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Mean performance of ridge gourd (*Luffa acutangula* (L.) Roxb.) Genotypes for fruit yield parameters

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Abstract

In the present investigation, 14 genotypes will be grown in the during rainy season 2016-2017 at the field experimentation centre of the Department of Horticulture, SHUATS, Allahabad (U.P.). The mean sum of squares due to various sources of variance for different characters of ridge gourd genotypes. The results indicated highly significant variation among the genotypes for the 18 characters studied viz., vine length at 90 days after sowing, days to first female and male flower, node to first female flower, days to first harvest, days to last harvest, sex ratio, per cent fruit set, number of fruits per plant, fruit yield per plant, fruit yield per plot, fruit yield per hectare, average fruit weight, fruit length and fruit diameter. Fruit yield per plot (kg) was maximum in Arka Sumeet followed by Arka Sujat and Dharidan Local and minimum yield per plot was observed in Neel gang Local. The mean fruit diameter was maximum in Jaipur Long, followed by Arka Sumeet and Arka Sujat and minimum fruit diameter was recorded in Neelgang Local.

Keywords: Ridge gourd, mean performance and fruit yield

Introduction

Ridge gourd (*Luffa acutangula* L.) is one of the most popular cucurbitaceous vegetable both as spring summer and rainy season crop. Cucurbits vegetable crops belonging to family Cucurbitaceae, which primarily comprised species consumed as food worldwide. The family consists of about 118 genera and 825 species. It is a monoecious and highly cross pollinated crop in which a large amount of variations are observed for most of the economically important traits.

Variability found in shape, size and colour of fruits is most conspicuous. It originated in subtropical Asian region particularly India (Kalloo, 1993) [3]. Ridge gourd is an annual plant, produces fruits containing a fibrous vascular system having vigorous vines with cylindrical ten angled fruits, deltoid to nearly orbicular leaves exteriorly but acutely pointed at the apex and usually three to seven lobed with dentate margin (Whitaker and davis, 1962) [9]. Ridge gourd is monoecious plant with branched tendrils. Flowers are yellow in colour and showy having five petals. The inflorescences of staminate flowers are raceme, while pistillate flowers are solitary and short long pendunculate. Seeds are reported to be possess purgative, emetic and anthelmintic properties due to the secondary metabolite *cucurbitacin* (Robinson and Decker-Walters, 1997) [6]. Isolation of Ribosome Inactivating Proteins (RIPs) and luffaculin from ridge gourd seeds and its crystallographic studies, RIPs have received wide attention for their potential applications in medicine as they possess various pharmacological activities including abortifacient, antifungal, antitumor, antiviral and HIV-1 integrase inhibitory properties (Hou *et al.* 2006).

Materials and Methods

The experiment was conducted horticulture Research Farm, Department of Horticulture, Allahabad School of Agriculture, Sam Higginbottom Institute of Agriculture, Science and Technology, Allahabad. The experiment will be conducted in Randomized Block Design having 14 (genotypes) in three replications. The allocation of treatments of the individual plots using random number in each replication.

Fourteen genotypes of ridge guard was grown in a randomized block design with three replications.

The sowing of experimental material was done on 26/07/2016 during the year 2016-2017. five competitive plants was selected at randomly tagged from each plot to record observation on various characters. The average value of each character was calculated on the basis of five plants for each

genotype in every replication. Experimental materials for this study consist of 14 genotypes of ridge gourd (including check), collected from different sources are presented in Table 1.

