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Comprehensive Overview of *Cucumis melo*

Preeti and PN Raju

Abstract
Cucumis melo which is commonly known as musk melon belongs to the family Cucurbitaceae and it is known as kharbuzah in Unani medicine. It is an annual climbing or creeping herb with angular, scabrous stem, simple soft hairy orbicular-reniform leaves and bears tendrils, by which it is readily trained over trellises. The aim of this review is to explore information available in Unani medicine and ethnobotanical literatures. Musk melons are extensively cultivated throughout India particularly in the hot and dry North-Western areas. Propagation is done by seeds and vegetative method. Main parts used are pulp, root, seeds and seed oil. It is having diuretic, emmenagogue, cooling, demulcent, aphrodisiac, galactagogue and astringent properties. Fruit has been used for several centuries to treat kidney disorders such as kidney and bladder stones, painful and burning micturition, ulcers in the urinary tract, suppression of urine and to treat cough, bilious diseases, hot inflammation of the liver, liver and bile obstruction, eczema, etc. The oil from seeds is said to be very nourishing and contains linoleic acid (60-70%), lecithin, cephalin and cerebroside isolated from seed oil. The seeds of melon contain multiflorenol, isomultiflorenol, 24-methylenecycloartenol, α- and β-amyrin, teraxerol, lupeol, euphol, 24-methyl-25(27)-dehydrocycloartanol, 24-methylene-24-dihydrolanosterol, 24-methylene-24-dihydroparkeol, tirucallol and cycloartenol. Its antimicrobial, antioxidant, anti-hyperlipidemic, anti-inflammatory, analgesic, diuretic, thyroid stimulatory, anthelmintic, nephroprotective and cytotoxic activity have been proved by research studies.

Keywords: *Cucumis melo,* Musk melon, nephroprotective, Unani

1. Introduction
Cucumis melo Linn. belongs to the family Cucurbitaceae. It is an annual climbing or creeping herb with angular, scabrous stem, simple soft hairy orbicular-reniform leaves and bears tendrils, by which it is readily trained over trellises. Flowers are unisexual and yellow. *Cucumis melo* is extensively cultivated for its fruits, eaten as a vegetable in many tropical countries. Sometimes it is naturalized in open scrub forests [1-3].

The many varieties of melon show great diversity in foliage and still more in the size and shape of the fruit, which in some kinds is as small as an olive and in others it is as large as the gourd; some are globular, others egg-shaped, spindle-shaped or serpent like, the outer skin smooth or netted, ribbed or furrowed and variously coloured. The flesh is white, green, or orange when ripe, scented or scentless, sweet or insipid; some are bitter and even nauseous. [2,4]

Cucumis melo is known as Kharbuzah in Unnai medicine. It has been used for several centuries to treat kidney disorders such as kidney and bladder stones, painful and burning micturition, ulcers in the urinary tract, suppression of urine and to cure cough, bilious diseases, hot inflammation of the liver, liver and bile obstruction, eczema, etc [1, 5-8].

Plant Taxonomy
Kingdom - Plantae Plants
Division - Magnoliophyta
Class - Magnoliopsida
Order - Cucurbitales
Family - Cucurbitaceae
Genus - Cucumis
Species - *Cucumis melo* Linn
Synonyms - *Cucumis callosus* (Rottl.) Cogn., *Cucumis trigonus* Roxb.

Synonyms: [9]

Table 1: Synonyms in Indian Languages.

