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## DUS CHARACTERIZATION IN SNAP MELON LAND RACES OF VINDHAYAN REGION OF EASTERN U.P. INDIA AS PER MUSKMELON PPV & FRA GUIDELINES

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### ABSTRACT

This study was performed to determine the morphological characteristics of 17 references snap melon landraces (*Cucumis melo* L. *momocardica*) collected from various district of Allahabad regions validate DUS testing using the Botanical descriptors are based on PPV and FRA DUS guidelines of muskmelon. Of the 34 morphological characters studied, 19 were visually assessed and 15 were measured. Based on fruit length, snap melon landraces are divided into three categories. Short, (no varieties) medium (CAIV-40, CSAK-30), long (almost all breeds are naturally long). Most of the cultivars have a long shape, and the cross-sectional shape of the fruit has been confirmed to be ovate (ASKP-552, KSKP-553, ASTP-554, RSCP-556, KSNP-561, BSKP-562, DSKP-567), elongated globe (ASNP-560, RSCP-564), round (CSAK-39) and oval (SSJP-551, ASKP-555, MSSP-557, BSKP-558, ASTP-563, CAIV-40). The fruit skin color is yellow (BSKP-558, BSKP-562) and yellowish green (ASKP-552, ASKP-554, ASKP-555, MSSP-557, ASTP-559, ASNP-560, RSCP-564) and orange (KSKP-553, RSCP-556, KSNP-561). Sutures on the surface of the fruit have been found to be absent in all snap melon landraces. Regarding fruit surface netting, landraces were grouped as absent netting and moderate netting, while all 17 landraces showed absence of netting on surface. Skin color is cream white (BSKP-558), white (SSJP-551), orange (ASKP-552, KSKP-553, ASTP-554, ASKP-555, RSCP-556, MSSP-557, ASTP-559, KSNP-561, BSRP-562, ASTP-563, RSCP-564, DSKP-567, CAIV-40, ASNP-560, CSAK-39). Seed color was observed to be cream colour (SSJP-551, ASKP-552, KSKP-553, RSCP-556, MSSP-557, ASTP-559, ASNP-560, ASTP-563, CAIV-40 and CSAK-39) and yellowish (ASTP-554, BSKP-558, KSNP-561, BSKP-562, RSCP-564 and DSKP-567). The results showed no intra-breed variation was observed for any of the imaging characteristics examined. Furthermore, the expression of characters in different landraces remained the same for three consecutive years, confirming the homogeneity and stability of the landraces with respect to the visual characteristics. Landraces have been grouped into different categories for each trait based on 34 descriptors. The grouping was done 6 traits as grouping traits, viz. sex [removed] at full bloom), shape of fruit in longitudinal section, color of rind, sutures in rind, surface of fruit and color of flesh. The morphological characterization of the existing landraces has been completed to determine the distinctiveness of the tested landraces from other check varieties in order to use these landraces as a reference for the protection of other varieties, according to PPV & FR laws.

**Keywords :** Characters, Snap melon, Landraces, DUS, groups.

### Introduction

The Plant Varieties and Farmers' Rights Protection Act (PPV & FR Act, 2001) aims to provide an effective system for protecting farmers' rights from new plant varieties and illegal commercial exploitation of plants in 2001 passed by the Indian government not only for breeders, but also for promoting the development of new plant varieties. It is imperative that the Government of India develop its own sui-generis ("proprietary variety") system to provide a framework for plant variety protection and farmers' rights. The Government-appointed Plant Variety Protection and Farmers' Rights Authority in New Delhi is responsible for implementing the provisions of this law. Testing of new plant varieties to establish clarity, uniformity and stability is called "discrimination, uniformity and stability testing (DUS)". The success of the DUS test attempt is based on a set of general principles and specific guidelines. The DUS assessment of a variety uses the relevant morphological and physiological characteristics to create a description of the variety. It is widely accepted as a non-conflicting descriptor for

characterization of plant varieties and DUS testing. Using morphological descriptors in sequence is convenient and convenient for distinguishing cultivars from each other. Cultivars are identified based on some characteristics that make them different from other known cultivars of the species. Guidelines for conducting DUS tests are needed to explain different things and to assess the degree of uniformity of properties and the stability of their expression at different growth sites over the years. For the purpose of objective comparison and consistent evaluation by DUS test staff, cultivar examples have been identified and included in the feature table to explain the state of characteristic representation. The varieties in these examples need to clearly indicate a particular representation of the characteristic. Strict maintenance breeding for the genetic purity of all example varieties is guaranteed for effective DUS testing to properly implement the PPV & FR method (Chakrabarty *et al.*, 2012 and Singh *et al.*, 2012). In India, there is a great deal of variability in the genotype of melons, and the example varieties under the PPV & FR Act 2001 to protect many of the relevant properties described in the

