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Agro-morphological characterization of spine gourd (*Momordica dioica* Roxb.)

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Abstract

Spine gourd showed huge diversity in all morphological traits. Nine qualitative and seventeen quantitative characters were assessed for each of fifteen promising genotypes at Horticulture research farm, IGKV, Raipur during *kharif* 2021. Categorical differences were observed for all 26 characters. The knowledge and nature magnitude of genetic analysis existed will provide the foundation of designing breeding program and selection of parents for the eventual development of new productive cultivars of spine gourd.

Keywords: Characterization, morphological traits, genotypes, spine gourd

Introduction

Spine gourd (*Momordica dioica* Roxb.) belongs to the cucurbitaceous family with chromosome number $2n=2x=28$. It is an underutilized, potential, perennial, dioeciously, cucurbitaceous fruit vegetable. It possess several medicinal and curative properties like decoction of leaves reduces fever, tuberous roots help in relieving headache, stone formation, migraine and green fruit is quite helpful in controlling blood sugar and blood pressure. Fruits can also be used to cure ulcers, piles, sores, and obstructions of the liver and spleen, as well as cough and other digestive disorders. In spite of many advantages, there was very little research thrust paid on kankoda's improvement. The propose of the present study was keep a data base of agro-morphological variability of collected plants, to evaluate the relationship and potential usefulness as genetic resources, to identify the relationship between geographical origin and genetic variability of kankoda land races and to propose a kankoda descriptors.

Materials and Methods

The present investigation agro-morphological characterization of spine gourd (*Momordica dioica* Roxb.) was carried out during the *kharif* 2021. The experiment was conducted at Horticultural Research farm, IGKV, Raipur (C.G.) 15 land races with two checks (Indira Kankoda-1 and C.G.Kankoda-2) of Kankoda were collected from different villages of district-Surajpur, Ambikapur and Pratappur under All India Coordinated Research Network on Potential Crops (Voluntary centre) IGKV, Raipur. Experiment was conducted in Randomized Block Design with three replications. Each land races and two checks were planted in each plot with a spacing of 2m X 2m. The male and female plants were kept in a 1:8 ratio. To raise the crop, the entire package of practices was followed. Character descriptors were used to make observations on both qualitative and quantitative traits as stated by Rasul *et al.*, (2004)^[1] and Yadav (2021)^[2].

Result and Discussion

The detailed 26 morphological characteristics (9 qualitative and 17 quantitative) of fifteen promising genotypes along with two check varieties *viz.* Indira Kankoda-1 and C.G.Kankoda-2 are given in Table-1

The stem colour 15 genotypes, 11 genotypes were recorded green colour (73%), 3 were recorded light green (20%) and 1 was recorded dark green (7%). Stem fineness Out of 15 genotypes, 11 genotypes were observed smooth (73%), 2 were moderate and rough (13%) each. The leaf colour were observed 6 genotypes into green, dark green 40% each and 3 genotypes into light green (20%).

The leaf margin were out of 15 spine gourd genotypes studied, 8 genotypes included into medium dented (53%), 4 into slightly dented (27%) and 1 into dented (20%). Sex ratio on the basis of the accessions is classified female and male sex ratio. All 15 genotypes noted high sex ratio (100%). Colour of fruits during maturity showed great variability among the accessions and categorized into yellow green, greenish and green. 5 accessions produced yellow green colour (33%), 3 produced greenish and green (20% each) and 4 for dark green. Fruit shape was classified into 3 groups, viz. round (40%), cylindrical (33%) and oval (27%). Generally growers prefer cylindrical to oval shaped fruit. Density of spines had 2 categories 8 genotypes included thin spines (53%) while 7 genotypes observed with thick spines. Colour of seed was quite variable from light yellow to black colour category. 7 genotypes showed light yellow (47%), 6 genotypes for grey (40%) and black (13%) for 2 genotypes. Days to first male flower as 12 were medium early (80%) and 3 were late (20%). Days to first female flower observed in spine gourd genotypes were observed, 3 genotypes were recorded medium (41-45 days) i.e. 20% while, 12 genotypes showed late duration (46-50 days) i.e. 80%. Days to first female flowering node classified into 3 groups (early, medium and late). 3 genotypes showed medium first female flowering node (20%) whereas late were observed in 12 genotypes with the frequency of 80%. Vine length observed in spine gourd genotypes were studied, all genotypes exhibited larger vine length i.e. 100%. Number of stems/plant were observed all genotypes with both checks were recorded few stems i.e. 100% frequency. Leaf length had classified into 3 groups. Medium length of leaves was recorded in all genotypes with the frequency of 100%. Short and long has not exhibited to any genotypes. Leaf width were recorded, 4 genotypes showed narrow width (27%) while 13 genotypes were medium width i.e. 73%. None of the genotypes were observed for wide leaf width. Fruit length was found medium for all genotypes including both checks i.e. 100%.

