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An Inventory of the Diversity and Ethnomedicinal Properties of Cucurbitaceous Vegetables in the Homestead Gardens of Sub Himalayan Districts of West Bengal, India.

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Research Article

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ABSTRACT

Cucurbits are group of vegetable crops belong to family cucurbitaceae. Apart from nutraceuticals and phytomedicinal properties, cucurbits are rich in several minerals, vitamins and dietary fibres. Homestead gardens are traditional *ex-situ* conservation sites for crop biodiversity. The agro-climatic condition of sub Himalayan West Bengal is ideally suited for cultivation of different cucurbitaceous vegetables including cucumber, bottle gourd, pumpkin, ridge gourd, sponge gourd, pointed gourd, spine gourd, ash gourd, bitter gourd, snake gourd, water melon, muskmelon, chow chow, ivy gourd etc, a majority of which are available in homestead gardens. Among individual crop, variability exists in fruit shape, fruit size, fruit colour, fruit length, fruit lustre, stem shape, seed size, 100 seed weight etc. The rich diversity remains unexploited for crop improvement, which may offer tremendous scope for utilization in food and nutritional security. These plants are having wide ethnomedicinal properties. To understand the pattern of biodiversity and ethnomedicinal uses under different home garden system an exploration was carried out during 2011 and 2012 covering two sub Himalayan districts namely Coochbehar and Jalpaiguri. Information was collected through questionnaire survey and field observation in selected villages. The findings revealed that morphological variability exists within the crop species and cultivars. Successful exploitation will lead to higher profitability and stability in production, increase home herbal remedy and reduce the risks of unexpected natural calamity.

INTRODUCTION

Cucurbitaceae is one of leading vegetable crops family of tropical and subtropical zone of the globe. The crops are known to reservoir of several essential nutrients, minerals, vitamins, dietary fibres and a number of nutraceuticals and phytomedicinal compounds [1, 2]. Most of the plants are warm season annual and trailing herbs. Cucurbits have diverse daily use such as salad (cucumber), dessert (watermelon and muskmelon), candy (wax gourd), utensil (bottle gourd), musical instruments (bottle gourd) and above all fresh kitchen vegetables. From plant breeding point of view, the crops are cross pollinated and entomophilies. The crops are having diverse sex form ranging from monoecious, dioecious, hermaphrodite, androecious, gynoecious, gynomonoecious etc. Homestead gardening is a traditional land use system with intimate association of diverse multipurpose annual and perennial crop species maintained by family

members within the compound of individual houses [3]. These gardens are the important *ex-situ* conservation sites for crop biodiversity. Use of in-compound plants for primary home remedy of common ailments of the family members utilizing traditional knowledge, transcending from the forefathers, is an age old practice of the inhabitants of this region. The study of the ethnomedicinal properties of the cultivated cucurbitaceous biodiversity of the homestead gardens helps to determine the preference in crop selection by the dwellers. Sub Himalayan districts of West Bengal are characterized by high rainfall (2100-3000 mm), high relative humidity, moderate temperature (max: 24-33^{0}C min: 7-8^{0}C) prolonged winter and high residual soil moisture which encourages cultivation of different cucurbits throughout the year. Most of farmers prefers to grow cucurbits in their home gardens as sources of fresh green and leafy vegetables round the year, nutritional security for the family members, engagement of women folk in homestead gardening, primary health care needs for the family and additional income through sell of excess fruits, branches, seeds etc. Among individual crop, variability exists in fruit shape, fruit size, fruit colour, fruit length, fruit lustre, stem shape, seed size, 100 seed weight etc. The rich diversity of home gardens is still unexploited for crop improvement. This plant genetic resource can be utilized for food and nutritional security, higher profitability, stability in production and reducing the risk factor related to variable climates. There exist a tremendous scope for utilization and conservation for future breeding programme. Hence the study was formulated to study the pattern of biodiversity in cucurbits under different home garden, their utilization pattern and traditional ethnomedicinal uses for herbal healing of human ailments.

MATERIALS AND METHODS

The study was scheduled to collect the existing biodiversity of cultivated cucurbits around home gardens of sub Himalayan districts of West Bengal, India. To understand the pattern of diversity sample village level survey was conducted in CoochBehar (89^{o}23′53″ East longitude and 26^{o}19′86″ North latitude) and Jalpaiguri (88°4' and 89°53' East longitudes and 26^{o}16′ and 27°0' North latitudes) districts during 2011 and 2012. The villages namely Dhalaguri, Haripur, Khagribari, Pundibari, Jatrapur, Raserkuthi, Dhangdhinguri, Konamalli, Satmile, Bararangras, Madhupur, Atialiguri, Kholta, Baneswar, Sakunibala, Okhrabari, Nishiganj, Barbisha, Kunjanagar, Jateshwar, Kamakhyaguri, Bhutnir Ghat, Salbari etc were purposively selected considering the intensity of home garden. Fifty home gardeners from different villages were selected randomly. Information was collected through participatory field observation and questionnaire survey.

