IDENTIFICATION OF PARENTS FORHYBRIDIZATION THROUGH COMBINING ABILITY ANALYSIS IN TORIA (BRASSICA CAMPESTRIS VAR TORIA)

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ABSTRACT

A line x tester analysis of combining ability was carried out using 10 inbreds and 3 open pollinated testers for 12 economic characters including seed yield and oil content in toria. Combining ability variances indicated the pre-dominance of non-additive gene actions for most of the traits. The testers, T 9, PT 507 and PT 303 were best general combiners for seed yield per plant, plant height and siliqua length, respectively; whereas, IB 5, IB 6, IB 9 and IB 10 were the best lines exhibiting high gca values for seed yield and other traits. Pest performing parents were not the best general combiners for most of the characters. Using sca effects multiple crossing for population improvement has been suggested.

INTRODUCTION

The selection of suitable parents for specific traits is pre-requisite for any successful hybridization. However, the ability of the parents to combine well depends upon various complex genic inter-actions which can not be fully judged by phenotype and adaptability. The combining ability analysis is considered most potential tool for the selection of suitable parents.

In toria information on combining ability are meagre and incon-clusive as most of the studies are based on non-inbred parents. Thus, the present study was conducted to gather information on combining ability of inbred lines to be used in the development of synthetics and hybrids.

EXPERIMENTAL

Materials and methods

Ten toria inbreds (IB I through IB 10) developed by the authors at Pantnagar by three cycles of selfings, were used as female parents and three widely adapted open pollinated toria varieties viz. PT 303, T 9 and PT 507 as males in developing a set of line x tester crosses. Thirty F_1's and their 13 parents were raised in a single row plot of 5m length, spaced 30 cms apart during winter of 1992-93. Data on 10

randomly selected plants were recorded on 12 important economic characters. The analysis of variances for combining ability was done following Kempthorne (1957) using means of 10 plants.

Results and Discussion

The estimates of variances due to GCA and SCA indicated predominance of non-additive gene actions for all the traits under study except days to flowering where additive gene action was predominant. However, for days to maturity, additive as well as non-additive gene actions were equally important. Similar results were found by Diwakar and Singh (1993), Yadav et al. (1992) and Yadav et al. (1993) in Brassica juncea and brown sarson.

Table 1 shows that the parents best in per se performance are not good general combiners. Similarly, best performing F_1s are not good specific combinations. On the other hand, most of the good specific cross combinations for different characters involved at least one good general combiner.

The study revealed that parents T 9, IB 5, IB 6, IB 9 and IB 10 were superior general combiner for yield and a few yield contributing characters which hold great promise for breeding early, high yielding varieties with high oil content.

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Table 1 : *Most promising parents and hybrid (F_1) based on per se performance and general and specific combining ability.*

Characters	Based on mean performance		Based on combining ability	
	Parents	Hybrid	General combiners	Specific combinations
DF	IB 10	IB1 x PT507	IB 7 PT 507 IB 10	IB7 x PT 303 IB5 x PT507 IB9 x PT 507
DM	IB 3	IB9 x PT303	IB 5	IB4 x T9
PH	IB 4	IB9 x PT507	IB 6, IB 3 PT 303	IB10 x PT 303 IB3 x PT303 IB8 x PT507
LMS	IB 4	IB5 x PT303	None	None
NPB	IB 3	IB5 x T9	IB 10 PT 507 IB 8	IB8 x PT507 IB9 x PT507 IB9 x PT507
NSB	IB 6	IB2 x PT303	T 9	IB5 x T9 IB8 x PT303 IB8 x PT507
NSM	IB 6	IB4 x PT303	IB 5	IB10 x PT303 IB5 x PT507 IB7 x T9
SL	IB 3	IB3 x PT507	PT 303	IB6 x PT303
NSS	IB 6	IB4 x T9	IB 5	IB5 x PT303
OP	IB 7	IB6 x PT303	IB 1 IB 9	IB8 x T9 IB2 x PT507 IB1 x PT303
TSW	IB 1	IB7 x PT303	T9	IB4 x PT507 IB1 x T9 IB3 x PT303
YPP	IB 3	IB5 x PT	IB 5 T 9 IB 10 IB 9	IB1 x T9 IB4 x T9 IB5 x PT507 IP10 x T9

DF = Days to flowering, DM = Days to maturity, PH = Plant height(cms), LMS = Length of main shoot(cms), NPB = No. of primary branches, NSB = No. of secondary branches, NSM = No. of siliqua on main shoot, SL = Siliqua length(cms), NSS = No. of seeds per siliqua, OP = Oil percentages, TSW = Thousand seed weight (g), YPP = Yield per plant (g).