IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A Review on Musk melon

Deepak Dhami

Lovely Professional University

Abstract

Musk melon (*Cucumis melo*) is a beautiful, juicy, fruit of the Cucurbitaceae family, which includes 825 species in 118-119 genera. This family contains all the edible gourds, such as cucumbers, watermelons, Musk melons, squash, and pumpkins. Musk melon is cultivated in all tropical and subtropical areas of the world for its nutritional and medicinal value. The fruit is commonly known as Kharbooja in Hindi and Musk melon or Cantaloupe in English. *Cucumis melo* has been shown to possess useful medicinal properties such as analgesic, anti-inflammatory, anti-oxidant, free radical scavenging, anti-platelet, anti-ulcer, anti-cancer, anti-microbial, hepato-protective, diuretic, anti-diabetic, anthelmintic and anti-fertility activity.

Keywords: Musk melon, Fruits, Beverages

Introduction

Cucumis melo L. (Reticulatus group), commonly called as cantaloupe or muskmelon, is a member of the Cucurbitaceae family (Bailey, 1976). Consumer preference for this fruit is determined largely by its sweetness (i.e sugar content), flavor or aroma, texture and more recently as a rich source of phytonutrients (Lester, 2008). Cucumis melo, in addition to its superior consumer preference, is an extremely healthful food choice as they are rich in ascorbic acid, carotene, folic acid, and potassium as well as a number of other human health-bioactive compounds (Lester and Hodges, 2008).

Squash, pumpkins, cucumbers, musk melons, watermelons, and gourds are members of the Cucurbitaceae family. Musk melon is a juicy, delicious and tasty fruit, famous for its nutritional and medicinal properties *Cucumis melo* (Cantaloupe or Musk Melon) is one of India and Africa's most common cultivated cucurbits. It's a more or less hairy vine that spreads, annually. It grows well across all of the world's tropical and subtropical areas, but prefers hot climate. Musk melon is prescribed as a diuretic, stomachic, anti-tussive and as a vermifuge for treating cardiovascular disorders

Brief history :

Musk melon was first described in species planetarum by Linné in the year 1753. This is a member of the Cucurbitaceae family which has some 118 genera and 825 species described. The origin of Musk melon has been questioned but recent reports clearly suggest the origin of Musk melon in South and East Africa. Musk melon is likely grown in China since 2000 years BC. Many cultivars and various types of fruit have developed in the tropical and subtropical regions all over the world. The largest production of musk melons is from China and the USA.

Natural Habitat :

The musk melon is cultivated in the Punjab and Rajasthan regions of India. Musk melon is quickly spread out from cultivation into the forests as feral. Near agricultural fields, townships, and riverbeds are natural ecosystems. They grow well on a large array of types of soil. Medium-textured soils (loams) generally yield higher yields and melons of greater quality. The soil has to show strong internal and surface drainage in all situations. The pH would be above 5.8 and should ideally be similar to 6.2.

Botanical Description :

The morphology of Musk melon is remarkably stable for some characters whereas, the morphology of the same organ in different 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, but breeders are developing more compact cultivars. Root system is large and superficial. Stems are ridged or striate. Its sprawling branches produce broad green leaves, bright yellow flowers, and tendrils. Seeds are whitish or buff, flat, smooth, 5-15 mm long.

Fruit :

Fruits are variable in size, shape and rind. The outer skin can be smooth, ribbed, furrowed, gray- brown , black, purple, fleshy or pink. Ripe Musk melon fruit is almost purple, yellowish white, and rough in texture. An immature musk melon is green with a smooth rind, and depending on the cultivar, may have shallow grooves. Most fruits are seeded.

Leaf :

The leaf of the musk melon is long, dark green, and rough. It is heart-shaped, orbicular, ovate, or pointed by 5-7 lobes. They have a diameter of 5-8 cm, they 're dentate and cordat base. The petioles and simple tendrils are 4-10 cm long. Nevertheless, musk melon leaves are often confused with cucumber, cucumber leaves (left) have sharply spiked and dented lobes.

Flower :

Musk melon flowers are yellow on the same plant, and have different male and female flowers. The tiny fruit (ovary) under the petals quickly distinguishes the female flora. The male flower lacks the structure of the fruit and will fall off the plant after the pollen is poured out. Flowers with a diameter of 1-3 cm are staminate, clustered, pistillate, solitary or hermaphrodite. Calyx measures 5 lobes, 6-8 mm long. The petals are free, shapely round, 2 cm long, with three stamens.

