



RESEARCH ARTICLE

Morphological and Phytochemical Studies on *Xanthium strumarium* L.

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ABSTRACT

Xanthium strumarium L. belonging to family Asteraceae is an annual herb with abundance occurring in India. This plant has been used in the indigenous system of medicine for a long time in India as well as other countries. The morphological studies reveal that there is notable difference in the plant habit, leaves, stem, root and flowers among this plant. Morphological study also helps for correct identification and nomenclature of plant. The chemicals present in root, stem and leaves drugs are analyzed physically as well as chemically by qualitative and quantitative parameters. In present study reveals morphology, medicinal properties and phytochemical studies of plants for correct identification authenticity of drugs. The details are presented in the present paper.

Keywords : *Xanthium strumarium* L., Morphology, Medicinal properties, Phytochemistry. Jalna



Xanthium strumarium L.

INTRODUCTION

Since millennium, man has utilized plants as a source of food, shelter and also for health and large part of the world's populations near about 80% are depend upon plants for primary health care. Even today in western medicine and despite progress in synthetic chemistry some 25% of prescription medicines are still derived either directly or indirectly from plants. The use of plants in medicine ranges from crude preparation of extract (Maiti R. K. & Singh 2006). India is known for Ayurveda and the traditional system of medicine. There are 17800 flowering plants species occurs in India out of which about 7500 species are known to have medicinal properties (V. N. Naik, 2000). Many medicinal plants with wide distribution have naturally several names. This has naturally led to the confusion or controversy in their genuinely and correct identity.

It was revealed that in some drugs, there is contamination of other non-medicinal plant in the form of small and fine powder in some drugs sold in the local market. *X. strumarium* L. is widely distributed all over the India and is medicinal plant. *X. strumarium* L. locally known as cocklebur, clothur, woodgarie bur, ogora, godrin, sankhanull, ghagra, umattai, marulutige, chhota dhatura, dhatura, murulumatti, etc. *X. strumarium* plant used for various diseases, i. e. leucoderma, poisonous bites of insects, epilepsy, salivation, malaria, rheumatism, tuberculous, arthritis, diarrhea, leprosy, bacterial and fungal infections and skin diseases. Many phytochemical studies of *X. strumarium* have been conducted and more than 170 compounds have been isolated and identified from this plant (Wenxiang Fan *et. al.* 2019).

Medicinal Properties

Xanthium strumarium L. is a common and well known Chinese herbal medicine. It has been used for thousands of years in China (Wenxiang Fan *et. al.* 2019). Extract of whole plant especially leaves, roots, fruits and seeds have been applied in traditional medicine for treatment of leucoderma poisonous bites of insect's epilepsy salivation long standing case of malaria, rheumatism, tuberculosis, arthritis, diarrhea, leprosy, bacterial and fungal infections. (Anjoo Kambo & Ajaykumar Saluja, 2010). The allergenic components presented in whole pollen extract of *X. strumarium* L. causing contact dermatitis. (Witje *et. al.* 1990). Antibacterial activity against staphylococcus aureus species (Gautam *et. al.* 2007). Whole plants of *X. strumarium* as well as all parts separately is used in medicine (Senthil Kumar, 2011). Antifungal activity of six different concentrations of *X. strumarium* essential oil evaluated by

agar well diffusion method on PDA against selected fungal strains (Z. Parveen *et. al.* 2017). *X. strumarium* contains various bioactive components including protein, carbohydrates, phenols, vannis saponins etc, Yaseen Khan Salaiman Shah, Shakir Ullah (2020).

MATERIAL AND METHODS

The samples were collected from the medium sized authentically identified plant species from different localities of Marathwada region of Maharashtra. The root, stem and leaves were collected removed carefully by hand prinking without damaging the plant. In phytochemical studies, plant powder of root stem and leaf of *Xanthium strumarium* L. species was under taken for chemical analysis. Each parameter has separate procedure every parameter has different procedure.

Morphological Characteristics

Xanthium strumarium L. (Fam. Asteraceae) English- Clotbur, Cocklebur Sanskrit- Nilapushpa, Hindi-Banokra, Aartgal Assamese- Agara; Kannada- Marulummathi; Gujrati- Gadariyun; Tamil-Marulumutham; Telegu- Marul mathangi; Bengali -Banokra, Chotadhatura; Punjabi - Chirru; Marathi -Sankeshvara; Arbi- Shabka.

