Table 4. Total nutrient analysis of surface soil samples (Correlation values)

Direction	R_2O_3	Ca	Mg	Na	K
East	-0.81**	-0.79**	-0.14^{NS}	-0.37**	-0.87**
West	-0.1^{NS}	-0.1^{NS}	-0.14^{NS}	-0.31^{NS}	-0.12^{NS}
South	-0.3^{NS}	-0.1^{NS}	-0.18^{NS}	-0.13^{NS}	-0.10^{NS}
North	0.2^{NS}	0.1^{NS}	0.22^{NS}	0.20^{NS}	0.05^{NS}

Table 3. Physical analysis of surface soil samples (Correlation values)

Direction	Bulk density	Particle density	Porosity	WHC	Volume Expansion
East	-0.9**	-0.8**	0.8**	-0.30**	-0.30^{NS}
West	0.06^{NS}	0.01^{NS}	-0.20^{NS}	0.22^{NS}	0.12^{NS}
South	-0.23^{NS}	0.02^{NS}	0.07^{NS}	0.19^{NS}	-0.15^{NS}
North	0.30^{NS}	0.18^{NS}	0.11^{NS}	0.18^{NS}	0.12^{NS}

cement kiln dust was observed only upto 2.0 km om the factory approximately, this may be ecause of the wind velocity in the factory area 7.79 km hr^{-1}) which was sufficient enough to eposit only upto 2.0 km in the windward direction e., east.

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(Received : November 1996 Revised : June 1997)

Madras Agric. J., 84(11,12): 678 - 681 November, December 1997
https://doi.org/10.29321/MAJ.10.A00943

CHARACTER ASSOCIATION AND PATH ANALYSIS IN BLACK GRAM

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ABSTRACT

Forty black gram hybrids along with 14 parents were studied for genotypic correlation and path analyses. Seed yield exhibited significant positive association with primary branch number, cluster number, pod number, pod length, seed number per pod, 100 seed weight and total dry matter production. The path analysis indicated that maximum direct effect on seed yield was exerted by pod number followed by total dry matter production, primary branch number, cluster number, seed number per pod and 100 seed weight.

KEY WORDS : Black gram, correlation, path analysis

Metric characters of economic importance are often associated with one another, and particularly yield is dependent on several other component characters. Knowledge of correlation between yield and other yield component characters is helpful in selection of superior plant type. When more

characters are included in correlation study, the indirect association becomes complex. In such situations, the path co-efficient analysis provides on effective means of partitioning of the correlation co-efficients into direct and indirect effects of the component characters. Selection on the basis of direct and indirect effects is much more useful than selection for *per se*. Hence, an investigation was undertaken in black gram parents and hybrids to study the correlation and path co-efficients among the seed yield and its component characters.

MATERIALS AND METHODS

Ten lines and 4 testers, their resultant 40 hybrids were raised in a randomised block design with two replications at the Agricultural College and Research Institute, Killikulam during summer 1992 under irrigation. Each genotype was raised in a single row with a spacing of 30 cm between rows and 20 cm within the rows. Observations were recorded on five randomly selected plants in each genotype in each replication. Correlation co-efficient (Singh and Chaudhary, 1979) and path co-efficients (Dewey and Lu, 1959) were worked out.

RESULTS AND DISCUSSION

In the present study, yield has registered significant positive association with primary branch number, cluster number, pod number, pod length, seed number per pod, 100 seed weight and total dry matter production. Similar results were reported by Damodaram *et al.* (1989) and Ramprasad *et al.* Hence, simultaneous selections based on these characters for improvement in yield is possible. Yield has significant negative relationship with days to 50 per cent flowering. This is in consonance with the findings of Ramprasad *et al.* (1989) suggesting that early flowering genotypes would give higher yields. No association was found to exist between seed yield and plant height since it exhibited non significant correlation co-efficient with seed yield (Table 1).

The present investigation on the interrelationship among the yield components had brought to light, the significant negative relationship of days to 50 per cent flowering with primary branch number, cluster number, pod number, pod length, seed number per pod and total dry matter production. This is in confirmity with the results of Ramprasad *et al.* (1989) indicating that early flowering could help corresponding improvement in other traits finally the seed yield. Primary branch number showed significant positive association with cluster number, pod number, pod length, seed number per pod and total dry matter production. Similar findings were also reported by Soundarapandian *et al.* (1976).

