
Taxonomical and Phenological Studies of Some Economically Important Plants of Gyanpur region, Bhadohi, Uttar Pradesh

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Abstract

The present paper describes for the first time a taxonomical and phenological account of some economically important plants of Gyanpur region, Bhadohi District. The plants have been extensively collected from different parts of the tehsil. Their biodiversity, taxonomy, phenology and economic uses have been discussed in detail.

Keywords: Taxonomy, Biodiversity, Phenology, Economic

Introduction

Plants are extremely important in the lives of people throughout the world. People depend upon plants to satisfy such basic human needs as food, clothing, shelter, and health care (Anonymous 1986). These needs are growing rapidly because of a growing world population, increasing incomes, and urbanization. Many plants are economically important and useful to mankind in several ways. Based on their utility, they are broadly classified as food plants, fibre plants, oil plants and timber plants. From the past to the present, people have used plants for nutrition, shelter, warmth, healing their wounds, and treating their diseases. Plants provide the oxygen and nutrients necessary to sustain human life and protect health. The use of plants in treatment began in the history of humanity. Thousands of years ago, humans discovered the therapeutic potential of plants and used them to maintain a healthy life. Many types of medicines used in modern medical science are also obtained from plants as well. Substances obtained from various parts of plants are used outside and within in the treatment of diseases, these plants are called medicinal plants (Tiwari et al. 2017). These plants' diversity must be increased and chances of getting a share in foreign trade. All requirements to produce quality products by the standards required in the world must be fulfilled.

The immense diversity of plants lies due to the variety of the varied climate and topographical, rainfall, terrestrial heterogeneity and ecological habitats in the Gyanpur. In Gyanpur, plants have been used extensively by mankind as a source of food, fodder, fruit, timber and other material for construction of housing, clothing, medicine, fiber, gum, resin and oil, and many other miscellaneous purposes. The present work has been taken therefore to fulfil the gap in this regard for the first time. The present studies helped in the documentation of some important plants of Gyanpur. Very little work had been done in this regard on the economical plants of Bhadohi district. The medicinal biodiversity, weeds, soil analyses of Gyanpur region, Bhadohi District of Uttar Pradesh has been discussed in detail by Mishra et al. 2016 a,b,

Materials and methods

The plant species have been collected from different parts of Gyanpur region of Bhadohi district, covering three seasons, summer, winter and rainy season. Collected plants were processed and their herbaria were prepared by standard Lawrence methods (Lawrence, 1951) with slight modifications. Plants were properly dried up by changing a number of newspapers and poisoned with mercuric chloride solution in alcohol. Later on, the dried specimens were mounted on standard herbarium sheets, labelled properly and arranged alphabetically according to their botanical names. For identity of species, digital herbaria (eFloras

2008, WCSP 2012, The Plant List 2013, POWO 2019.) were thoroughly examined and relevant literature was consulted. All the identified and voucher specimens were deposited in the Department of Botany KN Governmentt. PG college Gyanpur, Bhadohi District.

Observation & Results:

In the present study, nearly 84 plant species belonging to 41 families and 75 genera, collected from various parts of the Gyanpur tehsil, have been enumerated, documented, tabulated and some important species described below with their taxonomical & phenological description, family, vernacular name botanical name,(see Table-1)

Euphorbiaceae Juss, Kuppi, *Acalypha indica* L.

Taxonomical & Phenological description: Erect , annual herb, 30-70cm height, with many spreading or ascending branches, leaves membranous, 5x4cm, ovate or rhomboid ovate, serrate, cuneate at base, arranged in a mosaic; flowers small, greenish, in lax erect, axillary, spikes; male clustered towards the top; females solitary or paired, each enclosed by a foliar, 6x6mm bract, capsuler concealed by persistant bracts, seeds ovoid, pale brownish, shining. **Flowering & fruiting** sept – jan

Amaranthaceae Juss , Chirchita, Apamarg *Achyranthes aspera* L.