Sr.	Name	Language	State/Region
1	Kharbooja, Kherbuj	Hindi, Punjabi, Haryanvi	Punjab, Haryana, Delhi, U.P.
2	Chibunda, Tarkaddi	Marathi	Maharashtra
3	Thumattikai, mulampazham	Tamil	Tamil Nadu
4	Budame Kayi, Kakkarike	Kannada	Karnataka
5	Kharmuj	Bengali	West Bengal
6	Tarbucha, Sakkarteti	Gujarathi	Gujarat
7	Madhuphala, Vrittakarkatii	Sanskrit	India
8	Chiral	Assamese	Assam
9	Thai Kumbalom	Malayalam	Kerala

Table 2: International Synonyms

Sr	Name	Language	Country/Region
1	Musk melon	English	U. K
2	Cantaloupe	English	USA
3	Cantaloupe	Arabic	Egypt, Iraq
4	Ying pi tian gua	Chinese	China
5	Melon	Danish	Denmark
6	Kanteloep, knobbelmeloen	Dutch	Netherland, Belgium
7	Cantaloup, melon cantaloupe	French	France, Haiti
8	Kantaloupe/Rippen-melone	German	Germany
9	Melone cantalupo	Italian	Italy
10	Kantarohpu	Japanese	Japan
11	Tembikai wangi	Malay	Japan
12	Melão cantaloupe	Portuguese	Portugal
13	Melón cantaloupe	Spanish	Spain, Mexico, Peru
14	Melon	Tagalog	Philippines

Vernacular Names:

Afghanistan - Sardapaliz, Sirdapaliz; *Arabic* - Battigh, Dummeiri, Kauun; *Bengal* - Kakri, Kakur, Kharmuj, Phuti; *Bombay* - Chibuda, Kakadi, Kharabuja; *Burma* – Takhva; *Chinese* - Kan, Kua, Tien Kua; *Danish* – Melon; *Dutch* – Meloen; *English* - Melon, Sweet Melon; *French*- Melon; *German* – Melone; *Gujarat* - Chibdu, Shakarateti, Tarbucha; *Hindi* - Kakri, Kharbuja, Khurbuj, Tuti; *Italian* - Pepone, Popone; *Japan* - Mukuwauri, Tenkwa; *Malaya* -Tien Kua, Tien Kwa; *Persian* - Kharbuzeh; *Russian* – Melon; *Sanskrit* - Amritavha, Ervaru, Kalinga, Kharbuja, Madhupaka, Shadbhuja; *Spanish*- Melon, Melon muscatel; *Sudan* – Tagesrarit; *Swedish* – Melon; *Tamil* - Kakarikkai, Vellarikkai; *Urdu* – Kharbuzah.[1-3, 10-12]

Habitat

Cucumis melo is extensively cultivated in gardens as well as in the sandy basins of rivers. Its centre of origin is supposed to be Africa. It is mentioned in some books as native of South Asia, which has come from the foot of the Himalayas to Cape Comorin, where it grows wild but it's cultivated in the temperate and warm region of the whole world [4]. Domestication of musk melon may have occurred independently in India, especially North and Central India. Many forms of melons varying in size, skin, pulp-colour and taste are cultivated in North and Central India [2, 3, 10, 13, 14].

Botanical Description

The morphology of Musk melon is remarkably stable for some characters whereas, the morphology of the same organ in differents fruits can be highly variable. Vines are monoecious or andro-monoecious. Musk melon vines trail along the ground, though they can be trained on a trellis or other support. Most musk melon vines are quite large and but breeders are developing more compact cultivars. Root system are large and superficial.Stems are ridged or striate. It sprawling branches produce broad green leaves, bright yellow flower, and tendrils. Seed are whitish or buff, flat, smooth, 5-15 mm long.

Fruits

Fruits very in size, shape and rind. The outer skin may be smooth, netted, ribbed, furrowed, yellow- brown, green, flesh yellow or pink. Ripe Musk melon fruit is nearly round, yellowish green, and rough textured. An immature Musk melon is green with a smooth rind, and may have shallow grooves depending on the cultivar.

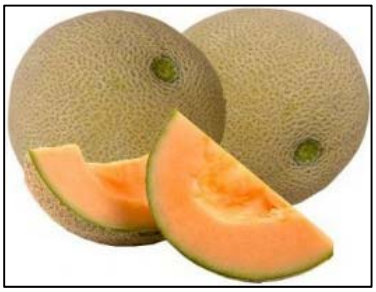

Fig 1: Musk melon fruits

Leaf

The Musk melon leaf is large, dark green, and rough. It is somewhat heart- shaped, orbicular, ovate or angled with 5-7 lobes. They have 5-8 cm diameter, They are dentate and base cordate The petioles are 4-10 cm long with simple tendrils. Musk melon leaves are sometimes confused with cucumber however, cucumber leaves (left) have sharply-pointed and toothed lobes.

