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Economic and Ethnomedicinal Importance of the Floral Diversity on Ancient Walls of Kota District, Rajasthan

Meenu Mathur[1]*, Krishnendra Singh Nama[2] and Kiran Choudhary[3]

[1]Department of Botany, SPC Govt. College, Ajmer, Rajasthan, India

[2]Department of Life Science, Career Point University, Kota Rajasthan, India

[3]Department of Botany, M.B. PG College, Kota Rajasthan, India

*Corresponding Author E-mail: meenu.mathur03@gmail.com

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ABSTRACT

An extensive study is conducted in and around Kota District to monitor diversity and economic uses of the plants which are emergent on the walls of Archaeological buildings. A total of 134 plant species are observed, out of which 119 plant species are dicotyledons and only 15 species are monocotyledons. Total 106 genera comprising 46 families are documented. The Asteraceae, Poaceae and Amaranthaceae are the dominant families of the wall flora. Herb and Shrub habit is dominant on the walls whereas climbers and trees are least observed. Majority of the species were observed in winters and Monsoon of the year. Most of the plant species are used by the tribals in the treatment of wounds, fever, dysentery and some are used as a remedy in cancer treatment. Members of Cyperaceae and Poaceae are utilized as fodder.

Key words: *Archaeological, Wall flora, Economic importance, perennials, annuals.*

INTRODUCTION

Walls are simulated habitats which symbolize a specific environment. Generally cracks and crevices are found in walls which are partly similar to rocks and rock fissures[1]. Floristic composition of the wall habitats in India and abroad has been studied broadly[2,3,4,5,6,7]. The cracks and crevices in the walls provide anchorage to the plant roots which support the growth of the plants.

The walls provide:-

(1) Better conditions for growth (i.e. more water and substrate);

(2) More chance of seeds landing;

(3) A good perch for birds that excrete seeds;

(4) A good site for ant nests where seeds are stored.

Following sites are best habitats for colonization of plants.

A. Ground level cavities, hosts many species as this substrate naturally collects rain water that does not runoff.

B. Cavities in inclined surfaces have more moisture than vertical surfaces which is favourable for seeds to lodge.

C. Cavities between two types of building material have chemical difference which offers more nutrients.

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D. In horizontal surface cavities, water availability is good but the plant must be capable of retaining it.

E. Cavities at the junction of vertical and horizontal surfaces have sufficient water availability but there is less substrate.

F. Wall invaded by the rhizome of a plant in adjacent soil.

This paper deals with vascular plant diversity on the walls of the selected sites located in Kota district and discuss their importance in conservation of regional plant diversity.

STUDY SITES

Kota is located along eastern bank of the Chambal River in the southern part of Rajasthan. It is the 3rd largest city of Rajasthan after Jaipur and Jodhpur. This district is situated between 24.2° and 25.2° N and 75.37° and 77.26° S of south-east of Rajasthan. Kota once belonged to the princely state of Bundi under the rule of the Chauhans. In the 17th century, Emperor Jahangir declared Kota a separate state and it was ruled by Rao Madho Singh and their apparent to the throne of Kota. Many Historical buildings and monuments are found in and around the city. Chatra Vilas Garden, Lakkhi Burj, Garh Palace, Kota Barrage are some of the selected sites of the Kota city for the present study.

MATERIALS AND METHODS

An extensive field study was conducted during the session of 2014-2015 to record the vascular wall flora growing on the walls of the studied sites of Kota City. One visit was made after every two months to study the seasonal appearance of plants and their economic and ethnomedicinal uses. The walls surrounding the Forts, Palaces, Monuments, Temples and Canal's walls. The identification of plant species was done using taxonomic literatures.

