

GENETIC ANALYSIS OF MAIZE STREAK VIRUS (MSV) RESISTANCE IN DWARF MAIZE

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ABSTRACT

Maize Streak Virus (MSV) is the most widespread biotic constraint to maize (*Zea mays* L.) production in Africa and may lead to total crop loss in susceptible varieties. Use of resistant cultivars is the most efficient and economic way of controlling MSV especially in rural communities where farmers cannot afford chemical control. Currently available dwarf maize varieties have limited resistance to MSV and no information on the mode of gene action controlling disease (MSV) resistance in dwarf maize is available. This study was therefore, conducted to determine the mode of the inheritance of resistance to MSV in dwarf maize inbred lines. Fifteen experimental hybrids were generated using a six parent half diallel with four susceptible and two tolerant parents. The fifteen hybrids were evaluated in a completely randomized block design with three replicates during the 2006/7 season at the University of Zimbabwe farm in Harare. Plants were artificially inoculated with leafhoppers (*Cicadulina mbila* Naude.) and scored for MSV disease development at flowering. Significant variation ($P < 0.05$) was found among the crosses for MSV. The variation was attributed to both General Combining Ability (GCA) and Specific Combining Ability (SCA) effects which were both significant ($P < 0.05$). However, a value of the relative importance of GCA to SCA of 0.86 which was close to unity suggested that GCA effects were more important than SCA effects. This was confirmed by the GCA to SCA variance ratio of 2.84 indicating that, though both additive and non-additive gene action were involved in the transmission of resistance to MSV in the experimental hybrids, additive gene action was more important. Resistance was highly heritable with an h^2 value of 71 % supporting the additivity but also suggesting that though the trait is polygenic, it is only controlled by a few genes as compared to many genes. Therefore, progress could be made by utilizing breeding methods that can fully exploit additive gene effects, such as recurrent selection. Backcrossing could also be used to convert susceptible lines to tolerant ones. Some high yielding MSV tolerant hybrids were identified and recommendations were made for further trials to be conducted with these materials. These experimental hybrids had yields of more than 8 t/ha.

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LIST OF ABBREVIATIONS

ACFD	African Centre for Fertiliser Development
CIMMYT	Centro Internacional de Mejoramiento de Maíz y Trigo
MSV	Maize Streak Virus
REGNUR	Regional Nursery Program
RFLPs	Restriction Fragment Length Polymorphisms
RILs	Recombinant Inbred Lines