Taxonomical & Phenological description: Erect annual herb, leaves large, ovate, acute or acuminate, glabrous. Flowers greenish white, deflexed, in terminal spikes elongating in fruits, bracts and bracteoles persistent , ending in a spine, utricle oblong, seeds sub cylindrical, brown. **Flowering & Fruiting** Sept-Mar

Malvaceae Juss, Kanghi, *Abutilon indicum*(L.) Sweet .

Taxonomical & Phenological description: A robust shrub or undershrub, branches many, leaves ovate to orbicular- cordate, soft. Flower buds drooping. Floowers orange- yellow on long pedicels. Ripe carpels 15-20, black at maturity, reniform, short beaked, seeds black, tubercled. **Flowering & Fruiting** Sept-Mar

Asteraceae Dum., Sarhand, *Ageratum conyzoides* L.

Taxonomical & Phenological description: Erect, branched, hairy herb upto 90cm high. 5.0-8.0x2.5-5.5cm, crenate, ciliate, densely pilose beneath. Corolla purple, infundibuliform, 5 lobed. Style branches slightly exserted. Pappus scales 5.1.5- 3.0 cm long; tipped with scabrous setae. Achenes black, sharply. angled. **Flowering and fruiting** throughout the year.

Amaranthaceae Juss, Chaulai, *Amaranthus viridis* L.

Taxonomical & Phenological description: Erect or ascending herbs, upto 1.25m high. Stem striate, often purple- tinged, hairy on young parts. Leaves ovate- lanceolate to oblong, acute or decurrent below; petiole variable in length. Flower clusters dense, lower ones exclusively female. Spikes with upper flowers all male and female flower inter-mixed, green or crimson. Bracts and bracteoles broad or deltoid- ovate, pale, membranous. Tepals elliptic or oblong- elliptic, narrowed above. Stigmas 3, erect or recurved. Capsule ovoid-urceolate, with a neck below style base. Seeds lenticular brown or black, shining. **Flowering & fruiting** July- Nov

Lythraceae, jangli mehdi, *Ammania buccifera* L.

Taxonomical & Phenological description: an erect, glabrous herb, stem and branches angular, purplish, leaves opposite, narrowed to the base. Flowers in condensed axillary racemes or cluster, capsules red when ripe, glabrous. **Flowering & fruiting** – Feb – September.

Acanthaceae Juss., Kalmegh, *Andrographis paniculata*(Burm. F) wall.ex.Nees.

An erect annual herb, 40-100cm in height, branches herbaceous, greenish, sharply 4- angled or winged. Leaves 5-10 x 2.0-2.5cm, ovate, lanceolate, inflorescence a lax, axillary and terminal, unilateral raceme, forming a panicle, flowers whitish, spotted with rose- purple, bracts opposite, paired, capsules tapering at ends. **Flowering & fruiting** Oct- Mar.

Papaveraceae Juss., Satyanashi, *Argemone mexicana* L.

Taxonomical & Phenological description: Undershrub, stems, woody, herbaceous, leaves glaucous, prickly, sinuate-pinnatifid, flowers yellow, stigmas red, capsules erect prickly, dehiscing by valves, seeds black. **Flowering & fruiting** April- Sept.

Cannabinaceae Auctt., Bhang, *Cannabis sativa* L.

Taxonomical & Phenological description: A robust annual herb, leaves 3-8 foliate, long petioled; lobes lanceolate, plants flowers dioecious, male plant flowers are axillary, short paniced cymes, and the female plant flowers crowded with leafy bracts, style arms 2, filiform, nuts crustaceous. **Flowering and fruiting** Nov-April.

Asclepiadaceae R.Br., Madar, *Calotropis procera* (L.) R.Br.

Taxonomical & Phenological description: Large shrub, reaching small tree size. Leaves elliptic to obovate, 10-20 cm long, amplexicaul or cordate at base, with a ring of glandular lateral hairs at the base of lamina. Flowers white, sub umbellate cymes. Sepals cottony. Corolla campanulate, divided more than half- way down, lobes revolute and twisted in age. Follicles in pairs, boat shaped, with a hooked tip, cottony pubescent. Seeds with long silky coma. **Flowering and fruiting** throughout the year.

