

## YIELD PARAMETERS AND THEIR SIGNIFICANCE IN GREENGRAM (*Vigna radiata* (L.) WILCZEK) GENOTYPES IN RELATION TO YIELD

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The number of clusters per plant had direct correlation with yield at high level of significance. For the selection of greengram genotypes, parameters like number of cluster per plant, pod length, number of seeds per pod, seed weight per pod, 100 seed weight and fertility coefficient deserve consideration.

Production physiology has been the recent theme in food crops particularly in grain legumes. Except in soybean and groundnut the physiological basis for yield has not been adequately explained in other legumes. In comparison to the phenomenal yields possible in cereals, in the case of pulses, yields have been generally low, inspite of the great efforts made by the breeders. The vegetative dominance, flower shed, poor filling of pods and other characters reduce the yield. Physiological studies in a greater depth will assist the plant breeders in evolving desirable material to be employed in breeding programme. The yield parameters necessarily govern the yield directly or indirectly and it should be possible to fix up a few characters that could be employed as selection indices. As quantitative characters, yield parameters naturally are very important for making assessment of the performance of any crop. Awatade *et al.* (1980) showed a wide range of variability with regard to number of pod clusters per plant which explained the variation in yield. Barthakur and Hazarika (1977) fixed three characters namely clusters per plant, pods per plant and pod length as having

positive correlation with yield in green gram. There was direct effect between seed number and yield in greengram shown by Krishnaiah *et al.* (1979). Malhotra *et al.* (1973) stated that 100 seed weight had maximum genetic advance and efficiency to straight selection of genotype for yield. Fertility coefficient in blackgram was reported by Soundrapandian *et al.* (1977). Sandhu *et al.* (1980) in a path coefficient analysis of greengram genotypes indicated that pods per plant, seeds per pod and 100 seed weight were important in improving the yield.

### MATERIAL AND METHODS

Investigations outlined in this were carried out during 1978 - 81 in the Department of Crop Physiology, Tamil Nadu Agricultural University, Coimbatore-3. In the present study an attempt was made to bring out an assessment of yield parameters among fifteen genotypes of greengram. The 15 genotypes chosen, varied in yield which were arbitrarily grouped into high (PIMS 4, Co 3, 11/99, ML 69 and Pusa Baisakhi), medium (T44, 11/395, LAM GG 127, ML 73 and 10/303) and low (KM1, PH6, ML 62, DM/2 and

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MH 1) yielders but had a duration of 60-63 days. The yield parameters were investigated from population samples grown under uniform field condition. Randomised block design was adopted with three replications. Enough number of samples were collected in each of three replications and average was worked out for each parameter. The data collected were subjected to statistical analysis.

## RESULTS AND DISCUSSION

On the whole six important parameters relating to yield in greengram were chosen for a full assessment of the behaviour of the genotypes.

i) *Number of clusters per plant* (Table 1): The data relating to this was significant at one per cent level and there was ample evidence to show that the three groups could be identified based on this parameter. All the high yielders recorded either 7.60 to 7.70 clusters/plant and T 44 a medium yielder gave close of 7.40 clusters/plant. The low yielding genotypes recorded values between 5.40 to 5.80 clusters/plant and genotype 10/303 was bordering between low and medium yielders.

ii) *Pod length* (Table 1): Adequate pod length is a desirable character in greengram and observation on the pod length proved to be highly significant statistically. Among the high yielders the pod length ranged from 6.91 to 7.34 cm whereas in the medium yielders it was seen to range from 6.28 to 6.89 cm. The pod length in low yielders was relatively less

ranging from 5.92 to 6.22 cm. The shortest pod was in PH 6 (5.92 cm) and longest in 11/99 (7.70 cm),

iii) *Number of seeds per pod* (Table 1): The number of seeds per pod is naturally closely related to length of pod and size of the seed and the data showed that there was quite a distinct difference among the three groups. The highest value in this regard was noted in 11/99 (10.83 seeds/pod) whereas MH1 recorded the lowest value (9.20 seeds/pod.) High statistical difference among genotypes was reflected in the identity of the three groups.

iv) *Seed weight per pod* and v) *100 seed weight* (Table 1):

The pattern of distribution of values in seed weight in pod and 100 seed weight was paralled as expected. Both the parameters were highly significant statistically in these characters. Again the genotype 11/99 recorded the highest value, whereas KM1 showed low value in respect of seed weight/pod and DM/2 in the case of 100 seed weight. However, the data amply showed that the three groups could be identified although position of MH 1 alone could not be fitted among the low yielders.

vi) *Fertility Co-efficient* (Table 1): This indicated the actual number of pods produced in relation to production of flowers. The data showed clearly existing differences among

the groups. The fertility coefficient in high yielders ranged from 83.24 to 87.05 per cent; among medium yielders 68.70 to 80.51 per cent and in low yielders from 66.70 to 69.75 per cent. The highest value was recorded by ML 69 (87.05 per cent) and lowest value by KM 1 (66.70). The data were statistically significant at one per cent for this character.

vii) *Yield per plant* and viii) *Yield per hectare* (Table 1):

The yield per plant and per hectare showed wide variation not only in genotypes but the three groups as well. According to the ranking of the genotypes based on the yield PIMS 4 recorded 4.25 g/plant and 1274 kg/ha. The lowest yielder MH 1 recorded 2.15 g/plant and 645 kg/ha. Both the parameters attained high significance statistically.