Fruit diameter was in two major diameter viz. medium (27%) for 4 genotypes, while larger 73% for 11 genotypes. Days to first fruit harvest found, all genotypes noted late (>60 days) to first fruit harvest i.e. 100%. Single fruit harvest is classified as light, medium, heavy and very heavy. Among 15 genotypes, 6 genotypes exhibited medium weight (40%) and 9 genotypes were heavy weight i.e. 60%. Flesh thickness of 15 spine gourd genotypes, all genotypes including both checks were observed high flesh thickness i.e. 100% frequency of the genotypes. Number of fruits per plant were classified into 4 groups. None genotypes were observed for low and medium number of fruits/plant. All genotypes with both checks were seen many number of fruits i.e. 100%. Number of seeds per fruit had classified into different classes of seeds per fruit. All genotypes were exhibited less number of seeds per fruit i.e. 100%. Days to last fruit harvest classified into early, medium and late classes. All 15 genotypes showed late fruit harvest i.e. more than 110 days and frequency was 100%. 100 seed weight of 15 spine gourd genotypes, all genotypes with both checks showed medium weight i.e. 100%. Fruit yield per plant is categorised as low, medium, good and very good. Out of 15 genotypes, 8 genotypes observed medium fruit yield (53%), 6 genotypes for good yield (40%) and only one genotype i.e. check variety CG Kankoda – 2 has very good yield per plant (7%).

In the present investigation the highest variations were observed for stem colour, leaf colour, leaf length, leaf margin, fruit colour, fruit shape, fruit length, fruit diameter, seeds/fruit, fruit yield/plant. These similar findings were also reported by Rasul *et al.* (2004)^[1] and Yadav (2018)^[2]. Other traits like single fruit weight, stem fineness, density of spines, seed colour, days to first female flowering, days to first female flowering node, vine length and number of fruits/plant were also exhibited variations. These similar findings were accordance with the finding of Yadav (2018)^[2]. Rest of the agro-morphological traits showed low variations in spine gourd.

Table 1: Parameters (descriptors) of agro-morphological traits studied in spine gourd germplasm

Traits	Descriptors(Parameters)	Name of genotypes	No.of genotypes	% of genotypes
*	1. Light green	IGSG21-4, IGSG21-13, Indira kankoda-1(c)	3	20
Stem colour	3. Green	IGSG21-1, IGSG21-2, IGSG21-3, IGSG21-5, IGSG21-6, IGSG21-7, IGSG21-8, IGSG21-9, IGSG21-10, IGSG21-11, IGSG21-12	11	73
	5. Dark green	C.G.Kankoda-2(c)	1	7
**	1. Smooth	IGSG21-1, IGSG21-2, IGSG21-4, IGSG21-5, IGSG21-6, IGSG21-7, IGSG21-8, IGSG21-9, IGSG21-10, IGSG21-11, IGSG21-12	11	73
Stem fineness				
	3. Moderate	IGSG21-3, C.G.Kankoda-2 (C)	2	13
	5. Rough	IGSG21-13, Indira Kankoda-1(c)	2	13
*	1. Light green	IGSG21-4, IGSG21-7, IGSG21-10	3	20
	3. Green	IGSG21-5, IGSG21-6, IGSG21-8, IGSG21-9, IGSG21-10, IGSG21-11, IGSG21-12, IGSG21-13, Indira Kankoda-1(c)	6	40
	5. Dark green	IGSG21-1, IGSG21-2, IGSG21-5, IGSG21-8, IGSG21-9, C.G.Kankoda-2(c)	6	40
***	1. Absence	None		
	3. Slightly dented	IGSG 21-2, IGSG21-3, IGSG21-9, IGSG21-12	4	27
	5. Medium dented	IGSG21-1, IGSG 21-6, IGSG 21-7, IGSG 21-8, IGSG 21-10, IGSG 21-11, IGSG 21-13, Indira kankoda-1(C)	8	53
	7. Dented	IGSG 21-4, IGSG 21-5, C.G.Kankoda-2(C)	3	20
***	1. Low(4:3)	None	-	-
Sex ratio(female: male)	3. Medium(6:2)	None	-	-
	5. High(8:1)	All genotypes with checks	15	100