Fig 2: Musk melon leaves

Flower

Musk melon flower are yellow and have separate male and female flowers on the same plant. The female flower is easily identified by the small fruit (ovary) below the petals. The male flowers lack the fruit stracture and falls of the plant after the pollen. Flowers are staminate, clustered, pistillate, solitary, hermaphrodite with 1-3 cm diameter. Calyx is 5-lobed, 6-8 cm long. Petals are free, round in shape, 2 cm long with 3 stamens.

Fig 3: Musk melon flower

Geographical Distribution

Native range- Iran, South Africa, India, China, Philippines and Australia.

Exotic range-Myanmar, Japan, Korea, Nepal, Pakistan, Saudi Arabia, Srilanka, Thailand, Yemen, Malaysia, Indonesia, New Guiena.

Africa- Angola, Benin, Cameroon, Egypt, Ethiopia, Ghana, Kenya, Maldives, Mali, Nigeria, Senegal, Somalia, Sudan, Tanzania, Uganda, and Zambia.

Pacific-Fiji Islands, Guam, New Britain, Samoa, Solomon Islands and Tonga.

USA-California, Arizona, Texas, Colorado, Georgia, Michigan, and New-York.

Phytochemistry

The unique aroma of melons is composed of many volatile compounds, biosynthetically derived from fatty acids, carotenoids, amino acids, and terpenes. The various volatile [15, 16] and non-volatile phytoconstituents present in *Cucumis melo*.

Meloside A, meloside L and their caffeoyl ester have been isolated from leaves. A-carotene, β-carotene, C-carotene and three more carotenes are also isolated. [10, 17] Sulphur compounds (mostly thioesters) are responsible for the characteristic aroma of the fruits. 3Methylpropanenitrile originating from 2-methyl-thiothyglucosinolate through the action of myrosinase thioglucoside glucohydrolase is a glucosinolate. The existence of myrosinase activity in fruit is because of 3- methylpropanenitrile. This activity seems to increase with the maturation of the fruit. Also, maximum activity of the l-amino cyclopropane-l-carboxylate oxidase was observed in the enzyme extracted from ripe melon fruits to which bicarbonate/ CO2 have been added. [1, 3, 13]

Fruits contain ferulic, caffeic and chlorogenic acids. Fruit stalk contains cucurbitacin B and E. [10] Fruit has urease, peptedase, protease and Vitamin A, B, C. [18] Volatile compounds of cucumber and musk melon were analysed and methyl-2-methylbutaoate-(2)-3 hexanal, 2hexanal, and ethyl-2 methyl propane were identified as the primary odorants. Ethyl 3propanate and 3- (methyl thio) propyl acetate have been considered to be of importance of aroma profile of the fruits. The green notes of musk melon are because of -2- and -3-hexenal, 1, 8-cineol and -1, 5-octadien-3-one. [3, 13]

Methanolic extract of *Cucumis melo* fruit contains a saponin (C40H64O16, mp, 158-59˚) which is identified as stigmasta-7-16-25(26) triene-3-O-β-D-glucopyranosyl (15)-O-β-Dxylofuranoside. Presence of curcumin and leptodermin is also reported in the fruits. [13] Linoleic acid (60-70%), lecithin, cephalin and cerebroside were isolated d from seed oil. The seeds of melon contain multiflorenol, isomultiflorenol, 24-methylenecycloartenol, α- and βamyrin, teraxerol, lupeol, euphol, 24-methyl-25(27)-dehydrocycloartanol, 24-methylene-24dihydrolanosterol, 24-methylene-24-dihydroparkeol, tirucallol and cycloartenol. [17]

