

Periodic Research

Systematic Study of Family *Cucurbitaceae* in Todgarh Raoli Wildlife Sanctuary



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Abstract

Family Cucurbitaceae occupies a significant position among first ten dominant families of Todgarh Raoli Wildlife Sanctuary. This family is characterized by a wide range of diverse habit, habitat and morphological features. Family Cucurbitaceae include both wild and cultivated taxa. Topographically this region is characterized by Arravalli ranges of varying heights, rocky terraces, valleys, ponds and lakes. This varied topography associated with peculiar phytodiversity has resulted in a highly diverse nature of vegetation of this region a total 21 species (both wild and cultivated) are collected from various localities of Todgarh Raoli Wildlife Sanctuary. The study will be useful to foresters, phytochemists and to those interested in biodiversity and conservational aspects of plants.

Keywords: Morphological, Biodiversity.

Introduction

Cucurbitaceae, with 800 species under 130 genera are among the economically most important plant families, divided Cucurbitaceae into 11 tribes under two subfamilies viz., the Nhandiroboideae (Zanonioideae, with 60 species under 19 genera) and Cucurbitoideae (with c. 740 species under 111 genera) (Jeffrey, 2005). In India, the family Cucurbitaceae is represented by 36 genera and 100 species (Pandey et al., 2006; Ali, 2006; Ali and Pandey, 2006, 2007; Ali et al., 2009). The plants of the family are collectively known as cucurbits (Kocyan et al., 2007) Cucurbitaceae is the largest group of summer vegetable crops. These include cucumber (*Cucumis sativus*), musk melon, (*Cucumis melo*), water melon (*Citrullus lanatus*), bottle gourd, (*Lagenaria siceraria*), luffa (*Luffa acutangula*), and bitter gourd (*Momordica charantia*), pumpkin (*Cucurbita moschata*), parwal (*Coccinia cordifolia*) and snake gourd, (*Trichosanthes cucumerina*). Cucurbitaceae is an economically and medicinally important plant group. Family Cucurbitaceae consists of specific taxonomic features like-monoecious or dioecious (rarely hermaphrodite), tendril bearing climbers (rarely tree). Leaves simple, alternate, entire or lobed. Inflorescence axillary. Flowers unisexual or rarely bisexual. Calyx forms a hypanthium tube. Corolla usually gamopetalous and very rarely polypetalous. Stamens 3-5, connate or distinct. Anthers monotheal or bitheal. Gynoecium tricarpellary, ovary inferior with usually many ovules on parietal placenta, rarely axile placentation. Fruit pepo. Seeds compressed or turgid.

Review of Literature

Cucurbitaceae is one of the important edible plant families and its importance is second only to Gramineae Leguminosae and Solanaceae. The fruit of this species is a vegetable of global importance. (Ekeke et al., 2018). Fruits, seeds, leaves and even roots are used for different purposes. Fruits may be eaten raw when immature or at maturity or after cooking. Pumpkin seeds can be considered as a good alternative for the nutritional enrichment of food products and could be consumed as food, having a rich source of oil and nutrients (Manda et al., 2018). Most of the species of family Cucurbitaceae are wild but a large number are cultivated. It constitutes major part of summer vegetable crops. Cucurbits are an excellent fruit in nature having composition of all the essential constituents required for good health of humans (Shrivastava, 2013), (Rahman, 2003), (Duke, 1999).

Aim of the Study

1. The present biosystematical study aims at utilizing data from morphology, for a better taxonomic understanding and interrelationship of species of family Cucurbitaceae
2. Species of family Cucurbitaceae can be properly documented to use these morphological characters in establishing the phylogenetic relationship and helps to produce a system of classification
3. Family Cucurbitaceae shows the presence of many chemical constituents which are responsible for various pharmacological medicinal properties has a leading capacity for the development of new good efficacy drugs in traditional medicinal uses