Table 1: Detail of genotypes

S. No	Genotypes	Source of Genotypes
1	Malpura Local	Nadakatti Seeds Pvt. Ltd
2	Anjali	Keyonic Seeds Pvt. Ltd
3	Rekha	Ankur Seeds Pvt. Ltd
4	Solani-S	Sardar Seeds Pvt. Ltd
5	NRG-9	Nirmal Seeds Pvt. Ltd
6	Jaipur Long	Ashok Seeds Pv Ltd
7	Pusa Nasdar	IARI Newdelhi
8	Deepti	KAU Thrissur
9	Arka Sujata	IIHR, Bangalore
10	Arka Sumeet	IIHR, Bangalore
11	Co-2	TNAU Coimbatore
12	Barsat Local	West Bengal
13	Neelaganj Local	West Begal
14	Dhardan Local	Allahabad

Result

Analysis of variance

The mean sum of squares due to various sources of variance for different characters of ridge gourd genotypes is presented in Table 2.

The results indicated highly significant variation among the genotypes for the characters studied viz., vine length at 90 days after sowing, days to first female and male flower, node

to first female flower, days to first harvest, days to last harvest, sex ratio, per cent fruit set, number of fruits per plant, fruit yield per plant, fruit yield per plot, fruit yield per hectare, average fruit weight, fruit length and fruit diameter. Similar finding were reported by Sing *et al.* (2002) [8] and Karuppiah *et al.* (2005) [4] in ridge gourd. Kadam and Kale *et al.* (1987) [2], Sahni *et al.* (1987) [7], Rao *et al.* (2002) [5] Singh *et al.* (2002) [8] and Hegade *et al.* (2009) [1] in ridge gourd.

Table 2: Analysis of variance (mean sum of squares) for growth, earliness, yield, fruit quality and seed parameters in Ridge gourd

S. No	Character	Replication	Genotypes	Error	SEm±	CD@ 5%
Df		2	13	26		
A	Growth parameters					
1.	Vine length 90DAS	62.2857	224586.96**	1085.74	10.05	20.66
B.	Earliness Parameter					
1.	Days to first female flower	0.05	27.92**	0.89	0.94	1.94
2.	Days to first male flower	0.22	10.91**	0.67	0.82	1.68
3.	Node to first female flower	2.02	32.40**	0.35	0.59	1.22
4.	Node to first male flower	0.17	0.25*	0.02	0.13	0.28
5.	Days to 50% flowering	0.06	9.10**	0.68	0.82	1.70
6.	Days to first harvest	0.61	10.79**	1.36	1.16	2.39
7.	Days to last harvest	6.62	53.83**	3.68	1.91	3.93
8.	Sex ratio	0.10	45.46**	0.08	0.28	0.58
C.	Yield and yield components					
1.	Per cent fruit set	241.46	49.52**	14.83	3.85	7.88
2.	Number of fruits per plant	2.48	1.52**	0.07	0.26	0.55
3.	Fruit yield per plant	49070.00	342163.72**	3069.86	55.40	133.30
4.	Fruit yield per plot	2.17	30.02**	0.13	0.36	0.74
5.	Fruit yield per hectare	177.43	2577.95**	11.49	2.40	6.93
6.	Average fruit weight	15.50	5972.36**	22.45	4.73	9.69
7.	Fruit length	4.64	63.05**	0.38	0.62	1.28
8.	Fruit diameter	98.98	53.91**	2.58	1.60	3.25
D.	Fruit quality parameters					
1.	Rind thickness	0.08	0.57**	0.05	0.23	0.47
2.	Flesh thickness	0.22	0.28**	0.01	0.11	0.23

Table 3: Mean performance of ridge gourd varieties based on different morphological traits related to yield

