IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES
ISSN PRINT 2319 1775 Online 2320 7876
Research Paper **© 2012 IJFANS. All Rights Reserved**, Journal Volume 13, Iss 01, 2024

Some plants utilized in the preparation of traditional Indian sweets

Acharya Balkrishna [1,2], Rama Shankar[1], Vedpriya Arya[1,2], Uday Bhan Prajapati[1], Darshika Lathwal[1], Priya Pathak[1], Rashmi Atul Joshi[1] *

[1,2] University of Patanjali, Haridwar (Uttarakhand), India-249405

[1]Patanjali Research Foundation, Haridwar (Uttarakhand), India-249405.

***Corresponding author **email-rashmiatuljoshi1972@gmail.com**

ABSTRACT

In India sweets are used since ancient time for their nutritional and health benefits besides for their taste. The Indian sweets can be classified on the basis of their ingredients as well as method of preparation. Some of important are Barfi, Gujiya, Halwa, Jalebi, Laddu, Lassi, Peda, Petha, Sandesh, and many others. Under the present study emphasis has been given on the herbs belonging to different climatic zones, continental origin and their parts used in preparation of different sweets. The paper presents the inclusion 117 herbs belonging to gymnosperm and angiosperms. The plants from various climatic zones i.e. tropical, dry tropical, wet tropical, sub-tropical, temperate and alpine zones have been described. *Cycus revoluta* and *Pinus gerardiana* are the only gymnosperms used in preparation of traditional Indian sweets. Millets, viz. pearl millet, barnyard millet, finger millet, foxtail millet, little millet, sorghum etc, grains viz. barley, oats, rice, wheat, durum wheat legumes viz. black beans, gram, green bean, pea, peanut, soybeans also play a vital role in preparation of various sweets. Out of 117 herbs used in sweet preparation only, 20 are from only Indian origin and others are from Africa, America, Australia, Europe, and other Asian countries and most of them are cultivated in India to cater the need and demand of preparation of various sweets and other industries.

KEY WORDS- Plant families, Indian sweets, health benefits, medicinal attributes.

INTRODUCTION

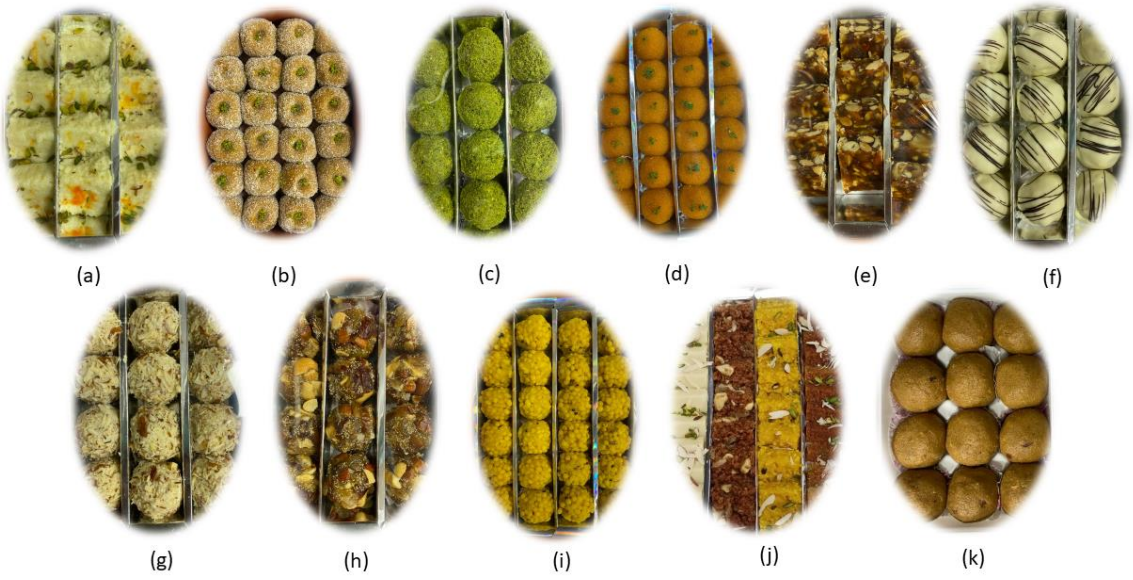
India is a land of great diversity in its culture and traditional values. The preparation of different sweets in India had been an integral part of its cultural tradition since ancient times. Many sweets are considered auspicious and religious and preparation of them is essential in celebration of festivals. However, much variation is observed in preparations of even same type of sweet in various parts of country as factors viz. availability of ingredients depends of geographical location and climate of surrounding vicinity. Since ancient times diverse array of sweets have been developed and it is often claimed that Indian subcontinent is a region in world with wide varieties of sweets not found anywhere else. The ancient records indicates that origin of sweets dates back to Rigveda, where sarkara (refined sugar) and gur, (raw sugar) and phanita (dissipated juice of sugarcane) was being used (Rigveda 1.191.3)[1].The use of Ghrita or ghee (clarified butter) is also mentioned in Dharmasutras (600-300BC) to fry number of cereal based sweets.Madhuparka was prepared by cooking curd and honey in ghrita .Morendaaka was prepared with dissipated milk in the shape of eggs of peacock (Rama , Uttara Khanda 131.38). Sushruta Samhita mentions about sugar being produced from others sources like honey, mahua flowers and yavasa (barley) [2,3].

Traditionally Indian sweets are known by the name of ‘mithai’ in Hindi prepared by using different types of ingredients and methods of preparation. The main ingredient in almost all

different types of sweets is sugar which comes from Sanskrit word 'sharkara' for refined sugar [2]. The other various ingredients used are mainly milk, flours, vegetables, fruits, dry fruits, roasted seeds and even fermented foods. In eastern parts of India, the fruits of *Madhuca longifolia* var. *latifolia* are used as sweetener for offerings on Tinchhat festival [4]. The fruits of *Cucurbita moschata* are used to prepare Petha . Similarly, an Indian traditional sweet 'Jalebi' is prepared from the fermented batter of *Triticum aestivum* grains (refined wheat flour). The list becomes endless if we prepare and there is very less information about the plants used in preparation of various different types of Indian sweets. *Curcuma angustifolia* commonly known as tikhur or arrow root is not only used for the treatment of ulcer but the starch of the rhizome is used for preparation of halwa, jalebi and barfi and also as weaning food known as shoti. The sharbat is drunk for its cooling attributes in various regions of country. The seeds of white sesame (*Sesamum indicum*) are recommended in Ayurvedic diet for the treatment for osteoporosis. The seeds are used in preparation of different types of sweets like laddu, barfi, halwa etc. A sweet candy known as 'Mufar' is prepared from leaves of *Cannabis sativa* [5,6].