Cluster number showed significant positive association with pod number, pod length, seed number per pod and total dry matter production. This results are in accordance with the findings of

Table 1. Genotypic correlation co-efficients between yield and yield components

Traits	Plant height	Day to 50 per cent flowering	Primary branch number	Cluster number	Pod number	Pod length	Seed number per pod	100 seed weight	Total drymatter production	Seed yield
Plant height	1.0000	0.2133	-0.2065	-0.1492	-0.0450	-0.2457	-0.1283	0.1393	0.1227	-0.0537
Day to 50 percent flowering		1.0000	-0.3658**	-0.4485**	-0.3297**	-0.6056**	-0.5461**	-0.0677	-0.2791**	-0.3844**
Primary branch number			1.0000	0.7528**	0.6576**	0.5103**	0.5261**	0.1184	0.6275**	0.6467**
Cluster number				1.0000	0.7811**	0.5342**	0.6409**	0.0858	0.7278**	0.7494**
Pod number					1.0000	0.5005**	0.5389**	0.2456	0.7650**	0.8795**
Pod length						1.0000	0.7903**	0.1482	0.4845**	0.4870**
Seed number per pod							1.0000	0.1041	0.5338**	0.5303**
100 seed weight								1.0000	0.2452	0.2979*
Total drymatter production									1.0000	0.8073**
Seed yield										1.0000

* Significant at 5 per cent level ; ** Significant at 1 per cent level

Table 2. Direct and indirect effects as partitioned by path analysis

Traits	Plant height	Day to 50 per cent flowering	Primary branch number	Cluster number	Pod number	Pod length	Seed number per pod	100 seed weight	Total drymatter production	Correlation with seed yield
Plant Height	-0.0729	-0.0248	-0.0047	-0.0002	-0.0260	0.0230	- 0.0020	0.0117	0.0022	-0.0537
Day to 50 per cent flowering	-0.0155	-0.1164	-0.0083	-0.0007	- 0.1901	0.0566	-0.0084	-0.0057	-0.0960	-0.3844**
Primary branch number	0.0151	0.0426	0.0227	0.0011	0.3792	- 0.0477	0.0081	0.0099	0.2158	0.6467**
Cluster number	0.0109	0.0522	0.0171	0.0015	0.4504	- 0.0499	0.0098	0.0072	0.2502	0.7494**
Pod number	0.0033	0.0384	0.0149	0.0012	0.5767	-0.0468	0.0083	0.0205	0.2631	0.8795**
Pod length	0.0179	0.0705	0.0116	0.0008	0.2886	-0.0935	0.0121	0.0124	0.1666	0.4870**
Seed number per pod	0.0093	0.0635	0.0119	0.0010	0.3108	- 0.0739	0.0153	0.0087	0.1836	0.5303**
100 seed weight	-0.0102	0.0079	0.0027	0.0001	0.1416	- 0.0138	0.0016	0.0837	0.0843	0.2979**
Total drymatter production	-0.0089	0.0325	0.0142	0.0011	0.4412	-0.0453	0.0082	0.0205	0.3439	0.8073**

Diagonal figures in bold indicate direct effects ; Residual effect : 0.4040

* Significant at 5 per cent level ; ** Significant at 1 per cent level

Shanmugasundaram (1989). It is concluded that selection based on cluster number will also increase the breeding value of other traits, the relationship between pod number and pod length, seed number per pod and total dry matter production was significantly positive. Present results are in accordance with the results of Patil and Deshmukh (1989). These results indicated that selection based on pod number, pod length, seed number per pod and total dry matter production either individually or in combination results in high yielding lines. Pod length showed significant positive correlation with seed number per pod and total dry matter production. Ramprasad *et al.* (1989) have also reported similar findings. Seed number per pod had significantly positive relationship with total dry matter production. These results are similar to the findings of Shanmugasundaram (1989). This result indicated that there might be appreciable improvement in seed number per pod, if selection was exercised on the basis of total dry matter production. Path values based on genotypic correlation co-efficients showing direct and indirect effects on seed yield is given in Table 2. Results revealed that the pod number showed the maximum direct effect on yield. Patil and Deshmukh (1989) also observed the positive direct effect of pod number. Total dry matter production showed high positive direct effect. Shanmugasundaram (1989) also reported similar results. The direct effect of primary branch number, cluster number, seed number per pod and 100 seed weight though they were positive but very low indicating the neutral behaviour of these traits towards seed yield. The positive direct effects for these characters have also been reported by Patil and Deshmukh (1989) and Ramprasad *et al.* (1989).

