IRJSE International Research Journal of Science & Engineering
Int. Res. J. of Science & Engineering, 2018; Special Issue A6 : 26-32
ISSN: 2322-0015
SJIF Impact Factor 6.68
UGC Approved Journal No. 63628
RESEARCH ARTICLE
OPEN ACCESS

Phytochemical and Taxonomical Studies of *Lepidium sativum* L. (Brassicaceae)

Sangekar SN [*1], Devarkar VD [2], Shaikh TJ [3], Shahane MK [4] and Kshirsagar UM [5]

[*1]Department of Botany, Shiv Chhatrapati College Aurangabad, Maharashtra, India
[2]Department of Botany, Shri Chhatrapati Shivaji College, Omerga, Maharashtra, India
[3] Departments of Botany, Yashwantrao Chavan College of Science, Karad, Maharashtra, India
[4] Haribhau Devkiran High school and Junior College, Solapur, Maharashtra, India
[5] Maharashtra secondary and Higher secondary Vidyalaya, Barshi, Solapur, Maharashtra, India
*Email: sarikadama@gmail.com

Manuscript Details

Available online on http://www.irjse.in
ISSN: 2322-0015

Editor: Dr. Arvind Chavhan

Cite this article as:
Sangekar SN, Devarkar VD, Shaikh TJ, Shahane MK and Kshirsagar UM. Phytochemical and Taxonomical Studies of *Lepidium sativum* L. (Brassicaceae), Int. Res. Journal of Science & Engineering, 2018; Special Issue A6: 26-32.

ABSTRACT

Almost 75 – 80 % of developing countries rely on traditional medicines, mostly on chemical constituents and drugs which is obtain from plant, for their primary health care needs, according to World Health Organisation (WHO). In recent times, focus on plant research has increased all over the world and a large number of evidence has collected to show immense potential of medicinal plants used in various traditional systems.Similarly it has been already proved that the correct identification and authentication of taxa is most important in plants science. The Lepidium sativum L. has enormous traditional uses against various diseases. The present review aims to Phytochemical, Morphological and anatomical review of Lepidium sativum L. In the present work phytochemistry and taxonomical enumeration of Lepidium sativum L. is carried out.

Keywords: Phytochemistry, Morphology, Anatomy, Lepidium sativum L., Brassicaceae.

INTRODUCTION

Lepidium sativum L. (Family: Brassicaceae) is a common plant in India, profoundly used as Ayurvedic medicine, and also used as Modern medicine. *Lepidium sativum* L. is an annual plant commonly known as "chandrashoor", "aleev" in Marathi language and also known as "halloo". The leaves of the plant are used in salads, cooked with other vegetables and used to garnish food. Leaves are stimulant and diuretic [1, 2]. The seed bran has high dietary fibre content and also it has high water holding capacity. Seed bran can be used as a rich source of dietary fibre [3]. The roots of halon are acrid and bitter which are useful in treatment of secondary syphilis and used as a condiment [4]. The aqueous extract of *L. sativum* seeds promoted hypoglycaemic activity both in normal and diabetic rats without interfering insulin secretion [5]. In recent trend the re-emerging connection between plants and human health especially depends on their antioxidant activities that may delay or reduce the hazardous effects of free radicals. The major causative for the generation of free radicals in food, drug and living systems is the oxidation process.

METHODOLOGY

Collection and Identification: Lepidium sativum L. (Family: Brassicaceae) was collected from Aurangabad region of the Maharashtra. The survey of the study area was conducted during June 2017. Identification of the collected specimens was made with the help of standard Floras ***[6, 7]***. Herbarium specimens are deposited in the Department of Botany, Shri Chhatrapati Shivaji College, Omerga. Library and Herbarium of Botanical Survey of India, Pune was consulted for review of literature and also for identification of the specimen.

Histochemical screening: Histochemical screening was performed as per standard methods given in by Gangulee et. al.*[8]*, Evans *[9],* Harbone *[10]*, Peach &Tracey *[11]*, Rastogi & Mehrotra *[12]* and Johansen *[13]*.

Anatomy with illustration: The T. S. of Root, Stem and leaf were taken by fine blade and the sections were stained by the method of double staining, and the illustration of all sections and habit of plant were made by 0.2, 0.4 and 0.6 tip Rotring Isograph Technical Drawing Pen on A4 sized drawing paper.