Chenopodiaceae Vent., Bathua, *Chenopodium album* L.

Taxonomical & Phenological description: Erect, branched herb, upto 1m or sometimes more tall. Stems angular, ribbed with dark green and red streaks densely covered with powdery vesicles on younger parts. Leaves ovoid rhomboid; coarsely dentate or lobulated in lower parts; upper leaves smaller, elliptic oblong almost entire. Flowers pentamerous, arranged in paniced cluster. Perianth lobes connate at base, concave. Stamen slightly exerted. Ovary depressed- globose stigmas 2. Utricle enclosed between perianth lobes, finally papillose, seed lenticular. **Flowering and fruiting:** Sept- May.

Cleomaceae, Horan, Hurrhur *Cleome viscosa* L.

Taxonomical & Phenological description: Pubescent herb, very variable in size, flowers whitish- yellow, solitary, viscid pubescent, stamens 12 or more. Fruit 1.5-7.5 cm reniform. **Flowering and fruiting** April- Oct.

Solanaceae Juss, Dhatura, *Datura metal* L.

Taxonomical & Phenological description: Erect, perennial, widely branched herb, stem flexuous, nearly glabrous or short hairy; lenticillate. Leaves ovate- triangular to elliptic, obliquely rounded at base,

acute or acuminate, repand- dentate to lobed, short hairy and glabrous. Petiole 1-15 cm long, flowers 0.5-1cm long pedicels, calyx subterete, 5-6 cm long; lobes triangular, acuminate, corolla white or purple; lobes 5, with an acumen of 1-2 cm long; fruit pendulous, globose, glabrous or hairy, with conical prickles. **Flowering and fruiting** throughout the year.

Asteraceae Dum., Bhringraj , *Eclipta alba* (L.) Hassk.

Taxonomical & Phenological description: Prostrate, decumbent- ascending or erect, annual herb, stem often creeping and rooting at the base, appressed- pubescent. Leaves sessile, ovate lanceolate, elliptic- oblong, acute or obtuse, narrowed to the base, entire- faintly serrate, appressed- hispidulous. Heads axillary and terminal, 0.6-1cm across, on 5-7cm long peduncles. Marginal flowers white, 2- dentate, 0.25cm long ligules. Corolla of disc- flowers 0.2 cm long. Achenes oblong- turbinate, tuberculate, with a thickened margin, 0.2- 0.25cm long. **Flowering and fruiting** April- Dec.

Euphorbiaceae Juss., Badi dudhi , *Euphorbia hirta* L.

Taxonomical & Phenological description: An annual, prostrate, hispid herb, leaves dark green or reddish, white- villous beneath elliptic or ovate- oblong with oblique bases. Cythia axillary and terminal, clustered in dense, crowded cymes. Involucres stalked, cup shaped, capsule breaking in to 3 cocci, seeds reddish- brown, trigonous. **Flowering and fruiting** Nov- April.

Convolvulaceae Juss., Safed sankhpushpi , *Evolvulus nummularis*(L.).

Taxonomical & Phenological description: Slender, prostrate herbs, rooting at nodes, leaves glabrous, except the hairy nerves beneath. Pedicels erect first decurved after anthesis, calyx segments oblong- lanceolate, ciliate, corolla deeply lobed, capsule 1-4 seeded. **Flowering and fruiting** Aug- Sept.

Euphorbiaceae Juss., Bhui-awla, *Phyllanthus niruri* L.

Taxonomical & Phenological description: Erect, glabrous, branched herb, upto 45 cm high, branchlets compressed trigonous. Leaves distichous, upto 2cm long, ovate elliptic or acute, cuneate at base. Male flowers fascicled, short stalked; bracts lanceolate; perianth segments 5-6, subequal, 2- seriate; stamens 3; disc lobes 6, glandular yellowish. Female flowers solitary; styles free; capsule globose, glabrous; seeds trigonous, longitudinally ribbed, disc shallowly 5- lobed. **Flowering and fruiting** June- Dec.

Acanthaceae, Juss., Kharmor, *Rungia pectinata* (L.) Nees.

