‘Kashi Madhu’: A New Muskmelon Cultivar with High Total Soluble Solids

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Abstract. ‘Kashi Madhu’ (*Cucumis melo* L.) is a new muskmelon cultivar released for agroecological zone IV of India comprising the states of Uttar Pradesh, Uttaranchal, Delhi, Punjab, and Bihar. The cultivar was developed through selection from a local landrace. Plants bear androemonocious flowers, round and yellow fruits with prominent green sutures and orange flesh color. The fruits become ready for first harvest in ≈ 90 days from seed sowing. The fruits have a distinct flavor and higher total soluble solids as compared with other cultivars recommended for cultivation in India after evaluation under different agroecological zones of India under the All India Coordinated Research Project on Vegetable Crops. The release of this cultivar was announced at the XIII meeting of Central Sub-committee on Crop Standard Notification and Release of Varieties for Horticultural Crops.

Muskmelon (*Cucumis melo* L.) is one of the most important dessert cucurbits throughout the world. The crop is annual with climbing, creeping, or trailing vines, and its fruits are many-seeded pepo. In India, many muskmelon landraces are grown in different regions. Lucknow safeda, Baghpat melon of Meerut, Jaunpuri netted, Mau melon, Kajari of Allahabad (Uttar Pradesh), Tonk melon of Rajasthan, Kharri melon of Hosangabad of Madhya Pradesh, Goose melon and Kaviti Jam or Neel of Northern Maharashtra, Bathesa of Andhra Pradesh, and Haridhari of Punjab are a few common landraces grown by farmers using their own saved seeds. In India, muskmelon breeding programs were strengthened with the beginning of the All India Coordinated Research Project on Vegetable Crops (AICRP-VC) in 1971. Seven cultivars such as ‘Pusa Sarbati’, ‘Hara Madhu’, ‘Pusa Madhuras’, ‘Arka Rajhans’, ‘Arka Jeet’, ‘Durgapur Madhu’, and ‘Narendra Muskmelon-15’ have been identified through AICRP-VC for cultivation in different agroecological zones (Rai et al., 2006). Among the identified cultivars, only ‘Hara Madhu’ has been widely cultivated by farmers. Cultivars of muskmelon having orange-colored flesh and prominent green sutures on the outer surface of fruit are preferred by the Indian consumers (More, 2003). In this article, we report the release of ‘Kashi Madhu’, a cultivar with better agronomic performance and higher total soluble solids (TSS) as compared with those of current cultivars available to Indian farmers.

Origin

‘Kashi Madhu’ originated from an open-pollinated landrace, Mau melon, grown in a farmer’s field in Eastern Uttar Pradesh (District Mau). During 1999, landraces collected from the farmer’s field were grown at the research farm of Indian Institute of Vegetable Research, Varanasi. Five plants were identified having fruits with prominent dark green sutures. The flesh color of their mature fruits was orange (RHS 23B; Royal Horticultural

Society, 2001), which was distinct from those of other collected landraces. These plants were disease-free despite severe infection of powdery mildew (*Sphaerotheca fuliginea*) and muskmelon mosaic on other plants, including released varieties like ‘Hara Madhu’ and ‘Arka Jeet’. These plants were self-pollinated and the seeds were collected separately; individual plant progenies were grown, and single plant selection was based on fruit length, diameter, weight, and TSS in addition to uniform fruit and flesh color. In the next generation, seeds from all the fruits of the selected plant were sown and 25% plants were selected based on flesh color, fruit color, and TSS. To increase the seeds, plants were self-pollinated for three seasons; plants were also grown in a polyhouse during the off-season (September to December).

Description

Plants of ‘Kashi Madhu’ have a long vine with dark green foliage. Plants are andromonoecious with 10 : 1 male to female flower ratio; usually the first female flower appears on seventh or the eighth node of the vine. Fruits are round, yellow (RHS 13A; Royal Horticultural Society, 2001) and have prominent green sutures on rind at maturity (Fig. 1). The fruit flesh color is orange (RHS 23B; Royal Horticultural Society, 2001) at edible maturity. The fruit weight ranges between 650 to 785 g with an average length to diameter ratio of 1.16 : 1. The fruits become ready for first harvest in ≈ 90 d from seed sowing. The flavor of fruit is musky and TSS content (13.24%) is higher compared

Fig. 1. Mature fruits of ‘Kashi Madhu’.

