Study of antifungal potential and phytochemistry of *Glossocardia bosvallea* (L.f.) DC. a member of *Asteraceae.*

Patil Kanchan S.

Dept. of Biotechnology, Jet's Z.B.Patil College, Dhule 424002, Maharashtra, India

ABSTRACT: *Glossocardia bosvallia* (L.f.) DC (Family- *Asteraceae*) is a medicinal plant collected from the Toranmal forest region of Nandurbar 21°22'11" N 74°14'25" E. This plant is studied for its ethnomedicinal uses, phytochemistry, antifungal activityagainst phytopathogenic fungi as well as the screening of compounds like Phenols, Quinones, Flavonoids, Tannins, Terpenoids, and Alkaloids, etc. were carried out. Detailed results were discussed in the present paper.

KEYWORDS: *Glossocardia bosvallia* (L.f.) DC, antifungal activity, Tannins

Fig.1*: Glossocardia bosvallea* (L.f.) DC.

INTRODUCTION: *Glossocardia bosvallea* (L.f.) DC. (Family - *Asteraceae*) (Vernacular Names: English- Patthar Suva, Seri, Kannada- Parpataka, Sanskrit- Charak, Parpata, Pithari, Marathi- Khadakshepu, Telugu- Parapalanam, Tamil-Parapalanam.)

Flowering and Fruiting were observed during the month of July to November. Ethnomedicinal uses. The aerial part of the plant is used in the treatment of colds, fever, and is also used in Pitta and Vata. Fresh plant is applied to promote the healing of sores and wounds and in the vegetable.

Medicinal plants have gained more importance as a probable source of a substitute and effective drugs. About 12,000 plant secondary Metabolites of antimicrobial importance have been isolated. These compounds fall in one of the major groups of compounds like Phenols, Quinones, Flavonoids, Tannins, Terpenoids, Alkaloids, and other mixtures. These plants have curative properties due to the presence of various complex compounds. Schippmann *et.al.* (2002), reported around the world more than 5000 species are used for medicinal purposes

of which almost 13% of flowering plants over 8000 plant species are used in traditional and modern medicine in India (Planning Commission Report, 2000).

The plants selected for study *Glossocardia bosvallea* (L.f.) DC. is exotic species invaded in India from its native West Indies (Surse et al, 2014). Though not used in traditional remedies but used in nontraditional, Ethnomedicine buys most of the tribes due to its varied medicinal applications. Its biological activity is also confirmed against pests and insects (Rajopadhey et al, 2016). It is used as a wild leafy vegetable in most of the tribal parts of Karnataka and Maharashtra (Prashant Kumar and Siddhamallaya, 2014). The phytochemicals present in species as of Phenolic compounds as antioxidants by Rajopadhey and Upadhey (2013). Yadava and Khan (2012) worked on organic examination of a new allelochemical from stem of *Glossocardia bosvallea* (L.f.) DC. It is observed that the isolation, and structural elucidation of novel allelochemical 5,6,7,4 tetrahydroxy 3- methoxy flavones.

MATERIALS AND METHODS:

Collection of Plant material and preparation of extracts :

Fresh plants *Glossocardia bosvallea* (L.f.) DC was collected from the forest region of the Nandurbar district of Maharashtra. During the survey data on medicinal uses of the plants used by people from the Nandurbar district was documented. Informal discussions, interviews, and through communication traditional knowledge about this species was collected. The parts of the plant were collected and gabled for the elimination of contaminants, shade dried, and then stored in an airtight container.

Identification of the collected specimens was made with the help of standard floras (Hooker,1872-1897). Herbarium specimens are deposited in the PG Department of Botany, Dhule(MS). Herbarium of Botanical Survey of India, Bangalore was consulted for review of the literature and also for identification of the specimen.

Selection of solvents for extraction:

For preliminary screening, to extract pulverized plant materials petroleum ether, chloroform, and acetone, and one polar solvent i.e methanol were selected.

Collection of diseased samples of vegetables and fruits:

Diseased plant material was collected from the farm of villages and the resident market of Dhule. Diseased tomatoes (*Solanum Lycopersicum*), those display symptoms for early blight disease, diseased onion bulb (*Allium cepa)* screening signs of black mold, and maize kernel (*Zea mays*) with rot disease were collected in sterile polythene bags and kept airtight. Subsequently that, they were brought to the laboratory and stored at 4°C until isolation of pathogen.