Taxonomical & Phenological description: A much branched, procumbent, annual; leaves elliptic or oblong lanceolate, tapering at ends; flowers very small, bright blue, in one sided, short spikes, bracts dimorphic, the barren ones lanceolate, fertile ones orbicular, lower anther cells tailed, capsule 3x1mm, ovoid. **Flowering and fruiting** Oct- Feb.

Acanthaceae, Juss., Fever root. *Ruellia tuberosa* L.

Taxonomical & Phenological description: Erect, annual herb, 60-70 cm in height, leaves upto 12 cm long, shining, narrowed at the base, entire to sub undulate, flowers blue violet, paired in axils of leaves, ephemeral, corolla tube abruptly narrowed below, capsule oblong- mucronate, flattened, black, seeds sub orbicular compressed black brown. **Flowering and fruiting** July- Oct.

Malvaceae Juss., Kharenta, *Sida acuta* L.

Taxonomical & Phenological description: Branched erect undershrub, upto 60cm; all parts sparsely hairy to glabrous; leaves ovate oblong to lanceolate, rounded or occasionally subacute at base; apex acute; serrate each tooth ending in a simple hair; flowers in a cluster of 2-3. Pedicels variable in length, calyx as long as corolla, mericarps 2-awned. **Flowering and fruiting** july-oct.

Solanaceae, Juss., Makoy, *Solanum nigrum* L.

Taxonomical & Phenological description: Diffused much branched herbs upto 1m height; leaves ovate to ovate-lanceolate, sinuate or lobed; flower in umbeliform, extra-axillary cyme; peduncle 1-5cm long, appressed hairy, calyx lobes ovate rounded, corolla pubescent; berries round, smooth up to 7mm across, seeds minutely pitted, yellow. **Flowering and fruiting** Oct-June

Asteraceae, Dum., Acmella, *Spilanthus radicans* Jacq.

Taxonomical & Phenological description: Prostrate or decumbent-ascending, aromatic, viscid, annual herbs. Stem branched, with coarsely dentate winged or decurrent leaf bases, glandular pubescent. Leaves obovate-spatulate, with narrowed base, obtuse, mucronate, coarsely double dentate, glandular-villous. Inflorescence globose-ellipsoid, 1cm long, winged, glandular pubescent peduncles. Involucral bracts lanceolate, acute, hairy in the upper half. Corolla pale. Achenes glandular, hairy. **Flowering and fruiting** : Feb-Oct.

Asteraceae Dumort., Dodak, *Sonchus arvensis* L.

Taxonomical & Phenological description: A perennial, erect herb, 60-100 cm tall. Stems hollow, umbellately branched, glandular hairy above. Heads pale yellow to yellowish-white, umbellately corymbose. Peduncles and bracts glandular hairy. Achenes ribbed, transversely rugose, brown. **Flowering and fruiting** : March-Nov.

Conclusion:

Plants provide food directly, of course, and also feed livestock that is then consumed itself. In addition, plants provide the raw materials for many types of pharmaceuticals, as well as tobacco, coffee, alcohol, and other drugs. The fiber industry depends heavily on the products of cotton, and the lumber products industry relies on wood from a wide variety of trees (wood fuel is used primarily in rural areas). Approximately 2.5 billion people in the world still rely on subsistence farming to satisfy their basic needs, while the rest are tied into increasingly complex production and distribution systems to provide food, fiber, fuel, and other plant-derived commodities. Today, these plants are used in areas such as phytotherapy, pharmacy, food, spices, cosmetics, dyes and also used as food and spices due to their aromatic properties. As technology progresses, the usage areas of these plants have increased, and they have been used in various industrial areas. Herbal treatment methods are today called 'alternative medicine or phytotherapy'. It is a systematic evaluation of medicinal plants, their traditional use, experimental observations, in vitro, in vivo, and clinical examination of therapeutic effects. Herbal medicines include active ingredient parts of plants, herbal materials, herbal preparations, and herbal products.

