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CORRELATION AND YIELD COMPONENT ANALYSIS IN GREENGRAM (*VIGNA RADIATA* L.) IN SUMMER RICE FALLOWS

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Abstract: Twelve genotypes of greengram were evaluated during summer 1995 in the rice fallows of the Regional Agricultural Research Station, Pattambi. WGG 62 was the highest yielder among the genotypes tested. Out of the ten characters studied the number of pods per plant, per day productivity, chlorophyll 'a' and total chlorophyll contents showed positive and significant association with grain yield. Duration of the crop was found to have no direct relation with yield.

Key words: Chlorophyll content, component analysis, greengram, summer rice fallows.

INTRODUCTION

Greengram (*Vigna radiata* L.) is one of the most important protein rich pulse crops having 22 per cent protein. An estimated area of 1.2 lakh ha is available as summer rice fallow in Kerala where scarcity of irrigation water is the major constraint limiting cultivation. Short duration pulse crops can be cultivated in such areas. It is the felt need of the farmers to identify a high yielding short duration pulse variety to exploit such areas. With this objective in view, the present study was undertaken to analyse the correlation between yield and its components in greengram and to select a suitable variety for summer rice fallows.

MATERIALS AND METHODS

The experiment was conducted with 12 genotypes of greengram during summer 1995 in the rice fallows of the Regional Agricultural Research Station, Pattambi. Randomised block design was adopted with three replications. The spacing given was 10 cm between plants and 30 cm between rows. Agronomic practices were given as per the package of practices recommendations of the Kerala Agricultural University. Observations on various economic characters like days to 50% flowering, days to maturity, plant height, number of primary branches/plant, number of pods/plant, length of pod, hundred seed weight, seeds per pod and seed yield were recorded in all the genotypes on ten random plants under each replication. Plant samples were collected during the maximum vegetative phase and chlorophyll "a' and 'b' of the index leaf were analysed following the method adopted by Yoshida *el al.* (1972). The data were subjected to statistical analysis as described by Panse and Sukhatme (1989). Correlation coefficients of yield with yield components and chlorophyll contents were worked out and response equations arrived at.

RESULTS AND DISCUSSION

Duration

The duration of the crop showed significant variation among genotypes. Among the genotypes studied, Pusa 9331 had the longest duration of 70 days with grain yield of 202 kg ha^{-1} (Table 1), whereas significantly higher grain yield was recorded in genotypes like WGG 62 though the duration was lower. The correlation between duration and yield was found to be negative (Table 3). Similar results have been reported earlier in greengram (Kumar *et al.*, 1995) and cowpea (Anon., 1987). This is attributable to the variation in photosynthetic efficiency and per day productivity of the genotypes (Devlin, 1981). Since yield is not directly related with duration, it is possible to evolve a variety with short duration character and high yield which is ideal for summer rice fallows.

Grain yield

The, genotypes showed significant variations with respect to grain yield (Table 1). It ranged from 202 kg ha^{-1} in Pusa 9331 to 326 kg ha ' in WGG 62. Due to severe drought condition during the crop period, the yields were comparatively low. Maximum per day produc-

tivity was recorded in WGG 62. Though longest in duration the yield recorded in Pusa 9331 was the least. The per day productivity was also lowest in this genotype which was

Table 1. Yield and yield attributes of greengram genotypes in summer rice fallows

Genotypes	Duration days	Pl.height cm	Branches / plant	Pods/plant	Seeds / plant	Pod length, cm	100 seed wt, g	Grain yield, kg ha^{-1}	Per day productivity
Co 4	64.7	32.6	3.0	6.2	5.1	8.5	3.62	253	3.9
Pusa 9072	64.6	25.7	3.3	7.8	6.1	8.6	3.58	282	4.4
WGG 62	66.3	30.2	3.5	7.3	5.5	9.2	3.36	326	4.9
Pusa 9371	60.5	31.2	3.2	5.3	5.4	9.3	3.62	287	4.6
Pusa 9372	61.3	27.7	3.2	4.7	5.8	9.2	4.09	262	4.3
TARM 21	59.3	29.7	3.2	5.4	6.1	9.4	3.37	225	3.8
MGG 320	60.3	34.4	3.6	6.0	5.8	9.5	3.25	255	4.2
Pusa 9331	70.3	38.0	3.2	4.5	5.6	8.9	3.62	202	2.9
Pusa 9171	62.7	33.6	3.2	5.2	5.5	9.1	3.84	242	3.9
Pusa 9033	68.3	31.7	3.6	4.6	6.0	8.8	3.26	228	3.3
VGG 6	62.3	31.3	2.9	5.4	5,7	9.1	3.66	279	4.5
VGG 7	59.0	51.2	3.3	4.8	5.9	8.5	3.50	236	4.0
CD (0.05)	2.04	3.5	NS	0.8	NS	NS	NS	48	-

