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## Varietal characterization of Satputia (*L. hermaphrodita* Singh & Bhandari) based on morphological descriptions

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### Abstract

A total of 36 Satputia (*L. hermaphrodita* Singh & Bhandari.) genotypes, purified and maintained as inbreds at Division of Vegetable Science, IARI were morphologically characterized for 17 different traits over two consecutive seasons (spring-summer 2015, 2016) as per DUS guidelines of PPV and FRA. Out of 17 morphological characters under study 13 were assessed visually and four were measured. All genotypes were grouped into different categories on the basis of these morphological descriptors. With respect to fruit shape at horticultural maturity all studied genotypes were observed to have either tapering (Dsat-11-1), elliptical (27), elongated (Dsat-113), top shaped (Dsat-5, Tezu, Sat-B, Dsat-7) or globular (Dsat-116, Dsat-3, Sat-O) fruits. Most of the genotypes under study were grouped into medium category on the basis of their fruit length, fruit thickness, fruit diameter and seed length and seed width. On the basis of fruit skin colour at immature stage, genotypes were grouped into three groups i.e. green, light green and dark green coloured with twenty seven, eight and one, respectively. With respect to fruit ridge shape genotypes were grouped into intermediate and superficial ribbed categories. Fruit skin lustre was observed as glossy, intermediate and matt at horticultural maturity. All studied characters can be used as grouping traits. The expression of studied characters remained consistent over two consecutive seasons indicating their uniformity. These studied genotypes can be successfully utilized as reference material for protection of other varieties under PPV & FR Act. 27.

**Keywords:** characterization, satputia, *L. hermaphrodita*, PPV and FRA

### Introduction

*Luffa hermaphrodita*, popularly known as Satputia, possessing hermaphrodite sex forms with compound racemes, is a domesticated or semi-wild taxon originated from *L. graveolens* (Arora and Nayar, 1984., Umesh, 1995) [3, 9]. *Luffa hermaphrodita* is characterized by smooth skin, tender fruits borne in clusters bearing bisexual flowers and is easily crossable with *L. acutangula* with fertile hybrids (Umesh, 1995) [9]. Generally, the cultivars bear seven fruits in each inflorescence and this appears to be a constant feature. Based on this trait, it is locally called "Satputria" or "Satputiya" meaning seven children (Ajmal Ali and Pandey, 2005-06) [1]. Satputia is commonly grown vegetable in the north-eastern part of Uttar Pradesh and adjoining regions (Sirohi *et al.* 2005) [7]. A cross derivative of Satputia with the common monoecious strain (*L. acutangula*) is reported to yield five times as many fruits as the monoecious parent. Unlike ridge gourd, the fruits of Satputia can be consumed without removal of the skin as it is soft and gets cooked homogeneously. The fruit is diuretic, expectorant, and is used in curing biliousness, bronchitis, diseases of spleen and ulcers while the seed is emetic and cathartic as well (Ram and Srivastava, 1999) [6]. Knowledge on level of genetic variation available in germplasm and relationship among the species is a prerequisite for effective utilization. Despite high efficiency of molecular tools in characterization of genetic resources, morphological studies are helpful in preliminary characterization and classification of germplasm through use of appropriate statistical tools (Agdagwa and Nadukwa 2004; Sudre *et al.* 2010) [2, 8]. India became a signatory to the TRIPS agreement in 1994 which need WTO member nations to formulate and enforce an effective system to protect plant genetic resources; a *sui generis* system was adopted. PPV and FR Act were formulated by Government of India in 2001 which provide protection to breeders as well as farmers rights. Varietal testing for distinctness, uniformity and stability (DUS) is the basis for grant of protection under this act and hence it is desirable to characterize the germplasm according to DUS test guidelines prescribed by PPV and FR Authority. Characterization of genotypes is useful to identify and avoid duplication. Therefore, the present study was aimed at characterization of Satputia genotypes for qualitative and quantitative traits using modified

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descriptors of International Plant Genetic Resources Institute (IPGRI; presently Bioversity International).