* & **	1.Greenish yellow	IGSG21-4, IGSG21-5, IGSG21-7	3	20
Fruit colour	3.Yellow green	IGSG21-3, IGSG21-9, IGSG21-10, IGSG21-12, Indira Kankoda-1(c)	5	33
	5.Green	IGSG21-6, IGSG21-11, IGSG21-13	4	20
	7.Dark green	IGSG21-1,IGSG21-2,IGSG21-8,C.G. Kankoda-2 (c)	4	27
* & **	1.Round	IGSG21-1, IGSG21-6, IGSG21-8, IGSG21-9, IGSG21-10, IGSG21-11	6	40
Fruit shape	3.Oval	IGSG21-2, IGSG21-4, IGSG21-7, Indira kankoda-1 (c)	4	27
	5.Cylindrical	IGSG21-3, IGSG21-5, IGSG21-12, IGSG21-13, C.G. Kankoda-2 (c)	5	33
* & ** Density of spines	1.Thin	IGSG21-1, IGSG21-2, IGSG21-3, IGSG21-5, IGSG21-7, IGSG21-9,IGSG21-13,Indira Kankoda-2(c)	8	53
	3.Thick	IGSG21-4, IGSG21-6, IGSG21-8, IGSG21-10, IGSG21-11, IGSG21-12,C.G. Kankoda-2 (c)	7	47
** Seed colour	1.Light yellow	IGSG21-1, IGSG21-6, IGSG21-7, IGSG21-8, IGSG21-10, IGSG21-13, C.G.Kankoda-2 (c)	7	47
	3.Grey	IGSG21-3, IGSG21-4, IGSG21-5, IGSG21-9, IGSG21-12, Indira Kankoda-1 (c)	6	40
	5.Black	IGSG21-2, IGSG21-11	2	13
*** Days to first male flower	1.Early (35-40 days)	None	-	-
	3.Medium early(41-45days)	IGSG 21-1, IGSG 21-2, IGSG 21-4, IGSG 21-6, IGSG 21-7, IGSG 21-8, IGSG 21-10, IGSG 21-11,	12	80
		IGSG 21-12, IGSG 21-13, Indira kankoda-1(c), C.G. Kankoda-2(c)		
	5.Late(>50days)	IGSG 21-3, IGSG 21-5, IGSG 21-9	3	20
** Days to first female flower	1.Early(35-40days)	None	-	-
	3.Medium early(41-45days)	IGSG21-7, IGSG21-8, C.G. Kankoda-2 (c)	3	20
	5.Late(46-50days)	IGSG 21-1, IGSG21-2, IGSG 21-3, IGSG21-4, IGSG21-5, IGSG21-6, IGSG 21-8, IGSG21-9, IGSG21-10,	12	80
		IGSG21-11, Indira Kankoda-1(c), C.G.Kankoda-2(c)		
** Days to first female flowering node	1.Early(35-40days)	None	-	-
	3.Medium early(41-45days)	IGSG 21-7, IGSG 21-8, C.G.Kankoda-2(c)	3	20
	5.Late(46-50days)	All genotypes except IGSG 21-7, and IGSG 21-8.C.G.Kankoda-2(c)	12	80
** Vine length(cm)	1.Short(100-110cm)	None	-	-
	3.Medium(111-120cm)	None	-	-
	5.Large(>120cm)	All genotypes with both checks	15	100
* No.ofstems/plant	1.Few(<10 stems)	All genotypes with both checks	15	100
	3.Moderate(11-20 stems)	None	-	-
	5.Many (>21 stems)	None	-	-
		None	-	-
* & ** Leaf length	1.Short(1-7cm)	None	-	-
	3.Medium(7.1-15cm)	All genotypes with both checks	15	100
	5.Long(>15cm)	None	-	-
*** Leaf width	1.Narrow (1-7 cm)	IGSG 21-1, IGSG 21-4, IGSG 21-5, IGSG 21-6	4	27
	3. Medium (7.1-15 cm)	IGSG 21-2, IGSG 21-3, IGSG 21-7,IGSG 21-8, IGSG 21-9, IGSG 21-10, IGSG 21-11, IGSG 21-12, IGSG 21-13, Indira kankoda-1(c), C.G.kankoda-2(c)	11	73
	5. Wide (> 15 cm)	None	-	-
* & ** Fruit length(cm)	1.Short(<5cm)	None	-	-
	3.Medium(4.1-9cm)	All genotypes with both checks	15	100
	5.Long(>9cm)	None	-	-
* & ** Fruit diameter(cm)	1.Small(1-4cm)	None	-	-
	3.Medium(4.1-8cm)	IGSG21-1, IGSG21-7, IGSG21-8, IGSG 21-9	4	27
	5.Large(8.1-12cm)	IGSG 21-2, IGSG 21-3, IGSG 21-4, IGSG 21-5, IGSG 21-6, IGSG 21-10, IGSG21-11, IGSG21-12, IGSG21-13, Indira Kankoda-1(c), C.G.kankoda-2(c)	11	73
*** Days to first fruit harvest	1.Early(45-50days)	None	-	-
	3.Medium(50-60days)	None	-	-
	5.Late(>60days)	All genotypes with both checks	15	100
* Single fruit weight(g)	1. Light (1-5g)	None	-	-
	3. Medium (5-10 g)	None	-	-
	5.Heavy (10-15 g)	IGSG 21-2, IGSG 21-4, IGSG 21-5, IGSG 21-8, IGSG 21-11, IGSG 21-12	6	40
	7.Very heavy (> 15	IGSG 21-1, IGSG 21-3, IGSG 21-6, IGSG 21-7, IGSG 21-9, IGSG	9	60