Material and Methods

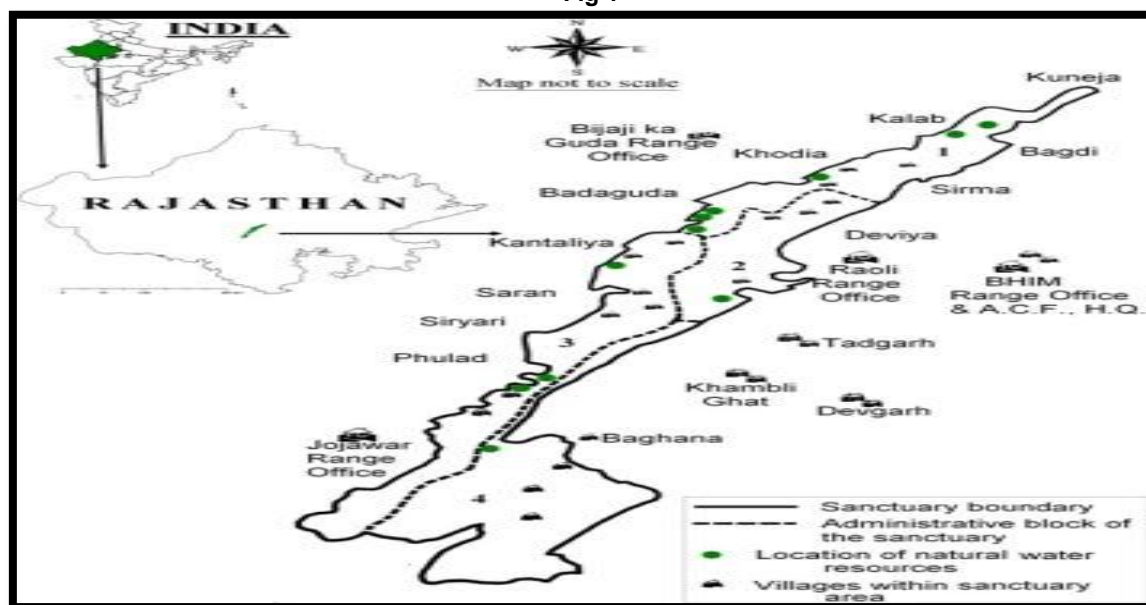
Field trips were arranged in such a way as to cover all the localities at regular intervals to collect the plants in flowering and fruiting stages. All the specimens were detailed for habit, habitat, colour of flowers, associations and other pertinent features, which generally cannot be studied from the pressed specimens. All plant species, were enumerated, collected and identified with standard floras. Efforts were made to identify the plants from the fresh

material; those which could not be satisfactorily identified in the field or in the laboratory at Ajmer, were preserved and later checked and authenticated, by using standard monograph and flora and also submitted to the herbarium Department of Botany S.P.C.Government college. Ajmer.

Study Area

Todgarh Raoli Wildlife Sanctuary located in central position of Aravalli range and northern side of Kumbhalgarh hills of Rajasthan between 25°38' and 26°58' North latitudes and 73°54' and 75°22' East longitudes in one of the world's oldest mountain ranges, the Aravalli hills, Rajasthan, India (Figure 1)(Koli,2014), and it covers an area of about 495 km. The sanctuary comprising of Rajasamand, Pali, and Ajmer districts. The vegetation cover varies from place to place owing to edaphic and biotic changes along with topography. About 50% of the area is well wooded and the rest has become degraded, because of excessive biotic interferences. This sanctuary is the transition zone of xerophytic and mesic vegetation. The major inhabitant communities of this sanctuary are Rawats, remaining are Gujjars, Brahmins, and Mahajans. People's major primary livelihood practices are based on rearing large animals like buffaloes, cattle, sheep and goats.

Fig 1



Enumeration

A brief description is given below for the species collected from study area

Wild Taxa

Blastania fimbristipula

Hindi name :Ankh Phutani Ki Bei

Extensive, climbing herbs. shortly scabrid-setose on both surfaces, ultimately white-punctate; segments ovate-oblong or lanceolate, acute, margins denticulate or crenulate; lateral lobes often bilobed. Bracts stipuliform, orbicular, reniform or ovate, long ciliate. Male flowers at the apex of filiform peduncles, whitish or yellowish. Fruits across, green with white blotches, mature ones smooth, scarlet red, 2-seeded.

Seeds, ovoid, one side much concave and the other convex.

Citrullus colocynthis

Hindi name: Tumba, Indrayan

Trailing, scabrid herbs, with a long tap root; stems diffuse, angular, hirsute. Leaves, deltoid, deeply 3-5 lobed, middle lobe the largest, each lobe pinnatifid or sinuate, petioles densely villose-hirsute. Tendrils simple or bifid, sparsely villous. Male flowers: Calyx-tube broadly campanulate, hispid; corolla-lobes ovate, acute, pale yellow or greenish-yellow. Female flowers: Ovary obovate, hirsute. Fruits., globose, slightly depressed at the top, variegated green, mottled with yellowish blotches arranged in undulating

E: ISSN No. 2349-9435

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bands. Seeds. obovate or ovate-oblong, compressed, with 2 oblique grooves one on each surface .