In *Cucumis melo* seeds, Codisterol, 25(27)-dehydroporiferasterol, avenasterol, clerosterol, isofucosterol, stigmasterol, campesterol, sitosterol, 25(27)-dehydrochondrillasterol, 24βethyl-25-(27)-dehydrolathosterol, 24ξ-methyllathosterol, spinasterol and 22dihydrospinasterol were identified. [17] Cucurbit seeds are promising substitutes for various nuts in milk beverages. This is supported by evidence on the high enzyme activities of urease, lipase, lipoxygenase, trypsin inhibitors and low activity of β-amylase in musk melon. The seeds contain triterpenoid glucoside. [3, 13, 19] The protein content of seed meal is 49.93%. The seeds contain myristic acid, phosphates, galactane, lysine, citrulline, histidine, tryptophane, cystine. [18]

Table 4: Volatile Components Present In Musk Melon [15, 16]

Sr.	Volatile Components
1	Aliphatic Esters: Methyl acetate; Ethyl acetate; Propyl acetate, etc.
2	Aliphatic Alcohol: Ethanol; (Z) -3-Hexenol; 1-Hexanol; Nonenol; Nonanol etc.
3	Aldehydes, Ketones: Hexanal; 2-Ethylbutanal; 6-Methyl-3-heptanone etc.
4	Aromatic Aldehydes, Ketones: Benzaldehyde; Phenylacetaldehyde etc.
5	Aromatic Esters: Benzyl acetate; Phenylmethyl acetate etc.
6	Aromatic Alcohols: Benzyl alcohol; Phenyl ethyl alcohol etc
7	Lactones (γ,δ): γ –Octalactone; δ –Nonalactone etc.
8	Phenols: Eugenol
9	Sulphur compounds: Dimethyl disulfide; 2-(Methy1thio) ethanol etc.
10	Terpenoids: β-Pinene; 1,8-Cineol; Limonene; γ-Terpinene, p-Cymene etc.
11	Cyano Compounds: Benzyl cyanide; 3-(Methylthio) propanenitrile

Table 5: Non-Volatile Phytoconstituents of Musk Melon.

Sr.	Chemical Constituents	Source
1	β-Carotenes and Apocarotenoids [20]	Fruit
2	Phenolic compounds [21,22]: Flavonoids	Fruit, leaf, stem, seed
3	Carbohydrates [22,23]	fruits,seed
4	Vitamin C (Ascorbic acid) [24]	Fruit
5	Fatty acids [22]: Linoleic acid, α-Linolenic acid etc.	Seed
6	Glycolipids [25]: Monogalactosyldiacylglycerol, Digalactosyldiacylglycerol etc.	Kernel
7	Phospholipids [25]: Phosphatidylcholine, Phosphatidyl-ethanolamine etc.	Kernel
8	Amino Acids [23]	Seed
9	Cucurbitacins (A, B and E) [26,27]	Stem
10	Phenolic Glycosides [28]	Seed
11	Chromone derivatives [29]	Seed
12	inerals [24]: Iron, Zinc, Copper, Manganese, Calcium, Potassium and Phosphorous	Fruit,seed
13	Trypsin inhibitors (CMeTI-A and CMeTI-B) [30]	Seed

Ethnobotanical Uses

Ophthalmia (Amraz-e-Ain), [1-3, 13] liver disorders (Amraz-e-Jigar), [1, 3, 5, 8] kidney disorders (Amraz-e-Kuliya), [1, 3, 8, 31] chronic and bilious fevers (Khuna wa safravi humma), [1, 3, 5, 8, 32] cough due to heat (Garm Khansi), [5] painful and burning micturition (Hirquat-ulBaul), [1, 3, 5, 8, 33] burning sensation of the oesophagus (Hirquat-ul-Mari), [1, 33] kidney and bladder