According to the investigations of WHO, there are approximately 20,000 plants used for medical purposes. Today, there has been an increase in the use of medicinal plants as humans move away from synthetic products containing chemical matter and turn to natural products. Many studies have shown that these plants have been used in every aspect of our lives from past to present. Due to increasing needs, the collection, drying, storage, and use of these plants from nature should be done in a controlled manner. Especially plant species with high

economic value should be cultivated and natural farming of these plants should be started. These plants' diversity must be increased and chances of getting a share in foreign trade.

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Table- 1. Showing Economically useful plants of Gyanpur region

S.No	Botanical Name	Vernacular Name	Family	Economic Uses	Phenology
1	<i>Acacia arabica</i> (Benth.)	Babul	Fabaceae	Food, Medicinal	Aug -Sept
2	<i>Aegle marmelos</i> (L)	Bel	Rutaceae	Food, Medicinal	April - Aug
3	<i>Agave americana</i> L.	Gwarpatha	Agavaceae	Medicinal	Jan- April
4	<i>Aloe arborescence</i> L.		Liliaceae	Medicinal ,Cosmetic	Feb - Mar

5	<i>Annona squamosa</i> L.	Sharifa	Annonaceae	Medicinal, food	Mar- May
6	<i>Anthocephalus cadamba</i> (Lamk.)	Kadamb	Rubiaceae	Aesthetic	July - Nov
7	<i>Artocarpus heterophylla</i> Lamk.	Kathal	Moraceae	Food,	Sept - Jan
8	<i>Azadirachta indica</i> A. Juss.	Neem	Meliaceae	Medicinal	Feb - Aug
9	<i>Bauhinia variegata</i> L.	Kachnar	Caesalpiniaceae	Aesthetic	April - Jun
10	<i>Bombax cieba</i> L.	Semal	Bombaceae	Medicinal	Mar - July
11	<i>Borassus flabellifer</i> L.	Taad	Arecaceae	Food, Medicinal	Nov - Feb
12	<i>Butea monosperma</i> (Lam.)Taub.	Dhak	Fabaceae	Dye	Jan - July
13	<i>Caesalpinia esculenta</i> L.	-	Caesalpiniaceae	Aesthetic	Jan - Dec
14	<i>Callistemon lanceolata</i> Skeels	Bottle brush	Myrtaceae	Aesthetic	Jan - Aug
15	<i>Cassia fistula</i> L.	Amaltas	Caesalpiniaceae	Aesthetic	Mar - July
16	<i>Cassia javonica</i> L.		Caesalpiniaceae	Aesthetic	Mar - July
17	<i>Casuarina equisetifolia</i> L.	Janglisaru	Casuarinaceae	Aesthetic	Sept - Jan
18	<i>Citrus limonia</i> L.	Neebu	Rutaceae	Food, Medicinal	Jan - Sept
19	<i>Citrus medica</i> L.	Kagzi Neebu	Rutaceae	Food, Medicinal	Jan - Sept
20	<i>Cordia dichotoma</i> G.Forst	Lasoor	Ehretiaceae	Aesthetic	Oct - Feb
21	<i>Crataeva religiosa</i> Candolle	Temple plant	Capparidaceae	Aesthetic	Nov - Mar
22	<i>Dalbergia sissoo</i> Roxb. Ex DC	Shisham	Fabaceae	Timber, Medicinal	Oct - Feb
23	<i>Delonix regia</i> (Bojer) Raf.	Gulmohar	Fabaceae	Aesthetic	July - Oct