Charcter	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Malpura Local	38.0000	42.0000	42.0000	4.0000	20.0000	20.3967	413.6667	51.0000	89.0000	20.1333	3.1067	3.1567	54.3333	36.9300	12.0000	180.0000	2159.3333	17.2733	207.2667
Anjali	40.0000	44.3333	44.0000	4.0667	16.0000	15.6000	387.3333	50.0000	89.0000	25.0000	4.1800	4.0600	49.6667	40.6700	10.3300	139.6667	1443.3334	11.5467	138.5667
Rekha	42.6667	47.0000	46.0000	3.2667	14.0000	18.5333	407.6667	51.0000	90.0000	24.1300	3.3067	3.1267	57.6667	40.3300	13.3300	146.3333	1951.6666	15.6100	187.3333
Solani-S	40.6667	45.0000	45.0000	5.0000	21.0000	17.6633	428.0000	50.0000	90.0000	23.2000	2.2933	2.6000	46.9967	36.9333	10.0000	189.3333	1893.6666	15.1500	181.8000
NRG-9	39.0000	43.0000	43.0000	5.0333	19.0333	18.5333	417.3333	51.0000	89.6667	24.7333	2.4067	3.1200	58.0000	39.4667	15.0000	162.3333	2436.3333	19.4900	233.9000
Jaipur Long	44.0000	52.0000	48.0000	5.5333	22.0000	20.6700	434.3333	58.3333	89.0000	31.6667	3.3133	3.1333	52.5000	74.5300	10.6667	277.6667	2962.3333	23.7000	284.3666
Pusa Nasdar	42.3333	45.6667	45.0000	4.0000	20.0000	15.6000	377.6667	51.3333	87.6667	25.0700	3.5600	3.5267	61.3333	60.3300	15.3300	223.6667	3430.3333	27.4433	329.3334
Deepti	35.0000	39.6667	39.0000	5.0000	19.0333	20.4000	362.3333	49.0000	89.3333	24.5333	3.3700	4.3933	47.8333	63.2000	9.6633	212.0000	2049.3333	16.3933	196.7667
Arka Sujata	36.0000	39.3333	42.0000	3.2667	12.0000	22.5333	445.0000	51.0000	92.0000	32.9333	3.1100	4.3267	65.8333	70.3333	18.6667	248.0000	4628.6665	37.0333	444.4000
Arka Sumeet	36.0000	38.0000	40.0000	4.0000	10.9667	18.5967	461.0000	48.0000	95.0000	34.6667	3.3600	5.3267	66.9967	73.1967	20.6667	238.0000	4918.6665	39.3500	472.2000
CO-2	40.3333	44.0000	44.0000	4.0000	16.0000	12.5333	442.6667	52.0000	89.0000	30.6000	4.1767	4.0933	53.5000	67.3333	11.0000	205.6667	2257.6667	18.0600	216.7334
Barsat Local	36.3333	40.0000	40.0000	4.4667	18.0333	15.3333	405.3333	49.0000	88.0000	25.5333	3.3067	4.1800	56.0000	41.3333	12.6667	182.3333	2309.6667	18.4767	221.7333
Neelaganj Local	33.0000	38.0000	39.0000	4.0333	14.0000	5.5367	151.6667	53.0000	88.0000	14.7300	2.3933	2.4467	46.1667	32.5967	8.6667	81.6667	708.0000	5.6667	68.0333
Dhardan Local	34.3333	36.0000	36.0000	2.9000	8.0000	20.2000	433.0000	45.0000	77.0000	27.6000	4.1667	3.0633	63.8300	65.4667	17.3300	232.3333	4027.0000	32.2167	386.5999
Mean	38.4048	42.4286	42.3571	4.1833	16.4333	17.2950	397.6428	50.6905	88.7619	26.0379	3.2893	3.6110	55.7612	53.0464	13.2369	194.2143	2655.4282	21.2436	254.9309
C.V.	1.9934	1.9270	1.9090	5.3550	5.5513	3.9293	3.0959	2.0680	1.9436	3.9609	5.1517	4.9187	4.2696	3.9224	7.0491	5.2359	8.7139	5.3800	8.5842
F ratio	59.0781	82.8055	49.1345	34.2924	62.7357	120.9045	113.9925	23.6350	15.0843	77.5861	40.7917	61.6014	25.2093	173.5009	46.3810	75.5674	81.3235	213.3689	83.7938
F Prob.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S.E.	0.4420	0.4721	0.4668	0.1293	0.5267	0.3923	7.1076	0.6052	0.9960	0.5954	0.0978	0.1025	1.3745	1.2013	0.5387	5.8710	133.5937	0.6599	12.6346
C.D. 5%	1.2849	1.3722	1.3571	0.3760	1.5311	1.1405	20.6614	1.7594	2.8954	1.7309	0.2844	0.2981	3.9957	3.4921	1.5660	17.0666	388.3499	1.9182	36.7280
C.D. 1%	1.7369	1.8550	1.8346	0.5083	2.0698	1.5418	27.9308	2.3784	3.9141	2.3399	0.3845	0.4030	5.4016	4.7208	2.1170	23.0713	524.9863	2.5930	49.6504
Range Lowest	33.0000	36.0000	36.0000	2.9000	8.0000	5.5367	151.6667	45.0000	77.0000	14.7300	2.2933	2.4467	46.1667	32.5967	8.6667	81.6667	708.0000	5.6667	68.0333
Range Highest	44.0000	52.0000	48.0000	5.5333	22.0000	22.5333	461.0000	58.3333	95.0000	34.6667	4.1800	5.3267	66.9967	74.5300	20.6667	277.6667	4918.6665	39.3500	472.2000