Citrullus lanatus

Hindi name : matira, tarbooz

Trailing, hispid herb, leaves triangular-ovate cordate, scabrid, deeply 3 fid, lobes pinnatifid, obovate oblong, lanceolate or linear; middle ones the largest, acute; lateral ones rounded. Bracts cochleariform. Male flowers: Calyx-lobes villose, narrowly lanceolate; corolla-lobes ovate-oblong, obtuse, greenish pale-yellow. Female flower: ovary or oblong. Fruits subglobose or ellipsoid, green or variegated with longitudinal, irregular dark green bands; pericarp hard, not woody; pulp white, pink or red. Seeds many, pyriform, compressed, black or red commonly.

Coccinia grandis

Hindi name : kundru ,gol

Perennial, scandent, dioecious herbs.

Leaves long. entire to palmately lobbed, bright green above, with few glistering glands beneath, margins minutely denticulate. Petioles long. Male flowers white pedunculate. Female flowers pedunculate; stigma long, densely papillose. Fruits subglobose, fusiform-ellipsoidal, streaked with white when immature, bright scarlet and fleshy when mature. Seeds oblong, compressed, rounded at the apex, notched at the base, yellowish.

Corallocarpus epigaeus

Hindi name : kadvi mirchi ki bel

Perennial, climbing herbs; roots napiform.

Stems slender, glabrous, angular-sulcate. Leaves variable in size and shape, broadly suborbicular, densely villose, 3 to 5-lobed, lobes often lobulate, obtuse, rounded at the base, margins subentire. Tendrils simple, subfiliform, glabrous. Male flowers yellowish-green or dirty green; anthers ovoid, yellow; connectives produced, bifurcate. Female flowers often solitary, pedunculate; ovary triplacentiferous. Fruits ovoid, base attenuate, red, 5 to 8- Seeds turgid, pyriform, distinctly marginate.

Cucumis callosus

Hindi name: Kachari , Kachrio

Prostrate or trailing, rarely climbing, hispid herbs. Leaf lobes ovate-oblong or obovate, narrowed at the base. Tendrils simple, hispid. Male flowers yellow; appendages of the connectives shorter than anthers. Fruits obovoid, rounded, longitudinally variegated with 7-11 green stripes; pulp bitter when immature, but mature ones are edible. Seeds, oblong or ellipsoid, white, margined.

Cucumis melo var momordica

Hindi name: kakrio, Baro ,Kachro

Annual prostrate, hispid. Leaves suborbicular or reniform, 3-7 lobed shallowly rounded, minutely to distinctly dentate, cordate at base surface hirsute, at length scabro-punctate. Male flowers yellow, 1-3 on axillary peduncles. Fruits variable in form and size; yellow or orange on maturation; epicarp thin, easily removable. Seeds oblong, immarginate, obtuse, subacute at base, pale yellow.

Cucumis prophetarum

Hindi name : Khat Chachario

Perennial, prostrate or climbing, hispid herbs; stems bristly, whitish when dry, angular.

Leaves grey-green, rigid, suborbicular or deltoid, cordate to truncate at the base, 3 to 5-lobed, margins crisped or dentate. Tendrils filiform. Male flowers yellow, solitary or fasciculate; connective-appendages glabrous. long. Fruits, green with 7-10 longitudinal white stripes; mature fruits yellow, spiny; spines white-tipped. Seeds, oblong-ellipsoid, immarginate, pale ashy.

Luffa acutangula

Hindi name : Torai

Extensive, scabrous climbers. Leaves palmately 5 to 7 angled or lobed. Flowers yellow to pale yellow. Fruits not warty. Seeds ovate compressed, black

Luffa cylindrica

Hindi name :Ghia Torai

Large, glabrous climbers. Leaves palmately 5-lobed. Tendrils trifid. Probracts, fleshy, ovate, with 3-7 glistening glands on the upper surface. Flowers bright yellow. Fruits, not angular, smooth, fusiform, obtuse. Seeds c. 10 x 0.5 mm, ovate, smooth, margins winged, black.

Melothria maderaspatana

Hindi name : Ankh Phutani Ki Bel

Scandent climbers or prostrate annuals.

Leaves membranous, ovate or subdeltoid, entire or 3 to 5-lobed, acute, denticulate, basal sinus present. Flowers yellow. Fruits globose, juicy, smooth, red when ripe. Seeds, grey, ovoid-oblong.

Momordica balsamina

Hindi name :bara karela

Perennial, branched climbers with tuberous roots. Leaves, reniform or orbicular, 5 to 7-lobed; lobes rhomboid or obovate to elliptic-rhomboid, usually constricted at base, irregularly denticulate. Flowers greenish-yellow. Fruits, ovoid with a broad, conical rostrum, attenuate at base, mucronate-tuberculate, bright orange-red to scarlet when ripe. Seeds, with a carmine red arilles, grey, ovate or oblong, marked with obscurely raised ridges.