CLASSIFICATION OF INDIAN SWEETS

The Indian sweets or mithai can be traditionally classified on the basis of ingredients as well as method of preparation. Figure 1 shows traditionally used Indian sweets prepared from milk as well as commonly growing plants.



(a) Kalakand (b) Peda (c) Pista Laddu (d) Laddu (e) Mewa Laddu (f) White Chocolate Laddu (g) Badam Laddu (h) Doda burfi (i) Bundi laddu (j) Barfi (k) Aate ka Laddu

Figure 1: Some commonly available sweets available in Indian markets as well as prepared in Indian homes.

Table 1. Plants used in preparation of various traditional Indian sweets.

Sl. No.	Plant name	Vernacular names	Traditional Indian Sweets
1	*Amaranthus cruentus* L.	Rajgiri, chaulai, ramdana	Laddu,kheer,barfi
	Beta vulgaris L	Chukandar, beet root	Halwa

ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 13, Iss 01, 2024

	Spinacia oleracea L.	Palak, spinach	Laddu
2	*Anacardium occidentale* L	Kaju, cashew	Laddu,katli,halwa
	Buchanania lanzan Spreng.	Chiraunji	Halwa, laddu,laddu,modak
	Mangifera indica L.	Aam, mango	Halwa
	Pistacia vera L	Pista, pistachio	Katli,laddu
3	*Annona reticulata* L	Sharifa, Sita phal	Halwa
	Annona squamosa L.	Sharifa, custard apple	Halwa
4	*Coriandrum sativum*	Dhaniya, coriander	Panjiri,barfi,laddu
	Cuminum cyminum L.	Jira, cumin seed	Panjiri, halwa, laddu
	Daucus carota L.	Gajar, carrot	Halwa, barfi
	Foeniculum vulgare Mill.	Saunf, common fennel	Panjiri, laddu
5	*Carissa carandas* L	Karonda,	As candy used in kulfi
6	*Cocos nucifera* L	Nariyal, coconut	Laddu, barfi, modak,halwa
	Phoenix dactylifera L.	Khajoor, date	Laddu, kheer,halwa
7	*Helianthus annuus* L.	Surajmukhi, sunflower	Laddu, barfi, panjiri
	Stevia rebaudiana (Bertoni) Bertoni	Stevia	Laddu, barfi
8	*Brassica cretica* Lam.	Phoolgobhi, cauliflower	Halwa
	Brassica oleracea L.	Pattagobhi, cabbage	Halwa
9	*Ananas comosus* (L.) Merr	Ananas, pine apple	Halwa
10	*Cannabis sativa* L.	Bhang, hemp	Laddu, panjiri,mufar
11	*Carica papaya* L.	Papita,papaya	Halwa
12	*Terminalia chebula* Retz.	Haritaki	Panjiri
13	*Ipomoea batatas* (L.) Lam.	Shakarkand, sweet potato	Halwa
14	*Benincasa hispida* (Thunb.) Cogn	Petha, kumhara	Petha sweet
	Citrullus lanatus (Thunb.) Matsum. & Nakai	Tarbuj, water melon seeds	Laddu, barfi
	Cucurbita pepo L.	Kaddu, pumpkin seeds	Laddu, barfi
	Lagenaria siceraria (Molina) Standl.	Lauki, bottle gourd	Barfi, kheer, halwa
	Momordica charantia L.	Karela, bitter gourd	Barfi
	Trichosanthes dioica Roxb.	Parwal, point gourd	Barfi

ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 13, Iss 01, 2024

15	*Cycas revoluta* Thunb.	Sago palm	Laddu,kheer
16	*Manihot esculenta* Crantz.	Semal aaloo, cassava	Halwa
17	*Arachis hypogaea* L	Mungphali, peanut	Laddu, Barfi
	Butea monosperma (Lam.) Kuntze	Palash, flame-of-the-forest	Kulfi
	Cicer arietinum L	Chana, horse gram	Laddu, halwa, barfi
	Glycine max (L.) Merr.	Soya bean	Barfi
	Lathyrus oleraceus Lam.	Matar, pea	Halwa
	Trigonella foenum-graecum L	Methi, fenugreek	Laddu, barfi , panjari
	Vachellia nilotica (L.) P.J.H.Hurter & Mabb.	Babool, acacia	Laddu, panjiri
	Vigna mungo (L.) Hepper	Moong, green gram	Laddu, panjiri, halwa
	Vigna radiata (L.) R.Wilczek	Urad, black gram split	Laddu,panjiri, halwa
18	*Crocus sativus* L.	Keshar	Kulfi, paak, barfi , laddu
19	*Juglans regia* L.	Akhrot, walnut	Laddu, paak
20	*Mentha × piperita* L.	Pepermint	Barfi
	Mentha spicata L	Pudina, mint	Laddu
	Salvia hispanica L.	Mexican chia, Spanish sage	Laddu
	Salvia officinalis L	Mexican chia, Spanish sage	Laddu
21	*Cinnamomum verum* J. Presl	Dalchini, cinamom	Laddu, panjiri
22	*Allium cepa* L.	Piyaj, onion	Kheer
23	*Linum usitatissimum* L.	Alsi, linseed	Laddu, panjiri
24	*Trapa natans* L.	Singhara, chestnut	Barfi, halwa
25	*Hibiscus rosa-sinensis* L.	Gudahal, hibiscus	Laddu
	Theobroma cacao L.	Cocoa, chocolate plant	Laddu, halwa
26	*Maranta arundinacea* L.	Arrowroot	Halwa
27	*Artocarpus heterophyllus* Lam.	Kathal, jackfruit	Halwa
	Ficus carica L.	Anjeer, fig	Halwa, kheer
	Morus alba L.	Shahatoot, mulberry	Barfi
28	*Musa × paradisiaca* L.	Kela, banana	Halwa, barfi
29	*Psidium guajava* L.	Amarood, guava	Halwa, barfi
30	*Euryale ferox* Salisb.	Makhana, prickly waterlily	Laddu, kheer, barfi
	Nelumbo nucifera Gaertn	Makhana, kamal, lotus	Laddu, barfi, kheer
31	*Vanilla planifolia* Andrews	Vanilla	Kher, laddu , barfi
32	*Papaver somniferum* L.	Khuskhus,posta dana, poppy	Laddu, kheer, barfi halwa

ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 13, Iss 01, 2024

33	*Sesamum indicum* L.	Til, sesame	Kheer, laddu , barfi
34	*Phyllanthus emblica* L	Amlaki, gooseberry	Halwa, barfi
35	*Pinus gerardiana* Wall. ex D. Don	Chir, pine	Laddu , barfi
36	*Piper betel* L.	Pan, betel	Laddu
37	*Platanus orientalis* L.	Chenar, oriental sycamore	Chenar pyas
38	*Avena sativa* L.	Jayee, jae, oats	Laddu, kheer
	Bambusa balcooa Roxb	Vans, bamboo	Panjiri
	Cenchrus americanus (L.) Morrone	Bajra, pearl millet	Laddu, kheer, halwa
	Echinochloa colonum subsp. *edulis* (Honda) Banfi & Galasso	Sawan, barnyard millet	Laddu, kheer, halwa
	Eleusine coracana (L.) Gaertn.	Ragi, finger millet	Laddu, kheer, halwa
	Hordeum vulgare L.	Yav, barley	Laddu, kheer, halwa
	Oryza sativa L.	Chawal, rice	Kheer
	Saccharum officinarum L.	Ganna, eekh, sugarcane	Kheer, Laddu
	Setaria italica (L.) P.Beauv.	Kangun, horsetail millet	Kheer
	Sorghum bicolor (L.) Moench	Jowar, broom corn, gini corn, durra, impee, sorghum	Barfi,ladu
	Triticum aestivum L.	Genhun, wheat	Barfi, laddu
	Triticum turgidum subsp. *durum* (Desf.) Husn.	Suji, durum wheat, hard wheat	Laddu, halwa, kheer
	Zea mays L.	Makai, maize	Kheer
39	*Fagopyrum esculentum* Moench	Kuttu	Katli
40	*Punica granatum* L.	Anar, pomegranate	Laddu, Barfi
41	*Ziziphus jujuba* Mill.	Ber,jujube	Halwa
42	*Cydonia oblonga* Mill	Quince	Halwa
	Fragaria × *ananassa* (Duchesne ex Weston) Duchesne ex Rozier.	Strawberry	Halwa

	Malus domestica (Suckow) Borkh.	Seb, apple	Halwa, barfi
	Prunus amygdalus Batach	Badam, almond	Laddu, kheer
	Prunus armeniaca L.	Khubani, apricot	Halwa
	Prunus avium (L.) L.	Cherry	Kheer
	Prunus domestica L.	Alu bukhara, plum	Halwa
	Prunus persica (L.) Batsch.	Aadu, peach	Halwa
	Pyrus communis L.	Nashpati, pear	Halwa
	Rosa × *damascena* Herrm.	Gulkand	Laddu
	Rosa indica L.	Gulab, rose	Laddu
	Rubus idaeus L.	Raspberry	Halwa, barfi
43	*Coffea arabica* L.	Coffee	Laddu
	Coffea canephora Pierre ex A.Froehner	Coffee	Laddu
44	*Citrus* × *aurantium* f. deliciosa (Ten.) M.Hiroe	Santara, orange	Barfi
	Citrus × *limon* (L.) Osbeck	Mosami	Barfi
	Citrus japonica Thunb.	Kumquat	Barfi
	Citrus medica L.	Nimbu, lemon	Barfi
45	*Santalum album* L.	Chandan, sandal	Laddu
46	*Litchi chinensis* Sonn	Lychee	Halwa
47	*Manilkara hexandra* (Roxb.) Dubard	Khirani	Halwa, barfi
	Manilkara zapota (L.) P.Royen	Chiku, sapota	Halwa, barfi, kulfi
48	*Capsicum annuum* L.	Mirch, chilli	Paak
	Solanum lycopersicum L..	Tamatar, tomato	Barfi, pachadi
	Solanum tuberosum L.	Aaloo, potato	Halwa
49	*Camellia sinensis* (L.) Kuntze	Chay, tea	Barfi
50	*Boehmeria nivea* (L.) Gaudich.	China grass	Barfi

51	*Vitis vinifera* L.	Angoor, kishmis, Resin	Laddu, barfi, kheer
52	*Amomum subulatum* Roxb.	Badi elaichi, large cardamom	Laddu, barfi, kheer
	Curcuma longa Roscoe	Haldi, turmeric	Panjiri, laddu
	Elettaria cardamomum (L.) Maton	Hari elaichi, green cardamom	Laddu, kheer, barfi,
	Zingiber officinale Roscoe	Adrak, shonth, ginger	Panjiri, laddu

ON THE BASIS OF INGREDIENTS

Milk based sweets – The raw material milk is mainly treated with different process to prepare a wide variety of sweets. The process includes first to prepare base product like khoya, chhana, paner, dahi, which are further utilized to prepare numerous sweets including the use of other ingredients commonly used locally. The famous milk based sweets commonly prepared throughout the nation are barfi, katli, gulab jamun, rasgulla, kalakand, kheer,chamcham, milk cake, kalakand, basundi,sandesh etc.

Plant based sweets - Since ancient times various plants have been used as main ingredients in preparation of different types of sweets. The plant parts like rhizome, leaves, flowers, shoots, stamens all are used in preparation of various sweets. The plants used in preparation of sweets are commonly used in Indian households and are categorized as spices and condiments, vegetables, fruits, dry fruits, cereals and legumes etc. The flour prepared from cereals and grains are also used in making different types of barfi, halwa, laddu jalebi, gujiya, laddu , malpua, sonpapadi,barfi, modak,kheer, paak,gajak, petha, etc.

ON THE BASIS OF METHOD OF PREPARATION

Fried sweets –The prepared sweet is deep fried either in hot oil or ghee (clarified butter) Jalebi, gulab jamun, balushai, malpua.

Dry sweets- The various ingredients used for preparation of sweets are fried dry or roasted first and then are finally either given particular shape of laddu modak etc. Usually some binding agent like melted sugar is commonly used for making final product.

Frozen sweets –The frozen sweets usually include milk based sweets where all the ingredients are mixed uniformly having thick consistency and thereafter kept for freezing using a refrigerator to form final product like kulfi.

METHODOLOGY

The study is based on literary survey as well as the sample survey in various executive sweet shops and sweet shops in various rural pockets. Study has also been embodied the sweets prepared in different households for domestic and family use or for presentation of sweets as gift. During survey the ingredients used in various sweet preparation have been recorded and their botanical nomenclature along with native range of the concern plants have been recorded in the present communication. Identification of plants were made from various floras Results have been presented through tables and graph. [7-12].

ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 13, Iss 01, 2024

RESULTS AND DISCUSSION

India is a land of diversity both in its geography as well as cultural traditions. The adjoining states near their boundaries almost share same floristic habitat which leads to only slight variation of the ingredients in the preparation of various sweets however main ingredient like milk and cereal or grain remain the same. In the various travelling expeditions, it was found that every cultural heritage in diversified India has its own culture, festivals and its own kind of food habits. However, there is much similarity in having similar food habits in their adjoining parts. Further, for the sake of livelihood support there is much more migration of the people from one part to another, which traverse the food habits including sweets from one part of the country to other. During various surveys different types of sweets were recorded along with ingredients which are used in various sweet preparations (Table 2; Figure 2).