Nutrients and micronutrients in 100 g of fresh melon fruit :

Nutrient	Amount of cantaloupe	Amount of honeydew
protein	1.34 g	0.86 g

carbohydrate	13.06 g	14.54 g
Fat, total	0.30 g	0.22 g
Dietary fiber	1.4 g	1.3 g
calories	54.0 kcal	58 kcal
water	144.24 g	143.71 g

Macronutrients in 100 g of fresh melon fruit : (Lester 1997)

nutrient	**Amount in cantaloupe**	**Amount on honeydew**
carbohydrate		
starch	0.03 g	0.00 g
Total sugars	7.86 g	8.12 g
monosaccharides	3.3 g	
fructose	1.86 g	2.96 g
glucose	1.53 g	2.68 g
galactose	0.06 g	0.00 g
disaccharides	4.10 g	
maltose	0.04 g	0.00 g
fat		
Polyunsaturated fat	0.13 g	0.06 g
Saturated fat	0.08 g	0.04 g
Trans fat	0.00 g	0.00 g
Calories from fat	2.74	
Calories from saturated fat	0.73	
Calories from trans fat	0.00	
cholesterol	0.00 mg	0.00 mg
Individual fatty acids		
Omega-3 fatty acids	0.04 g	
Omega-6 fatty acids	0.04 g	
18:2 linoleic	0.04 g	0.03 g

18:3 linolenic	0.04 g	0.03 g
16:0 palmitic	0.04 g	0.03 g
18:0 stearic	0.08 g	0.008 g

Vitamin content in 100 g of fresh melon : (Eitenmiller et al., 1985).

vitamins	**Amount in cantaloupe**	**Amount in honeydew**
Water soluble		
B-complex vitamins		
Vitamin B1	0.75 mg	0.42 mg
Vitamin B2	0.02 mg	0.02 mg
niacin	0.75 mg	0.42 mg
Vitamin B6	0.13 mg	0.04 mg
Vitamin B12	0.00 µg	0.00 µg
Betaine	0.125 mg	
Choline	7.62 mg	7.62 mg
Folate	21.25 µg	30.0 µg
Folate (DFE)	21.25 µg	18.75 µg
Folate (food)	21.25 µg	18.75 µg
Pantothenic acid	0.10 mg	0.16 mg
Vitamin C	28.72 mg	18.0 mg
Fat soluble		
Vitamin A (retinoids and carotenoids)		
Vitamin A	3382.0 IU	
Vitamin A	169.10 µg (RAE)	3.125 µg
Vitamin A	338.20 µg (RE)	
Retinol	0.00 µg (RE)	0 µg
Carotenoids	338.2 mcg (RE)	
Alpha-carotene	16.25 µg	0 µg
Beta-carotene	2020.00 µg	30 µg
Beta-carotene equivalents	2028.50 µg	
Cryptoxanthin	1.25 µg	0 µg

Lutenin and zeaxanthin	26.25 µg	27.15 µg
Vitamin E	0.06 mg (ATE)	0.02 mg
Vitamin E	0.0.8 IU	
Vitamin E	0.06 µg	
Vitamin K	2.5 µg	2.8 µg

Origin and Distribution

Muskmelon is said to be a native of tropical Africa more specifically in the eastern region, south of Sahara Desert. The secondary centers of diversity are Central Asia, Southern Russia, Iran, Afghanistan, Pakistan, North-West India and China. It was first cultivated in Egypt during 2400 BC. It was introduced into the USA by Columbus in 1494. It is now grown both in the Old World and the New World.

Area and Production :

The production of cantaloupes and melons in the world is 28 million tonnes. In India, the area under muskmelon is 54 (‘000) hectares with a production of 1231 (‘000) MT (Horticultural Statistics at a Glance, 2018). The major melon growing states are Uttar Pradesh, Haryana, Punjab, Rajasthan, Madhya Pradesh, Andhra Pradesh, Maharashtra and Gujrat.

Importance and Uses :

Muskmelon consumed as dessert mainly. Per 100 g of edible portion of muskmelon contain 78% edible portion, 95.2% moisture, 17 k-cal energy, 3.5 g carbohydrate, 32 mg calcium, 14 mg phosphorus, 1.4 mg iron, 169 µg carotene and 26 mg Vitamin C (Bose *et al.*,2002). Muskmelon provides relief in constipation, acidity, diarrhea etc. It maintains skin texture, removes oil spots, prevents baby from birth defects and regulates blood flow during menstruation etc.

