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Comprehensive Selection of Yield and Yield influencing Characters in *Brassica species*

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ABSTRACT

Eight accessions of *Brassica* were sown in a randomized complete block design for a comprehensive selection of all important yield influencing characters. Data thus collected were analysed to evaluate various yield components by stepwise regression and correlation analysis for the estimation of factor-wise contribution for yield improvement. Number of primary and secondary branches per plant, pod length, number of seeds per plant were found the best variables with maximum potential for selection.

Key Words: Brassica; Coefficient; Accessions

INTRODUCTION

Edible oil is an important constituent of our diet and Brassica oilseeds have been an important source of edible oil in Pakistan contributing about 23% towards the total domestic production (Anonymous, 1997-98). The production in Pakistan is not sufficient to meet the consumption requirement. Consequently, a huge amount of hard earned foreign exchange is spent every year on its import. It is necessary to take important measures to improve the production potential of Brassica. The improvement through breeding could be made successfully by determining the exact contribution of various yield components. The present study was thus undertaken to evaluate various yield components by stepwise regression and correlation analysis of *Brassica* accessions. The purpose was to evaluate the genetic potential of these accessions for yield and yield components and to develop a selection criterion. Information thus obtained could be used for the development of a comprehensive breeding programme to evolve high yield *Brassica* cultivars.

MATERIALS AND METHODS

The experiment comprising eight accessions of *Brassica* viz. RL-18, Brown Raya, UCD 4/1, UCD 12/4, UCD 55, UCD 342, UCD 15 and UCD 304 was laid out in (RCBD) with four replications maintaining row to row distance 45 cm and plant to plant 30 cm in 11 rowed plots of each accession in each replication at University Campus. Out of 11 planted rows, 10 well in competition plants were randomly selected from five middle rows, from each plot in each replication. The data were collected for the characters, plant height, number of primary branches, number of secondary branches, number of pods per plant, pod length, number of seeds per pod, 1000-seed weight and seed yield per plot. The data recorded for various characters were analysed by standard analysis of variance technique as given by Steel and Torrie (1980).

Phenotypic and genotypic correlation coefficients were calculated as given by Kwon and Torrie (1964). Standard error of genotypic correlation coefficients were calculated as given by Lathrop *et al.* (1985). Genetic correlation coefficients were considered significant if their absolute value exceeded twice their respective standard error. Phenotypic correlation coefficient were tested using t test (Steel & Torrie, 1980). Coefficients of determination (R^2) were calculated through stepwise regression analysis to construct the regression models for selection of better Brassica types.

RESULTS AND DISCUSSION

Correlation. Genotypic and phenotypic correlation coefficients among eight characters of economic importance in eight accessions of Brassica are presented in Table I.

Plant height has positive and significant correlation at both levels with number of primary branches, secondary branches, number of pods per plant and seed yield per plot. The results are in accordance with Katiyar and Singh (1974), Woyke (1981) and Dhillon *et al.* (1990). Association of plant height with pod length and number of seeds per pod was positive and significant; whereas, it was negative and significant with 1000-grain weight.

Number of primary branches per plant exhibited positive and significant correlation with number of secondary branches, number of pods per plant and number of seeds per pod. The correlation of primary

Table I. Genotypic (rg) and phenotypic (rp) correlation coefficients among eight characters of eight accessions of Brassica

