

## Mean Performance of Parents and Hybrids for Fruit Yield and Quality attributing Characters in Yardlong bean (*Vigna unguiculata* (L.) Walp. ssp. *Sesquipedalis* Verdc.)

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### ABSTRACT

The present investigation was carried out to know the mean performance of parents and hybrids for fruit yield and quality attributing traits in yardlong bean at College of Horticulture, Venkataramannagudem, during 2018-19. Among the seven parents used for study Babli, Bobbili Local, Lola and Trivendrum Local were high yielding of 3.69, 3.42, 3.17 and 3.06 kg per plant, respectively. The hybrids Babli x Lola, Babli x Bobbili Local, Babli x Trivendrum Local, Bobbili Local x Lola, Bobbili Local x Trivendrum Local and Lola x Trivendrum Local recorded highest yield of 5.16, 4.97, 4.84, 4.75, 4.64 and 4.34 kg per plant, respectively in yardlong bean. Based on their mean performance parents can be used for further breeding programmes and hybrids could be exploited for cultivation.

**Keywords:** *Breeding programmes, Mean performance, Quality, Yardlong bean and Yield.*

Yardlong bean (*Vigna unguiculata* (L.) Walp. ssp. *sesquipedalis* Verdc.) belongs to the family Fabaceae with chromosome number  $2n=2x=22$ . Yardlong bean has a typical leguminous flower and is predominantly a self pollinated crop. However, cross pollination upto 10 percent has been reported (Carlos *et al.*, 1998). It is a distinct form of cowpea grown as a vegetable crop throughout Asia especially in South and South East Asian countries including India. It is also known as asparagus bean, chinese long bean, pea bean, string bean, snake bean, snake pea, snap pea, borbati *etc.*, in different parts of the world.

The information on breeding behaviour of parents is a prerequisite in planning of any breeding programme. The *per se* performance of parents may not always give a correct indication of their breeding potential indicating the importance of general combining ability of parents and specific combining ability of crosses in breeding programme. Information on combining ability provides guidelines to the plant breeders in selection of the elite parents and desirable cross combinations and at the same time reveals the nature of gene action involved in the inheritance of various traits.

### MATERIAL AND METHODS

The experimental material consisted of seven parental lines *viz.*, Geethika, Babli, Vizianagaram Local, Bobbili Local, Lola, Trivendram Local and Bhuvanewar Local which were crossed in diallel fashion excluding reciprocals during *Rabi*, 2018. The resultant 21 F<sub>1</sub> hybrids along with seven parents and one check were evaluated in randomized block design with three replications with spacing of 1.0 x 1.0 m during *Summer*, 2019. Observations were recorded on five randomly selected plants from each plot for yield and quality attributing traits *viz.*, number of clusters per plant, number of pods per cluster, number of pods per plant, pod length (cm), pod girth (cm), pod weight (g), number of seeds per pod, 100 seed weight (g), pod yield per plant (kg), TSS (<sup>0</sup>Brix) and protein (%) to see the mean performance of parents and hybrids.

### RESULTS AND DISCUSSION

In the analysis of mean squares the differences due to the treatments were significant for all the characters studied except for number of clusters per plant and number of pods per cluster (Table 1).

The results from *per se* performance (Table 2) of parents and hybrids revealed that, for the character number of clusters per plant, for parents the range varied from 19.47 (Vizianagaram Local) to 22.67 (Bobbili Local) while among hybrids ranged from 17.33 (Vizianagaram Local x Bhuvanewar Local) to 24.60 (Babli x Lola) and 20.93 recorded in check Arka Mangala. For number of pods per cluster and number of pods per plant, the parents, ranged from 4.13, 89 (Vizianagaram Local) to 5.53, 117.13 (Babli) respectively. In hybrids it ranged from 4.20 (Babli x Vizianagaram Local), 96.93 (Geethika x Bhuvanewar Local) to 5.60 (Babli x Lola), 148.13 (Babli x Bobbili Local) respectively and in check Arka Mangala 4.13 and 98.87 recorded respectively. These results are conformity with the findings of Ushakumari *et al.* (2010) and Owusu *et al.* (2018) in cowpea, Farag and Afiah (2012) and Abdalla *et al.* (2017) in faba bean.

For the characters pod length, pod girth and pod weight, the parents ranged from 36.30, 2.05 and 21.37 (Vizianagaram Local) to 64.36, 2.51 and 29.63 (Babli) respectively, while among hybrids they ranged from 39.91, 1.84 (Vizianagaram Local x Bobbili Local) and 28.21 (Lola x Bhuvanewar Local) to 65.98, 2.62 and 34.28 (Babli x Lola) respectively and in check Arka Mangala 60.66, 2.10 and 24.97 respectively. For the character, number of seeds per pod parents ranged from 13.73 (Vizianagaram Local) to 18.13 (Babli), while hybrids ranged from 13.20

(Vizianagaram Local x Bobbili Local) to 18.93 (Babli x Lola) and in check Arka Mangala it recorded 16.80. These results are in agreement with the findings of Borwal *et al.* (2018) in Indian bean, Kumar *et al.* (2019) in garden pea and Khaimichho *et al.* (2016) in mung bean.