Qualitative analysis*:* Test for qualitative analysis of starch, protein, fat, tannin, saponin, glycosides and alkaloids was taken and confirm the presence or absence of compounds in plant parts ie. Root, Stem and Leaves.

Quantitative analysis*:* Total Ash values, Moisture contents, Sugar in root, alkaloids, Nitrogen, Potassium, Calcium, Phosphorus, Crude protein, free amino acid were calculated in percentage

RESULT AND DISCUSSION

L. sativum L. (Family -Brassicaceae) is commonly known as "chandrashoor" in this region, the flowering and fruiting period is June to December.

The *L. sativum* widely used in folk medicine treatment in used for treatment of asthma , bronchitis and cough, and also used to relief from waist pain after maternal delivery in Women's, and as energisers.

Morphology (Taxon Treatment) (Fig .01)
Lepidium sativum L. Sp. Pl 644. 1753; Hook F. & Anders. In Hook. f. fl. Brit. India 1: 159 1872; Naik, fl. osmanabad 35. 1979.

Erect, Glabrous, Annual branched herb. 10 - 45 cm tall. branches bluish green in colour. Lower leaves pinnatisect or variously divided, ca 3-7 cm long (Sometime Entire) , lobes inciso dentate, upper ones entire. *(Fig .02).* Flower actinomorphic, across in terminal simple or compound, Inflorescence 10-15 cm long racemes. pedicels 3-3.5 mm long. Sepals 4, obtuse, 1-1.5 mm long petals white, 2-2.5 mm long. Stamen 6 (Sometime 4), Gynocium fused, Carpel 1. *(Fig .03).*

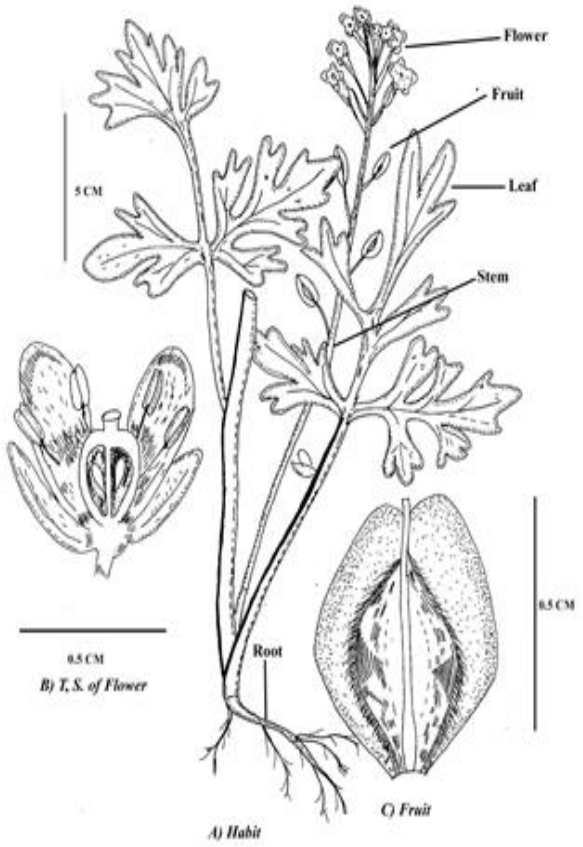

Figure 1. *Lepidium sativum* (Habit)