1 Days to Taken 1st Male Flowering 2. Days to Taken 1st Female Flowering 3. Days to 50% Flowering 4. Node to First Male Flower 5. Node to First Female Flower 6. Sex Ratio 7. Vine Length cm at 90 Days 8. Days to 1st harvest 9. Days to last harvest 10. Fruit Length cm 11. Flesh Thickness cm 12. Rind Thickness mm 13. Fruit Set % 14. Fruit Diameter 15. Fruits/ Plant 16. Average Fruit Weight (g) 17. Fruit Yield/ Plant (g) 18. Fruit Yield/ Plot (kg) 19. Fruit Yield Q/ha

Maximum vine length was observed in check Arka Sumeet (460.93 cm) followed by Arka Sujat (445.00 cm) and CO-2 minimum was observed in Neelagang local (151.66cm). Genotypes differed for Vine length 90 days after sowing ranging from 151.66 to 460.93 with mean of 397.64 cm.

The earliness or lateness is dependent on the number of days taken for its first female flower. The genotype Dharidan local shows earliest to open first female flower (36.00 days) followed by Arka Sumeet (38.00 days) and Neelagang local (38.00 days) the genotype Jaipur Long took maximum number of days (52.00 days) for female flower appearance. The range for this attribute being 36.00 days to 52.00 days with mean of 42.43 days was observed.

Genotype Neelagang local took minimum number of days (33.00 days) for appearance of first male flower followed by Dharidan local (34.00 days) and the genotype Jaipur Long took maximum number of days (44.00 days) for first male flower appearance. Days for appearance of first male flower ranged from 33.00 to 44.00 days with average mean of 38.40 days.

Genotype Dharidan local (8.00) showed for appearance of female flower, followed by Arka sumeet (11.00) and Jaipur Long shows higher node position (22.00). The genotypes varied among themselves for this character from 8.00 to 22.00 with average mean of 10.05.

Genotype Dharidan local showed lower node (2.93) for appearance of male flower followed by Arka Sujat (3.26) and Rekha (3.26) and Jaipur Long shows higher node position (5.53). The node at which first male flower appearance ranging from 2.93 to 5.53 with average mean of 4.18.

The genotype Dharidan Local took minimum number of days (36.00 days) for 50 per cent plant to produce flower followed by Deepti (39.00days) and Neelagang Loca (39.00days) genotype Jaipur Long took maximum number of days (48.00 days) for 50 per cent of plant produce flower. The range observed for this character varies from 36.00 days 48.00 days, with mean value of 42.36 days.

The genotype Dharidhan Local took minimum number of days (45.00 days) for first harvest followed by Arka Sumeet (48.00 days) and Jaipur Long took maximum number of days (58.00days). Days to first harvest varied from 45.00 days to 58.00 days with the mean of 50.69 days.