For the character 100 seed weight, parents showed a range of 15.47 (Geethika) to 22.68 (Trivendrum Local), while hybrids were in the range of 16.26 (Trivendrum Local x Bhuvanewar Local) to 23.58 (Babli x Trivendrum Local) and 21.39 recorded in check Arka Mangala. For pod yield per plant, parents varied from 2.88 (Vizianagaram Local) to 3.69 (Babli). The hybrids recorded a range of 3.60 (Trivendrum Local x Bhuvanewar Local) to 5.16 (Babli x Lola) and 2.94 recorded in check Arka Mangala. For TSS content, among the parents varied from 2.93 (Bobbili Local) to 3.47 (Babli) and among the hybrids it ranged from 2.12 (Vizianagaram Local x Lola) to 3.51 (Babli x Trivendrum Local). The check Arka Mangala recorded 3.07. The protein content among the parents varied from 2.08 (Bhuvanewar Local) to 2.99 (Babli) and among the hybrids it ranged from 1.97 (Vizianagaram Local x Trivendrum Local) to 3.00 (Babli x Trivendrum Local). However, the mean protein content for check Arka Mangala was 2.79. These results are conformity with the findings of Kumar *et al.* (2019) in garden pea, Mujjassim *et al.* (2018) in chick pea and Chinapolaiah *et al.* (2019) in velvet bean.

**Table 1. Analysis of variance for fruit yield and quality attributing traits in 7 x7 half diallel of yardlong bean**

Source	Df	Number of clusters per plant	Number of pods per cluster	Number of pods per plant	Pod length (cm)	Pod girth (cm)	Pod weight (gm)
Replicates	2	0.796	0.023	16.713	2.293	0.006	0.295
Treatments	28	10.591	0.536	857.108**	204.683**	0.164**	25.891**
Error	56	0.688	0.083	16.279	2.094	0.005	1.349

Table 1.Cont...

Source	Df	Number of seeds per pod	100 seed weight (gm)	Pod yield per plant (kg)	TSS (% brix)	Protein (%)
Mean Sum of Squares						
Replicates	2	0.53	0.043	0.036	0.002	0.001
Treatments	28	7.410**	15.641**	1.1386**	0.383**	0.304**
Error	56	0.271	0.202	0.021	0.006	0.008

\* and \*\* Significance at 5% and 1% level respectively.

**Table 2. Per se performance of parents and hybrids for fruit yield and quality attributing traits in 7 x7 half diallel of yardlong bean**

Treatment	Number of clusters per plant	Number of pods per cluster	Number of pods per plant	Pod length (cm)	Pod girth (cm)	Pod weight (g)	Number of seeds per pod
<b>Parents</b>							
Geethika	20.07	4.27	91.93	43.23	2.25	25.49	17.60
Babli	20.90	5.53	117.13	64.36	2.51	29.63	18.13
Vizianagaram Local	19.47	4.13	89.00	36.30	2.05	21.37	13.73
Bobbili local	22.67	4.53	107.93	60.63	2.41	28.59	17.00
Lola	21.53	4.67	100.93	48.70	2.35	27.96	17.80
Trivendrum Local	20.73	5.00	106.73	50.43	2.35	26.78	16.87
Bhuvanewar Local	19.67	4.07	90.07	47.87	2.13	25.27	14.67
<b>Parents Mean</b>	<b>20.72</b>	<b>4.60</b>	<b>100.53</b>	<b>50.22</b>	<b>2.29</b>	<b>26.44</b>	<b>16.54</b>
<b>Crosses</b>							
Geethika x Babli	20.63	4.87	115.80	53.78	2.00	31.73	16.73
Geethika x Vizianagaram Local	19.40	4.73	101.80	57.63	2.32	30.26	17.07
Geethika x Bobbili Local	19.53	4.53	99.80	50.23	1.97	29.42	15.13
Geethika x Lola	18.40	4.47	99.13	54.38	2.17	29.55	17.00
Geethika x Trivendrum Local	18.60	4.53	100.13	52.82	2.01	28.79	15.93
Geethika x Bhuvanewar Local	18.00	4.27	96.93	49.29	1.87	28.91	14.13
Babli x Vizianagaram Local	19.60	4.20	99.87	50.79	2.11	28.76	15.00
Babli x Bobbili Local	24.40	5.40	148.13	65.28	2.61	32.48	18.67
Babli x Lola	24.60	5.60	146.80	65.98	2.62	34.28	18.93
Babli x Trivendrum Local	22.80	5.33	141.33	63.78	2.60	34.15	18.27
Babli x Bhuvanewar Local	20.07	4.53	119.80	48.37	2.13	30.62	16.53
Vizianagaram Local x Bobbili Local	19.40	4.80	118.53	39.91	1.84	29.87	13.20
Vizianagaram Local x Lola	19.13	4.60	110.53	46.42	2.15	29.49	15.27
Vizianagaram Local x Trivendrum Local	17.47	4.87	106.40	40.34	1.86	29.46	13.33
Vizianagaram Local x Bhuvanewar Local	17.33	4.80	99.60	44.79	2.18	30.46	15.73
Bobbili local x Lola	22.47	5.13	135.87	62.28	2.55	33.69	18.00
Bobbili local x Trivendrum Local	21.47	5.07	130.60	59.29	2.48	33.53	17.40
Bobbili local x Bhuvanewar Local	18.13	4.80	120.00	57.43	2.24	30.67	16.93
Lola x Trivendrum Local	21.60	5.20	135.80	60.15	2.49	32.60	17.53
Lola x Bhuvanewar Local	19.67	5.00	118.53	44.37	2.17	28.21	17.07
Trivendrum Local x Bhuvanewar Local	18.73	4.80	117.20	48.42	2.04	28.28	16.80
<b>Crosses mean</b>	<b>20.07</b>	<b>4.83</b>	<b>117.27</b>	<b>53.13</b>	<b>2.21</b>	<b>30.72</b>	<b>16.41</b>
<b>Check</b>							
Arka Mangala	20.93	4.13	98.87	60.66	2.10	24.97	16.80
<b>Grand Mean</b>	<b>20.26</b>	<b>4.75</b>	<b>112.59</b>	<b>52.69</b>	<b>2.23</b>	<b>29.49</b>	<b>16.46</b>
Min	<b>17.33</b>	<b>4.07</b>	<b>89.00</b>	<b>36.30</b>	<b>1.84</b>	<b>21.37</b>	<b>13.20</b>
Max	<b>24.60</b>	<b>5.60</b>	<b>148.13</b>	<b>65.98</b>	<b>2.62</b>	<b>34.28</b>	<b>18.93</b>
SE(d)	0.48	0.17	2.33	0.84	0.04	0.67	0.30
C.D. at 5%	1.36	0.47	6.60	2.37	0.11	1.90	0.85
C.V.	7.10	9.08	6.58	5.75	6.05	6.94	6.17