Xanthium strumarium L. is an annual and branched herb with erect stem about one meter in height. It has stout and hairy stem appear green, brownish or reddish brown in colour, often red spotted. The leaves are heart shaped simple ovate opposite, alternate phyllotaxy triangular to ovate in outline have stiff hairs and are approximately 2-7 inches long. Leaves are irregularly lobed with leaf margins that have relatively inconspicuous teeth. The flowers are monoecious and are pollinated by insects. Flower heads occurs several to many in short pediculate axillary or terminal racemes. Fruits are cylindrical to ovoid, two chambered bur, 1 to 4 cm long, and glandular covered with hooked prickles projecting from the apex of the bur. Brownish to reddish when mature. Seeds are one achene per floret, two per bur 1 to 1.5 cm long, dark brown oblong and flattened with pointed apex. The seeds are dispersed through contaminated farm tools, waste soils and furry farm animals.

OBSERVATIONS & DISCUSSION

A) Physical parameters (Table No.1).

i) **Colour:** - The root, stem and leaf powders of *Xanthium strumarium* root, stem and leaf drugs have following colours root – dull yellow, stem – greenish yellow, leaf - dark green

ii) **Odour:** - The root, stem and leaf powders of selected root, stem and leaf drugs have following Odour. root – characteristic, stem – specific, leaf – specific.

iii) **Taste:** - The root, stem and leaf powders of root, stem and leaf drugs have following tastes- root – bitter, stem – acrid, leaf – bitter astringent.

Table 1- Physical evaluation of samples.

Sr. No	Name of the Sample	Root	Stem	Leaves
Colour of the Plant parts				
1	<i>Xanthium strumarium</i> L	Whitish brown	Whitish brown	Green
Odour of the Plant parts				
2	<i>Xanthium strumarium</i> L	Characteristic	Specific	Specific
Taste of Plant parts				
3	<i>Xanthium strumarium</i> L	bitter	Intensely bitter	Specific

B) Chemical parameters (Table No.2).

a) Qualitative Chemical Parameters

Alkaloids are present in root, stem and leaves under investigation. Almost all the alkaloids have medicinal property and hence their presence in the Medicinal plants is not surprising. Phytochemical screening was carried out to assess the qualitative chemical composition of crude extract. The major natural chemical groups such as steroids, alkaloids, anthraquinone, iridoids, saponin, steroids and tannins. Alkaloids present in root, stem and leaves of *X. strumarium*. (Table -2).

Anthraquinone present in stem and absence in root and leaves. Analysis of iridoid test reveals presence of iridoid in stem and absence in root and leaf.

Saponins were reported higher from *X. strumarium* stem and lower in root. The Negative test of saponin reported in leaves (Table -2).

Steroids were present in root, stem and leaves of plant organ. (Table -2) **Tannins:** Present in the root and stem but absence in leaves. (Table -2).

b) Quantitative Chemical Parameters:

Dry matter (DM), Bulk density, Total Ash (TA), Acid insoluble ash (AIA), Acid soluble ash (ASA), Water insoluble ash (WIA), Water soluble ash (WSA), Nitrogen (N), Water soluble nitrogen (WSN), Crude protein (CP), Reducing sugars, Non-reducing sugars, Total sugars, Crude

fats (C fat), Crude fibers (CF), Cellulose, Gross energy (GE), Calcium (Ca), Phosphorus (P) and Extractive values in Water, Acetone, Butanol, Chloroform, Diethyl Ether, Ethyl alcohol, Methanol, Petroleum ether, Propanol. Result of each chemical parameter shown in Table 3 and 4.

Table 2- Distribution of chemical compounds.

Sr. No.	Name of the Sample	1	2	3	4	5	6
1.	<i>Xanthium strumarium</i> – Root	+	-	-	+	+	++
2.	<i>Xanthium strumarium</i> Stem	+	+	+	+++	+	+++
3.	<i>Xanthium strumarium</i> – Leaves	+	-	-	-	+	-