The genotype Arka Sumeet took maximum number of days (95.00 days) for last harvest followed by Arka Sujat (92.00 days) and the genotype Dharidhan Local took minimum number of days (77.00 days). Days to last harvest varied from 77.00 to days to 95.00 days with the mean of 88.76 days.

Minimum sex ratio (Male: female) was observed in Neelagang Local (5.53) followed by CO-2 (12.53) and Barsat Local (15.33) and maximum was observed in Arka Sujat (22.53). Sex ratio (male flowers for one female flower) ranged from 5.53 to 22.53 with mean of 17.30.

Among the genotypes maximum per cent fruit set was observed in Arka Sumeet (67.00%) followed by Arka Sujat (65.83%) and Dharidhan Local (63.5%) and minimum was observed in Neelagang Local (46.16%). Per cent fruit set ranged from 46.16 to 67.00 percent with mean value of 55.76%.

Maximum number of fruits per plant was observed in Arka Sumeet (20.66) followed by Arka Sujat (18.66) and Dharidan Local (17.33) and minimum number of fruits per plant were observed in Neelgang Local (8.66). The number of fruits per plant ranged from 8.66 to 20.66. With mean value of 13.24.

Total fruit yield per plant was maximum in Arka Sumeet (4918.66 g) followed by Arka Sujat (4629.00 g) and Dharidan

Local (4027.00g) and minimum yield per plant was observed in Neelgang Local (708.33g). The magnitude of variation among the genotypes with respect to fruit yield ranged from 708.33g to 4918.66 g with mean of 2655.43 g.

Total fruit yield per plot (kg) was maximum in Arka Sumeet (39.34 kg) followed by Arka Sujat (37.54kg) and Dharidan Local (31.40 kg) and minimum yield per plot was observed in Neelgang Local (5.97 kg).

The magnitude of variation among the genotypes with respect to fruit yield per plot ranged from 5.97 kg to 39.34 kg with mean of 21.24 kg.

Total fruit yield per hectare (q/ha) was maximum in Arka Sumeet (472.19 q/ha) followed by Arka Sujat (444.38 q/ha) and Dharidan Local (386.59 q/ha) and minimum yield per plot was observed in Neelgang Local (68.00 q/ha). The magnitude of variation among the genotypes with respect to fruit yield per hectare ranged from 68.00 q/ha to 472.19 q/ha with mean of 254.93 q/ha.

Average fruit weight was maximum in Jaipur Long (277.66 g) followed by Arka Sujat (248.00 g) and Arka Sumeet (238.00 g) and minimum was observed in (81.66 g). Mean fruit weight ranged from 81.66g to 277.66g with the mean value of 194.21.

Mean fruit length was maximum in Arka Sumeet (34.66 cm) followed by Arka Sujat (32.93 cm) and Jaipur Long (31.66 cm) and minimum fruit length was recorded in Neelgang Local (14.73 cm). Fruit length ranged from 14.73 cm to 34.66 cm with mean of 26.04 cm was observed for fruit length.

The mean fruit diameter was maximum in Jaipur Long (74.53 mm), followed by Arka Sumeet (73.2mm) and Arka Sujat (70.33 mm) and minimum fruit diameter was recorded in Neelgang Local (32.66 mm). Fruit diameter ranged from 32.6 mm to 74.33 mm with mean of 53.05 mm was observed.

The rind thickness was maximum in Arka Sumeet (5.32 mm), followed by Deepti (4.39 mm) and Arka Sujat (4.32) and minimum rind thickness was recorded in Neelgang local (2.44mm). Thickness of rind ranged from 2.44 mm to 5.32 mm with mean of 3.61 mm was observed.

Mean flesh thickness was maximum in Anjali (4.18 cm), followed by CO-2 (4.17 cm) and Dharidan Local (4.16cm) and minimum flesh thickness was recorded in Solani-S (2.29 cm). Flesh thickness ranged from 2.29 cm to 4.18 cm with mean of 3.29 cm was observed.

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