Table 2 cont.....

Treatment	100 seed weight (g)	Pod yield per plant (kg)	TSS (%brix)	Protein (%)
<b>Parents</b>				
Geethika	15.47	2.89	3.33	2.65
Babli	21.73	3.69	3.47	2.99
Vizianagaram Local	18.23	2.88	3.13	2.57
Bobbili local	19.83	3.42	2.93	2.81
Lola	19.65	3.17	3.43	2.77
Trivendrum Local	22.68	3.06	3.40	2.97
Bhuvaneswar Local	18.04	2.95	3.30	2.08
<b>Parents Mean</b>	<b>19.38</b>	<b>3.15</b>	<b>3.28</b>	<b>2.69</b>
<b>Crosses</b>				
Geethika x Babli	21.08	3.95	2.81	2.34
Geethika x Vizianagaram Local	22.12	3.81	2.69	2.62
Geethika x Bobbili Local	19.48	3.86	2.57	2.14
Geethika x Lola	22.24	3.81	2.72	2.54
Geethika x Trivendrum Local	18.72	3.84	2.48	2.29
Geethika x Bhuvaneswar Local	18.64	3.80	2.72	2.16
Babli x Vizianagaram Local	21.94	3.83	2.63	2.44
Babli x Bobbili Local	22.79	4.97	2.95	2.85
Babli x Lola	22.91	5.16	3.01	2.89
Babli x Trivendrum Local	23.58	4.84	3.51	3.00
Babli x Bhuvaneswar Local	21.77	3.95	2.82	2.36
Vizianagaram Local x Bobbili Local	20.07	3.96	2.79	2.04
Vizianagaram Local x Lola	20.62	3.70	2.12	2.16
Vizianagaram Local x Trivendrum Local	19.24	3.67	2.47	1.97
Vizianagaram Local x Bhuvaneswar Local	21.43	3.76	2.76	2.21
Bobbili local x Lola	23.21	4.75	3.48	2.96
Bobbili local x Trivendrum Local	23.01	4.64	3.40	2.72
Bobbili local x Bhuvaneswar Local	16.92	3.71	3.17	2.68
Lola x Trivendrum Local	22.65	4.34	2.89	2.83
Lola x Bhuvaneswar Local	17.07	4.00	2.74	2.49
Trivendrum Local x Bhuvaneswar Local	16.26	3.60	2.96	2.68
<b>Crosses mean</b>	<b>20.75</b>	<b>4.09</b>	<b>2.84</b>	<b>2.49</b>
<b>Check</b>				
Arka Mangala	21.39	2.94	3.07	2.79
<b>Grand Mean</b>	<b>20.44</b>	<b>3.83</b>	<b>2.96</b>	<b>2.55</b>
Min	<b>15.47</b>	<b>2.88</b>	<b>2.12</b>	<b>1.97</b>
Max	<b>23.58</b>	<b>5.16</b>	<b>3.51</b>	<b>3.00</b>
SE(d)	0.26	0.08	0.04	0.05
C.D. at 5%	0.74	0.24	0.12	0.14
C.V.	5.20	6.83	5.54	6.47

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