stones (Hisat-e-Kuliya wa Masana), [5-7, 32, 33] ascites (Istisqa), [1, 3, 6] burning sensation (Jalan), [2, 3] insanity (Janoon), [1, 3, 10] improving complexion (Mumallisat-e-jild),[33] chronic and acute eczema (Muzmin wa Haad Naar-e-Farsi), [1, 10, 11, 14] suppression of urine (Quilat-eBaul), [1, 11, 14, 32] liver and bile obstruction (Tasuddud-e-Kabid wa Safra), [14] biliousness (Safravi Amraaz), [1, 33] vitiligo (Bars), [5, 8, 19] gonorrhoea (Suzak), [32, 33] fatigue (Thakawat), [1] thirst (Uttas), [1, 3, 5, 8] chest pain (Wajaus Sadar), [5, 8, 33] inflammation and ulcers in the urinary tract (Warm wa Qurooh-e-Majar-e-Bole), [6, 10, 32] hot inflammation of the liver (Warm-e-Jigar Har), [5, 33] bronchitis (Warm-e-Shobatyn), [1, 3, 31] dryness of the throat and tongue (Yaboosat-eHalaq wa Lisaan), [5, 8] jaundice (Yarqan), [6] sexual tonic and semen producing (Zau-e-Baah wa Muzayyad-e-Mani), [33] general debility (Zauf-e-Amoomi) [3, 31] and dyspepsia (Zauf-eHazm). [1, 3, 14, 31]

Pharmacological Studies

Analgesic and Anti-inflammatory activity: The methanolic extract of *Cucumis melo* seeds possesses potent analgesic property. Carrageenan induces accumulation of leukocytes in the pleural cavity, as well as the enhancement of LTB4 levels in pleural exudates after inflammatory stimulus. Migration of neutrophils to the affected area constitutes an important proinflammatory factor, as they liberate toxic oxygen radicals in the extracellular medium. *Cucumis melo* inhibited the leukocyte influx and diminished LTB4 levels, thereby producing anti-inflammatory effect [34].

Anti-oxidant and free radical scavenging activity: The methanolic extract of cantaloupe has shown DPPH and hydroxyl radicals scavenging activity. This activity of cantaloupe extract is particularly due to the presence of phenolic compounds especially flavonoids. High antioxidant activity was observed in the leaf and stem extracts of cantaloupe [35].

Anti-ulcer activity: The methanolic extract of *Cucumis melo* seeds exhibited anti-ulcerogenic activity. The mechanism of its gastro-protective activity may be attributed to reduction in vascular permeability, scavenging of free radicals and diminished lipid peroxidation along with strengthening of mucosal barrier. Presence of triterpenoids and sterols are responsible for these actions [36].

Anti-cancer activity: Cucurbitacins are highly oxygenated tetracyclic-triterpenes, predominantly found in the cucurbitaceae family. Cucurbitacin B is a natural anti-cancer agent isolated from the stems of *Cucumis melo*. The anti-cancer activity of cucurbitacin B in human leukemia cells has been reported. Cucurbitacin B inhibits STAT3 activation and the Raf/MEK/ERK pathway in leukemia cell line K562. Cucurbitacin A and cucurbitacin E also possess significant anti-tumour activity [37, 38].

Hepato-protective effect: The dried pedicel of *Cucumis melo* L has been observed to improve hepatic function and to increase gluconeogenesis. It has a protective effect against CCl4 intoxication. It is used to treat toxic and chronic hepatitis, jaundice and cirrhosis of liver [37].

Diuretic effect: The diuretic effect of *Cucumis melo* L. was tested in anaesthetised dogs. An ether extract of the seeds significantly increased the urinary volume and its chloride content. The mechanism for this increase in chloride content may be attributed to increased glomerular filtration rate and decreased tubular reabsorption [39].

Protects against hypothyroidism: Administration of three test fruit peel extracts (Mangifera indica, *Citrullus vulgaris* and *Cucumis melo*) significantly increased both the thyroid hormones (T3 and T4) with a concomitant decrease in tissue lipid peroxidation, suggesting their thyroid stimulatory and antiperoxidative role. This thyroid stimulatory nature was also exhibited in propylthiouracil induced hypothyroid animals [40].