OBSERVATION AND RESULTS

Table- Angiospermic plants and their Ethnomedicinal uses found on the Ancient walls of Kota District, Rajasthan

S.No.	Families & Plant Species	Ethnobotanical Uses
Acanthaceae		
1.	*Barleria prionitis* subsp. *prionitis* var. *prionitis*	Antidot
2.	*Blepharis repens* (Vahl.) Roth	Treatment of wounds
3.	*Indoneesiella echioides* (L.) Sree.	To treat fever
4.	*Justicia diffusa* var. *diffusa*	Anti-inflammatory
5.	*Peristrophe paniculata* (Forsk.) Brummitt	To cure fever and abdominal pain
Aizoaceae		
1.	*Trianthema portulacastrum* L.	Leaves are diuretic
Amaranthaceae		
1.	*Achyranthes aspera* L. var. *aspera*	Laxative, stomachic, carminative
2.	*Aerva lanata* (L.) Juss. ex Schult	Treatment of cough, sore throat, indigestion
3.	*Alternanthera sessilis* R.Br.	As a vegatable
4.	*Amaranthus polygamous* L.	In the treatment of internal bleeding, diarrhea
5.	*Amaranthus spinosus* L.	Excessive menstruation, vaginal discharges
6.	*Amaranthus tenuifolius* Willd.	Inflammations, abscesses, acne, skin cleansing
7.	*Amaranthus viridis* L.	As a vegetable
8.	*Celosia argentea* L.	Seed powder with milk to stop burning sensation during urination
9.	*Digera muricata* (L.) Mart.	Laxative
Apocynaceae		
1.	*Catharanthus pusillus* (Murr.) G. Don	Used on swellings
2.	*Nerium oleander* L.	Used in warts, cancerous ulcers
Araceae		
1.	*Colocasia esculenta* (L.) Schott	Tender leaves and petioles as vegetables
Arecaceae		
1.	*Phoenix sylvestris* (L.) Roxb.	Fruits edible

Asclepiadaceae		
1.	*Calotropis gigantea* (L.) R. Br.	Latex is applied over insect bite to reduce the effect of insect poison
2.	*Calotropis procera* subsp. *hamiltonii* Ali.	Root powder with cow milk for inducing sterility in Man
Asteraceae		
1.	*Ageratum conyzoides* L.	Antidysentric, treat cold
2.	*Blumea eriantha* DC.	Juice of the herb carminative, diuretic
3.	*Blumea laciniata* (Roxb.) DC.	Antiviral
4.	*Cyathocline purpurea* (Ham. ex D.Don) O. Ktze.	Gaseous problem in stomach
5.	*Eclipta alba* (L.) Hassk.	Leaf extract and fruit juice applied to grey hairs
6.	*Gnaphalium pulvinatum* Delile	A paste of the plant is used in the treatment of coughs and backaches
7.	*Launaea procumbens* (Roxb.) Ramayya Rajagopal	Lant extract with mishri gives orally in painful micturation
8.	*Parthenium hysterophorus* L.	
9.	*Sonchus asper* (L.) Hill.	Raw stem used as celery
10.	*Sonchus oleraceus* L.	Used to treat cold
11.	*Tridax procumbens* L.	Leaf juice on wound to stop bleeding and prevent microbial growth
12.	*Vernonia cinerea* L.) Less.	The decoction is given regularly for scorpion bite and obstruction in urination
13.	*Xanthium strumarium* L.	Cooling, laxative, anthelmintic, tonic, digestive, antipyretic.
Boraginaceae		
1.	*Heliotropium ovalifolium* Forssk.	Used against scorpion stings
Cactaceae		
1.	*Opuntia elatior* Mill.	Digestive, carminative, diuretic
Caesalpiniaceae		
1.	*Cassia tora* L.	The leaves and seeds are useful in leprosy, ringworm and cough
Capparidaceae		
1.	*Capparis sepiaria* L. var. *sepiaria*	Leaves and fruits used in boils, eruptions, swelling, cough, asthma and vomiting
Chenopodiaceae		
1.	*Chenopodium album* L.	As vegetable
2.	*Chenopodium murale* L.	As vegetable
Cleomaceae		
1.	*Cleome viscosa* L.	In wounds treatment
Commelinaceae		
1.	*Commelina benghalensis* L.	In treatment of leprosy
2.	*Cyanotis fasciculata* (Heyne ex Roth) J.A. Schult.f. & J.H. Schult	In treatment of mouth sores
Convolvulaceae		
1.	*Evolvulus alsinoides* L.	Whole plant powder used to improve memory
2.	*Convolvulus prostratus* Forsk.	Used to cure chronic fever and Jaundice; used as nerve tonic
Cucurbitaceae		
1.	*Coccinia grandis* (L.) J.O.	Whole plant extract used as diuretic
2.	*Cucumis melo* L.	Used as vegetable
3.	*Momordica balsamina* L.	Used in Chronic diseases
4.	*Momordica charantia* L.	Fruits are used as vegetable in diabetes, piles, worms, jaundice
Cyperaceae		
1.	*Cyperus compressus* L.	Fodder
2.	*Kyllinga brevifolia*	Fodder
Euphorbiaceae		
1.	*Acalypha indica* L.	Leaf paste applied externally for skin

