditions.

CONCLUSION:

From all the observations its evident that, *Decalepis hamiltonii* Wight & Arn can be classified under the

Kingdom: Plantae,
Super-Class: Dicotyledonae, (presence of two cotyledons formed in mature state) www.wikipedia.com
Class: Magnolidae, (usually unfused carpels are surrounded by many petals or none).
Order: Gentianales, (have simple leaves that are opposite or whorled viz., two or more per node and the leaves are usually accompanied by stipules viz., small leaflike appendages at the base of the leaves, that are reduced to a ridge on the stem inbetween adjacent leaf stalks) (www.britanica.com).

From previous studies: ***Decalepis hamiltonii*** **Wight & Arn** belonged to:

Family: Apocyanaceae, (The milkweed family includes annual plants, perennial herbs, stem succulents, woody shrubs, trees, or twines. Most of them exude a milky sap with latex, if injured. Leaves are present alternating on the stem, but usually occur in pairs or in whorls, they are present on opposite sides of the stem. Stipules are small and have radial symmetry and are borne on heads that are cymes or racemes, but are rarely fasciculate or solitary. Flowers are bisexual, with a synsepalous, five-lobed calyx united into a tube at the base. Inflorescences are terminal or axillary. Five petals are united into a tube with four or five epipetalous stamens. The style is expanded at the apex into a massive clavuncle just below the stigma. The ovary is usually superior, bicarpellary, and apocarpous, with a common fused style and stigma. The fruit is a drupe, a berry, a capsule, or a follicle (https://en.wikipedia.org/wiki/Apocynaceae)
Sub-family: Periplacoideae, pollen grains are granular, arranged in tetrads and translators are spoon or funnel shaped. (www.biologydiscussion.com).

But from present studies: ***Decalepis hamiltonii*** **Wight & Arn** exhibits all the characters more similar to **Family: Apocynaceae,** (The leaves are simple, opposite decussate in arrangement with whorled phyllotaxy; stipules remain absent, flowers bisexual and actinomorphic, rarely zygomorphic. Calyx synsepalous, corolla sympetalous and both are penta-lobed, Stamens distinct andequivalent to the number of corolla lobes that alternate with them, adnate to the corolla tube (or perigynous zone). Anthers are introrse, commonly adherent to the stigmatic surface. Gynoecium: carpels-2 distinct at the level of the superior or inferior ovary but are united to form single style. Fruit is a follicle, capsule or berry and the seeds are flat, winged with a tuft of hairs on one end. **(**www.botany.hawaii.edu**).**
Genus: ***Decalepis***
Species: ***hamiltonii*** **Wight & Arn.**

Even the pharmacognostic features procure strongly that the plant belongs to Apocynaceae rather than affinities towards Asclepiadaceae. Moreover the anatomical details revealed that the formation secondary phloem was in connection with the xylary elements and the morphological characters display convincing results that possess more similarities with Apocynaceae than Asclepiadaceae.,

Decalepis hamiltonii Wight & Arn collected from Bannerughatta had fulfleged growth (2012-2014) but it was not consistent in Devarayanadurga region. The plants collected from Bidadi possessed least pharmacognostic features than the others., anatomically the plant details were very distinct and co-ordinating with the original source of plants collected from Kyatsandra. Overall the ***Decalepis hamiltonii*** Wight & Arn grown in Tumkur district (Devarayanadurga and Kyatsandra regions) possessed least morphological features on an average than the Bangalore district (Bannerughatta and Bidadi regions) and typical interesting characteristics observed in Ramanagara district (Savanadurga region).

REFERENCES:

1) Prajapati, N. D., Purohit, S. S., Sharma, A. K., Kumar, T., (2003): A handbook of Medicinal Plants, Agrobios (India), Jodhpur.
2) ***www.britannica.com***., https://www.britannica.com/plant/Magnoliid-clade.
3) ***https://en.wikipedia.org/wiki***/Apocynaceae.
4) ***http://www.biologydiscussion.com/plants/flowering-plants/family-asclepiadaceae-quick-notes-botany/19638.***
5) ***http://www.botany.hawaii.edu/faculty/carr/apocyn.htm***
6) Henderson, A., (2006) Traditional morphometrics in plant systematics and its role in palm systematics., ***Botanical Journal of the Linnean Society***, 151, 103–111.
7) Kapla, Z., Marhold, F. L. S. K., (2012): Multivariate morphometric analysis of the ***Potamogeton compressus*** group (Potamogetonaceae)., ***Botanical Journal of the Linnean Society***, 170, 112–130.
8) Reddy, M.P., Shantha, T.R., Naveen Kumar, S.P., Rao, V.R., Shiddamallayya N., Bhat, S., (2018) : Pharmacognostical Evaluation of Arjuna Flowers: ***Terminalia Arjuna*** **(Roxb.)** Wight & Arn., ***Journal of Drug Research in Ayurvedic Sciences***, 2 (4): 289-294.
9) Sharma, S., Anwar Shahzad, A., (2014): An Overview on Decalepis: A Genus of Woody Medicinal Climbers., ***J Plant Sci Res***. ;1(1): 104.