Characters	Primary branches per plant	Secondary branches per plant	Pods per plant	Pod length (cm)	Seeds per pod	1000-grain weight (gm)	Yield per plot (gm)	
Plant height (cm)	$0.9838^{+}0.8657^{**}$	$0.9632^{+}0.9483^{++}$	$0.93165^{+}0.8538^{**}$	$0.8107^{+}0.7448^{**}$	$0.7839^{+}0.6899^{**}$	$-0.9470^{+}-0.8304^{**}$	$0.4473^{+}0.4344^{**}$	rgrp
Primary branches per plant		$0.9946^{+}0.9942^{**}$	$0.9813^{+}0.9213^{**}$	$0.8781^{+}0.8174^{**}$	$0.6997^{+}0.6160^{**}$	$-0.8653^{+}-0.7645^{**}$	$0.3953^{+}0.3876^{NS}$	rgrp
Secondary branches per plant			$0.9989^{+}0.9354^{**}$	$0.89344^{+}0.8229^{**}$	$0.7161^{+}0.6273^{**}$	$-0.8418^{+}-0.7523^{**}$	$0.3679^{+}0.3562^{NS}$	rgrp
Pod per plant				$0.9750^{+}0.8792^{**}$	$0.9506^{+}0.7689^{**}$	$-0.6827^{+}-0.5825^{**}$	$0.3346^{+}0.3076^{NS}$	rgrp
Pod length (cm)					$0.8280^{+}0.7073^{**}$	$-0.7256^{+}-0.6108^{**}$	$0.6587^{+}0.6161^{**}$	rgrp
No. of seed per pod						$-0.7734^{+}-0.5428^{**}$	$0.0399^{NS}0.0668^{NS}$	rgrp
1000-grain weight (gm)							$-0.5051^{+}-0.4400^{*}$	rgrp

* Significant at 0.05; NS Non-significant**; Significant at 0.01 level of probability + Significant tested against error

branches with seed yield per plot was also positive but negative with 1000-seed weight. The association of number of secondary branches was positive with seed yield per plot, number of pods per plant, number of seeds per pod and pod length. The results coincided with Swain (1990) and Ramani *et al.* (1995). However, correlation of secondary branches with 1000-grain weight was negative and highly significant at both levels. Correlation of number of pods per plant with seed yield per plot, pod length and number of seeds per pod was positive; whereas, it was negative with 1000-grain weight. Correlation between pod length and seed yield per plot was positive and highly significant. Another positive correlation was between pod length and number of seeds per pod. Association of pod length with 1000-grain weight was negative and significant.

Table II. Regression model for the dependent variable seed yield per plot (g), the best fitting model is shown for a given number of variables beyond one

No. in Model	R-square							
1	1.24	SDPP						
1	5.30	NPP						
1	10.18	NSB						
1	10.68	SDWT						
1	12.42	NPB						
1	15.21	PLHT						
1	26.25	PLT						
2	27.41	PLT	PLHT					
3	32.97	PLT	PLHT	NSB				
4	36.25	PLT	PLHT	NSB	SDPP			
5	37.85	PLT	PLHT	NSB	SDPP	SDWT		
6	38.64	PLT	PLHT	NSB	SDPP	SDWT	NPP	
7	38.96	PLT	PLHT	NSB	SDPP	SDWT	NPP	NPB

PLT : Pod length; NSB : No. of secondary branches; NPP : No. of pods per plant; SDPP : No. of seed per pod; PLHT : Plant height; NPB : No. of primary branches;SDWT : 1000-seed weight

Number of seeds per pod exhibited positive correlation with seed yield per plot but negative with 1000-grain weight. Results are in accordance with Pathak *et al.* (1984) who have reported negative correlation of 1000-grain weight with seed yield per plot. **Regression.** The coefficients of determination (R^2) were calculated through stepwise regression analysis. The R^2 value for the dependent variable, seed yield per plot of eight accessions of Brassica fall in the range of 1.24 to 26.25% for number of seeds per pod and pod length, respectively (Table II). The other R^2 values on single factor basis were 5.30, 10.18, 10.68, 12.42 and 15.21% for number of pods per plant, number of secondary branches, 1000-seed weight, number of primary branches and plant height, respectively. The R^2 value increased for two variable model 27.41% by including pod length and plant height. Further improvements of 32.97, 36.25, 37.85, 38.64 and 38.69% for three, four, five, six and seven variable models, respectively were achieved. The maximum increase in variability for seed yield per plot on single factor basis was caused by pod length. Thus pod length appeared to be the most important trait responsible for an increase in seed yield in *Brassica* accessions. Kukushkin and Karpachev (1992) and Ismail (1996) also made studies for the evaluation of material on the basis of coefficient of regression in swede rape and Brassica spp.

CONCLUSIONS

The breeders should concentrate on number of primary and secondary branches per plant, number of pods per plant and pod length to have best genotype for improvement in edible oil in the country.

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