	g)	21-10,IGSG 21-12, Indira Kankoda-1(c), C.G.Kankoda-2(c)		
*** Flesh thickness(cm)	1.Low(<2cm)	None	-	-
	3.Medium(2-4cm)	None	-	-
	5.High(>4cm)	All genotypes with both checks	15	100
*&*** No.of fruits/plant	1.Few(<20cm)	None	-	-
	3.Moderate(21-40)	None	-	-
	5.Proluse(41-60)	None	-	-
	7.Many(>60)	All genotypes with both checks	15	100
*&*** No.of seeds/fruit	1.Few(1-15)	None		
	3.Less(16-30)	All genotypes with both checks	15	100
	5.Medium(31-45)	None	-	-
	7.Many(41-60)	None	-	-
*** Days to last fruit harvest			15	100
	1.Early(<100days)	None		
	3.Medium(100-110days)	IGSG 21-11, IGSG 21-12	2	13
	5.Late(>110days)	All genotypes except IGSG 21-11 and IGSG 21-12	13	87
** 100 seed weight(g)	1.Light(<10g)	None		
	3.Medium(11-20g)	All genotypes with both checks	15	100
	5.Bold(>20g)	None	-	-
*&***	1.low(<1.0kg)	None	-	-
Fruit yield/plant(g)	3.Medium(1.1-2.0kg)	IGSG 21-1, IGSG 21-5, IGSG 21-6, IGSG 21-7, IGSG 21-8, IGSG 21-10, IGSG 21-13, Indira Kankoda-1(c)	8	53
	5.Good(2.1-3.0)	IGSG 21-2, IGSG 21-3, IGSG 21-4, IGSG 21-9, IGSG 21-11, IGSG 21-12	6	40
	7.Very good(3.1-4.0)	C.G.Kankoda-2(c)	1	7

*Indicates characters as suggested by Rasul *et al.* (2004) ^[1].

**Indicates characters as suggested by Yadav (2018) ^[2].

***Additional characters not listed in above descriptor

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