Table 2. Summary of various plants used in preparation of various traditional Indian sweets.

Sl. No.	Family	Plant name	Vernacular names	Cultivation and native range	Climatic condition under cultivation	Parts used
1	Amaranthaceae	*Amaranthus cruentus* L.	Rajgiri, chaulai, ramdana	America	Dry tropical	Seed
		Beta vulgaris L	Chukandar, beet root	India-Europe	Temperate	Root
		Spinacia oleracea L.	Palak, spinach	Asia	Tropical to temperate	Leaf
2	Anacardiaceae	*Anacardium occidentale* L	Kaju, cashew	America	Dry Tropical	Seed
		Buchanania lanzan Spreng.	Chiraunji	India	Dry tropical	seeds
		Mangifera indica L.	Aam, mango	India	Dry tropical	Fruit
		Pistacia vera L	Pista, pistachio	Asia	Temperate	Seed
3	Annonaceae	*Annona reticulata* L	Sharifa, Sita phal	America	Wet tropical	Fruit
		Annona squamosa L.	Sharifa, custard apple	America	Wet Tropical	Fruit
4	Apiaceae	*Coriandrum sativum*	Dhaniya, coriander	Asia	Tropical to Subtropical	Fruit
		Cuminum cyminum L.	Jira, cumin seed	Asia	Subtropical	Fruit
		Daucus carota L.	Gajar, carrot	Africa, Europe, Asia	Tropical to temperate	Root

ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 13, Iss 01, 2024

		Foeniculum vulgare Mill.	Saunf, common fennel	Asia	Tropical to temperate	Fruit
5	Apocynaceae	*Carissa carandas* L	Karonda,	India	Dry tropical	Fruit
6	Arecaceae	*Cocos nucifera* L	Nariyal, coconut	Asia	Wet tropical	Seed
		Phoenix dactylifera L.	Khajoor, date	Asia	Tropical to Subtropical	Fruit
7	Asteraceae	*Helianthus annuus* L.	Surajmukhi, sunflower	America	Tropical to temperate	Seed
		Stevia rebaudiana (Bertoni) Bertoni	Stevia	America	Tropical	Seeds
8	Brassicacea	*Brassica cretica* Lam.	Phoolgobhi, cauliflower	Asia	Tropical to temperate	Flower fol gobhi
		Brassica oleracea L.	Pattagobhi, cabbage	Europe	Tropical to temperate	Leaf
9	Bromeliaceae	*Ananas comosus* (L.) Merr	Ananas, pine apple	America	Tropical	Fruit
10	Cannabaceae	*Cannabis sativa* L.	Bhang, hemp	Asia	Tropical to temperate	Leaf
11	Caricaceae	*Carica papaya* L.	Papita,papaya	America	Wet tropical	Fruit
12	Combretaceae	*Terminalia chebula* Retz.	Haritaki	India	Wet tropical	Fruit
13	Convolvulaceae	*Ipomoea batatas* (L.) Lam.	Shakarkand, sweet potato	America	Dry tropical	Tuber
14	Cucurbitaceae	*Benincasa hispida* (Thunb.) Cogn	Petha, kumhara	Asia	Wet tropical	Fruit
		Citrullus lanatus (Thunb.) Matsum. & Nakai	Tarbuj, water melon	Africa	Dry tropical	Fruit
		Cucurbita pepo L.	Kaddu, pumpkin	America	Tropical to subtropical	Fruit
		Lagenaria siceraria (Molina) Standl.	Lauki, bottle gourd	Africa	Dry tropical	Fruit
		Momordica charantia L.	Karela, bitter gourd	Asia, Europe	Wet tropical	Fruit
		Trichosanthes dioica Roxb.	Parwal, point gourd	India	Dry tropical	Fruit
15	Cycadaceae	*Cycas revoluta* Thunb.	Sago palm	Asia	Tropical	Exudate

ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 13, Iss 01, 2024

16	Euphorbiaceae	*Manihot esculenta* Crantz.	Semal aaloo, cassava	America	Tropical	Root
17	Fabaceae	*Arachis hypogaea* L	Mungphali, peanut	America	Tropical	Seed
		Butea monosperma (Lam.) Kuntze	Palash, flame-of-the-forest	India	Tropical	Flower
		Cicer arietinum L	Chana, horse gram	Asia	Tropical	Seed
		Glycine max (L.) Merr.	Soya bean	Asia	Tropical to temperate	Seed
		Lathyrus oleraceus Lam.	Matar, pea	Asia	Tropical to temperate	Seed
		Trigonella foenum-graecum L	Methi, fenugreek	Asia	Tropical	Seed
		Vachellia nilotica (L.) P.J.H.Hurter & Mabb.	Babool, acacia	India Asia, Africa	Tropical	Exudate
		Vigna mungo (L.) Hepper	Moong, green gram	India	Tropical	Seed
		Vigna radiata (L.) R.Wilczek	Urad, black gram split	Asia, Australia	Tropical	Seed
18	Iridaceae	*Crocus sativus* L.	Keshar	America	Temperate to Alpine	Flower
19	Juglandaceae	*Juglans regia* L.	Akhrot, walnut	India, Asia	Temperate	Seed
20	Lamiaceae	*Mentha × piperita* L.	Pepermint	Europe	Tropical	Leaf
		Mentha spicata L	Pudina, mint	Europe	Tropical to temperate	Leaf
		Salvia hispanica L.	Mexican chia, Spanish sage	America	Subtropical	Seed
		Salvia officinalis L	Mexican chia, Spanish sage	Europe	Temperate	Seed
21	Lauraceae	*Cinnamomum verum* J. Presl	Dalchini, cinamom	Asia	Tropical to temperate	Bark
22	Liliaceae	*Allium cepa* L.	Piyaj, onion	Asia	Tropical to temperate	Bulb
23	Linaceae	*Linum usitatissimum* L.	Alsi, linseed	Asia	Tropical	Seed
24	Lythraceae	*Trapa natans* L.	Singhara, chestnut	Africa	Tropical to temperate	Fruit
25	Malvaceae	*Hibiscus rosa-sinensis* L.	Gudahal, hibiscus	Europe	Tropical	Flower