Climate and Soil :

The muskmelon raised as warm season crop. The optimum temperature for its growth is 20-25 ℃. The seeds show poor germination if the temperature falls below 18℃. High temperature and low humidity at fruit ripening stage enhance the sweetness and aroma of the fruits. Muskmelons are susceptible to frost but tolerant to drought. Muskmelons thrive best in loamy to sandy loamy texture of soil and the desired pH should be 6-7.5.

Methods of Sowing and Planting :

Muskmelon is direct seeded and transplanted. Seeds are sown in pits and on raised beds while in riverbed cultivation seeds are sown in trenches. The pits of the dimension, 60 cm x 60 cm and 45 cm depth are dug at distance of 150 – 200 cm between channels and 60 – 90 cm apart from hills. Generally, 5-6 seeds are sown in each pit at a depth of 1-1.5 cm. Later on, when the plants are well established, only 2 or 3 plants in each pit are allowed to grow and the rest are uprooted.

Table 2: Time of sowing and transplanting

Region/ Cultivation type	**Time of sowing / Sowing period**
In northern plains	If directly sown; Middle of February to early March If seedling raised; End of January or first -week of February
In western and southern regions	October/November to January
In riverbed cultivation	In November

Seed Rate :

About 1.5 to 2 kg seeds is required for one hectare for open pollinated varieties whereas, for F1 hybrids is about 500-800 g per hectare.

Manures and Fertilizers :

The requirement of fertilizers varies with the soil type, fertility status, climate/ season and location wise. FYM should be applied to the soil at the time of land preparation. The dug pits are also filled with manure and fertilizer mixture, a week prior to sowing of seeds. In the case of nitrogenous fertilizers, only one-third of quantity is mixed with the soil at the time of field preparation. The rest of nitrogen is given as basal applications twice during the early stages of vine growth, the first after 25-30 days of sowing followed by the second after another 25-30 days.

Irrigation :

The crop should be irrigated at 4-6 days interval during summer. While giving the irrigation care should be taken that fruit do not come in contact with water and over-watering should be avoided, particularly at fruit maturity stage.

Intercultural Operation :

Light hoeing during initial stages of vine growth helps to check the weeds. Dry grass or straw mulches are recommended for mulching so that fruits do not come **582**© 2020 in contact with water.

Harvesting :

The fruits for home consumption or local market are harvested at full maturity. The maturity indices for muskmelon are full slip stage (the mature fruits separate/ slips easily from the stem leaving a complete scar) and half slip stage (only half of the stems separates leaving an incomplete/ half scar). At the fruit ripening stage, the rind becomes soft, skin colour changes from green to yellow, yellow-green to brown, slight odour at blossom end and development of an abscission layer or crack at the stem attachment point. Normally the fruits ripen after 6 to 10 weeks of anthesis, or
90-125 days after seed sowing depending on the cultivar.

Storage :

Muskmelon fruit being climacteric ripen during transportation and storage The harvested fruits can be stored for 5-10 days at 5°C and 95 percent relative humidity.

Yield :

The average yield is about 10-12 tonnes per hectare (Choudhary *et al.*, 2013).

Important Diseases :

i) ***Powdery Mildew***

This is a fungal disease caused by *Erysiphe cichoracearum*. Symptoms first appear as white nearly or fluffy, somewhat circular patches or spots which appear on the under-surface of leaves. Severely infested leaves become brown and shriveled and defoliation may occur. Fruit of the affected plants do not develop fully and remain small.

Control: Karathane @ 6 g in 10 litre of water or Bavistin @ 1 g per litre of water control the disease, if sprays are given when the first initial symptoms appear. The sprays will have to be repeated at least thrice, at 5-6 days interval. Varieties like Campo and Jacumba are resistant to powdery mildew.

ii) ***Fusarium Wilt***

The causal organism of this disease is a fungus identified as *Fusarium oxysporum* subsp. *Niveum*. In young seedlings, cotyledons droop and wither. In older plants, leaves wilt suddenly and vascular bundles in the collar region become yellow/ brown.

Control: The disease can be checked to some extent by drenching the soil with captan and hexocap or thiride 0.2% to 0.3% solution. Resistant varieties like Golden Gopher, Harvest Queen and Delicious-51 should be grown.

Pest :

Aphids: These small green insects (*Aphis* sp.) damage the plants by sucking the leaf sap. In young stage, cotyledonary leaves crinkle and in severe case the plants become wither while in grown up vines the leaves turn yellow and plant loses its vigour and yield.