Anti-diabetic activity: The fruit peel extracts of *Cucumis melo* reversed the CCT-diet (supplemented with 4% cholesterol, 1% cholic acid and 0.5% 2-thiouracil) induced increase in the levels of tissue lipid peroxidation, serum lipids, glucose, creatinine kinase-MB. Furthermore, Musk melon increased the levels of thyroid hormones and insulin indicating their potential to ameliorate the diet induced alterations in serum lipids, thyroid dysfunctions and hyperglycemia/diabetes mellitus. These beneficial effects could be due to the rich content of polyphenols and ascorbic acid in the peel extracts [41]. Oxykine is the cantaloupe melon extract rich in vegetal superoxide dismutase (SOD) covered by polymeric films of wheat matrix gliadin. The treatment of oxykine ameliorated the progression and acceleration of diabetic nephropathy in type 2 diabetic rodents. The oxykine reduced the diabetes-induced oxidative stress and renal mesangial cell injury. Oxykine might be a novel approach for the prevention of diabetes nephropathy [42].

Prevention of atherosclerosis: The chronic consumption of Musk melon juice helps in prevention of atherosclerosis and liver steatosis [43]. Adenosine isolated from an aqueous melon extract inhibited human platelet aggregation induced by epinephrine, ADP, collagen, thrombin, sodium arachidonate, prostaglandin endoperoxide analogue U-46619 and PAF-acether[44]. This activity of Musk melon may be helpful in the management of cardiovascular diseases.

Anti-microbial activity and anthelmintic activity: The n-hexane and methanolic extracts of the seeds of *Cucumis melo* L. have shown good antimicrobial, and anthelmintic activity [29]. *Cucumis melo* is also used as a vermifuge [45].

Anti-fertility activity: *Cucumis melo* is a favourite plant of Bhat community for regulating fertility [46].

Immuno-modulato: The combination of SOD-rich melon extract and wheat gliadin (Glisodin®) increased specifically the production of type 1 helper T lymphocytes (Th1) as well as the expression of INFgamma and IL-4. However, the production of IgE (allergic) remained marginal and the production of IgA did not change, thereby reinforcing the hypothesis of the immunomodulatory action of Glisodin®. This action might result from the activation of antigen presenting cells (APC) by the gliadin-SOD combination. This activation induces the release of nitric oxide and H2O2, which in turn activates catalase and Gpx, followed by the expression of the INF-gamma and IL-4 cytokines. Then the immune response is modulated by the activated APC towards a Th1 response [47].

Conclusion

Cucumis melo which is known as kharbuzah in Unnai

medicine has been used for several centuries to treat different kinds of ailments by Unani physicians. There are large number of phytoconstituents have been discovered. However, very few pharmacological studies have been carried out to prove its beneficial effects scientifically. Hence, this review will serve as base for further studies to validate the claims mentioned in the Unani medicine and ethnobotanical literatures.

