GENERAL AND SPECIFIC COMBINING ABILITY STUDIES OF SELECTED TROPICAL WHITE MAIZE INBRED LINES FOR YIELD AND YIELD RELATED TRAITS

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ABSTRACT

In Ghana: low yield of maize 1.7 t ha⁻¹ has been reported. Thus, use inbred lines with good combining ability for yield and yield-contributing characters to form excellent combinations is crucial. Thus, the present study was designed to estimate the combining ability effects of tropical white maize inbred lines for yield and yield-contributing traits. A line x tester mating design involving sixteen white maize inbred lines as females and two testers as males generated thirty-two single crosses. These hybrids plus three checks were evaluated using a 5 x 7 alpha lattice design replicated twice at the University of Ghana, WACCI research farm during 2015/-16 offseason using drip irrigation. Analysis of variance revealed that genotype mean squares were highly significant (P < 0.001) for days to 50% anthesis and silking, plant and ear height, plant aspect, ear length, number of kernel rows ear⁻¹, number of kernels row⁻¹ and yield. Similarly, mean squares of genotypes were significant (p < 0.05) for ear rots, anthesis-silking interval, husk cover and maize streak virus disease. Line x tester revealed both additive and non-additive gene action played important role in the inheritance of all the traits indicating that both progeny selection and heterosis breeding will be valuable for future breeding programme using these inbred lines. However, the ratio of general combining ability (GCA) variance to specific combining ability (SCA) variance was less than unity, indicating the prevalence of non-additive gene action in the inheritance of all the parameters studied except for days to 50% anthesis and anthesis-silking interval.

Three inbred lines L16 (867), L1 (595) and L8 (247) were identified to have high GCA effects for yield kg ha⁻¹, indicating that these lines have the genetic potential to transmit this desirable trait to their progenies. Based on the SCA effect for grain yield, the lines were separated into two heterotic groups. The lines L1, L3, L4, L8, L11 and L14 belonged to tester group 1368 while L2, L5, L6, L7, L9, L10, L12, L13, L15 and L16 belonged to heterotic group of CML 444. This is useful for the development of hybrids and synthetic varieties. The information generated in the present study will be useful for breeders who want to improve yield and yield-contributing traits of maize.

KEYWORDS: Heterotic Group, GCA, Inbred Line, Line X Tester & SCA

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