### Materials and Methods

The experimental material for the present study consisted of thirty six promising and diverse genotypes of *Satputia* collected from different parts of the country. These were further purified and maintained as inbreds at Division of Vegetable Science, IARI, New Delhi. The data on vegetative and reproductive plant parts were recorded for two consecutive seasons (spring-summer 2015, 2016) using ten replicates of each accession. Observations on Plant growth habit, Stem pubescence, Stem shape, Tendril branching, Tendril Type, Leaf margin, Leaf shape, Leaf pubescence, leaf pubescence density, Sex type, Fruit shape, Peduncle shape, fruit borne in cluster, Fruit skin colour, Fruit ridge, Continuity of ridges, Fruit skin lustre, Fruit ridge, Flesh texture, Seediness and Seed were recorded at specified stage of crop growth period. Out of 17 morphological characteristics 13 were visually assessed and 4 were measured. The list of thirty six genotypes used in the present study has been given in the table 1. The crop was raised in rows of 2.5 meter apart with a spacing of 0.75 meter. All the recommended packages of practices were followed to raise a successful crop under irrigated condition in Randomized Block Design with three replications. For recording observations 10 plants were randomly selected from each replication. The observation on Plant growth habit was recorded on fully grown plant. Leaf margin and Leaf shape were recorded at full foliage; Sex type recorded at flowering stage; Fruit shape, Fruit skin colour, Fruit ridge shape, Continuity of ridges, Fruit skin lustre, Fruit ridge, Flesh texture and Seediness were recorded at marketable stage while Seed lustre were recorded on mature and dried seeds. Morphological characterization data were recorded using modified descriptors of International Plant Genetic Resources Institute (IPGRI; presently Bioversity International) for 21 qualitative traits.

### Results and Discussion

Morphological characterization is the first step in the description and classification of genetic resources. According to Simmonds (1962) greater the variability in available germplasm, better would be the chances of selecting superior genotypes. The present investigation revealed considerable variation among all 36 genotypes. On the basis of 17

morphological traits, 36 genotypes were identified in different category such as viz. Plant height (length of main vine), stem (stem shape, stem pubescence), tendril (type, branching), leaf (leaf margin, leaf shape, leaf pubescence nature, leaf pubescence intensity), fruit (skin colour, shape of fruit, ridge pattern, lustre of fruit, texture of flesh, seediness) and seed characters (length, width & colour of seed coat) (Table 2, 3,4).

**Table 1:** Genotypes of *Luffa hermaphrodita* used for the study

Sl.no	Genotypes	Sex form	Source
1.	DSat-1	Hermaphrodite	IARI, New Delhi
2.	DSat-1-2	Hermaphrodite	IARI, New Delhi
3.	DSat-2	Hermaphrodite	IARI, New Delhi
4.	DSat-3	Hermaphrodite	IARI, New Delhi
5.	DSat-4	Hermaphrodite	IARI, New Delhi
6.	DSat-4-1-1	Hermaphrodite	IARI, New Delhi
7.	DSat-4-12	Hermaphrodite	IARI, New Delhi
8.	DSat-5	Hermaphrodite	IARI, New Delhi
9.	DSat-7	Hermaphrodite	IARI, New Delhi
10.	DSat-8	Hermaphrodite	IARI, New Delhi
11.	DSat-9	Hermaphrodite	IARI, New Delhi
12.	DSat-9-1	Hermaphrodite	IARI, New Delhi
13.	DSat-10	Hermaphrodite	IARI, New Delhi
14.	DSat-11	Hermaphrodite	IARI, New Delhi
15.	DSat-11-1	Hermaphrodite	IARI, New Delhi
16.	DSat-14	Hermaphrodite	IARI, New Delhi
17.	DSat-15	Hermaphrodite	IARI, New Delhi
18.	DSat-19	Hermaphrodite	IARI, New Delhi
19.	DSat-23	Hermaphrodite	IARI, New Delhi
20.	DSat-63	Hermaphrodite	IARI, New Delhi
21.	DSat-103	Hermaphrodite	IARI, New Delhi
22.	DSat-112	Hermaphrodite	IARI, New Delhi
23.	DSat-112-1	Hermaphrodite	IARI, New Delhi
24.	DSat-113	Hermaphrodite	IARI, New Delhi
25.	DSat-115	Hermaphrodite	IARI, New Delhi
26.	DSat-116	Hermaphrodite	IARI, New Delhi
27.	Sat-O	Hermaphrodite	IARI, New Delhi
28.	Sat-B	Hermaphrodite	IARI, New Delhi
29.	Sat-SSG	Hermaphrodite	IARI, New Delhi
30.	Sat-H 2014	Hermaphrodite	IARI, New Delhi
31.	Sat-Tezu	Hermaphrodite	IARI, New Delhi
32.	Satputia Gol	Hermaphrodite	IARI, New Delhi
33.	Sat Dewariya	Hermaphrodite	IARI, New Delhi
34.	Sat Bahraich-1	Hermaphrodite	IARI, New Delhi
35.	Swarna Sawani	Hermaphrodite	Bihar
36.	Kashi Khushi	Hermaphrodite	Uttarakhand

