

Diallel analysis of inbred lines in maize (*Zea mays* L.)

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ABSTRACT

A diallel analysis with eight diverse inbreds revealed highly significant GCA and SCA variances indicating importance of additive and non-additive gene action for all the traits. The estimated components of SCA variances were higher in magnitude for all the traits except plant height and days to maturity, indicating the predominance of non-additive or dominant gene action. The inbreds Pant 7421-S₆-194-3-⊗-#, Jogia local-S₆-2-1-⊗-# and M9-S₆-11-⊗-# were a good general combiners for majority of the characters which gave high gca effects for yield per plant with positive and significant gca effects for many of the yield characters. The crosses (M9 x CM 601) S₆-7-8-⊗-# x Pant 7421-S₆-194-3-⊗-#, AB (W)S₅-3-2-⊗-# x Jogia local S₆-2-1-⊗-#, Jogia local S₆-2-1-⊗-# x CM 601-S₅-8-7-⊗-#, (CM 400 x CM 300)-S₅-⊗-# x CM 601-S₅-8-7-⊗-# and M9-S₆-11-⊗-# x Pant 7421-S₆-194-3-⊗-# exhibited significant SCA effects for grain yield and some other characters. It is proposed that inbred Pant 7421-S₆-194-3-⊗-#, Jogia local S₆-2-⊗-# and M9-S₆-11-⊗-# may be utilized to exploit additive and additive x additive type of gene action, whereas the hybrids M9-S₆-11-⊗-# x Pant 7421-S₆-194-3-⊗-# and (M9 x CM 601) S₆-7-8-⊗-# x Pant 7421-S₆-194-3-⊗-#, x manifested significant sca effect which could be more rewarding in a hybrid breeding programme.

Key words : Combining ability, Maize, *Zea mays* L.

INTRODUCTION

Combining ability analysis is one of the useful genetical tool which gives the estimate of combining ability effects and provides a guide line to select desirable parents and crosses for further exploitation. The present investigation was, therefore, undertaken with eight maize inbreds on the basis of genetic divergence, from the fifty-five inbred lines, developed under All India Coordinated Maize Improvement Project, at T.C.A. Dholi, to meet the diallel and estimate the combining ability effects.

crossed in all possible combinations, excluding reciprocals at the maize breeding plot of Tirhut College of Agriculture Dholi Farm. The 28F₁S, eight parents and 4 hybrids viz., CM 400 x CM 300, CM 202 x CM 211, RH-1 and RH-2 served as checks hybrids were planted in RBD with 3 replications. Each entry was planted in a two-row plot of 5 m length with spacing of 75 cm x 25 cm. Observations were recorded on randomly competitive selected ten plants from each entry in each replication for the days to 75 per cent tassel, days to 75 per cent silk, days to maturity, plant height, ear length, ear diameter, kernel rows per ear and yield per plant. Combining ability effects and variance were worked out by following methods 2, model I of Griffing (1956).

MATERIALS AND METHODS

Selected eight diverse inbred lines (Table 1) were

Table 1 : Composition of clusters based on D²- Statistics of fifty-five inbred lines of Maize

Cluster	No. of inbred lines included	Line included in clusters with their pedigree
I	9	CM 601-S ₅ -1-8-⊗-#, CM 601-S ₅ -2-2-⊗-#, CM 300-S ₅ -1-⊗-#, AB(W)-S ₅ -3-2-⊗-#, AB(W)-S ₅ -4-2-⊗-#, M ₉ X CM 601-S ₆ -2-⊗-#, X ₁ -S ₅ -10-1-⊗-#, Across 8331-S ₅ -76-1-⊗-#, Pant 7421-S ₆ -107-1-⊗-#,
II	16	CM 601-S ₅ -2-3-⊗-#, CM 601-S ₅ -87-⊗-#, AB(W)-S ₅ -4-3-⊗-#, M ₉ -S ₅ -2-1-⊗-#, M ₉ -S ₅ -62-2-⊗-#, M ₉ X CM 601-S ₅ -1-⊗-#, X ₁ -S ₅ -9-3-⊗-#, Across 8331-S ₅ -18-1-⊗-#, Across 8331-S ₅ -63-1-⊗-#, M ₉ X CM 400-S ₅ -14-2-⊗-#, Pant 7421-S ₅ -76-1-⊗-#, Pant 7421-S ₆ -133-3-⊗-#, Pant 7421-S ₆ -166-1-⊗-#, Pant 7421-S ₆ -194-3-⊗-#, Pant 7421-S ₆ -228-1-⊗-#, Pant 7421-S ₆ -238-2-⊗-#,
III	9	CM 601-S ₅ -14-1-⊗-#, CM 601-S ₅ -14-2-⊗-#, CM 601-S ₅ -14-3-⊗-#, M ₉ -S ₆ -11-1-⊗-#, AB(W)-S ₅ -5-2-⊗-#, M ₉ -S ₅ -37-2-⊗-#, Across 8331-S ₅ -71-1-⊗-#, Jogia local -S ₆ -2-1-⊗-#, Pant 7421-S ₆ -22-1-⊗-#,
IV	11	M ₉ -S ₆ -36-1-⊗-#, M ₉ -S ₆ -37-1-⊗-#, M ₉ -S ₅ -37-3-⊗-#, M ₉ X CM 601-S ₆ -7-8-⊗-#, Across 8331-S ₅ -3-2-⊗-#, Across 8331-S ₅ -68-1-⊗-#, M ₉ X CM 400-S ₆ -2-1-⊗-#, M ₉ X CM 400-S ₆ -14-1-⊗-#, Jogia local-S ₆ -78-⊗-#, CM400 X CM 300-S ₅ -⊗-#, Pant 7421-S ₆ -93-1-⊗-#,
V	10	CM 601-S ₅ -1-2-⊗-#, CM 601-S ₅ -2-8-⊗-#, AB(W)-S ₅ -4-4-⊗-#, M ₉ X CM 601-S ₆ -6-8-⊗-#, Across 8331-S ₅ -3-3-⊗-#, Jogia local -S ₆ -12-1-⊗-#, Jogia local -S ₆ -72-1-⊗-#, Jogia local -S ₆ -72-2-⊗-#, Jogia local -S ₆ -75-⊗-#, Pant 7421-S ₆ -129-1-⊗-#,

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