"Minimum Descriptor of Vegetable Crop". The true representation of the characteristics of is becoming more important. Musk melon is prescribed by Srivastava *et al.* (2001) and the United Nations for the Protection of New Species of Plants (UPOV), 2006. Therefore, this study "expresses various characteristics of the DUS test guidelines for actual varieties of Musk melon".

### Material and Methods

The investigation was carried out at the Research Block, Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Sciences and Technology, Prayagraj, Uttar Pradesh during the Season Kharif- 2018 to 2020. The basic material for the study included seventeen landraces collected from different parts of Allahabad district along with three check varieties (Big-B, M.K-70, PB-977) were characterized using PPV&FRA DUS guidelines of muskmelon crop (Ann., 2014). The experiment was laid out in the Randomized block design. Each treatment or a landraces was represented by two rows each accommodating nine plants at a row to row spacing of 2.5 m and 0.45 m from plant to plant. Recommended cultural

practices were adopted in raising the crop. Five plants are randomly selected as representative sample for studying growth and yield attributing traits viz., by recording observations on leaf blade length (cm), leaf blade width (cm), petiole length (cm), ovary length (cm), ovary width (cm), sex expressions, fruit weight (kg), fruit length (cm) and flesh thickness (cm). Characterization of snap melon landraces was done as per PPV&FRA DUS guidelines of muskmelon. The length and width of leaf blade of was measured from fully developed young leaves between the 5th and 8th node when the plant had at least 11 nodes. Length of petiole was measured after 50 per cent flowering stage. The length and width of ovary was measured during appearance of first flower flushes and their mean was expressed in centimeter. Sex forms were categorized as monoecious, Andromonoecious and others and observation was taken at 50 per cent flowering stage. Fruit length and flesh thickness of the fruits was measured in centimeter and the average thickness of flesh was calculated. After washing and drying, all observations on the seeds were made on fully developed, matured, and clean seeds. Local types were categorized in to different classes based on comparison with standard checks.

**Table 1 :** DUS characteristics used for phenotypic evaluation of Snap melon landraces as per muskmelon PPV & FRA guidelines