Six important parameters associated with yield have been chosen for discussion. Among legumes conflicting data as well as opinion have been published regarding the actual participation of these characters towards yield. The six parameters were subjected to path coefficient analysis of components and yield (Table 2), which gives the nature of association between components themselves and yield. This was primarily done to have some information on the direct and indirect effects of the chosen components on yield. Among the characters, number of clusters per plant appeared to govern the yield directly and the significance was high (0.4355). It can also be noted that the indirect

effect of this factor through other variables were negligible, thereby suggesting finally the importance of this character in greengram selection. Like wise the indirect effect of other variables through number of clusters was considerable. Taking into account all the parameters, in the case of greengram genotypes, number of clusters, pod length and seed weight may be considered for direct selection after working out the still precise optimum values from more genotypes. It was also clear that the variables such as number of seeds, 100 seed weight and fertility coefficient participated more as indirect effects. Hence these characters may only serve for indirect selection. Earlier workers like Barthakur and Hazarika (1977) and Sandhu *et al.* (1980), expressed a similar opinion.

#### REFERENCES

- AWATADE S. N., P. R. CHOPDE, V. G. MAKNE and V. P. CHAUDHARI. 1980. Estimates of genetic parameters in advanced generations of pigeonpea. *Trop. Grain legume Bull* 17/18:16-18.
- BARTHAKUR, A. K. and M. H. HAZARIKA. 1977. Inter relationship between yield and yield components in greengram. *J. Assam Sci. Soc.*, 20 : 77-85.
- KRISHNAIAH, V. V., M. M. K. DURGA PRASAD and Y. HANUMANTHA RAO. 1979. Inter-relationship between yield and yield components in greengram. *The Andhra agric. J.* 26 : 1-14.
- MALHOTRA, R. S., K. B. SINGH and J. S. DODNI. 1973. Discriminant function in *Phaseolus aureus* Roxb. *Madras agric. J.* 60 : 1327-1330.

SANDHU, T. S., B. S. BHULLAR, H. S. CHEEMA and J. T. BRAR. 1980. Path Coefficient analysis for grain yield and its attributes in greengram. *Indian J. agric. Sci.* 50: 541-544.

SOUNDARAPANDIAN, G., R. NAGARAJAN, V. MYLSWAMI S. IYAMPERUMAL and R. S. ANNAPPAN. 1977. Genetic variability in flower shedding and its impact on yield in blackgram (*Vigna mungo* (L.) Hopper). *Madras agric. J.* 64: 641-645.

Table 1 Yield Parameters in 15 Genotypes of Greengram.

Geno- type	Number of clus- ters per plant	Pod length (cm)	Number of seeds per pod	Seed weight per pod (mg)	100 seed weight (g)	Fertility co-effi- cient	Yield per plant (g)	Yield per hectare (kg)
PIMS 4	7.6	7.0	10.5	370	3.73	86.4	4.25	1274
Co 3	7.7	6.9	10.7	362	3.75	83.2	4.15	1247
11/99	7.6	7.3	10.8	414	4.47	84.9	3.80	1139
ML 69	7.6	6.9	10.6	395	3.97	87.0	3.58	1073
Pusa Baisakhi	7.7	7.0	10.5	384	3.88	84.1	3.56	1067
T 44	7.4	6.7	10.1	369	3.62	80.5	3.30	991
11/395	6.6	6.8	9.9	335	3.61	75.3	3.26	977
LAM GG 12	6.5	6.6	9.9	342	3.70	74.4	3.19	957
ML 73	6.8	6.4	9.9	320	3.53	72.5	3.16	948
10/303	5.7	6.2	9.4	312	3.44	68.5	3.09	927
KM 1	4.6	6.1	9.5	301	3.50	66.7	2.83	850
PH 6	5.6	5.9	9.3	306	3.42	68.8	2.56	769
ML 62	5.4	5.9	9.2	303	3.40	69.7	2.42	727
DM/2	5.8	6.2	9.3	331	3.38	68.2	2.38	715
MH 1	5.4	6.0	9.2	351	3.93	69.7	2.15	645
CD (P=0.05)	1.21**	0.68**	0.51**	42.10**	0.18**	9.53**	0.73**	219**

Table 2 Path Coefficient analysis and nature of Association of yield Components (Phenotypic)

Characters	Number of clusters per plant	Pod length	Number of seeds per pod	Seed weight per pod	100 seed weight	Fertility Coefficient	Total correlation with yield
Number of clusters per plant	<u>0.4355</u>	0.0774	-0.0331	0.1242	-0.0621	-0.0499	0.6603
Pod length	0.2277	<u>0.1400</u>	-0.0344	0.1170	-0.0670	-0.0503	0.6410
Number of seeds per pod	0.2701	0.0953	<u>-0.0534</u>	0.1251	-0.0622	-0.0496	0.6516
Seed weight per pod	0.2592	0.0836	-0.0320	<u>0.2086</u>	-0.1013	-0.0469	0.5807
100 seed weight	0.2142	0.0792	-0.0263	0.1675	<u>-0.1262</u>	-0.0402	0.4301
Fertility Co-efficient	0.2696	0.0923	-0.0328	0.1213	-0.0628	<u>-0.0807</u>	0.5993

Direct effect = under scored

Indirect effect = Rest of the figures

Residual effect : PX = 0.4350