Figure 2. Habit Photograph

Figure 3. Flower

Figure 4. Seed

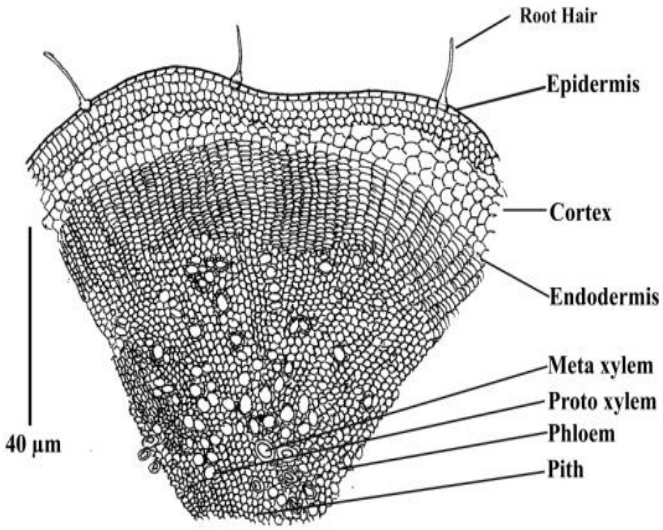

Figure 5. T. S. of Root

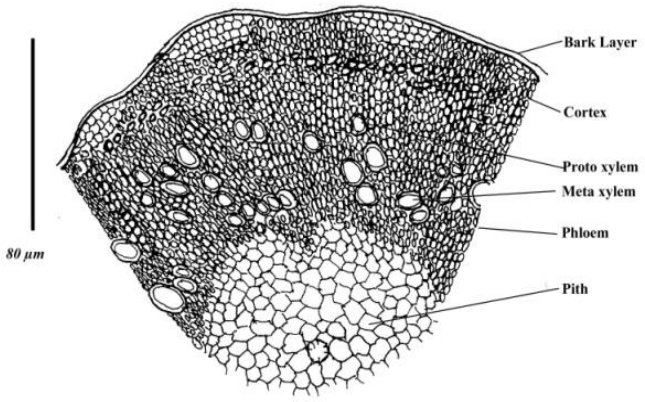

Figure 6. T. S. of Stem

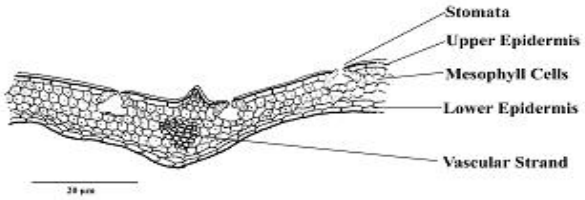

Figure 7. T. S. of Leaf

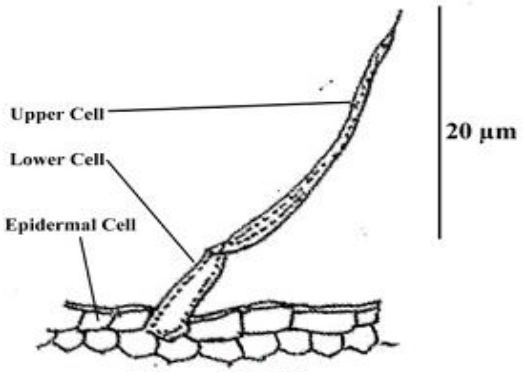

Figure 8. Trichome

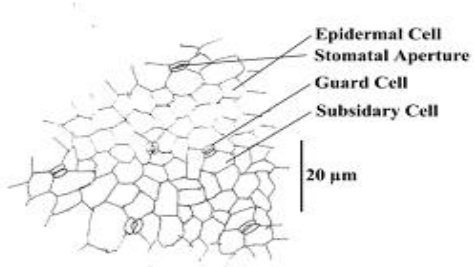

Figure 9. Stomata

Fruit Two-seeded, elliptic, flat, tip broadly winged, with notched tip, grey, about 6 mm long silicula. Stalk quite erect, 5–8 mm long. Seeds Glabrous, Broun, 2 x 1 mm. *(Fig .04).*

Notes: cultivated for edible seeds as a winter crop, also escaped around fields and roadsides.

Micro-morphology

Trichome *(Fig .08)*

The bicellular uniserrate type of trichomes is present in *Lepidium* which is measured about 20-25 µ length.

Stomata *(Fig .09)*

The *Lepidium* stomata shows the tetracydic type of stomata the guard cells were measured about 3-4 x2-3 µ.

Anatony

1) T. S. of Root *(Fig .05)*

The T.S. of *Lepidium* root shows the outermost layer is of epidermis. Epidermis is composed of thick walled barrel shaped cells which is compactly arranged. The epidermal layer interrupted by root hairs. The epidermal cells were measured about 2.1 x 3.5 µ.