NS = Not significant

Table 2. Chlorophyll components in greengram genotypes

Genotypes	Chlorophyll, mg g^{-1}			Chloro-phyll 'a' : 'b' ratio
	a	b	Total	
Co 4	0.283	0.582	0.865	1:2.06
Pusa 9072	0.297	0.539	0.835	1:1.82
WGG 62	0.338	0.640	0.979	1:1.90
Pusa 9371	0.303	0.580	0.883	1:1.91
Pusa 9372	0.299	0.496	0.795	1:1.66
TARM 21	0.278	0.499	0.777	1:1.80
MGG 320	0.306	0.540	0.846	1:1.76
Pusa 9331	0.277	0.509	0.786	1:1.84
Pusa 9171	0.315	0.571	0.886	1:1.81
Pusa 9033	0.292	0.544	0.836	1:1.86
VGG 6	0.293	0.565	0.858	1:1.93
VGG 7	0.288	0.472	0.761	1:1.64
CD (0.05)	NS	0.076	0.093	-

NS - Not significant

41% lower than the highest yielder. Number of pods per plant also showed a similar trend.

The correlation analysis (Table 3) revealed that grain yield was significantly and positively correlated (r = 0.39*) with number of pods per plant. Plant height also differed significantly with genotypes. It ranged from 25.7 cm to 51 cm. The highest value was recorded in VGG 7 while Pusa 9072, Pusa 9372 and TARM 2 were dwarf types with less than 30 cm height.

Chlorophyll components

Chlorophyll components of index leaf of the crop at maximum vegetative growth stage exhibited variations among genotypes. Chlorophyll 'a' content was low compared to chlorophyll 'b' in all the genotypes tested. The values of chlorophyll a ranged from 0.277 mg to 0.338 mg g^{-1} of the fresh weight of leaves whereas chlorophyll 'b' ranged from 0.472 to 0.641 mg g^{-1} (Table 2). Significant positive correlations were observed between yield and chlorophyll content. As the chlorophyll content increases, photosynthetic efficiency increases which leads to higher increased grain yield (Zelich 1973). Maxi-

mum chlorophyll `b' was in the highest yielder WGG 62. Chlorophyll `a' as well as total chlorophyll content was also the highest in this variety. Contents of chlorophyll fractions were lowest in the variety Pusa 9331 which incidently was the lowest yielder among the genotypes tested. The pattern of response between yield and chlorophyll content was found to be linear and the response equations were

$Y = -8.04 + 885.9x1,$
$Y = 86.9 + 309.3x2,$
$Y = 4.65 + 297.7x3$

where X1, X2 and X3 are contents of `a' and `b' and total chlorophyll respectively.

Table 3. Correlation coefficients of yield components in greengram with grain yield

Maturity	-0.08
No. of pods	0.39*
Per day productivity	0.969*
Chlorophyll `a'	0.441*
Chlorophyll `b'	0.355
Total chlorophyll	0.432*

* Significant at 5 per cent level

Ratio between chlorophyll `a' and chlorophyll "b' in different genotypes did not exhibit much variation. This indicated that the chlorophyll `a' and `b' components are balanced in the genotypes tested. Efficient photosynthesis has been reported to be the function of both the pigment systems which facilitate more absorption of photosynthetic radiation and confer a synergestic effect (Meyer and French, 1960). The higher contents of chlorophyll components in the higher yielding genotypes also suggest that they are more adaptive to the region.

The study indicated that number of pods per plant, per day productivity, chlorophyll 'a' and total chlorophyll contents may be given priority while selecting for high yielding genotypes as these components showed positive and significant association with grain yield. A variety with short duration coupled with these characters will be ideal for summer rice fallows.

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