**Table 2:** Characterization of *Luffa hermaphrodita* genotypes based on plant and leaf characters

Characteristics	State of expression	Example genotypes
Plant : Length of main Vine	Short (<150cm)	Dsat- 113
	Medium (150-250cm)	DSat-1, DSat-1-2, DSat-2, DSat-3, DSat-4, DSat-4-1-1, DSat-4-12, DSat-5, DSat-7, DSat-8, DSat-9, DSat-115, DSat-116, Sat-O, Sat-B, Sat-SSG, Sat-H 2014, Sat Dewariya, Sat Bahraich-1, Kashi Khushi, DSat-112, DSat-112-1, DSat-103, DSat-9-1, DSat-10, DSat-11, DSat-11-1, DSat-14, DSat-15, DSat-19, DSat-23 and DSat-63
	Long (>250cm)	Sat-Tezu, Satputia Gol and Swarna Sawani
Leaf blade: Margin	Dentate	DSat-1-2, DSat-4, DSat-4-1-1, DSat-4-12, DSat-5, DSat-7, DSat-9, DSat-9-1, DSat-11, DSat-15, DSat-63, DSat-23, DSat-103, DSat-112, DSat-112-1, DSat-115, DSat-116, Sat-O, Sat-H 2014, Satputia Gol, Sat Bahraich-1 and Swarna Sawani
	Serrate	Dsat- 113, Sat-Tezu, DSat-1DSat-2, DSat-3, DSat-8, Sat-B, Sat-SSG, Sat Dewariya, Kashi Khushi, DSat-10, DSat-11-1, DSat-14 and DSat-19
Leaf shape	Cordate	DSat-1, DSat-1-2, DSat-2, DSat-3, DSat-4, DSat-4-1-1, DSat-4-12, DSat-5, DSat-7, DSat-8, DSat-9, DSat-116, Sat-B, Sat-SSG, Sat Dewariya, Sat Kashi Khushi, DSat-112, DSAT- 113, Sat-Tezu, DSat-112-1, DSat-9-1, DSat-10, DSat-11, DSat-11-1, DSat-14, DSat-15, DSat-19, and DSat-63
	Reniform	DSat-23, DSat-103, DSat-115, Sat-O, Sat-H 2014, Satputia Gol, Bahraich-1 and Swarna Sawani
Leaf	Soft	DSat-116, DSat-63, DSat-8 and Swarna Sawani