The epidermal layer is followed by cortical cells, the cortical cells further of three type's *i.e.* outer, middle & inner cortex. The outer cortex is composed 3-4 layer & the outer cortical cells were measured about 2.5-3 x -3.5 µ. The middle cortex is composed of 2-4 layer & the cells of middle cortex is measured about 3.5-4 x 4.5-5 µ and the inner most cortical layer is of 7-11 layers of inner cortical cells which is measured about 1.5-2 x 3.5-4 µ. The centrally located stele is comport vascular elements strand. The stele is delimiting by endodermis the vascular strand is composed of phloem parenchyma & xylem elements.

The phloem parenchymatous cells were increased about 1.5- x 2-2.5 µ. Were the xylem elements measured about 3-4 x 4-5 µ.

2) T. S. of Stem(Fig .06) The T. S. of *Lepidium* stem shows outer most layer is epidermis which is composed of parenchymatous patches.

Below to epidermis there is presence of cortex. Cortex is of 3-4 layered & composed of compactly arranged cells with the measurement of 3 - 3.5 x 3.5 -4 µ. The cortical zones were adjacent to the epidermis & interrupted by parenchymatous patches.

The stele is present at the center of T. S. The setele is delimiting with endodermis the endodermis is ring like appearance of compactly arranged cells. The stele is composed of vascular strand, pericycle, endodermis& pith. The pericycle present just below to endodermis.

The pericycle not distinct from vascular strand. The vascular strand is composed of phloem arenchyma & xylem elements. The phloem parenchyma is 8-12 layered &it's interrupted by xylem elements.

3) T. S. of Leaf *(Fig .07)*

T.S of the *Lepidium* leaf shows the bi-layer (upper epidermis & lower) of epidermis. The epidermis is of two type. Upper epidermis is composed of thick walled barrel shaped cells with compact arrangement. The epidermis is covered by cuticle & interrupted by stomata. The epidermal cells were measured about 3-4 x 4.5-5 µ. The vascular tissue is located at the center of midrib. This is composed of xylem & phloem elements.

The vascular strand delimiting with bundle sheath cells & having diameter of 7-9 µ.

The chlorenchymaatous cell is present between the two epidermis & the chlorenchymaatous cells were measured about 3-3.4 x 3.5-4 µ.

Table 1: Qualitative analysis

Lepidium sativum L.				
Sr. No.	**Test**	**Root**	**Stem**	**Leaf**
1	Starch	+	+	+
2	Protein	+	+	+
3	Fat	+	+	+
4	Tannin	_	+	+
5	Saponin	+	+	+
6	Glycoside	+	+	+
7	Alkaloids	+	+	+
Lepidium sativum L.				
1	Starch	+	+	+
2	Protein	+	+	+
3	Fat	+	+	+
4	Tannin	_	+	+
5	Saponin	+	+	+
6	Glycoside	+	+	+
7	Alkaloids	+	+	+
Lepidium sativum L.				
1	Starch	+	+	+
2	Protein	+	+	+
3	Fat	+	+	+
4	Tannin	_	+	+
5	Saponin	+	+	+
6	Glycoside	+	+	+
7	Alkaloids	+	+	+

Table 2. Physiochemical investigation

Sr. No	Parameter		Percentage of content in Plant Part		
			Root	Stem	Leaf
1)		Total ash	23.30%	17.10%	20.20%
	A	Water insoluble ash	16.20%	15.10%	19.10%
	B	Water soluble ash	00.70%	01.70%	01.10%
	C	Acid soluble ash	22.60%	13.70%	17.30%
	D	Acid in soluble ash	00.60%	03.40%	02.90%
2)		Moisture content	06.69%	05.20%	07.10%
3)		Total sugar	00.78%	01.23%	02.10%
	A	Reducing sugar	00.56%	01.00%	01.79%
	B	Non reducing sugar	00.22%	00.23%	00.31%
4)		Total alkaloids	02.10%	10.18%	07.00%
5)		Nitrogen	03.90%	07.20%	07.40%
6)		Potassium	00.12%	00.21%	00.19%
7)		Calcium	00.13%	00.70%	00.92%
8)		Phosphorous	00.22%	00.40%	00.70%
9)		Crude protein	19.10%	17.80%	29.30%
10)		Total free Amino acid	00.44%	00.79%	00.90%