Phytopathogen:

Phytopathogenic fungi triggering common diseases in storage and post-harvest periods of vegetable and fruit crops. *Aspergillus niger*, *Rhizopus oryzae*, and *Penicillium* sp. were isolated from diseased fruit and plant samples. Aflatoxin and other toxic metabolites are produced by *Aspergillus flavus*. The culture of *Aspergillus*

flavus was acquired from NFCCI, Pune. The isolated and acquired fungi culture was maintained onto SDA slants at 4 °C. Subculturing was carried out subsequently every 14 days. Isolation and identification of test pathogen were carried out according to the standard protocol suggested in plant pathology (Gilman, 1957).

Qualitative Analysis: Qualitative Analysis in *Glossocardia bosvallea* (L.f.) DC. has shown positive test results for the presence of fat, saponins starch, protein, glycosides, and alkaloids in completely the plant part. Leaf, root, and stem. Tannin was found to present in stem and leaf while absent in root.

Determination of plant extract yield:

The percentage plant extract yield from all parts of the plant sample was calculated by using the formula:

$$\text{Extraction yield (\%)} = \frac{W_1}{W_2} \times 100$$

W_1: Weight of the Extract residue obtained after removal of solvent.

W_2: Weight of the powdered material taken initially

Antifungal activity of *Glossocardia bosvalllea* (L.f.) DC by Poisoned food technique:

Preliminary screening of all the extracts of *Glossocardia bosvalllea* (L.f.) was carried out by using a disc diffusion assay to select the two most potent extracts.

The Poisoned Food Technique was followed to assess the antifungal potential of all the extracts of leaves and flowers of *Glossocardia bosvalllea* (L.f.) DC**.** The Poisoned Food Technique involves the poisoning of the mycelial growth into medium, thus using the antifungal agent and then evaluating the reduction of growth of the test organism over the medium. Dithane M-45 (Mancozeb) with a suggested dosage as (0.2gm/ml) were tested. (Table-3). Percentage growth was calculated by taking the formula by Vincent (1947).

$$I\ \% = \frac{(C-T)}{C} \times 100$$

Where C = Diameter of hyphae in control

T = Diameter of hyphae in the treatment (extract)

I = Inhibition %

RESULTS: The extraction yield of different parts of *Glossocardia bosvalllea (L.f.) DC*

is determined. The dried form of the extract after extraction was taken to that of grounded pulverized plant material. The table-1 reviews the percent yield of plant parts.

Table-1: The percentage yield of different parts of plant extract of *Glossocardia bosvalllea* (L.f.) Dc

Sr. No.	**Solvent**	***Glossocardia bosvalllea* (L.f.) Dc**			
		Leaf	**stem**	**Flower**	**root**
1.	PE	2.32	3.35	0.45	1.40
2.	CHL	1.32	2.16	0.10	0.20
3.	AC	1.13	2.31	0.62	1.72
4.	ME	80.26	4.11	1.20	4.22

PE: Petroleum ether, CHL: Chloroform, AC: Acetone, ME: Methanol

Qualitative analysis of phytochemicals in an extract of methanol of leaf, stem, root, and flower parts of *Glossocardia bosvallea* (L.f.) DC.indicates the secondary metabolites. Table-2 summarizes the qualitative test result of active phytochemicals.

Table-2: Phytochemical analysis of *Glossocardia bosvallea* (L.f.) DC.

Sr. No.	**Phytochemical constituents**	**Leaf**	***Stem***	***Root***	***Flower***
1.	Proteins	-	+	-	+
2.	Carbohydrates	-	+	-	+
3.	Phenols/Tannins	+	+	-	-
4.	Saponins	-	-	+	++
5.	Glycosides	-	+	+	-
6.	Steroids	-	+	-	+
7.	Terpenoids	+	+	-	-
8.	Alkaloids	+	+	+	+++

'+': present, '++': moderately present, '+++': significantly present, '-': absent

Table-3: Preliminary screening of *Glossocardia bosvallea (L.f) Dc* against *Aspergillus niger*.