		Theobroma cacao L.	Cocoa, chocolate plant	America	Wet tropical	Fruit
26	Marantaceae	*Maranta arundinacea* L.	Arrowroot	America	Wet Tropical	Root
27	Moraceae	*Artocarpus heterophyllus* Lam.	Kathal, jackfruit	India	Wet tropical	Fruit
		Ficus carica L.	Anjeer, fig	Asia	Tropical to temperate	Fruit
		Morus alba L.	Shahatoot, mulberry	Asia	Tropical totemperate	Fruit
28	Musacea	*Musa paradisiaca* × L.	Kela, banana	Asia	Wet tropical	Fruit
29	Myrtaceae	*Psidium guajava* L.	Amarood, guava	America	Dry tropical to subtropical	Fruit
30	Nymphaeaceae	*Euryale ferox* Salisb.	Makhana, prickly waterlily	India	Aquatic tropical to temperate	Seed
		Nelumbo nucifera Gaertn	Makhana, kamal, lotus	Europe, Asia	Aquatic tropical to subtropical	Seed
31	Orchidaceae	*Vanilla planifolia* Andrews	Vanilla	America	Wet tropical	Plant
32	Papaveraceae	*Papaver somniferum* L.	Khuskhus,post a dana, poppy	Europe Asia	Tropical to temperate	Seed
33	Pedaliaceae	*Sesamum indicum* L.	Til, sesame	India	Dry tropical	Seed
34	Phyllanthaceae	*Phyllanthus emblica* L	Amlaki, gooseberry	Asia	Tropical to Subtropical	Fruit
35	Pinaceae	*Pinus gerardiana* Wall. ex D. Don	Chir, pine	India	Temperate	Seed
36	Piperaceae	*Piper betel* L.	Pan, betel	India	Wet tropical	Leaf
37	Platanaceae	*Platanus orientalis* L.	Chenar, oriental sycamore	America	Temperate	Seed
38	Poaceae	*Avena sativa* L.	Jayee, jae, oats	Asia	Temperate	Seed
		Bambusa balcooa Roxb	Vans, bamboo	India	Wet tropical	tender shoot
		Cenchrus americanus (L.) Morrone	Bajra, pearl millet	Africa	Dry tropical	Seed

ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 13, Iss 01, 2024

		Echinochloa colonum subsp. *edulis* (Honda) Banfi & Galasso	Sawan, barnyard millet	Africa	Dry tropical	Seed
		Eleusine coracana (L.) Gaertn.	Ragi, finger millet	Africa	Dry tropical to temperate	Seed
		Hordeum vulgare L.	Yav, barley	Asia	Dry tropical to temperate	Seed
		Oryza sativa L.	Chawal, rice	Asia	Tropical to temperate	Seed
		Saccharum officinarum L.	Ganna, eekh, sugarcane	Austrtalia	Dry tropical	Stem juice
		Setaria italica (L.) P.Beauv.	Kangun, horsetail millet	Asia	Tropical to temperate	Seed
		Sorghum bicolor (L.) Moench	Jowar, broom corn, gini corn, durra, impee, sorghum	India, Africa	Dry tropical	Seed
		Triticum aestivum L.	Genhun, wheat	India, America	Dry tropical to temperate	Seed
		Triticum turgidum subsp. *durum* (Desf.) Husn.	Suji, durum wheat, hard wheat	Asia Africa	Subtropical	Seed
		Zea mays L.	Makai, maize	America	Tropical to temperate	Seed
39	Polygonaceae	*Fagopyrum esculentum* Moench	Kuttu	Asia	Temperate	Seed
40	Punicaceae	*Punica granatum* L.	Anar, pomegranate	Asia	Tropical to temperate	Fruit
41	Rhamnaceae	*Ziziphus jujuba* Mill.	Ber,jujube	Asia	Tropical to temperate	Fruit
42	Rosaceae	*Cydonia oblonga* Mill	Quince	Asia	Temperate	Fruit
		Fragaria × *ananassa* (Duchesne ex Weston)	Strawberry	Naturalized hybrid (India)	Temperate	Fruit

ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 13, Iss 01, 2024

		Duchesne ex Rozier.				
		Malus domestica (Suckow) Borkh.	Seb, apple	Asia	Temperate	Fruit
		Prunus amygdalus Batach	Badam, almond	Asia	Temperate	Seed
		Prunus armeniaca L.	Khubani, apricot	Asia	Temperate	Fruit
		Prunus avium (L.) L.	Cherry	Europe, Asia, Africa	Temperate	Fruit
		Prunus domestica L.	Alu bukhara, plum	Asia	Temperate	Fruit
		Prunus persica (L.) Batsch.	Aadu, peach	Asia	Sub tropical to temperate	Fruit
		Pyrus communis L.	Nashpati, pear	Europe Asia	Temperate	Fruit
		Rosa × *damascena* Herrm.	Gulkand	Hybrid	Tropical to temperate	Flower
		Rosa indica L.	Gulab, rose	India	Tropical to temperate	Flower
		Rubus idaeus L.	Raspberry	America	Temperate	Fruit
43	Rubiaceae	*Coffea arabica* L.	Coffee	Africa	Dry tropical	Seed
		Coffea canephora Pierre ex A.Froehner	Coffee	Africa	Dry tropical	Seed
44	Rutaceae	*Citrus* × *aurantium* f. deliciosa (Ten.) M.Hiroe	Santara, orange	Asia	Subtropical	Fruit juice
		Citrus × *limon* (L.) Osbeck	Mosami	Africa	Subtropical	Fruit juice
		Citrus japonica Thunb.	Kumquat	Asia	Subtropical	Fruit juice
		Citrus medica L.	Nimbu, lemon	India	Tropical to sub tropical	Fruit juice
45	Santalaceae	*Santalum album* L.	Chandan, sandal	Australia	Tropical	Stem
46	Sapindaceae	*Litchi chinensis* Sonn	Lychee	Asia	Tropical to sub tropical	Fruit

ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 13, Iss 01, 2024

47	Sapotaceae	*Manilkara hexandra* (Roxb.) Dubard	Khirani	India	Wet tropical	Fruit
		Manilkara zapota (L.) P.Royen	Chiku, sapota	America	Wet tropical	Fruit
48	Solanaceae	*Capsicum annuum* L.	Mirch, chilli	America	Tropical to temperate	Fruit
		Solanum lycopersicum L..	Tamatar, tomato	America	Wet tropical tosubtropical	Fruit
		Solanum tuberosum L.	Aaloo, potato	America	Tropical to Subtropical	Tuber
49	Theaceae	*Camellia sinensis* (L.) Kuntze	Chay, tea	India	Wet tropical to subtropical	Leaf
50	Urticaceae	*Boehmeria nivea* (L.) Gaudich.	China grass	India Asia	Wet tropical to subtropical	Leaf
51	Vitaceae	*Vitis vinifera* L.	Angoor, kishmis, Resin	Europe, Asia	Temperate	Fruit
52	Zingiberaceae	*Amomum subulatum* Roxb.	Badi elaichi, large cardamom	Asia	Wet tropical	Fruit
		Curcuma longa Roscoe	Haldi, turmeric	India	Dry tropical	Rhizome
		Elettaria cardamomum (L.) Maton	Hari elaichi, green cardamom	India	Dry tropical	Fruit
		Zingiber officinale Roscoe	Adrak, shonth, ginger	India	Dry tropical	Rhizome