Reference

1. Kirtikar KR, Basu BD. Indian Medicinal plants. 2nd ed, Dehra Dun: International Book Distributors 1987; II:1140-1142.
2. Parrotta JA. Healing plants of peninsular India. USA: CABI Publishing, 2001, 254- 255.
3. Prajapati ND, Purohit SS, Sharma AK, Kumar T. A handbook of medicinal plants. India, Agrobios, 2001, 176.
4. Biswas PK. Encyclopaedia of medicinal plants. New Delhi, Dominant publishers and distributors 2006; III:584, 585
5. Ibn-e-Baitar, Aljamaiul Mufradat-ul Advia Wal Aghzia. V.I (Urdu Trans), New Delhi, CCRUM, 2003, 248-252.
6. Kabiruddin M. Makhzanul Mufradat. Lahore, Sheikh Mohammad Bashir & Sons, 1951, 266.
7. Ibn-e-Rushd AWMB. Kitabul kuulliyat (Urdu Trans). New Delhi, CCRUM, 1987, 255.
8. Hakeem MA. Bustan-ul Mufradat. Lucknow, Idara Taraqqi Urdu Publications, 1311 H., 159.
9. Khare CP. Ayurvedic pharmacopoeial plant drugs (Expanded therapeutics), CRC Press taylor & francis group, 2016, 205.
10. Joshi SG. Medicinal plants. New Delhi, Oxford & IBH publishing Co. Pvt. Ltd, 2000, 156.
11. Chopra RN, Chopra IC, Handa and Kapoor. Chopra's indigenous drugs of India. 2nd end Calcutta UN Dhur and Sons Private Ltd, 1958, 502.
12. The useful plants of India. New Delhi Publication & information directorate, council of science & industrial research, 1992, 149.
13. The wealth of India. Vol. II, New Delhi, National institute of science communication, Council of science & industrial research, 2001, 252-253.
14. Nadkarni KM. Indian Materia Medica. Vol. I, Bombay, Popular Prakashan, 1989, 402-403.
15. Homatidou VI, Karvouni SS, Dourtoglou VG, Poulos CN. Determination of Total Volatile Components of *Cucumis melo* L. Variety Cantaloupensis. J Agrlc. Food Chem. 1992; 40:1385-1388.
16. Kourkoutas D, Elmore JS, Mottram DS. Comparison of the volatile compositions and flavour properties of cantaloupe, Galia and honeydew musk melons. Food Chemistry. 2006; 97(1):95-102.
17. Rastogi RP, Mehrotra BN. Compendium of Indian Medicinal Plants. Vol. II (1970-1979), Lucknow, Central Drug Research, and New Delhi, Publication & Information Directorate, 1991, 228.
18. Perry LM. Medicinal plants of east and Southeast Asia. Cambridge, London, MIT Press, 1980, 253.
19. Trease GE, Evans WC. Pharmacognosy. London, New York, W.B. Saunders, 2002, 473.
20. Fleshman MK, Lester GE, Riedl KM, Kopec RE, Narayanasamy S, Curley RW, Schwartz SJ, Harrison EH. Carotene and Novel Apocarotenoid Concentrations in Orange Fleshed *Cucumis melo* Melons: Determinations of β-Carotene Bioaccessibility and Bioavailability. J Agric Food Chem 2011; 59(9):4448-4454.
21. Tadmor Y, Burger J, Yaakov I, Feder A, Libhaber SE, Portnoy V *et al.* Genetics of flavonoid, carotenoid, and chlorophyll pigments in melon fruit rinds. J Agric Food Chem. 2010; 58(19):10722-10728.
22. Ismail M, Mariod A, Bagalkotkar G, Hoe SL. Fatty acid composition and antioxidant activity of oils from two cultivars of Cantaloupe extracted by supercritical fluid extraction. Grasas Y Aceites 2010; 61(1):37-44
23. Hu Mian-hao, Ao Yansong. Characteristics of some nutritional composition of melon (*Cucumis melo* hybrid 'ChunLi') seeds. International Journal of Food Science and Technology. 2007; 42:1397-1401
24. Keng CL, Hoong LK. In vitro plant regeneration from nodal segments of musk melon (*Cucumis melo* L). Biotechnology 2005; 4(4):354-357
25. Hemavatahy J. Lipid composition of melon (*Cucumis melo*) kernel. Journal of Food Composition and analysis. 1992; 5(1):90-95.
26. Chen C, Qiang S, Lou L, Zhao W. Cucurbitane-type triterpenoids from the stems of *Cucumis melo*. J Nat Prod. 2009; 72(5):824-9.
27. Wang J, Zhou X, Cao Y, Xiao J, Ma E, Deng Y, Chen D. The antitumor activities of Cucurbitacin Liposome for Injection both in vitro and in vivo. Asian Journal of Traditional Medicines. 2007; 2(3):98-103.
28. De Marino S, Festa C, Zollo F, Iorizzi M. Phenolic glycosides from *Cucumis melo* var. inodorus seeds. Phytochemistry Letters. 2009; 2(3):130-133.
29. Ibrahim SR. New 2-(2-phenylethyl) chromone derivatives from the seeds of Cucumismelo L var. reticulatus. Nat Prod Commun 2010; 5(3):403-6
30. Lee CF, Lin JY. Amino acid sequences of trypsin inhibitors from the melon *Cucumis melo*. J Biochem. 1995; 118(1):1822.
31. Pullaiah T. Encyclopaedia of world medicinal plants. New Delhi, Reagency publication 2006; II: 674-675.
32. Ram Labaya. Goswami Bayanul Advia. Delhi, Goswami Pharmacy 1984; I:232-234.
33. Ghani MN. Khazain-ul-Advia. Lahore, Pakistan, Sheikh Basheer Ahmad & Sons, 1920, 495- 498.
34. Gill NS, Bajwa J, Sharma P, Dhiman K, Sood S, Sharma PD, Singh B and Bali M. Evaluation of therapeutic potential of traditionally consumed *Cucumis melo* seeds. Asian Journal of Plant Sciences. 2011; 10 (1): 86-91.
35. Ismail HI, Chan KW, Mariod AA, Ismail M. Phenolic content and antioxidant activity of cantaloupe (*Cucumis melo*) methanolic extracts. Food Chemistry. 2010, 119 (2): 643-647 5.
36. Gill NS, Bajwa J, Sharma P, Dhiman K, Sood S, Sharma PD. Evaluation of antioxidant and anti-ulcer activity of traditionally consumed *Cucumis melo* seeds. Journal of Pharmacology and Toxicology 2011; 6(1):82-89.
37. Wang J, Zhou X, Cao Y, Xiao J, Ma E, Deng Y *et al*. The antitumor activities of Cucurbitacin liposomes for injection both in vitro and in vivo. Asian Journal of Traditional Medicine.
38. Chan KT, Li K, Liu SL, Chu KH, Toh M, Xie WD. Cucurbitacin B inhibits STAT3 and the Raf/MEK/ERK pathway in leukemia cell line K562. Cancer Lett 2010; 289(1):46.
39. Wright CI, Van-Buren L, Kroner CI, Koning MM.