RESULTS AND DISCUSSION

The cucurbitaceae family consisted of nearly 120 genera and more than 800 species [2].The family have tremendous morphological diversity for better adaptability and survivability in diverse climatic condition. The variability exists both in vegetative and reproductive characteristics. Depending on species, virtually all plant parts are used as fresh vegetable including immature and mature fruits, foliages, shoots, flowers, storage roots and seeds. In addition to the common cucurbits of the tropical region (cucumber, bottle gourd, pumpkin, wax gourd, muskmelon, watermelon, and bitter gourd), some minor or non-traditional cucurbits such as spine gourd, chow chow, pointed gourd, ivy gourd, snake gourd etc are widely cultivated on regular basis in most of the household (Table 1). Summer squash (*Cucurbita pepo*) was previously unknown to the study area is now cultivated in few households. Some wild cucurbits like *Citrullus colosynthus, Cucumis hardwickii* are naturally gown around household are utilized for the treatment of different human ailments. Cucurbits are well known for the production of the alkaloid cucurbitacin. The pharmacological properties of cucurbitacin for the treatment of physical ailments, disease and disorders have been documented by several researchers [4, 5, 6]. The morphological diversity and ethnomedicinal use of some commonly available cucurbits around home gardens of the study area is discussed hereunder.

Bitter gourd

Bitter gourd is indigenous to India. Plants are annual climber. Leaves are simple, alternate, deeply lobed, ovate or cordate. Stem is angular. Flowers are yellow in colour. Fruit is berry and shape (Table 2) varies from globular or spindle to oblong or elliptical having light or deep tubercle. Fruit colour at marketable stage may be green, dark green, light green or milky white. Seeds are yellowish orange in colour. Glycoalkaloids cucurbitacin present in root, stem, leaves and fruits. Small fruiting types are mostly grown during summer months where as large fruiting types are cultivated during rainy season. The plant as a whole is used for curing various human ailments. The leaves are known to act as galactogogs and widely used for spleen disease, malarial fever, deworming and wound healing. Flowers are treated for

haemoerrage from the liver. The roots are used as astringent [7]. The fruit has germicidal properties and used for treating blood diseases and diabetes [8].

Table 1: Major cucurbits in home gardens

Sl. No	Common name	Local name	Botanical name	Ch. No	Origin	Season of availability
1.	Bitter gourd	*Karola, ucche*	*Momordica charantia*	2n=28	India	Summer and rainy
2.	Bottle gourd	*Lou*	*Lagenaria siceraria*	2n=22	South Africa	Year round
3.	Chow chow	*Sqush*	*Sechium edule*	2n=24	Central America	Winter
4.	Cucumber	*Sasha*	*Cucumis sativus*	2n=14	India	Year round
5.	Ivy gourd	*Kundru*	*Coccinia indica*	2n=24	India	Summer and rainy
6.	Muskmelon	*Bangi*	*Cucumis melo*	2n=24	Africa	Summer
7.	Pointed gourd	*patal*	*Trichosantes dioica*	2n=22	India	Summer and rainy
8.	Pumpkin	*kumro*	*Cucurbita moschata*	2n=40	Central America	Summer and rainy
9.	Ridge gourd	*Jhinga*	*Luffa cylindrica*	2n=26	India	Summer and rainy
10.	Snake gourd	*chichinga*	*Trichosantes anguina*	2n=22	India	Summer and rainy
11.	Sponge gourd	*Dhudhul*	*Luffa acutangula*	2n=26	India	Summer and rainy
12.	Sweet gourd	*Kakrol*	*Momordica dioica*	2n=28	India	Summer and rainy
13.	Watermelon	*Tormuj*	*Citrullus lanatus*	2n=22	South Africa	Summer
14.	Wax gourd	*Chal kumro*	*Benincasa hispida*	2n=24	Malaysia	Summer and rainy

Bottle gourd

Bottle gourd originates from South Africa and can tolerate high temperature and long sunshine hours. The crop is annual climber and monecious in nature. Leaves are simple, cordate or ovate in shape with entire or serrated margin. The stems are green angular or round in shape having medium or sparse pubescence. The flowers are large, white coloured, solitary and appear on leaf axils. The fruits displayed a wide variation (Table 2) in shapes, size and colours ranging from long or oblong to round oblong and even club shaped and fruit colour varies from dark green, light green, dark green with white stripes to almost white. Seeds are flat and light yellow in colour. Sometimes bitterness occurs due to the presence of glycoalkaloids - cucurbitacin. The plant as a whole has many medicinal uses. The twigs are widely used for digestive complaints, dental problems and curing of jaundice and skin diseases. Flowers are commonly used against cataract. Bottle gourd fruit is believed to be good for diabetic patients. Fruits are recommended as an excellent remedy for those suffering from liver complaints, piles, and pyorrhoea.