Control:

iii) The aphids can be easily controlled by spraying metasystox @ 0.1-0.2% or rogor 0.1-0.2%

Pharmacological Effects :

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 LTB 4 levels in pleural exudates after inflammatory stimulus. Migration of neutrophils to the affected area constitutes an important pro- inflammatory factor, as they liberate toxic oxygen radicals in the extracellular medium. Cucumis melo inhibited the leukocyte influx and diminished LTB 4 levels, thereby producing anti-inflammatory effect. (Gill NS, et., 2011)

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. (Ismail HI, et al., 2010).

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. (Bajwa J, et al., 2011).

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. (Wang J, et al., 2007) (Chan KT, et al.,2010)

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 CCl 4 intoxication. It is used to

treat toxic and chronic hepatitis, jaundice and cirrhosis of liver. (Zhou X, er al., 2007).

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. (Wright CI, et al.,2007).

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. (Parmar HS, Kar A. 2008) 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. (Naito Y, et al., 2005).

Prevention of atherosclerosis - The chronic consumption of Musk melon juice helps in prevention of atherosclerosis and liver steatosis. (Dé cordé K, et al., 2010) 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. (Altman R, et al., 1985) 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. (Ibrahim SR. 2010) Cucumis melo is also used as a vermifuge. (Zinchenko TV, et al.,1955)

Anti-fertility activity - Cucumis melo is a favourite plant of Bhat community for regulating fertility. (Lal and Lata 1980).

REFERENCES :

1. Bailey, L. H. and Bailey, E. Z. 1976. Hortus Third. Macmillan Pub. Co. New York.

2. Lester, G. E. 2008. Antioxidant, sugar, mineral, and phytonutrient concentrations across edible fruit tissues of orange- fleshed Honeydew melon (*Cucumis melo* L.). Journal of Agricultural and Food Chemistry 56: 3694-3698.

3. Lester, G. E. and Hodges, D. M. 2008. Antioxidants associated with fruit senescence and human health: Novel orange fleshed non-netted honey dew melon genotype comparisons following different seasonal productions and cold storage durations. Postharvest Biology and Technology 48: 347-354.

4. Bose, T.K., Kabir, J., Maity, T.K., Parthasarthy, V.A., Som, M.G., 2002. Vegetable Crops. In: Cucurbits. *Naya Prokash*, 1(3), 493-584.

5. 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.

6. Ismail HI, Chan KW, Mariod AA and Ismail M. Phenolic content and antioxidant activity of cantaloupe (*Cucumis melo*) methanolic extracts. Food Chemistry. 2010, 119 (2): 643-647

7. Gill NS, Bajwa J, Sharma P, Dhiman K, Sood S, Sharma PD, Singh B and Bali M. Evaluation of antioxidant and anti-ulcer activity of traditionally consumed *Cucumis melo* seeds. Journal of Pharmacology and Toxicology; 2011; 6 (1): 82-89.

8. 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.

9. 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):46-52.

10. 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.

11. Parmar HS and 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.

12. 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.

13. Naito Y, Akagiri S, Uchiyama K, Kokura S, Yoshida N, Hasegawa G, Nakamura N, Ichikawa H, Toyokuni S, Ijichi T, Yoshikawa T. Reduction of diabetes-induced renal oxidative stress by a cantaloupe melon extract/gliadin biopolymers, oxykine, in mice. Biofactors. 2005; 23 (2): 85-95.

14. 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.

15. Altman R, Rouvier J, Weisenberger H. Identification of platelet inhibitor present in the melon (Cucurbitaceae *Cucumis melo*). Thromb Haemost. 1985; 53 (3):312-3.

16. Ibrahim SR. New 2-(2-phenylethyl) chromone derivatives from the seeds of *Cucumis melo* L var. *reticulatus*. Nat Prod Commun 2010; 5 (3): 403-6

17. Zinchenko TV, Mindlin MZ, Prokopovich NN. Anthelmintic properties of *Cucumis melo* seeds. Farmakol Toksikol. 1955; 18 (5): 41-43.

18. Lal D and Lata K. Plants used by the Bhat community for regulating fertility. Econ Bot. 1980; 34 (3): 273-275.

19. Lester, G.E., 1997. Melon (Cucumis melo L.) fruit nutritional quality and health functionality. Hort. Technol. 7 (3), 222227.

20. Eitenmiller, R.R., Johnson, C.D., Bryan, W.D., Warren, D.B., Gebhardt, S.E., 1985. Nutrient composition of cantaloupe and honeydew melons. J. Food Sci. 50 (1), 136138.