The negative direct effect towards yield was exhibited by plant height, days to 50 per cent flowering and pod length. The negative direct effects of these traits were reported by Rao *et al.* (1983). Positive indirect effect through pod number on seed yield was observed with primary branch number, (Kumar and Rao, 1987), cluster number and seed number per pod (Damodaram *et al.*, 1989) and pod length (Patil and Deshmukh, 1989). From the study, it was obvious that the positive direct effect were mostly achieved through pod number, total dry matter production, primary branch number, cluster number, seed number per pod and 100 seed weight and it was clear that these traits also possess positive association with seed yield and among themselves. This fact suggested that these traits were reliable for selection.

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(Received : November 1996 Revised : November 1997)

Madras Agric. J., 84(11,12): 681 - 685 November, December 1997

SEED MYCOFLORA OF GREEN GRAM

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ABSTRACT

The per cent incidence of seed mycoflora and seed germination of two varieties of green gram or mungbean (*Vigna radiata* L. var. Pant-2 and Type-44) were studied in freshly collected, six months stored and one year stored seeds. In all, 25, 23 and 25 fungal species were isolated from the seeds of var. Pant-2 collected from godown, shopkeepers and crop filed respectively and 22 fungal species were isolated from var. T 44 collected from godown using agar plate and blotter techniques. Seed mycoflora superficially associated with the freshly collected seeds of both the varieties predominantly consisted of fungi belonging to genera *Alternaria, Cladosporium* and *Curvularia*. Dominant fungal species of *Alternaria, Aspergillus, Penicillium, Cladosporium* and *Curvularia* were found to be associated with stored seeds. *Aspergillus flavus, A. niger, A. fumigatus* and *A. luchuensis* were found to be dominant on one year stored seeds. Deuteromycetes ranked first in number followed by phycomycetes. The number of fungal species was found more by the blotter technique in comparison to the agar-plate technique. The fungal population increased with increasing storage periods.

KEY WORDS : Green gram, seed mycoflora, collection place, storage

Seeds carry a wide range of microorganisms either externally or internally and these organisms become active in favourable conditions and cause extensive damage to the seeds and severe diseases on crops raised from them. About 90 per cent of all food crops grown are propagated by seed and these crops are attacked by devasting seed-borne diseases (Neergaard, 1986). Losses due to storage fungi in an Indian condition may be as high as 30 per cent of the total harvest (Neergaard, 1977). The seed borne mycoflora which is responsible for the reduction of seed quality, varies from place to place according to local conditions (Neergaard, 1967). The moist grain provides a favourable medium for te fungi to grow until it is dried to safe moisture level of 12 per cent (Palaniswami *et al.*, 1989). Seed mycoflora, particularly of green gram, has been studied already by some workers. In view of the above facts, the seed mycoflora of green gram (*Vigna radiata* L.) in relation to collection place, varietal difference and storage were studied.

MATERIALS AND METHODS

Freshly harvested seeds of two varieties of green gram or mungbean (var. Pant-2 and Type-44) were procured from the crop fields, godown (Government Agricultural Trial and Demonstration Centre, Varanasi) and shopkeepers (Gyanpur market) at Bhadohi district of Uttar Pradesh. Seed lots were dried under direct sunlight till they attain safe moisture level of around 5 per cent. The seeds were then stored in earthenware pots covered with lids under laboratory conditions for one year. Samples were withdrawn after six months and one year of storage and seed infection and percentage of seed germination were recorded simultaneously. For studying seed mycoflora in relation to