Momordica charantia

Hindi name :karela

Prostrate or climbing annuals. Leaves, suborbicular or reniform, glabrous, prominently nerved, 5 to 7-lobed; lobes ovate-oblong, obovate base narrowed, dentate, mucronate. Flowers yellow. Bracts leafy, reniform or orbicular-cordate, mucronate, entire. Fruits long, mucronate-tuberculate, oblong, 3-valved. Seeds, base and apex subtridentate, sculptured on surface.

Momordica dioica

Hindi name: kankero

Perennial climbers, with tuberous roots.

Leaves membranous, ovate, mucronate, deeply emarginate at base, entire or 3 to 5-lobed; lobes triangular. Flowers yellow. Bracts long, sessile, cucullate, orbicular-reniform, margins entire, sometimes ciliated. Fruits ellipsoid or ovoid, beaked, densely echinate with soft spines. Seeds pyriform, attenuated at the base, rounded at the apex, slightly corrugate.

Trichosanthes bracteata

Hindi name : Lal Indrayan

Climbers. Leaves membranous, glabrous, broadly ovate or suborbicular, palmately 3 to 5 (-7)-lobed,

E: ISSN No. 2349-9435

Periodic Research

deeply cordate. Tendrils robust, 3-fid. Flowers white. Bracts long, ovate, deeply-cut. Fruits across, bright red, with 10 longitudinal streaks. Seeds mm, many, ovate-oblong, smooth, immarginate, attenuate at the base, white.

Cultivated Taxa

Citrullus lanatus var *fistulosa*

Prostrate herbs; stems thick, fistulous, hispid. Leaves sparingly lobed, immature, but mature one edible. Seeds oblong ellipsoid, white, margined.

Cucumis melo L. var. *melo*.

Hindi name : kharbuja

Creeping or trailing, hirsute herbs, with broadly ovate-cordate, 3 to 5-angled or lobed leaves, yellow flowers and fruits of various shape and size with free placentae and seeds in the central cavity when mature. Usually cultivated in sandy river-beds for sweet edible fruits.

Cucumis sativus L

Hindi name : khira

Creeping or climbing, hirsute herbs, with palmately 3 to 5 lobed leaves, yellow flowers and elongate-cylindric, smooth or tuberculate fruits. Cultivated for its edible fruits.

Cucurbita moschata

Hindi name : kaddu

Annuals, with 5 to 7-angled or lobed leaves, multifid tendrils, yellow flowers and oblong or subglobose fruits. Cultivated for the fruits cooked as vegetable.

Cucurbita pepo L

Hindi name : khola

Annual hispid herbs, with 5-lobed leaves having club-shaped glandular hairs beneath, yellow flower and furrowed fruits of variable shape and fibrous pulp. Occasionally cultivated for its fruits.

Lagenaria siceraria

Hindi name : lauki

Climbing herbs, with angular or shortly 3-lobed leaves, white flowers and bottle-shaped fruits. Cultivated for the fruits cooked as vegetable.

Discussion

Several cucurbits have significant bioactive and nutrient profiles. Their extracts are extensively used in the medicines. Wild species are not only rich in their nutritive contents but also have medicinally important metabolites. Cucurbitacins are highly oxidized tetracyclic triterpenoids that are widely found in plants belonging to Cucurbitaceae family and exert various pharmacological effects. (Jing,2019). Watermelon has a high concentration of citrulline and lycopene, which impart human health benefits. Citrulline benefits include increased vasodilation, cardiovascular health, and reduced risks for stroke and several cancers (Veazie et al., 2012). *Citrullus lanatus* seed oil is used for anti-inflammatory activity (Madhavi et al.,2012). Some researchers have shown that cucurbitacins have hepatoprotective, anti-inflammatory, antidiabetic, and anticancer properties (Jayaprakasam et al.,2003),(Park et al.,2004),(Rios et al.,2012).

Conclusion

Urbanization causes biodiversity to decline. Vital habitats are being destroyed or fragmented into patches and now not big enough to support complex

ecosystems, due to this, region could lose a sizeable amount of medicinally important plant species. Since ancient times cucurbits are in the use as a folk medicines, It is essential to control the over exploitation, extinctive destruction of vegetation and to protect the existing species in this area. Protected areas, such as wildlife sanctuaries, national parks, and biodiversity reserves, are increasingly recognized as critical to supporting biodiversity and play a key role in essential ecological functions (Heal, 2000) .The present biosystematical study aims at for utilizing data from morphology, for a better taxonomic understanding of the family Cucurbitaceae. The study will be useful to foresters, phytochemists and to those interested in biodiversity and conservational aspects of plants. For proper management programs and strategy in the Wildlife sanctuaries.

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