Table 1. On-station performance² of muskmelon cultivars for yield, yield attributes, and total soluble solids.³

Cultivars	Fruit length (cm)	Fruit diam (cm)	Fruit wt (g)	Fruit number	Yield (t·ha ⁻¹)	TSS (%)
Kashi Madhu	9.51 c ^a	10.83 a ^a	785.00 a ^a	2.34 a ^a	23.87 a ^a	13.24 a ^a
Hara Madhu	10.37 b ^a	11.17 a	683.33 a	1.97 b ^a	20.67 b ^a	9.56 c ^a
RM 49	11.56 a ^a	11.09 a	673.33 a	1.72 b	18.27 c ^a	10.53 b ^a
Punjab Sunehari (NC)	10.29 b	10.11 b ^a	530.00 b ^a	2.29 a	14.10 c	8.73 d ^a
SD	0.85	0.48	104.88	0.29	4.12	1.96

²Data collected over 3 years (2001, 2002, and 2003) from a trial laid out in randomized complete block design with three replications; data were recorded from 5.4 m × 3-m plots with a plant density of 1.35 plant/m².

³Total soluble solids (TSS) determined by Hand Refractometer (Erma, Japan), 0% to 32% scale.

^aValues within a column followed by the different letters are significantly different at 5% level according to Duncan’s multiple range test.

NC = national control.

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Table 2. Performance^z of Kashi Madhu at multilocation trials for yield and TSS.^y

Variety/location	IIVR, Varanasi		PAU, Ludhiana		ARS, Durgapura		NDUAT, Faizabad	
	Yield (t-ha ⁻¹)	TSS (%)	Yield (t-ha ⁻¹)	TSS (%)	Yield (t-ha ⁻¹)	TSS (%)	Yield (t-ha ⁻¹)	TSS (%)
Kashi Madhu	22.13 a ^x	13.47 a ^x	14.98 a ^x	13.45 a ^x	17.13 a ^x	14.25 a ^x	21.21 a ^x	13.38 a ^x
NDM-18	12.37 d ^x	8.44 d	12.16 b ^x	10.55 b ^x	14.39 b ^x	9.81 b ^x	17.51 b ^x	9.35 b ^x
NDM-21	17.56 b ^x	9.08 b ^x	11.28 c ^x	9.48 d ^x	12.22 c ^x	9.74 b	19.64 c ^x	9.60 b
Punjab Sunehari (NC)	13.45 c ^x	9.78 c ^x	12.07 c	10.18 c ^x	11.43 c	9.04 c ^x	12.63 d ^x	8.36 c ^x
SD	4.44	2.25	1.62	1.75	2.55	2.39	3.73	2.20

^zData collected over 3 years (2003, 2004, and 2005) from a trial laid out in randomized complete block design with four replications at four locations; data were recorded from 5.4 m × 3-m plots with a plant density of 1.35 plant/m².

^yTotal soluble solids (TSS) determined by Hand Refractometer (Erma, Japan), 0% to 32% scale.

^xValues within a column followed by the different letters are significantly different at 5% level according to Duncan's multiple range test.

PAU = Punjab Agricultural University; ARS = Agricultural Research Station; NDUAT = Narendra Dev University of Agricultural and Technology; NC = national control.

with that of the other popular cultivars previously recommended for cultivation in India (Table 1).

Performance

Three years on-station replicated trials conducted during 2001 to 2003 including 'Kashi Madhu' and released popular cultivars indicated that the TSS content (13.24%) and yield (23.87 t-ha⁻¹) of 'Kashi Madhu' were much higher than those of the other cultivars. The new variety is comparable to other popular cultivars in India in terms of general horticultural traits such as length, diameter, weight, number, and yield of fruit (Table 1). Because of its superiority over the popular cultivars at station trials, 'Kashi Madhu' was included for multilocation trials under AICRP-VC. Evaluation under different agro-ecological zones of India for 3 years (2003 to 2005) indicated the suitability of 'Kashi Madhu' for zone IV comprising the states of Uttar Pradesh, Uttaranchal, Delhi, Punjab, Bihar (AICRP-VC, 2006). The highest TSS content was recorded for 'Kashi Madhu' over

three seasons (years) in locations such as PAU, Durgapura, Faizabad, and IIVR station (Table 2). Yield of 'Kashi Madhu' was significantly higher than the other varieties at Durgapura, IIVR, and Ludhiana (Table 2). Later, the variety was identified and recommended for release and notification to the Central Government for zone IV during the 24th AICRP-VC workshop held on 22 to 25 Apr. 2006. Subsequently, in Aug. 2006, 'Kashi Madhu' was released and notified during the XIII meeting of Central Sub-Committee on Crop Standard Notification and Release of Varieties for Horticultural Crops (The Gazette of India, 2006).

Availability

Seeds of 'Kashi Madhu' are being multiplied every year and available from IIVR for Indian scientists and farmers. Seed requests within India may be addressed to The Director/Dr. Sudhakar Pandey, Scientist, IIVR, P.B. No. 5002, P.O. B.H.U., Varanasi-221 005. The seed has also been deposited at

National Bureau of Plant Genetic Resources (NBPGR), New Delhi, under the accession no. IC-523666. Seed requests from outside India may be addressed to The Director, NBPGR (ICAR), Pusa Campus, IARI, New Delhi-110012 (India).

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