S.No	Varieties	Cotyledon length (cm)	Cotyledon width (cm)	Leaf Blade length (cm)	Leaf blade width (cm)	Leaf blade: depth of terminal lobes	Leaf blade: length of terminal lobes	Leaf blade: Denotation of margin	Leaf blade: petiole length (cm)	Appearance of first pistillate/ flowers in 50% plant	Sex expression (at full flowering)	Male sterility	Fruit Length (cm)	Fruit Diameter (cm)	Fruit: Shape in longitudinal Section
1	Santlal Desi Kakadi	Short	Broad	Long	Narrow	Medium	Long	Weak	Short	Medium	Andromonocious	Absent	Long	Broad	Oval
2	Desi Kakadi Ambika	Medium	Narrow	Medium	Narrow	Medium	Medium	Weak	Medium	Early	Andromonocious	Absent	Long	Broad	Ovate
3	Kaushlesh Desi Kakadi	Short	Broad	Short	Narrow	Medium	Short	Strong	Long	Early	Andromonocious	Absent	Long	Broad	Ovate
4	Anurag Desi Kakadi	Long	Medium	Medium	Broad	Strong	Medium	Weak	Medium	Medium	Andromonocious	Absent	Long	Broad	Ovate
5	Ambika Desi Kakadi	Medium	Narrow	Short	Medium	Medium	Short	Strong	Long	Medium	Andromonocious	Absent	Long	Broad	Oval
6	Ramraj Desi Kakdi	Long	Broad	Long	Broad	Weak	Medium	Strong	Long	Medium	Andromonocious	Absent	Long	Broad	Ovate
7	Mahendra Desi Kakdi	Short	Narrow	Long	Broad	Weak	Medium	Weak	Long	Early	Andromonocious	Absent	Long	Broad	Oval
8	Bholanath Desi Kakadi	Medium	Medium	Long	Broad	Medium	Short	Strong	Long	Medium	Andromonocious	Absent	Long	Broad	Oval
9	Ankit Desi Kakdi	Long	Broad	Medium	Broad	Medium	Medium	Strong	Short	Early	Andromonocious	Absent	Long	Broad	Oval
10	Arjun Desi Kakadi	Short	Narrow	Long	Broad	Weak	Medium	Weak	Long	Medium	Andromonocious	Absent	Long	Broad	Elongate Globe
11	Kamlesh Desi Kakadi	Long	Broad	Long	Broad	Weak	Short	Strong	Long	Medium	Andromonocious	Absent	Long	Broad	Ovate
12	Desi Bholanath Kakadi	Short	Narrow	Long	Broad	Medium	Short	Weak	Long	Medium	Andromonocious	Absent	Long	Broad	Ovate
13	Desi Ankit Kakadi	Medium	Medium	Medium	Broad	Medium	Short	Strong	Short	Early	Andromonocious	Absent	Long	Broad	Oval
14	Ramraj Kakdi-180	Long	Broad	Long	Broad	Strong	Medium	Weak	Medium	Early	Andromonocious	Absent	Long	Broad	Ovate
15	Dharamraj Kakadi	Short	Narrow	Long	Broad	Weak	Short	Strong	Long	Medium	Andromonocious	Absent	Long	Broad	Ovate
16	Ajeet Desi Kakadi	Long	Broad	Long	Broad	Medium	Medium	Strong	Long	Late	Andromonocious	Absent	Medium	Narrow	Ovate
17	Amba Desi Kakadi	Short	Narrow	Long	Broad	Weak	Short	Weak	Long	Medium	Andromonocious	Absent	Medium	Narrow	Oval
18	Big-B (check-1)	Medium	Medium	Long	Broad	Weak	Short	Weak	Long	Medium	Andromonocious	Absent	Medium	Narrow	Ovate
19	M.K-70 (Check-2)	Short	Broad	Long	Narrow	Strong	Long	Weak	Long	Early	Andromonocious	Absent	Long	Broad	Oval
20	PB-977 (Check-3)	Medium	Narrow	Medium	Broad	Medium	Medium	Medium	Medium	Medium	Andromonocious	Absent	Medium	Narrow	Oval