Pubescence	Intermediate	DSat-1, DSat-1-2, DSat-2, DSat-3, DSat-4, DSat-4-1-1, DSat-4-12, DSat-5, DSat-7, DSat-9, DSat-115, Sat-O, Sat-B, Sat-SSG, Sat-H 2014, Sat Kashi Khushi, DSat-112, DSat-112-1, DSat-103, DSat-9-1, DSat-10, DSat-11, DSat-11-1, DSat-14, DSat-15, DSat-19, DSat-23 and Satputia Gol
	Hard	Sat Bahraich-1, Sat-Tezu, Dewariya, and Dsat- 113, Sat-O and Sat-SSG,
Tendrill type	Straight	DSat-1-2, DSat-4-12, DSat-9, DSat-8, DSat-112-1, Dewariya, Swarna Sawani and Sat-SSG,
	Coiled	DSat-1, DSat-116, DSat-63, DSat-2, DSat-3, DSat-4, DSat-4-1-1, DSat-5, DSat-7, DSat-115, Sat-O, Sat-B, Sat-H 2014, Sat Kashi Khushi, DSat-112, DSat-112-1, DSat-103, DSat-9-1, DSat-10, Sat-Tezu, DSat-11, DSat-11-1, DSat-14, DSat-15, DSat-19, DSat-23 and Satputia Gol
Stem pubescence	smooth	Sat-Tezu
	Pubescence	DSat-1, DSat-1-2, DSat-2, DSat-3, DSat-4, DSat-4-1-1, DSat-4-12, DSat-5, DSat-7, DSat-8, DSat-9, DSat-115, DSat-116, Sat-O, Sat-B, Sat-SSG, Sat-H 2014, Sat Bahraich-1, Kashi Khushi, DSat-112, DSat-112-1, DSat-103, DSat-9-1, DSat-10, DSAT- 113, DSat-11, Sat Dewariya, DSat-11-1, DSat-14, DSat-15, DSat-19, DSat-23, DSat-63, Swarna Sawani, and Satputia Gol

### Plant and leaf characters

Vine length is considered as an important yield contributing trait, because it leads to more number of branches, flowers and fruits, which ultimately result in increased productivity. Longest vine length was observed in genotypes Sat-Tezu, Satputia Gol and Swarna Sawani (>250cm) while 32 genotypes had vine length that ranged between 150-250cm and the genotype DSAT- 113 produced short vine length of 130 cm.

The present study revealed that leaf blade margin in *Luffa hermaphrodita* can be grouped into two i.e Dentate and Serrate. Twenty two genotypes showed coarsely dentate leaf margin while fourteen genotypes had serrate-asymmetrical

teeth pointing forward type of leaf margin. The type of Leaf shape observed in genotypes of *Luffa hermaphrodita* were Cordate and Reniform, with maximum genotypes showing cordate leaf shape. The morphological variability as assessed visually showed three groups of leaf pubescence nature i.e. soft (DSat-116, DSat-63, DSat-8 and Swarna Sawani), Intermediate (26) and Hard (Sat Bahraich-1, Sat-Tezu, Dewariya, Dsat- 113, Sat-O and Sat-SSG).Tendrils were generally bifid with some showing branching pattern of straight and coiled, respectively. All studied genotypes had angular stem shape with pubescent stem except Sat-Tezu. Significant variations in vegetative traits of *Luffa* species has been observed by Prakash *et al.* (2013)<sup>[5]</sup>.