		allergies
2.	*Euphorbia caducifolia* Haines	Treat week eyes
3.	*Euphorbia hirta* L.	Latex applied externally to cure wounds.
4.	*Euphorbia prostrata* Ait.	Leaves crushed with butter milk and administered orally for jaundice
5.	*Phyllanthus amarus* L.	Fruit decoction to cure blood pressure
6.	*Ricinus communis* L.	Leaf decoction to expel intestinal worms
7.	*Securinega leucopyrus* Muell.-Arg	Its paste is used to extract any extraneous materials from body tissues without surgery
Fabaceae		
1.	*Indigofera hirsuta* L.	Plant extract in skin diseases
2.	*Indigofera oblongifolia* Forssk	The seeds are nutritive.
3.	*Indigofera trita* L.	Plant extract applied to scorpion bites.
4.	*Lathyrus aphaca* L.	The seeds are narcotic
5.	*Melilotus alba* Medik. Ex Desr	Used to Treat wounds, inflammation
6.	*Melilotus indica* (L.) All. Fl. Pedem.	Soil improver
7.	*Pueraria tuberosa* (Roxb. ex Willd.) DC.	Leaf extract used as a cooling agent
8.	*Vigna umbellata* (Thunb.) Ohwi & Ohashi	Leaves used as sedative
Gentianaceae		
1.	*Canscora diffusa* (Vahl.) R. Br.	Plant paste used as a nerve tonic
Lamiaceae		
1.	*Hyptis suaveolens* (L.) Poit.	Leaf paste used in headache, snake bites
2.	*Nepeta hindostana* (Roth) Haines	Plant paste used in bronchitis
3.	*Ocimum basilicum* L.	Leaves chewed to induce saliva secretion, keeps mouth fresh, headache.
4.	*Ocimum canum* Sims	Leaf extract with tea to treat colds, fevers
Liliaceae		
1.	*Aloe vera* (L.) Burm	Gel in Pimples & blemishes
Lythraceae		
1.	*Ammannia auriculata* Willd.	
2.	*Ammannia baccifera* L.	Leaf paste applied externally to cure muscular pains.
Malvaceae		
1.	*Abutilon bidentatum* Hochst. var. bidentatum	Stem fiber used for rope making and strings for bed
2.	*Abutilon indicum* subsp. *Indicum*	Leaves are laxative, diuretic, pulmonary and sedative.
3.	*Abutilon ramosum* (Cav.) Guill. & Perr.	Powdered root is added to beer for the treatment of stomach ailments.
4.	*Malvastrum coromandelianum* (L.) Garcke	Anti-Inflammatory and Analgesic
5.	*Sida cordata* (Burm. f.)Borssum	Root bark is used in fever.
6.	*Sida cordifolia* L.	It cures diarrhea
7.	*Urena lobata* L. subsp. Lobata	Plant pacifies vitiated kapha, vata, colic, cough, bronchitis
Menispermaceae		
1.	*Tinospora cordifolia* (Willd.) Miers ex Hook.f. & Thoms.	Root-Emetic, leprosy. Stem-dyspepsia, anaemia, leprosy, jaundice, diabetes, fever, urinary disorders. Leaf-gout, health tonic. Fruits-tonic
Mimosaceae		
1.	*Acacia nilotica* (L.) Willd.subsp. *indica*	In gonorrhea, leucorrhoea, diarrhea, dysentery or diabetes
2.	*Mimosa pudica* L.	Roots are used as aphrodisiac and strength promoter
3.	*Prosopis juliflora* (Swartz.) DC.	Fodder
Moraceae		
1.	*Ficus benghalensis* L.	Seed soaked in water and the water is taken to treat diabetics
2.	*Ficus glomerata* L.	Treat intestinal worms, leucorrhea,