Herbal medicines as diuretics: a review of the scientific evidence. J Ethnopharmacol. 2007; 114(1):1-31.
40. Parmar HS, Kar A. Protective role of Mangifera indica, *Cucumis melo* and *Citrullus vulgaris* peel extracts in chemically induced hypothyroidism. Chem Biol Interact 2009; 177(3):254-258.
41. Parmar HS, Kar A. Possible amelioration of atherogenic diet induced dyslipidemia, hypothyroidism and hyperglycemia by the peel extracts of Mangifera indica, *Cucumis melo* and *Citrullus vulgaris* fruits in rats. Biofactors 2008; 33(1):13-24.
42. Naito Y, Akagiri S, Uchiyama K, Kokura S, Yoshida N, Hasegawa G *et al*. Reduction of diabetes-induced renal oxidative stress by a cantaloupe melon extract/gliadin biopolymers, oxykine, in mice. Biofactors. 2005; 23(2):85-95.
43. Dé cordé K, Ventura E, Lacan D, Ramos J, Cristol JP, Rouanet JM. An SOD rich melon extract Extramel® prevents aortic lipids and liver steatosis in diet-induced model of atherosclerosis. Nutr Metab Cardiovasc Dis. 2010; 20(5):301-7.
44. Altman R, Rouvier J, Weisenberger H. Identification of platelet inhibitor present in the melon (Cucurbitaceae *Cucumis melo*). Thromb Haemost. 1985; 53(3):312-3.
45. Zinchenko TV, Mindlin MZ, Prokopovich NN. Anthelmintic properties of Cucumis melo seeds. Farmakol Toksikol. 1955; 18(5):41-43.
46. Lal D, Lata K. Plants used by the Bhat community for regulating fertility. Econ Bot. 1980; 34(3):273-275.
47. Vouldoukis I, Conti M, Kolb JP, Calenda A, Mazier D, Dugas B. Induction of Th1- dependent immunity by an orally effective melon superoxide dismutase extract. Curr Trends Immunol 2003; 5:141-145.