Chow chow

Chow chow is an herbaceous perennial climber indigenous to Central America. Vine length can exceed 15 metres. Leaves are large lobed ovate shaped and produce male and female flowers in the same leaf axil. Male flowers are formed in clusters while female flowers are solitary. Flower colour varies from creamy white, pale white to light yellow. Fruits are single seeded - shows viviparous germination. Fruits are mostly pear shaped but some are oblong or club shaped (Table 2). Skin colour ranges from light green, green, dark green, milky white or creamy yellow. Fruit surface are mostly prickly wrinkled with prominent ridges. Plants are diuretic having anti-inflammatory properties and used against cardiovascular problems.

Cucumber

Cucumber is annual climber originated in India. The stem is angular and hairy. Leaves are simple, large, triangular or ovate with 3-5 lobes. Flowers are solitary and yellow in colour. Staminate flowers are more in number than the pistillate. Cool temperature and short day encourages more female flowers while high temperature and long day increases male flower production. Apart from moneocious sex form, gynoecious, gynomoniecous and androgynomonoecious sex form are also available in cucumber. Fruits are pepo and the edible part is the fleshy mesocarp. Fruit shape (Table 2) ranges from globular, oval, oblong, elongated or spherical. Crooked neck fruits are common during hot summer. Fruit skin colour varies from

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light green, green, dark green with white stripes. Seeds are flat and white in colour. The plants have traditional medicinal uses. The leaves are used against loss of appetite and biliousness. The seeds are good remedies for treating throat boils, urinary trouble and stone.

Ivy gourd/Little gourd

Ivy gourd is perennial dioecious cucurbits indigenous to India. Leaves are lobed cordate or ovate or oblong in shape. Flowers are solitary and colour varies from creamy white to pale white. Fruits are ovoid or elliptical or oblong in shape (Table 2). Fruit colour varies from light green to dark green with white stripes in immature stages and turn scarlet or red when ripe. Ivy gourd has long being recognised as essential herbal medicine. The leaves are used to control skin disease. Roots are used against osteoarthritis. The fruits are widely used as antidiabetic, anti-anaphylactic and antihistaminic. Fruits are also used for the treatment of leprosy, fever, asthma, bronchitis and jaundice.

Table 2: Diversity in fruit characters among cucurbits in home garden

Sl. No.	Common name	Fruit shape	Fruit size	Fruit colour	Fruit wt. (g)	100 seed wt (g)
1.	Bitter gourd	Globular, spindle, oblong	Small, medium	Dark green, light green, milky white	20-120	247.57±19.46
2.	Bottle gourd	Long, oblong, round,club shaped	medium, large	Dark green, light green, dark green with white stripes	400-2400	218.26±17.39
3.	Chow chow	Pear, oblong, club shaped	Medium, large	creamy white, pale white to light yellow	120-280	*
4.	Cucumber	Oval, oblong, elongated or spherical	Medium, small	Dark green, green, light green with white stripes	40-130	32.19±1.73
5.	Ivy gourd	Ovoid or elliptical or oblong	Small. medium	Light green, green with white stripes	20-60	*
6.	Muskmelon	Spherical, oval, oblong or round	Small, medium	light yellow, yellow, orange yellow	400-1300	24.16±1.03
7.	Pointed gourd	Spindle, oval, oblong	Small, medium	Light green, dark green with white stripes.	20-70	*
8.	Pumpkin	Globular, round, oblong, elongated, flattened or heart shaped	Medium, large	Light yellow, yellow, dark yellow or orange	1000-8000	194.27±12.34
9.	Ridge gourd	Elongated, club, cylindrical	Medium, large	Dark green	80-200	137.43±8.71
10.	Snake gourd	Long spindle, elongated or cylindrical	Large and serpentine	Light green, dark green with white stripes	40-160	144.28±10.03
11.	Sponge gourd	Long, cylindrical	Medium, large	Dark green, light green	50-150	149.31±9.97
12.	Sweet gourd	Globular, oblong, elliptical, round to oval	Small, medium	Light green, dark green, light yellow or light orange	40-150	*
13.	Watermelon	Long, oblong, cylindrical, oval or round	Small, medium	Dark green to light green with white stripes.	800-2500	123.42±8.76
14.	Wax gourd	Round, oblong	Medium, large	Light green, dark green, pale white or light yellow	1200-3000	158.53±9.82

