

A GENETIC ANALYSIS OF NON-RESTORER LINES
IN SORGHUM (SORGHUM BICOLOR (L.) MOENCH)

BY

BHOLA NATH, B.Sc. (Hons) Ag. & A.H., M.Sc. (Ag.), INDIA

A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

IN

AGRICULTURE

IN THE

POST-GRADUATE INSTITUTE OF AGRICULTURE

OF THE

UNIVERSITY OF PERADENIYA, SRI LANKA

APPROVED

Mahar R. Prapankul
W. J. Jacobs
H. H. H. H.
A. Aman

EXAMINATION COMMITTEE

368130

C 633.174

N17



368130

AGRICULTURE LIBRARY
UNIVERSITY OF PERADENIYA

ABSTRACT

A genetic analysis of maintainers of sterility in the milo-kafir cytoplasmic genetic system was undertaken at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, Andhra Pradesh, India during 1981-83, to study divergence, combining ability, heterosis and variance components of important characters through a 15x15 diallel and line x tester cross analyses in sorghum.

Results indicated high variability in the non-restorer collection. Additive genetic variance component was predominant in controlling important agronomic characters. Heritability estimates for all characters were high. High heterosis was observed for grain yield, panicle yield, biomass production, plant height and grain number. The expression of heterosis in yield was attributed to cumulative effects of yield components. Heterosis was not related to genetic, geographic or taxonomic diversity. All the high yielding crosses involved at least one parent with a high gca effect.

Based on results, good prospect of improving female parents for hybridization programme were envisaged, primarily due to the contribution of new variability from the population derived lines developed at ICRISAT. It was suggested to initially screen parents on the basis of their per se performance and then evaluate their combining ability for optimal use of resources in a breeding program. A mass selection scheme subsequently followed by reciprocal recurrent selection for gca was recommended for the improvement of parental populations.

A line, Rs/R-20-682-5-1 recessive for the two genes ($b_1b_1b_2b_2$) determining testa in sorghum grain, was discovered. The line would produce white grained sorghum hybrids with any pollinator parent and would be useful in breeding programmes on a global basis.