**Table 3:** Characterization of Satputia genotypes based on fruit characters

Characteristics	State of expression	Example genotypes	Type of assessment*
Peduncle: Length	Short (<3 cm)	DSAT-14, DSAT-15 and DSAT-115	MS
	Medium (3-6 cm)	DSat-1, Sat-H 2014, DSAT -23 and DSAT-11	
	Long (>6cm)	Sat-Tezu, Satputia Gol, Swarna Sawani, DSat-1-2, DSat-2, DSat-3, DSat-4, DSat-4-1-1, DSat-4-12, DSat-5, DSat-7, DSat-9, DSat-115, Sat-O, Sat-B, Sat-SSG, Kashi Khushi, DSat-112, DSat-112-1, DSat-103, DSat-9-1, DSat-10, DSat-11-1, DSat-19, DSat-23 and Satputia Gol	
Fruit skin colour	Light green	Swarna Sawani, Sat-B and DSat-8	VG
	green	DSat-1, DSat-1-2, DSat-2, DSat-3, DSat-4, DSat-4-1-1, DSat-4-12, DSat-5, DSat-7, DSat-9, DSat-115, DSat-116, Sat-O, Sat-SSG, Sat-H 2014, Sat Dewariya, Sat Bahraich-1, Kashi Khushi, DSat-112, DSat-112-1, DSat-103, DSat-9-1, DSat-10, DSat-11, DSat-11-1, DSat-14, DSat-15, DSat-19, DSat-23, DSat-63, Sat-Tezu, Satputia Gol and DSAT- 113	
	Dark green	DSAT-103	
Fruit shape	Tapering	Dsat-11-1	VG
	Elliptical	DSat-1, DSat-1-2, DSat-2, DSat-4, DSat-4-1-1, DSat-4-12, DSat-8, DSat-9, DSat-115, Sat-SSG, Sat-H 2014, Sat Dewariya, Sat Bahraich-1, Kashi Khushi, DSat-112, DSat-112-1, DSat-9-1, DSat-10, DSat-11, DSat-14, DSat-15, DSat-19, DSat-23, DSat-63 Satputia Gol and Swarna Sawani	
	Globular	DSat 116, Dsat – 3, Sat-O	
	Top shaped elongated	Dsat-5, Sat-Tezu, Sat-B, Dsat-7	
		Dsat- 113	
Fruit ridge	Intermediate	DSat-23, DSat-1	VG
	Superficial	DSat-1-2, DSat-2, DSat-3, DSat-4, DSat-4-1-1, DSat-4-12, DSat-5, DSat-7, DSat-8, DSat-9, DSat-115, DSat-116, Sat-O, Sat-B, Sat-SSG, Sat-H 2014, Sat Dewariya, Sat Bahraich-1, Kashi Khushi, DSat-112, DSat-112-1, DSat-103, DSat-9-1, DSat-10, DSat-11, DSat-11-1, DSat-14, DSat-15, DSat-19,DSat-63 Sat-Tezu, Satputia Gol and Swarna Sawani and Dsat- 113	
Fruit skin lustre	Glossy	DSat-1-2, DSat-3, DSat-4, DSat-4-1-1, DSat-4-12, DSat-5, DSat-7, DSat-8, DSat-9, DSat-115, DSat-116, Sat-B, Sat-SSG, Sat Dewariya, Sat Bahraich-1, Kashi Khushi, DSat-112, DSat-112-1, DSat-9-1, DSat-11, DSat-11-1, DSat-14, DSat-19, DSat-23, DSat-63, Sat-Tezu, Satputia Gol and Swarna Sawani	VG
	Intermediate	DSat-1, DSat-2, Dsat- 113, Sat-O, Sat-H 2014 and DSat-103,	
	Matt	DSat-15, DSat-10,	
Fruit flesh texture	smooth	DSat-2, DSat-5, DSat-9, DSat-9-1, Dsat- 113, DSat-115, DSat-19, Sat Dewariya, Sat Bahraich-1, DSat-4-12, DSat-3, DSat-116, DSat-63, DSat-7, DSat-8, Kashi Khushi, DSat-112-1, Satputia Gol,	VG
	Soft	DSat-1, DSat-4, DSat-4-1-1, DSat-10, DSat-11-1, DSat-112, Sat-O, Sat-SSG, Sat-H 2014, DSat-103, Sat-B, DSat-23, DSat-15, DSat-1-2, DSat-11, Sat-Tezu,	

