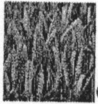

1.3.4 Chama, Chilenga. (2003). Inheritance of gluten strength in adapted wheat (*Triticum aestivum* L.) lines in Zambia. (Supervisors: Dr. M. S. Mwala and Dr. D. M. Lungu).

The study of the inheritance and gene action of gluten strength in adapted wheat lines in Zambia was undertaken using a half-diallel design. Seven adapted wheat lines were obtained from the Wheat Research Team of the Crop and Soils Research Branch of Zambia. The lines were planted and crossed in glasshouses at Mount Makulu Research Station and at the University of Zambia from January to May 2001. The F_1 and self parental lines were then planted in 3 replications using a Randomized Complete Block Design at Munkumpu Farm of the Mpongwe Development

Company in Mpongwe district of Zambia in May 2001 under center pivot irrigation system. The F_2 seed was then harvested at 133 days after planting and analyzed for quality analysis using Sodium Dodecyl Sulphate Sedimentation (SDS) test, Mixograph Development Time (MDT), flour yield and protein content at the Agricultural Research Council Small Grain Institute in Bethlehem, South Africa. There was genetic variability and significant differences among the genotypes for the quality parameters. Inter parameter correlations of the various quality parameters showed that SDS sedimentation volume and Mixograph development time were positively and significantly correlated ($r = 0.36^*$, $P<0.01$). SDS sedimentation volume and protein content were also positively and significantly correlated ($r = 0.38^*$, $P<0.01$). SDS sedimentation and flour yield showed positive but not significant correlation ($r = 0.30$, $P<0.01$). mixograph development time and protein content were negatively and not significantly correlated and mixograph development time and flour yield were positively correlated but not significant also. Protein content and flour yield showed a positive and significant correlation ($r = 0.54^*$, $P<0.01$). The GCA effects were significant for flour yield and protein content ($P<0.05$). GCA effects were found to be of great importance for the determination of flour yield, protein content and mixograph development time but not so for SDS sedimentation. SCA effects were significant for SDS sedimentation and mixograph development time. Broad sense and narrow sense heritability estimates were low for SDS sedimentation volume ($h^2_{bs} = 0.33$; $h^2_{ns} = 0.37$). Additive genetic effects were found to greatly contribute to the genetic control of flour yield and protein content. Dominance genetic effects were responsible SDS sedimentation while additive and dominance genetic effects were of equal importance in the genetic control of mixograph development time. Genetic improvement would therefore be more rapid for flour yield and mixograph development time in the earlier generation segregating materials due to the substantial additive genetic effects as well as the relatively high narrow sense heritabilities. However, for SDS sedimentation and protein content, effective selection in the earlier generation cannot easily be achieved and therefore would require further evaluation of the materials in later generation stages.