Qualitative analysis

Root gave the negative test for tannin but other metabolites are seen in scattered in few cells of cortex. Leaves shows the presence of all metabolites like starch, protein fat tannin saponin glycosides and alkaloids, the collenchymatous cells of midrib shows presence of alkaloids and protein

Quantitative analysis

Phytochemical investigation

Ash values: Total amount of ash in the root was 23.30 %, water soluble was found to be 00.70 % water insoluble ash was16.20 %, acid soluble ash was 22.60 % acid insoluble ash was found to be 00.60%

Total amount of ash in the stem was 17.10 %, water soluble was found to be 01.70% water insoluble ash was15.10%, acid soluble ash was 13.70% acid insoluble ash was found to be 03.40%

Total amount of ash in the leaf was 20.20 %, water soluble was found to be 01.10% water insoluble ash was19.10%, acid soluble ash was 17.30% acid insoluble ash was found to be 02.90%

Moisture contents: Moisture content in root 6.9%, stem 5.2% and leaf is found in 7.1%.
The values were found in increase in number root < stem< leaf.

Total sugars: Total sugar content in root 00.78%, reducing sugar is found in 00.56% and non reducing sugar is 00.22 % Total sugar content in stem01.23 %, reducing sugar is found in 01.00% and non reducing sugar is 00.23% Total sugar content in leaf 02.10%, reducing sugar is found in 01.79% and non reducing sugar is 00.31%.

Total alkaloids*:* Total alkaloids in root is found in 2.1%, in stem 10.18% and leaf 07% is found.

Nitrogen*:* Amount of nitrogen in root 03.90%, stem 07.20% and in leaf 07.40% is found.

Potassium: Amount of potassium in root is 00.12%, stem 00.19% and in leaf 00.21% is found.

Calcium: Amount of calcium in root 0.13%, stem 0.7% and in leaf 00.92% is found.

Phosphorus: Amount of Phosphorus in root 00.22%, stem 00.40% and in leaf 00.70% is found.

Crude protein: Amount of Crude protein in root 19.10%, stem 17.80% and in leaf 29.30% is found

Total free amino acid: Amount of Total free amino acid in root 00.44%, stem 00.79% and in leaf 00.90% is found.

REFERENCES

1. Maghrani, et al. Antihypertensive effect of Lepidium sativum L. in spontaneously hypertensive rats. *Journal of Ethnopharmacology*, 2005, 100(1-2), 193–197.
2. Wright et al. Herbal medicines as diuretics: A review of the scientific evidence. *Journal of Ethnopharmacology*, 2007, 114(1), 1–31.
3. Gokavi et al. Chemical composition of garden cress (Lepidium sativum) seeds and its fractions and use of bran as a functional ingredient. *Plant Food. Hum. Nutr*, 2004, 59(3), 105–111.
4. Welbourne TC. Ammonia production and glutamine incorporation into glutathione in the functioning rat kidney. *Can J Biochem*, 1979, 57(3), 233–237.
5. Eddouks *et al.* Study of the hypoglycaemic activity of *Lepidium sativum* L. aqueous extract in normal and diabetic rats. *Journal of Ethnopharmacology*, 2005, 97(2), 391–395.
6. Hooker JD. Flora of British India. Reeve & Co. Ltd., London, 1872-1897, I-VII.
7. Naik VN. Flora of Osmanabad. Venus publishers, Aurangabad, 1998, 464pp.
8. Ganguly J, Krishnamurthy S & Mahadevan S. *Biochem. J.* 1959, 71, 756.
9. Evans JD. Straightforward statistics for the behavioral sciences. Pacific Grove, CA: Brooks/Cole Publishing, 1996.
10. Harbone JB. Phytochemical methods, Chapman and Hall, London, 1973.
11. Peach K, Tracy MV. Modern Methods of Plant Analysis, Springer-Verlag, Heidelberg; 1955, 3-4.
12. Rastogi & Mehrotra and Rastogi RP, Mehrotra N (1995). Compendium of Indian Medicinal Plants, CDRI, Luknow and P.I.D, New Delhi, 1999, 4: 493-498.
13. Johansen DA. Plant Microtechnique . Mc Graw Hill Book Co., New York, 1940.