	spongy	DSat-14 and Swarna Sawani	
Fruit length at marketable stage	Short (<10cm)	DSat-1, DSat-1-2, DSat-2, DSat-3, DSat-4, DSat-4-1-1, DSat-4-12, DSat-5, DSat-7, DSat-8, DSat-9, DSat-115, DSat-116, Sat-O, Sat-B, Sat-H 2014, Sat Dewariya, Sat Bahraich-1, Kashi Khushi, DSat-112, DSat-112-1, DSat-9-1, DSat-10, DSat-11-1, DSat-14, DSat-15, DSat-19, DSat-23, DSat-63, Sat-Tezu, Satputia Gol, Swarna Sawani and Dsat- 113	VG
	Medium (11-15cm)	DSat-11, DSat-103 and Sat-SSG	
	Long (>15cm)	None	
Fruit diameter at marketable stage	Small (<20mm)	DSat-4, DSat-4-1-1, DSat-9, DSat-11-1, DSat-112, DSat-115, Kashi Khushi, DSat-19 and DSat-14	MS
	Medium (21-30mm)	DSat-1-2, DSat-1, DSat-2, DSat-9-1, DSat-3, DSat-4-12, DSat-5, DSat-7, DSat-8, DSat-116, Sat-B, Sat-SSG, Sat-H 2014, Sat Dewariya, Sat Bahraich-1 DSat-112-1, DSat-10, DSat-11, DSat-15, DSat-23, DSat-63, Sat-Tezu, Swarna Sawani and Dsat- 113	
	Large (>30 mm)	DSat-103, Sat-O and Satputia Gol,	

\*MS: Measurement of a number of individual plants or parts of plants

VG: Visual assessment by a single observation of a group of plants or parts of plants

### Fruit characteristics

On the basis of fruit skin colour at immature stage, Satputia genotypes were grouped into three groups i.e. green, light green and dark green coloured with 32, 3 and 1 genotypes in each group, respectively. DSat-15 and DSat-10 showed matt skin lustre while intermediate and glossy type of skin lustre was observed in 6 and 28 genotypes, respectively.

Peduncle length in all genotypes was grouped into short, medium and long groups. DSAT-14, DSAT-15 and DSAT-115 was observed to have shortest peduncle while, other 4 and 28 genotypes were grouped in medium and long group, respectively. Satputia is characterised by short fruit length and based on the length it was grouped into two i.e. DSat-11, DSat-103 and Sat-SSG as medium long and other 33 genotypes as short, respectively. DSat-103, Sat-O and Satputia Gol, was observed to have large fruit diameter (>30mm) while 9 genotypes and 24 were observed to have small (<20mm) and medium (21-30mm) fruit diameter,

respectively. The characteristics viz. color of fruit skin at immature harvest stage, fruit skin lustre, fruit length, fruit diameter and fruit shape was used for grouping the genotypes. Similar variations for different morphological traits in Satputia had also been reported earlier by Pandravada *et al.* (2014).

### Seed characters

Seed is the most important input factor in any crop production programme, as the success or failure of any crop solely depends on the quality and potential performance of seed. In the present investigation, seed coat colour of the genotypes was observed to be black, shiny and smooth as also reported by Pandravada *et al.* 2014. Seed length in all studied genotypes was grouped into two groups i.e. medium (6-10mm) and long (>11mm) with DSat-112, DSat-2, DSat-4 and DSat-10 into long group. DSat-112 was grouped into large seed width while the 35 fell into medium group.