24	<i>Diospyros malabarica Kostel</i>	Tendu	Ebenaceae	Medicinal, fumicatories	Feb - July
25	<i>Eucalyptus citriodora Mitchell.</i>	Safeda	Myrtaceae	Medicinal, Aesthetic	Nov - Mar
26	<i>Eucalyptus rostrata Desf.</i>	Neelgiri	Myrtaceae	Medicinal Aesthetic,	Dec - Feb
27	<i>Eugenia jumbolana</i>	Jamun	Myrtaceae	Medicinal, food	June - Aug
28	<i>Ficus racemosa L.</i>	Gular	Moraceae	Aesthetic, religious	Mar - Aug
29	<i>Ficus benghalensis L.</i>	Bargad	Moraceae	Aesthetic, religious	Jun- mar
30	<i>Ficus carica L.</i>	Anjeer	Moraceae	Aesthetic, food, Medicinal	Jan- Apr
31	<i>Ficus religiosa L.</i>	Peepal	Moraceae	Aesthetic, religious, Medicinal	Apr - Sept
32	<i>Ficus virens Dryander</i>	Pakri	Moraceae	Medicinal	Whole year
33	<i>Grewia asiatica L.</i>	Phalsa	Malvaceae	Medicinal	May- June
34	<i>Jacaranda mimosifolia D.Don</i>	Nupur	Bignoniaceae	Aesthetic,	June- Sept
35	<i>Lagerstroemia flos L.</i>	Pride of India	Lythraceae	Aesthetic,	April - June
36	<i>Lagerstroemia parviflora Roxb.</i>	Pride of India	Lythraceae	Aesthetic,	April- June
37	<i>Madhuca indica Gmel</i>	Mahua	Sapotaceae	Medicinal, food	Feb- Sept
38	<i>Mangifera indica L.</i>	Aam	Anacardiaceae	Medicinal, timber, food	Feb - May
39	<i>Moringa oleifera Lamk.</i>	Sahjan	Moringaceae	Medicinal, food	Jan - June
40	<i>Morus alba L.</i>	Shahtut	Moraceae	Medicinal, food	Feb - June
41	<i>Nerium odorum</i>	Kaner	Apocyanaceae	Medicinal	Whole year

42	<i>Nyctanthus arbor-tristis L.</i>	Parijaat	Oleaceae	Medicinal	Sept - Nov
43	<i>Oreodoxa regia</i>	Bottle Palm	Arecaceae	Medicinal	Feb - June
44	<i>Pandanus tectorius</i>	Ketki	Pandanaceae	Medicinal	Mar - June
45	<i>Parkinsonia aculeata L.</i>	Vilayati Kikar	Caesalpiniaceae	Aesthetic	Jan - March
46	<i>Phoenix dactylifera Roxb.</i>	Khajur	Arecaceae	Medicinal, Food	Feb- June
47	<i>Phyllanthus emblica L.</i>	Amla	Euphorbiaceae	Medicinal, food	Sept- Feb
48	<i>Plumeria alba L.</i>	Safed Champa	Apocyanaceae	Aesthetic, Medicinal	June - Sept
49	<i>Plumeria acutifolia F.</i>	Lal Champa	Apocyanaceae	Aesthetic Medicinal,	July - Oct
50	<i>Populous sp. L.</i>	-	Salicaceae	Aesthetic	Nov- May
51	<i>Prunus amygdalus</i>	Aaru	Rosaceae	Food, Medicinal	Jan - March
52	<i>Psidium gujava L.</i>	Amrood	Myrtaceae	Medicinal	Sept - Dec
53	<i>Pterocarpus indicus Willd.</i>	Mahogani	Fabaceae	Aesthetic	Feb - May
54	<i>Ricinus communis L.</i>	Arandi	Euphorbiaceae	Medicinal	Whole year
55	<i>Saraca indica (Roxb.)</i>	Ashok	Caesalpiniaceae	Aesthetic, Medicinal	Mar - April
56	<i>Spondias pinnata (L.f.) Kurz.</i>	Aamra	Anacardiaceae	Aesthetic Medicinal,	Mar - April
57	<i>Tamarindus indica L.</i>	Imli	Caesalpiniaceae	Medicinal, food	May -June
58	<i>Tectona grandis</i>	Sagon	Verbenaceae	timber	July - Aug
59	<i>Thevetia peruviana (Pers.)</i>	Pilli Kaner	Apocynaceae	Aesthetic	Whole year
60	<i>Terminalia bellirica Gaetn.</i>	Bahera	Combretaceae	Medicinal, food	Feb - May
61	<i>Ziziphus maritiana Lamk.</i>	Ber	Rhamnaceae	Medicinal ,food	Sept - feb