* Propagated either through vine cutting or rooted cuttings

Muskmelon

Musk melon is annual herbaceous trailing cucurbits originated in Africa. Leaves are simple, lobed circular, oval or kidney shaped arranged in alternate. Flowers are large, solitary, creamy yellow or yellow in colour. Male flowers are formed in clusters whereas female flowers are borne single in different axils. Apart from monecious sex form, androeceious or andromonoecious flowers are also common in some cultivars. Fruits are hard with tough rind. Fruit shape varies from spherical, oval, oblong or round (Table 2). Skin colour ranges from light yellow, yellow, creamy yellow or orange yellow. The plants are used against scanty urination, anaemic scanty urination, loss of appetite, vomiting, problems in prostate gland and wound in urinary tract.

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Pointed gourd

Pointed gourd is indigenous to India and Bengal-Assam area is the primary centre of origin [9]. Plants are climbing dioecious perennial. Leaves are cordate or ovate. Flowers are creamy or pale white, male and female flowers are borne separately. Fruits are spindle or oval or oblong in shape (Table 2). Skin colour may be green, light green with white stripes. Pointed gourd has diverse ethnomedicinal uses. The leaves and stems are hypocholesterolemic, hypoglyceridimic, hypoglycemic, hypophospholipemic and commonly prescribed for digestive complaints. Fruits are highly useful as mouth freshener and for the treatment of fever as well as wounds and boils. The roots are diuretic and good medicine for ascites. The herbage of *Trichosanthes dioica* is extensively used for treatment of different human ailment [10].

Pumpkin

Central America is considered as native home of pumpkin. The fruits are very popular in home garden due to long storage capacity. The crop is annual, monoecious and trailing in habit. Leaves are simple, five lobed with pubescence. Stem is angular, produced branched tendril as well as roots at nodes. Flower is solitary, deep yellow in colour. Male flowers are more in number than female flowers. Fruit is pepo with hard rind. Fruit shape (Table 2) varies from globular, cylindrical, oblong, oval, elongated, flattened or heart shaped. Mature flesh colour may be light yellow, yellow, dark yellow or orange. Pumpkin has traditional ethnomedicinal uses. The twig prevents premature aging and reduces body weight and imparts benefit to skin and teeth. The fruits are rich in carotene and widely used as remedies for vitamin A deficiency as well as loss of appetite.

Ridge gourd

Ridge gourd is annual climbing vines native to India. Leaves are simple, smooth and five lobed. Plants are monoecious in flowering habit. Flowers are solitary, pale yellow or yellow in colour. Fruits have 10 distinct angled ribs. Some small fruited cultivars produced fruits in cluster. Fruits are elongated or cylindrical or club shaped (Table 2). Clustered fruits are globular or heart shaped. The leaves are commonly used for the treatment of cold related eye diseases and leprosy [11]. Fruits are good remedies for headache and piles. Seeds are known to prevent vomiting tendency.

Snake gourd/Serpentine gourd

The probable centre of origin for snake gourd is Indo-Malayan region. Plants are monoecious annual and climbing in nature. Leaves are simple, alternate, angular with 5 to 7 lobed. Flowers are solitary, white in colour. Male flowers are formed in groups. Fruits are large and serpentine (Table 2). Fruit shape ranges from long spindle, elongated or cylindrical and tapering edges. Rind has waxy coating and fruit skin colour varies from light green, green, dark green and white stripes. The leaves and stems are used for the treatment of skin disease, whereas fruits are used as appetiser. The seeds have deworming properties.

Sponge gourd

Sponge gourd is annual climbing vines and monoecious in sex form. Flowers are large yellow in colour. Group of male flowers and single female are formed in leaf axil. Fruits are long, smooth and cylindrical in shape. Skin colour varies from light green, green, dark green with light white stripes (Table 2). The plants contain a compound called luffein. Juice from the leaves are use to cure conjunctivitis of the eye. The leaves and fruits are good remedies for Jaundice. Roots have laxative effects and the oil from the seeds are used for cutaneous complains [8].