Sr. No.	***Glossocardia bosvallea(L.f) Dc.***	**Zone of inhibition in mm**			
		Petroleum Ether	Chloroform	Acetone	Methanol
1.	*Leaf*	3	4	2	15
2.	*Stem*	2	0	3	5
3.	*Root*	3	2	3	6
4.	*Flower*	3.5	3	3.5	8
5.	*Whole plant*	3	3	7	7
6	Mancozeb	18			

Table-4summarizes the results of a detailed analysis of the antifungal activity of *Glossocardia bosvallea (L.f) DC* against *Aspergillus niger*.by Poisoned Food Technique. For reference fungicide, Dithane M-45 (Mancozeb) was taken as per the suggested dosage (0.2gm/ml). The control plates were occupied with mycelial growth after 72 hours of incubation. The values I column shows a reduction in mean percentage of linear mycelium growth (LMGR); for individually standard error value is calculated. The test was performed in triplicate. The leaf methanol extract confirms maximum inhibition to *Aspergillus niger*.

Table-4: Percentage (%) reduction in Linear Mycelium Growth (LMGR) of leaf and flower extracts of *Glossocardia bosvallea (L.f) DC* against *Aspergillus niger*.

Sr. No.	**Solvent**	**Leaf extract (10mg/ml) Percentage Reduction in Linear Mycelium Growth (LMGR)**	**Flower Extract (10mg/ml) Percentage Reduction in Linear Mycelium Growth (LMGR)**
1.	Petroleum ether	23.07 ± 0.33	15.07 ±0.33
2.	Chloroform	25.41 ±0.33	18.19 ± 0.33
3.	Acetone	28.26 ± 0.33	19.52 ± 0.00
4.	Methanol	60.37 ± 0.33	30.37 ± 0.33

mean (n=3) ± S.E

CONCLUSIONS:

Thus, the highest amount of bioactive compounds present in the stem and flower is confirmed in this study. This also confirms that the rural people using this plant as a vegetable is the right way to develop the maximum benefit from the plant as a medicinal herb. Of all four extracts of leaf and flower, the methanol leaf extract of *Glossocardia bosvallea (L.f) DC* gave 60.37 $\pm$ 0.33 mycelial inhibition to *Aspergillus niger*. Thus the methanol extract of the leaf of the studied plant could be used to find out potent ecofriendly fungicides to combat post-harvest pathogenic fungi.

REFERENCES:

Evans, W.C. (1996). Trease and Evans'Pharmacognosy. Saunders Publications, India

Gilman, J.C. (1957) A manual of soil fungi. 2nd Edn. (1959). Iowa state university

press, Constable & Company Ltd. London.

Harborne, J.B. 1(973). Phytochemical Methods. – A Guide to Modern Techniques of Plant Analysis. – Chapman and Hall, London.

Hooker, J. D. 1872-1897. *The Flora of British India*. Vol. I - VII. London.

Prashanth Kumar, G M and N Shiddamallayya 2014. *Documentation of Wild Leafy Vegetables of Hassan District, Karnataka.* Int. J. Pure App. Biosci. **2 (1):** 202-208 (2014)

Rajopadhey A A, A S Upadhey (2013). Determination of phenolic content and in vitro antioxidant potential of ethanol extract of seven sources of Ayurvedic drug " Pittapapada". Ind. J. Nat. Prod. Reso. Vol 4 (1) pp 81-87.

Rajopadhey A A, A S Upadhey and S P Taware 2016. Bioactivity of Indigenous plant *Glossocardia bosvallea* (L.f.) DC against insect pests of stored products. Ind. J. Trad. Know. Vol 15 (2) pp 260-265.

Schippmann Uwe, Danna J. Leaman and A. B. Cunningham 2002. *Impact of cultivation and gathering of medicinal plants on biodiversity: Global trends and issues.* Work on Biodiversity and the Ecosystem Approach in Agriculture, Forestry, and Fisheries. Satellite event on the occasion of the Ninth Regular Session of the Commission on Genetic Resources for Food and Agriculture. Rome, 12-13 October 2002.

Vincent, J. (1947). Distortion of fungal hyphae in presence of certain inhibitors. Nature.

Yadava, R. N, and Khan S.(2012) Chemical examination of a new Allelochemical from the stem of *Glossocardia bosvallea* (L.f.) DC. Int. J. Pharm. Vol. 3 (10) pp. 3932-3935