**Table 4:** Characterization of *Luffa hermaphrodita* genotypes based on seed characters

Characteristics	State of expression	Example genotypes	Type of assessment
Seed: Length	Small (<5mm)	None	MS
	Medium (6-10)	Dsat-1, Dsat-1-2, Dsat-3, Dsat-4-1-1, Dsat-4-12, Dsat-5, Dsat-7, Dsat-8, Dsat-9, Dsat-115, Dsat-116, Sat-O, Sat-B, Sat-SSG, Sat-H 2014, Sat Dewariya, Sat Bahraich-1, Kashi Khushi, Dsat-112-1, Dsat-103, Dsat-9-1, Dsat-11, Dsat-11-1, Dsat-14, Dsat-15, Dsat-19, Dsat-23, Dsat-63, Sat-Tezu, Satputia Gol, Swarna Sawani And Dsat- 113	
	Long (>11mm)	Dsat-112, Dsat-2, Dsat-4 And Dsat-10	
Seed: Width	Small (<6 Mm)	None	MS
	Medium (6-8mm)	Dsat-1, Dsat-1-2, Dsat-3, Dsat-4-1-1, Dsat-4-12, Dsat-5, Dsat-7, Dsat-8, Dsat-9, Dsat-115, Dsat-116, Sat-O, Sat-B, Sat-SSG, Sat-H 2014, Sat Dewariya, Sat Bahraich-1, Kashi Khushi, Dsat-112-1, Dsat-103, Dsat-9-1, Dsat-11, Dsat-11-1, Dsat-14, Dsat-15, Dsat-19, Dsat-23, Dsat-63, Sat-Tezu, Satputia Gol, Swarna Sawani And Dsat- 113	
	Large (>8mm)	Dsat-112	
Seed: Colour Of Coat	Black	Dsat-1, Dsat-1-2, Dsat-3, Dsat-4-1-1, Dsat-4-12, Dsat-5, Dsat-7, Dsat-8, Dsat-9, Dsat-115, Dsat-116, Sat-O, Sat-B, Sat-SSG, Sat-H 2014, Sat Dewariya, Sat Bahraich-1, Kashi Khushi, Dsat-112-1, Dsat-112, Dsat-103, Dsat-9-1, Dsat-11, Dsat-11-1, Dsat-14, Dsat-15, Dsat-19, Dsat-23, Dsat-63, Sat-Tezu, Satputia Gol, Swarna Sawani And Dsat- 113	VG
	Grey	None	

\*MS: Measurement of a number of individual plants or parts of plants

VG: Visual assessment by a single observation of a group of plants or parts of plants

In the present investigation 36 Satputia genotypes were grouped into different categories for 17 traits. This characterization may be utilized for maintaining the genetic

purity of a genotype and also as reference cultivar. More than one reference cultivar for a state of expression of characteristic is desirable in case the cultivar deteriorates for

the given character and/or it does not get expressed due to some growing condition and areas. Further, these identified diverse genotypes with peculiar characteristics may be used as parents in the crop improvement programme for evolving elite genotype. The study will be useful for breeders/researchers/farmers to identify Satputia varieties and to seek protection under Protection of Plant Varieties and Farmers Rights Act.

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#### References

1. Ajmal AM, Pandey AK. Systematic Studies on the family Cucurbitaceae of Eastern Bihar, India. Cucurbit Genetics Cooperative Report. 2005-06; 28-29:66-69.
2. Agdagwa IO, Nadukwa BC. The value of morpho-anatomy features in the systematics of *Cucurbita* L. (Cucurbitaceae) species in Nigeria. African. J Biotech 2004; 3(10):541-546.
3. Arora RK, Nayar ER. Wild Relatives of Crop Plants in India. NBPGR Science Monograph No. 7. National Bureau of Plant Genetic Resources, New Delhi, India. 1984; 90.
4. PPV&FR Act. Protection of Plant Varieties and Farmers' Rights Act (No. 53 of 2001). Department of Agriculture & Cooperation, Ministry of Agriculture, Government of India, Krishi Bhavan, New Delhi, 2001.
5. Prakash K, Pati K, Arya L, Pandey A, Verma M. Population structure and diversity in cultivated and wild *Luffa* species. Biochemical Systematics and Ecology. 2013; 56:165-170.
6. Ram D, Srivastava U. Some lesser known minor cucurbitaceous vegetables: Their distribution, diversity and uses. Indian Journal of Plant Genetic Resources. 1999; 12:307-316.
7. Sirohi PS, Munshi AD, Kumar G, Behera TK. Cucurbits. In: Plant Genetic Resources: Horticultural Crops (Dhillon, B.S., Tyagi, R.K., Saxena, S., and Randhawa, G.J., eds.). Narosa Publishing House, New Delhi, India. 2005, 34-58.
8. Sudre CP, Goncalves LSA, Rodrigues R, do Amaral AT Jr, Riva-Souza EM, Dos S, Bento C. Genetic variability in domesticated *Capsicum* spp. As assessed by morphological and agronomic data in mixed statistical analysis. Genet Mol Res. 2010; 9(1):283-294.
9. Umesh C. Distribution, domestication and genetic diversity of *Luffa* gourd in Indian subcontinent. Indian Journal of Plant Genetic Resources. 1995; 8(2):189-196.