		menorrhagia, fatigue, blood impurity, bronchitis, leprosy
3.	*Ficus hispida* L. f.	Used in the treatment of ulcers, psoriasis, anemia, piles jaundice
4.	*Ficus religiosa* L.	Treatment of wounds, earache, glandular swelling, inflammation, stomach ache, ulcers
Moringaceae		
1.	*Moringa concanensis* Nimmo ex Dalz. & Gibs	The tender fruits used as grren vegetables
Musaceae		
1.	*Musa paradisiaca* L.	Stem extract reduces the effect of snake poison and treat diabetes.
Nyctaginaceae		
1.	*Boerhavia diffusa* L.	Root decoction is given as a remedy for arthritis
2.	*Boerhavia erecta* L.	Whole plant juice administered orally to remove stones from urinary tracts
Oxalidaceae		
1.	*Oxalis corniculata* L.	Leaves used as greens
Papaveraceae		
1.	*Argemone mexicana* L. forma mexicana	Latex is applied on blisters.
Pedaliaceae		
1.	*Sesamum indicum* L.	In cancer, constipation, antifungal, infant cholera, diarrhoea, dysentery, urinary infections
Poaceae		
1.	*Brachiaria deflexa* C.E. Hubb	Fodder
2.	*Chloris virgata* Sw.	Fodder
3.	*Cynodon dactylon* (L.) Pers.	Dry leaf powder to cure menstrual problem in women.
4.	*Dactyloctenium aegyptium* (L.) Willd.	Used internally for dysentery and acute hemoptysis, relieve pains in the region of the kidney.
5.	*Dichanthium annulatum* (Forssk) Stapf.	Fodder grass
6.	*Digitaria ciliaris* Koel.	Fodder grass
7.	*Echinochloa colona* (L.) Link.	Fodder grass
8.	*Eragrostis tenella* P. Beauv.	Fodder grass
9.	*Oplismenus burmannii* P. Beauv.	Fodder grass
10.	*Panicum psilopodium* Trin	Fodder grass
11.	*Saccharum spontaneum* L.	Fodder grass
12.	*Sporobolus diander* (Retz.) P. Beauv.	Fodder grass
Polygonaceae		
1.	*Rumex nepalensis* Spreng	Cough, chronic, bronchitis and rheumatism
Portulacaceae		
1.	*Portulaca oleracea* L.	It is used to treat infections or bleeding of the genito-urinary tract as well as dysentry
2.	*Portulaca quadrifida* L.	Seeds and leaves are Used for asthma, cough, urinary discharges, inflammations and ulcers
Primulaceae		
1.	*Anagallis arvensis* L.	Diuretic, diaphoretic, expectorant
Rhamnaceae		
1.	*Ziziphus mauritiana* Lam.	The fruit is eaten raw or pickled or used in beverages. It is quite nutritious and rich in vitamin C
2.	*Ziziphus nummularia* (Burm.f.) Wight & Arn.	The roots are used in preparation of wine
Rubiaceae		
1.	*Borreria articularis* (L.f.) F.N. Will.	Plant pacifies vitiated vata, pitta, arthritis,