S. No	Varieties	Fruit: rind color	Fruit: Patches	Fruit: Peduncle at maturity	Fruit: Shape at peduncle end	Fruit: diameter of blossom end (cm)	Fruit: Surface	Fruit: sutures	Fruit: surface netting	Fruit: Flesh thickness	Fruit: flesh colour	Fruit: flesh texture	Fruit: flavour	Seed: length	Seed: width	Seed: Colour
1	Santlal Desi Kakadi	Creamy White	Absent	Non-Slipable	Pointed	Pointed	Smooth	Absent	Absent	Medium	White	Mealy	Mild	Short	Narrow	Creamy white
2	Desi Kakadi Ambika	Yellow Green	Absent	Non-Slipable	Depressed	Flattened	Smooth	Absent	Absent	Thin	Orange	Mealy	Mild	Short	Narrow	Creamy white
3	Kaushlesh Desi Kakadi	Orange	Absent	Non-Slipable	Pointed	Depressed	Smooth	Absent	Absent	Medium	Orange	Mealy	Mild	Short	Narrow	Creamy white
4	Anurag Desi Kakadi	Yellow Green	Absent	Non-Slipable	Flattened	Depressed	Grooved	Absent	Absent	Medium	Orange	Mealy	Mild	Short	Narrow	Yellowish
5	Ambika Desi Kakadi	Yellow Green	Absent	Non-Slipable	Flattened	Depressed	Smooth	Absent	Absent	Thin	Orange	Mealy	Mild	Short	Narrow	Creamy white
6	Ramraj Desi Kakadi	Orange	Absent	Non-Slipable	Flattened	Flattened	Grooved	Absent	Absent	Medium	Orange	Crispy	Medium	Short	Narrow	Creamy white
7	Mahendra Desi Kakadi	Yellow Green	Present	Non-Slipable	Pointed	Flattened	Smooth	Absent	Absent	Thin	Orange	Mealy	Mild	Short	Narrow	Creamy white
8	Bholanath Desi Kakadi	Yellow	Absent	Non-Slipable	Depressed	Flattened	Smooth	Absent	Absent	Medium	Creamy white	Mealy	Medium	Short	Narrow	Yellowish
9	Ankit Desi Kakadi	Yellow Green	Present	Non-Slipable	Depressed	Flattened	Smooth	Absent	Absent	Thin	Orange	Mealy	Mild	Short	Narrow	Creamy white
10	Arjun Desi Kakadi	Yellow Green	Absent	Non-Slipable	Pointed	Flattened	Smooth	Absent	Absent	Thick	Orange	Crispy	Medium	Short	Narrow	Creamy white
11	Kamlesh Desi Kakadi	Orange	Absent	Non-Slipable	Depressed	Depressed	Smooth	Absent	Absent	Medium	Orange	Crispy	Medium	Short	Narrow	Yellowish
12	Desi Bholanath Kakadi	Yellow	Absent	Non-Slipable	Depressed	Flattened	Smooth	Absent	Absent	Medium	Orange	Mealy	Medium	Short	Narrow	Yellowish
13	Desi Ankit Kakadi	Creamy White	Present	Non-Slipable	Depressed	Flattened	Smooth	Absent	Absent	Thin	Orange	Mealy	Mild	Short	Narrow	Creamy white
14	Ramraj Kakdi-180	Yellow Green	Absent	Non-Slipable	Flattened	Flattened	Smooth	Absent	Absent	Thick	Orange	Crispy	Medium	Short	Narrow	Yellowish
15	Dharamraj Kakadi	Yellow Green	Absent	Non-Slipable	Depressed	Flattened	Smooth	Absent	Absent	Thin	Orange	Crispy	Medium	Short	Narrow	Yellowish
16	Ajeet Desi Kakadi	Yellow Green	Present	Non-Slipable	Rounded	Depressed	Smooth	Absent	Absent	Medium	Orange	Mealy	Medium	Short	Narrow	Creamy white
17	Amba Desi Kakadi	Yellow Green	Absent	Non-Slipable	Depressed	Flattened	Grooved	Absent	Absent	Thin	Orange	Mealy	Medium	Short	Narrow	Creamy white
18	Big-B (check-1)	Yellow Green	Present	Non-Slipable	Rounded	Depressed	Smooth	Absent	Absent	Medium	Orange	Crispy	Medium	Short	Narrow	Creamy white
19	M.K-70 (Check-2)	Yellow Green	Absent	Non-Slipable	Pointed	Depressed	Smooth	Absent	Absent	Thin	Orange	Mealy	Medium	Short	Narrow	Creamy white
20	PB-977 (Check-3)	Orange	Present	Non-Slipable	Depressed	Flattened	Grooved	Absent	Absent	Medium	Orange	Mealy	Medium	Short	Narrow	Creamy white

## Results and Discussion

Considerable differences in all major traits were observed among 20 snap melon cultivars, including plaid. The expression status of specific traits is shown in Table 1 along with example snap melon cultivars. Of the morphological features, six characters have been identified as grouping characters *Viz*: sex (at full bloom), fruit shape in longitudinal section, fruit skin color, skin sutures, fruit surface meshwork, flesh color. In the present study, showed early female flowering behaviour, whereas and showed medium flowering behaviour. All the 17 landraces including checks under study had Andromonoecious sex expression with fertile pollens. On the basis of fruit length, Snap melon varieties have been grouped into three categories, viz. short, (no varieties) medium (CAIV-40, CSAK-30) and long (Mostly all varieties are long in nature). Mostly varieties are long in shape, the fruit shape in longitudinal section was expressed as ovate (ASKP-552, KSKP-553, ASTP-554, RSCP-556, KSNP-561, BSKP-562, DSKP-567), elongated globe (ASNP-560, RSCP-564), round (CSAK-39) and oval (SSJP-551, ASKP-555, MSSP-557, BSKP-558, ASTP-563, CAIV-40). The rind colours of fruit have been grouped as yellow (BSKP-558, BSKP-562), yellow green (ASKP-552, ASTP-554, ASKP-555, MSSP-557, ASTP-559, ASNP-560,