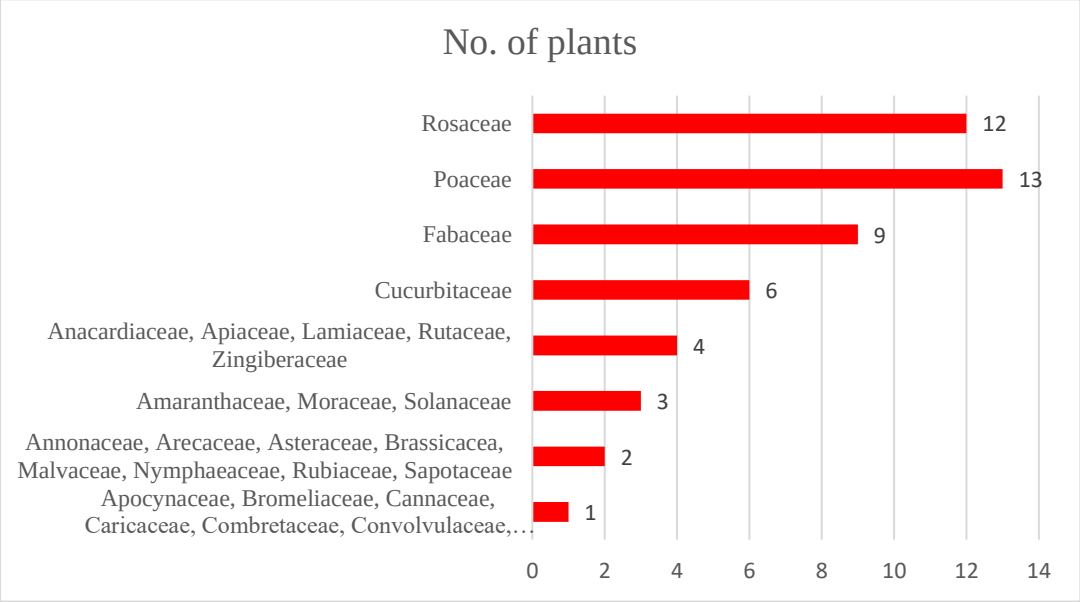


Figure-2. Graph showing the number of plants used for preparing sweets recipes from different plant families.

Analysis of the records expresses that in total 117 plants falling under 52 families, were used in preparation of different kinds of sweets as given in table 2. While going through the botanical aspects of the ingredients initially family wise plants were segregated and it was found that maximum number of plant i.e. 13, were from the family Poaceae to which cereals and millets belong. Family Poaceae was followed by the family Rosaceae with 12 plants, which covers various fruits i.e. almond, apple, apricots, plums, strawberry, raspberry etc. Fabaceae covers 9 plants i.e. gram, pea, green beans, black beans, soya beans etc., Cucurbitaceae represents 6 plants i.e. bitter gourd, bottle gourd, melon, point gourd, pumpkin and wax gourd. 4 plants belonged to each families i.e. Anacardiaceae, Apiaceae, Lamiaceae, Rutaceae, and Zingiberaceae.; 3 plants were from the families Amaranthaceae, Moraceae, and Solanaceae, 2 plants were from each of the families Annonaceae, Arecaceae, Asteraceae, Brassicacea, Malvaceae, Nymphaeaceae, Rubiaceae, and Sapotaceae and only 1 plant was used from each of the families Apocynaceae, Bromeliaceae, Cannaceae, Caricaceae, Combretaceae, Convolvulaceae, Cycadaceae, Euphorbiaceae, Iridaceae, Juglandaceae, Lauraceae, Liliaceae , Linaceae, Lythraceae, Marantaceae, Musacea, Myrtaceae, Orchidaceae, Papaveraceae, Pedaliaceae, Phyllanthaceae Pinaceae, Piperaceae, Platanaceae, Polygonaceae, Punicaceae, , Rhamnaceae, Santalaceae, Sapindaceae, Theaceae, Urticaceae and Vitaceae. [13]

These described plants were also analysed for their native range and it was found that that out of 117 plants used in preparation of Indian sweets, 39 plants were from Asian origin and 20 exclusively from Indian origin. However, 25 plants were from American origin, 9 from Africa, 5 from Europe, 3 from common to Europe and Asia, 2 from Australia and 1 from many common native groups viz. Africa, Europe, Asia; Asia, Africa; Asia, Australia; Asia, Europe; Europe, Asia, Africa; India Asia, Africa; India Europe; India, Africa; India, America. (Table3; Figure 3).

IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES
ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 13, Iss 01, 2024

Table: 3: Number of plants used in preparing sweets and their native/cultivation ranges.

Cultivation and native range of the plant	Number of plants
Africa	9
Africa, Europe, Asia	1
America	24
Asia	38
Asia, Africa	1
Asia, Australia	1
Asia, Europe	1
Australia	2
Europe	5
Europe, Asia	4
Europe, Asia, Africa	1
Hybrids	1
India	20
India, Asia	2
India Asia, Africa	1
India Europe	1
India, Africa	1
India, America	1
Naturalized hybrid (India)	1
Total	**117**

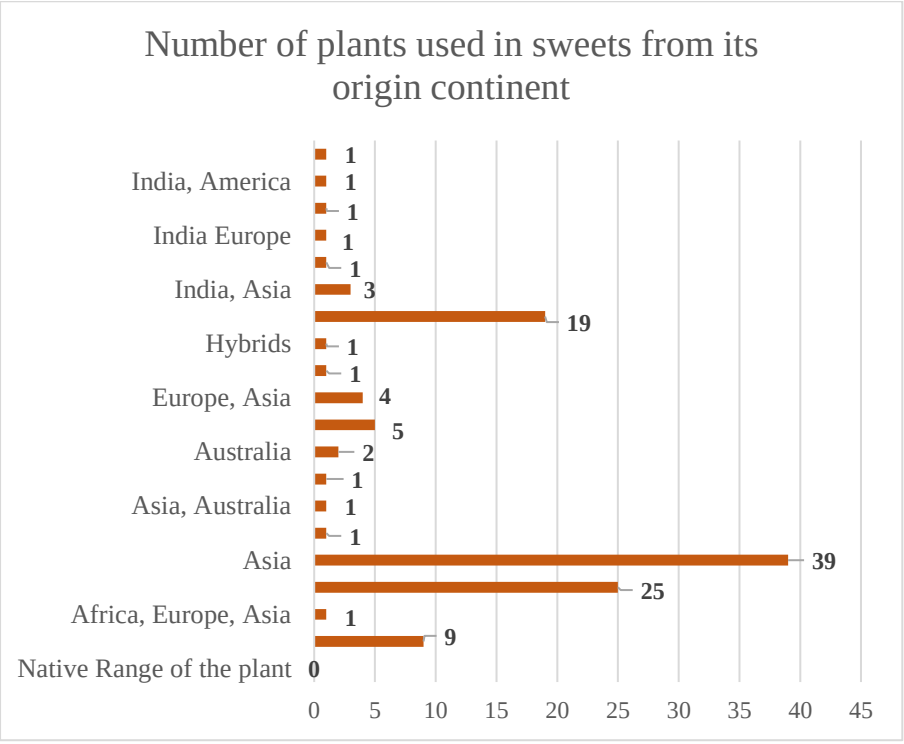


Figure-3. Number of plants from different native ranges used in preparation of various sweets

ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 13, Iss 01, 2024

In the analysis 15 different climatic zones (Table 4;Figure4),were found and maximum number of plants belonged to tropical to temperate i.e. 23; followed by 19 from dry tropical, 18 from temperate to Alpine, 17 from wet tropical, 14 from tropical, 7 from both tropical to subtropical, 6 from sub-tropical, 3 from dry tropical to temperate and tropical to temperate, and 1 each from different intermediary climatic zones i.e. Aquatic tropical to subtropical, aquatic tropical to temperate, dry tropical to subtropical, sub-tropical to temperate, temperate to alpine [12].

Table 4. Number of plants used in preparing sweets from different climatic zones.

S. No.	Name of climatic zone	Number of plants
1	Aquatic tropical to subtropical	1
2	Aquatic tropical to temperate	1
3	Dry tropical	19
4	Dry tropical to subtropical	1
5	Dry tropical to temperate	3
6	Sub tropical to temperate	1
7	Subtropical	6
8	Temperate	18
9	Temperate to Alpine	1
10	Tropical	14
11	Tropical to temperate	3
12	Tropical to subtropical	7
13	Tropical to temperate	23
14	Wet tropical	17
15	Wet tropical to subtropical	3
	Total	**117**

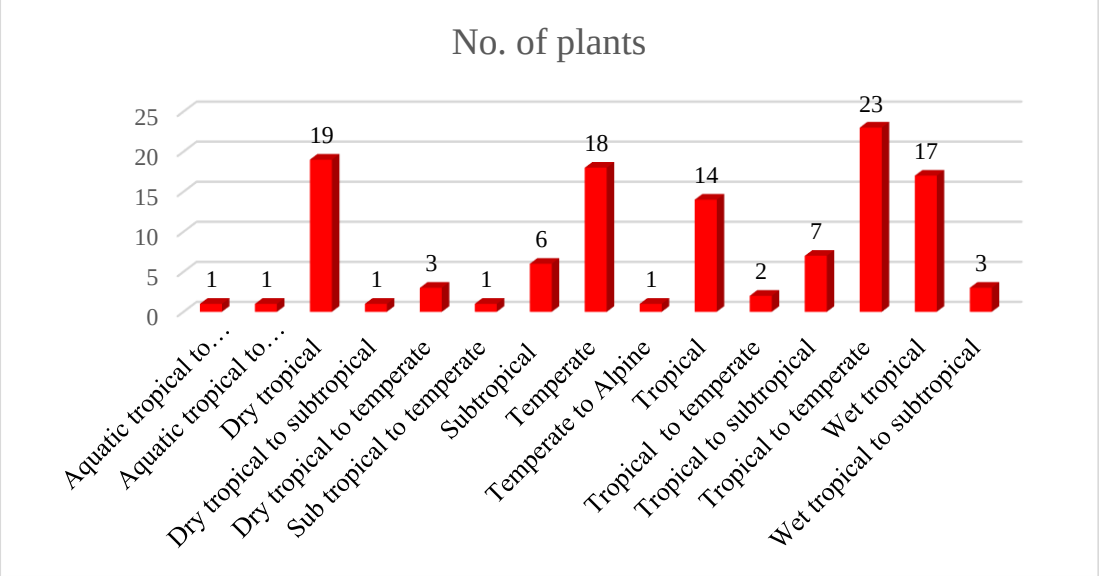


Figure-4. Number of plants used in preparation of various sweets from different climatic zones.

ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 13, Iss 01, 2024

If we talk of plant parts used in preparation of sweets we find that maximum of parts used are fruits, 44; seeds, 38; leaves, 9, flowers, 6; rhizome and tubers, 5; root and fruit juice, 4 each; stem bark and exudates, 2 each and 1 each from whole plant, tender shoot and stem juice (Table 5; Figure 5).

Table 5: Different plant parts used in preparation of various Indian sweets.

Parts	Number of sweets
Root	4
Rhizome, tuber, bulb	5
Whole plant	1
Tender shoot	1
Stem/ bark	2
Exudate	2
Stem juice	1
Leaf	9
Flower	6
Fruit	44
Fruit juice	4
Seed	38
Total	**117**

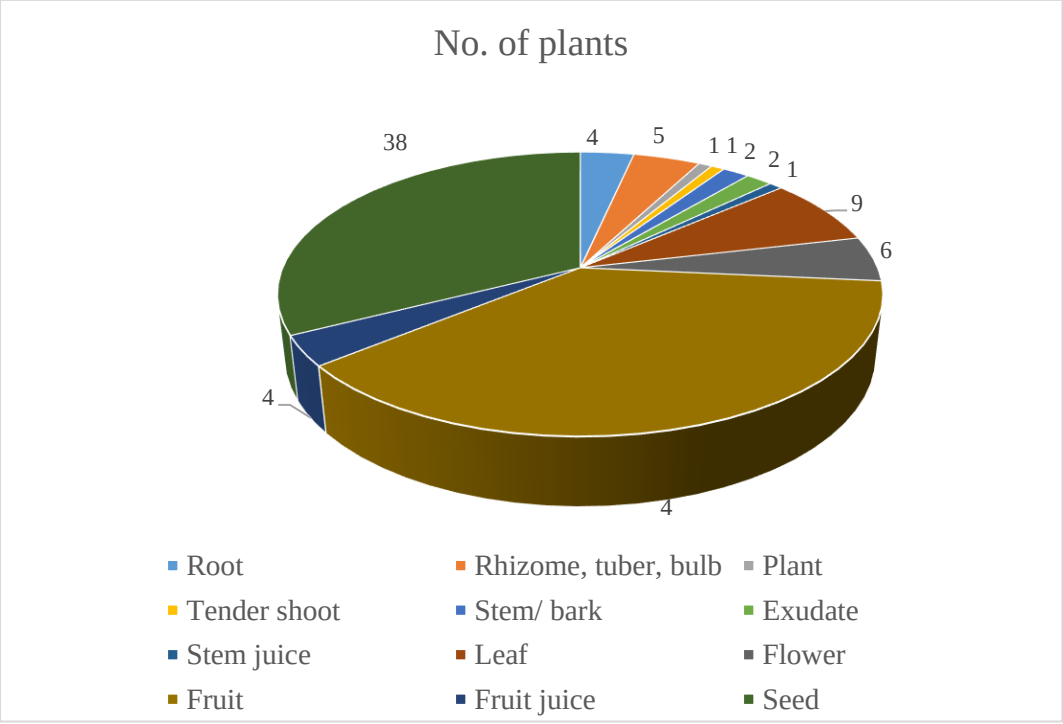


Figure-5. Parts of different plants used in sweet preparation.

ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 13, Iss 01, 2024

Besides this not only the various plant parts are considered to be used in making various sweets but the exudates are also used. In a nut shell table 6 and figure 6 presents the categories of various plants commonly represented as fruits, flavours, exudates etc in preparation of different types of Indian sweets.

Table-6. Category of plants commonly used in preparing sweets.

S. No.	Category of plant	No. of plants
1	Sugar base	4
2	Beverage	4
3	Cereals and millets	14
4	Dry fruits	15
5	Exudate and root flour	4
6	Flavour	15
7	Fruits	33
8	Legumes	7
9	Spices and condiments	7
10	Green vegetables	14
	Total	**117**

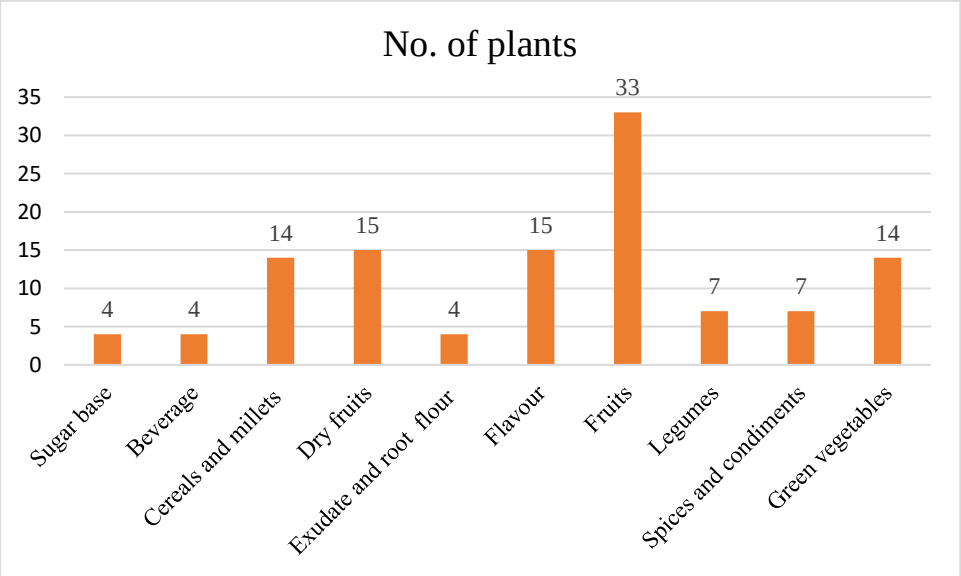


Figure 5: Categories of plants used to prepare different Indian sweets.

The variation in the ingredients is very commonly done in preparing sweets for example besan ka laddu (sweet round ball) prepared from clarified butter roasted gram flour with sugar is very simple to prepare but to add more flavour and texture to it one can add roasted semolina to it. To further add more nutritive value and taste to it dried almond powder as per the choice can also be added. In India all these changes are mostly done by the lady of the house. However various catering institutes and famous chefs also do these types of variations.

CONCLUSION

The plant analysis data shows that various Indian sweets are prepared mainly from 117 herbs belonging to 52 families native to large number of countries belonging to different continents. Most of the plants are cultivated in different climatic zones of India where varying climatic zones i.e. tropical, (dry and wet), sub-tropical, temperate and alpines are present and which provides a huge platform for their

cultivation. Different types of soil present in India also support the luxurious growth plants for better yield. Climates of northeastern India is best suitable for rhizomatous growth of zinger and turmeric. Different plants are also cultivated in more than one climatic zones which brings common ingredients available at distict place. Currently owing to fulfil the nutritional and health challenges alternative for sugar used for preparing various sweets is in great demand and plants serve as the best source for it. Recent researches focus on Stevia plant and is recommended as sugar base plant. However, more research should be focused on various plants ha
rnessing their sweeting agent property as well as their medicinal benefits so that the present Indian sweets can come up with more nutritive value to cater the needs of western world also.

ACKNOWLEDGEMENT

Authors are thankful to Parampujy Swami RamDev Ji Maharaj for his encouragements and support in various ways.

REFERENCES

1. Arya RP, Joshi RL. Rgveda Samhita. Sanskrit Text, English Translation, Notes and Index of Verses. https://www.exoticindiaart.com/book/details/rgveda-samhita-rig-veda-in-4-volumes-ide751/?affcode=aff11436.
2. Anonymous. Apastamba Dharmasutra. (600-300BC. Patrick Olivelle 2006, p. 178 with note 28.
3. Srikantha Murthy K. R Illustrated Susruta Samhita (Volume 1) English. https://www.chaukhambha.com/product/susruta-samhita-volume-1-english/
4. Singh V, Srivastava SK. (2014). Utilization of wild plants during Tinchhath festival in eastern Uttar Pradesh. Ethnobotany 26:103-105.
5. Jain V. (2020) Sweets as traditional medicine in winter season: An ethnobotanical study in Udaipur city, India. Ethnobotany Research & Applications 20:31: 1-17. http://dx doi.org/10.32859/.era20.31.1-17.
6. Gawande H, Dhotre AV, Shendurse AM. (2012). Low calorie traditional milk sweets in India: A review. Indian Food Industry. 31(2): 43-51.
7. www. e-flora.com Flora of China. Retrieved on October 14,2023.
8. www.eflora.com Flora of North America . Retrieved on October 14,2023.
9. e-flora of India. Retrieved on October 14,2023.
10. www.//eflora.com Flora of Pakistan. Retrieved on October 14,2023.
11. Biswas P, Anand U, Saha SC, Kant N, Mishra T, Masih H, Bar A, Devendra Kumar Pandey DK, Jha NK, Majumder M, Das N, Gadekar VS, Mahipal S, Shekhawat M, Kumar M, Radha Proćków J, Pérez de la Lastra JM, Dey A, Betelvine (*Piper betle* L.)(2022) . A comprehensive insight into its ethnopharmacology, phytochemistry, and pharmacological, biomedical and therapeutic attributes. J. Cell Mol Med. 3083–3119), doi: 10.1111/jcmm.17323.
12. Kokkini S., Hanlidou E., herbs of the Labiatae, in Encyclopedia of Food Sciences and Nutrition (Second Edition), (2003)UPS, Herb. Thunberg 22775.
13. https://powo.science.kew.org/results