1. Alkaloids 2. Anthraquinone, 3. Iridoids, 4. Saponins, 5. Steroids 6. Tannins

Table 3. - Chemical Parameters

Sr. No.	Chemical Parameter	Root	Stem	Leaf
1	Dry matter	39.24 %	52.86 %	42.72 %
2	Bulk density	0.389 %	0.34 %	0.282 %
3	Total ash	0.378 %	12.66 %	08.43 %
4	Acid insoluble ash	09.87 %	1.52 %	01.25 %
5	Acid soluble ash	09.65 %	09.60 %	07.25 %
6	Water soluble ash	03.00 %	05.5 %	02.2 %
7	Water insoluble ash	06.85 %	06.12%	62.24 %
8	Nitrogen	1.90 %	03.8 %	03.35 %
9	Water soluble nitrogen	03.00 %	2.190 %	01.24 %
10	Crude proteins	14.07 %	22.87 %	14.54 %
11	Reducing sugar	13.07 %	02.94 %	3.46%
12	Total sugar	0.64 %	01.42 %	2.64 %
13	Non reducing ash	1.09 %	01.53 %	0.82 %
14	Crude fat	0.60 %	12.5 %	13.09 %
15	Crude fiber	14.60 %	12.5 %	20.26 %
16	Cellulose	13.20 %	14.80 %	23.38 %
17	Gross energy	14.25 %	03.15 %	04.36 %
18	Calcium	1.456 %	02.44 %	1.76 %
19	Phosphorus	0.26 %	00.35 %	00.26 %

CONCLUSION

However, real problems are with powdered material. For confirming the authenticity any one parameter of Photochemical analysis viz. dry matter, nitrogen, water soluble nitrogen, crude protein, crude fat, crude fiber, total ash, acid insoluble ash, acid soluble ash, phosphorus, calcium, gross energy, total sugar, reducing sugar, non-reducing Sugar, bulk density, cellulose is inadequate. Such as all these parameters taken together are helpful in determining the authenticity of raw materials. The

extractive values in different solvents appear to be much reliable and quick method to establish the authenticity of powdered material.

However, it is felt that instead of depending on any one solvent, extractive value in all solvents taken together will be the most reliable test. Various parameters for standardizing test for authenticity of a drug are provided for each plant which has been studied.

Table 4.- Extractive value

Sr. No.	Extractive value	Root	Stem	Leaf
1	Extractive value in water	12.4%	10.4 %	12.2 %
2	Extractive value in acetone	03.0%	03.3 %	04.6 %
3	Extractive value in butanol	03.0%	03.6 %	04.8 %
4	Extractive value in chloroform	04.4%	03.4 %	04.4 %
5	Extractive value in diethyl ether	01.8 %	02.6 %	03.4 %
6	Extractive value in ethyl alcohol	08.2 %	08.8 %	08.4 %
7	Extractive value in methanol	15.7 %	13.6 %	15.7 %
8	Extractive value in petroleum ether	1.6 %	03.2 %	03.2 %
9	Extractive value in propanol ether	03.6 %	03.5 %	03.5 %

REFERENCES

Gautam R, Saklani A, Jachak SM, (2007) Antimycobacterial agents Journal Ethno-pharmacol, 2007, 110 – 200 -34

Kamboj Anjoo and Ajay Kumar Saluja, (2010) Phytomorphological review of *X. strumarium* L. International Journal of Green Pharmacy 4 (3) 129-139. DOI: 10.4103/0973-8258.69154

Maiti R. K. and Singh V. P. (2006) An Introduction to Modern Economic Botany by Dr. Updesh Purohit for Agro-bios Jodhpur, India. ISBN: 9788177542721

Naik V. N., (2000). Taxonomy of controversial Ayurvedic plant drugs, proceeding of the seminar held on December 9, 2000, Plant Resource Development: Edited by Mungikar & Bhukhtar A. S.

Parveen Z.; S. Mazhar; S. Siddique; A. Manzoor and Z. Ali; (2017) Chemical composition and antifungal activity of essential oil from *Xanthium strumarium* leaves, Indian Journal of Pharm Sci. 2017, 79 (2); 316 – 321.

Senthil Kumar H, P S Kumar, V K Kumar, S. Revathy R. Manivannan and R. Malathy, (2011) Pharmacognostic standardization and Physico

chemical Evaluation of *Xanthium strumarium* (Linn) Root. International Journal of Pharmaceutical Research 3: 45 – 48.

Wenxiang Fan, Linhong Fan, and Chunjie Wu, (2019) Traditional uses of botany, photochemistry, pharmacology and pharmacokinetics Wenxiang of *Xanthium strumarium*, are view. Molecules Journal online – multidisciplinary digital publishing institute.

Wifie S T, Osweiler G D, Sthar H M, Mobley G. (1990) Cocklebur toxicosis in cattle associated with consumption of mature *X. strumarium*. Journal of Vet Dign Invest, 1990; 2 263 – 7.

Yaseen Khan Salaiman Shah, Shakir Ullah (2020) Ethnomedicinal, pharmacological and phytochemical evaluation of *X. strumarium* L. International Journal of Scientific and Engineering Research Vol. II, Issue 7, July 2020.

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