RSCP 564, DSKP-567, CAIV-40, CSAK-39) and orange (KSKP-553, RSCP-556, KSNP-561). The sutures on fruit surface were found to be absent in all landraces of Snap melon. With respect to netting on fruit surface the landraces has been grouped as absent of netting and moderate netting, but in all 17 landraces netting surface is absent. The flesh colour was expressed as Creamish white (BSKP-558), white (SSJP-551) and orange (ASKP-552, KSKP-553, ASTP-554, ASKP-555, RSCP-556, MSSP-557, ASTP-559, KSNP-561, BSRP-562, ASTP-563, RSCP-564, DSKP-567, CAIV-40, ASNP-560, CSAK-39). The seed colour was observed to be creamy white (SSJP-551, ASKP-552, KSKP-553, RSCP-556, MSSP-557, ASTP-559, ASNP-560, ASTP-563, CAIV-40, CSAK-39) and yellowish (ASTP-554, BSKP-558, KSNP-561, BSKP-562, RSCP-564, DSKP-567). Similar results have been reported by Yadav and Ram (2010) in muskmelon for days to first female flowering; Prasad and Singh (1990.b) in pointed gourd ; Prasad and Singh (1992); Rajput *et al.* (1994); Thakur *et al.* (1994); Thakur and khattra (1996); Narayan *et al.* (2006) in bitter gourd and Azcon-Aguilar (2012) in snake cucumber for number of fruits per plant; Varalaxmi and Reddy (1998) in ridge gourd for number of fruits per plant and days to first female flowering; Yadav and Ram (2010) for fruit weight in muskmelon; Kumar *et al.*

(2012) in watermelon; Prasad and Singh, (1992) and Narayan *et al.* (2006) in bitter gourd; Prasad and Singh, (1990.b) and Prasad and Pitchaimuthu, (2004) in cucumber for vine length.

In this study, female flowering behaviour was early and female flowering behaviour was intermediate. Vijay (1987), Lal and Singh (1997), studies by Pandey *et al.* (2005), Pandey *et al.* (2009) and Choudhary *et al.* (2012) also describe the variability of *Cucumis* species in terms of morphology, yield and yield-related traits. They also proposed to characterize the germplasm in terms of economic traits to help quantify and organize genetic diversity. Previous morphological characterizations of bell pepper (Sood *et al.* 2011), cabbage (Singh *et al.* 2012), rice (Chakrabarty *et al.* 2012) and kidney bean (Singh *et al.* 2014) have demonstrated distinctiveness, uniformity and , and stability checks. All landraces are expected to have very uniform and stable trait expression in specific conditions. This applies to qualitative characteristics that are least affected by environmental conditions. There is a need to reduce the number of landraces to reduce the cost of DUS trials and facilitate maintenance of the high-cost landrace set due to cross-pollination of snapper melons. If landraces for a given trait are degraded and/or not expressed in the growing conditions or region, multiple landrace examples of the trait's expression state are desirable. Reference cultivars are of primary importance in the DUS test for comparing the characteristic conditions of candidate regional cultivars. Potential seed contamination in the reference landrace series can lead to erroneous or invalid DUS test results. Therefore, maintaining the highest level of genetic purity in reference landraces is a prerequisite for successful DUS testing. It is also proposed to conduct periodic reviews of all breeds at all DUS test centers to validate landrace groups. Since cantaloupe melon is a highly cross-pollinated crop, rigorous maintenance breeding of reference cultivars, including example cultivars, and alternative examples for conducting his DUS tests of cantaloupe melon, if necessary The use of cultivars of The landraces characterized with DUS were grouped into different categories by traits that could be used as reference varieties. These landraces can be used in snap melon breeding programs for desired traits. We conclude that the developed DUS descriptors can be effectively used to identify and group landraces and to compare candidate varieties for registration under the PPV&FR Act, which protects the rights of farmers and plant breeders attached.

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