		pain, muscle ache, edema, trauma, indigestion, colic, skin disease, menorrhagia, and leucorrhea
2.	*Mitragyna parviflora* (Roxb.) Korth.	Plant used in vata, kapha, internal or external hemorrhages, muscle pain, skin diseases, fever, inflammations, infections and fever.
3.	*Morinda tomentosa* Heyne ex Roth	
4.	*Oldenlandia corymbosa* L.	Root paste taken orally along with garlic to remove intestinal worms.
5.	*Oldenlandia digyna*	Used to treat snake bite and skin diseases
Scrophulariaceae		
1.	*Lindenbergia indica* Vatke	Leaves used in bronchitis , poultice applied on cuts and wounds
2.	*Lindernia crustacea* (L.) F. Muell.	Decoction of whole herb is used for the treatment of asthma, rheumatism and applied on wounds. Root chewed in throat irritation
3.	*Lindernia parviflora* (Roxb.)Haines	As fodder
Solanaceae		
1.	*Nicotiana plumbaginifolia* Viv.	Narcotic drug
2.	*Physalis maxima*	To treat cancer, leukemia, malaria, asthma, hepatitis, dermatitis and rheumatism
3.	*Physalis minima* L.	Used as vermifuge, for fever, diabetes, ulcers, gonorrhea; also diuretic. Used for cold, fever, swelling pain of throat, bronchitis
4.	*Solanum nigrum* L.	It is useful in skin-disease, emesis, oedema
5.	*Solanum xanthocarpum*	Used in the treatment of urinary diseases, cough and prevents hair falling. It is pungent, digestive, bitter, diuretic, astringent and expectorant
6.	*Withania somnifera* (L.) Dunal	Whole plant is used as tonic and leaf paste in cow's milk to trat asthma.
Tiliaceae		
1.	*Corchorus olitorius* L.	Demulcent, diuretic, purgative, fever, dysentery, pectoral pains and tumours
Ulmaceae		
1.	*Holoptelea integrifolia* Planch.	Rheumatism, intestintal tumors, regulate fat metabolism, treat ring worm, eczema
Verbenaceae		
1.	*Lantana camara* L.	Leaf juice improves digestion in children and fruits treat diabetics
Vitaceae		
1.	*Ampelocissus latifolia* (Roxb.) Planch.	For treatment of dental troubles, ulcers, chronic dysentery, healing of wounds, muscular pain, healing of broken bones
2.	*Cayratia trifolia* (L.) Domin	To treat tumors, fever, neuralgesia and splenopathy, ulcers, wounds, hemorrhoids and as CNS depressant

The study reveals that the Asteraceae and Poaceae are the dominant families of the wall flora of Kota city. Many other studies suggest that Asteraceae and Poaceae families are dominant on walls[8,9,10,11]. Thus the present study also supports that Asteraceae, Poaceae and Amaranthaceae are the dominant families of the wall flora of study area. It is also observed that mostly members of Asteraceae colonize the walls in winter season while the members of Poaceae colonize the walls in Monsoon. Contrary to these, members of Amaranthaceae generally colonize the walls in summer season.

The most commonly visible angiospermic flora on the walls of the study area include, *Achyranthus aspera, Amaranthus spinosus, Parthenium hysterophorus, Commelina benghalensis, Tridax procumbens, Chenopodium album, Sida cordata, Ficus benghalensis, Ficus hispida, Ficus racemosa, Ficus religiosa* etc.

CONCLUSION

The favourable climatic conditions and the composition of old historical walls, have contributed to high taxonomic diversity at species, genera and family levels. The walls are situated within urban and rural landscape, so the composition of the wall flora is strongly influenced by the surrounding vegetation type. The wall flora plants in almost all the studied sites create an additional decorative effect on the walls and the buildings as archaeological and historical sites. The growth of trees causes a strong and negative effect on their consistence.

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