Sweet gourd/Kakrol

Sweet gourd originates in India. Plants are trailing perennial and dioecious in nature. It is known by various names in different region. Leaves are simple ovate or cordate in shape. Flowers are creamy or pale white to light yellow in colour. Fruit is berry and shape varies from globular, oblong, elliptical, round to oval (Table 2). Fruit colour at marketable stage may be light green, dark green, light yellow or light orange. Seeds are yellowish orange to deep orange in colour. The fruits are used for the treatment of ulcer, piles, sores and obstruction of liver and spleen whereas seeds are used for chest problems and stimulating urinary discharge [12]. Roots are useful for removing piles, migraine, excess sweating, cough and stones.

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Watermelon

Watermelon is indigenous to tropical Africa. Plants are annual, monoecious trailing herb. Stem is thin, hairy, angular with branched tendrils. Leaves are simple, cordate with 4-5 lobed. Flowers are small, solitary, pale yellow to yellow in colour. Fruit is pepo with thick hard rind. Fruit shape varies from long, oblong, cylindrical, oval or round (Table 2). Rind colour varies from dark green to light green with white stripes. Flesh colour may be white, pink, reddish white or red. Seeds are small, flat and mostly black or dark brown in colour. The plants are used to treat fatigueness, typhoid fever, malnutrition and scanty urination.

Wax gourd/Ash gourd

Wax gourd is herbaceous annual climbing monoecious cucurbit. Leaves are broad with angular lobes. Flowers are large solitary and colour varies from light green, dark green, pale white or light yellow (Table 2). Fruits are round or oblong type and develop waxy coating at maturity which ensures storability of the fruits. The plant has traditional use in treating various health problems. The twigs and fruits are used for the treatment of belly pain, pleurisy and heart disease. They are also used as deworming agent and laxative.

CONCLUSION

Sub Himalayan districts of West Bengal are endowed with favourable climatic condition for growth of diverse cucurbitaceous vegetables. Rich diversity of cucurbits exists in the homestead garden of different villages. Variability exists within the crop species and cultivars in different morphological traits. This reservoir of plant genetic resource can offer great opportunity for utilization in food and nutritional security, higher profitability and stability in production under variable climatic situation. The elite genetic materials can be exploited for future crop improvement programme to alleviate the rural poverty and enhancing the livelihood support of rural folk. This diverse biodiversity possesses a wide array of ehhnomedicinal properties which may serve as the poorest of the society to meet the primary health care needs.

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REFERENCES

1. Nath Prem, Srivastava VK, Dutta OP, Swamy KRM. Vegetable Crops: Improvement and production. PNASF, Bangalore, India, 2008.
2. Rubatzky VE, Yamaguchi M. World vegetables: Principle, production and nutritive values. International Thomson Publishing, Singapore, 1997.
3. Das T, Das A K. Inventorying plant biodiversity in home gardens: A case study in Barak Valley, Assam, North East India. Current Sci. 2005; 89(1): 155-163.
4. Chakravarthy HL. Cucurbits of India and their role in the development of vegetable crops. Pp 325-324. In: D M Bates, R W Robinson and C Jeffrey (eds). Biology and utilization of the cucurbitaceae. Cornell Univ. press, Ithaca, N.Y. 1990.
5. Schultes RE. Biodyanamic cucurbits in the New World tropics. 1990; Pp. 307-317.
6. Whitaker TK. Cucurbits of potential economic importance. Pp.318-324, In: D. M. Bates, R.W. Robinson and C. Jeffrey (eds). Biology and utilization of the cucurbitaceae. Cornell Univ. press, Ithaca, N.Y. 1990.
7. Nadkarni, KN. Indian Materia Medica. Nadkarni and Company, Bombay, India. 1927.
8. Chauhan DVS. Vegetable production in India. Ram Prasad and Sons, Agra, India, 1972.
9. Desai UT, Musmade AM. Pumpkins, Squashes and Gourds. Pp. 273-297, In: Salunkhe D K and Kadam S S(Eds),Hand book Vegetable Science and Technology, Marcel Dekkar, Inc, New York,1998.
10. Gohil, KJ, Shende VM, Hamdulay NM. Pharmacological potential of *Trichosanthes dioica* : Current prospects. Int J Adv Pharm Biol Chem. 2012; 1(2):192-198.
11. Bhattacharya S. Koshatak (*Jhinga*). In: Chiranjeeb Banousadhi – 4th volume (Bengali). Ananda Publishers Pvt. Ltd., Kolkata, India. 2000; Pp. 236-242.
12. Ram D, Kalloo G, Banerjee MK. Indian Horticulture, October –November issue, 2002 ; Pp: 6-9.