1.1.8 Langa, Marcos. (2006). Combining ability for grain yield of quality protein maize (QPM) (*Zea mays* L.) under low soil nitrogen. (Supervisors: Dr. B. Vivek and Dr. D. M. Lungu).

Maize (*Zea mays* L.) is the main staple food crop in the Southern Africa Development Community (SADC) region. The nutritional superiority of Quality Protein Maize (QPM) in both human and animal nutrition, especially in monogastric animals, has been clearly and repeatedly demonstrated. Numerous studies have been carried out in several countries around the world with infants, young children and adults recovering from severe malnutrition when fed on diets. The QPM varieties currently being grown by farmers in the region were not bred for production under conditions of low soil fertility however, due to economic hardships and lack of access to

credit facilities small holder farmers grow maize with inadequate levels of nitrogen. This study aims at assessing the performance of QPM maize under low nitrogen conditions. A total of 11 QPM lines selected for their differential performance under low nitrogen conditions were studied. Trials were carried out under low N conditions at two environments in Mocambique and one in Zimbabwe in the 2003/04 season. Differences among entries (genotypes) were significant ($P \leq 0.05$) for grain yield, anthesis date, number of plants, in the combined analysis of variance across environments. Genotypes by environment interactions were significant ($P \leq 0.05$) for grain yield; anthesis date and number of plants. Partitioning of these interactions revealed that the crosses by environment mean squares were highly significant for all traits except stem lodging. The relative importance of general and specific combining ability effects, GCA and SCA, respectively, for grain yield, maturity, senescence and number of ears per plant was assessed Parents demonstrating highly significant, positive GCA effects for yield included lines 3, 4, 7 and 11 for grain yield. GCA and SCA effects were not significantly different from each other for grain yield. For plant height Line 4 contributed tallness to progeny as was shown by its positive GCA effects for PH (9.443), while Line 7 contributed to reducing the height (-4.312). SCA effects for the hybrid were negative indicating a net reduction in height compared to other crosses effects. There was a balance between GCA and SCA in contributing to total sums of squares for GY (35% - 65%), AD (82% - 18%), ASI (30% - 70%), EPP (14 % - 86%), NP (45.8% - 54.2%). The study showed that it is possible to develop QPM hybrids and populations that have improved yield under low nitrogen conditions.