


→ 1.1.10  Kaonga, Kesbell K. E. (2007). Expressivity of opaque-2 mutant gene in maize (*Zea mays* L.) genotypes under low nitrogen and moisture stressed conditions. (Supervisor: Dr. D. M. Lungu).

In maize based diets, low protein may be a problem. Quality protein maize (QPM) is an alternative source since it has double the level of lysine and tryptophan which are essential amino acids. However, there is lack of information on the levels of these amino acids when QPM is grown under stress conditions. Therefore, the objectives of this study were to determine the expressivity of opaque-2 mutant gene and assess the general performance of QPM when grown under low N soil and moisture stress conditions by evaluating open-pollinated and hybrid QPM genotypes in the 2005/06 seasons at four sites. These sites comprised two low N, one drought and one optimum site. Orthogonal contrasts of lysine and tryptophan for low soil N versus optimum N environment indicated that low N stress had an influence on the expressivity of opaque-2 gene. Seven QPM hybrids had their lysine levels within the accepted range of 3.4 – 4g/100g protein that represented 88% penetrance for opaque-2 mutant gene for the hybrids used in this study. On the other hand, the QPM OPV genotypes used in the study exhibited complete penetrance for the opaque-2 gene. The across site analysis of variance indicated that the QPM OPV VP05194 had the highest mean lysine value and was followed by VPO51 WITH 3.98 AND 3.97g/100g protein. With respect to hybrids, CZHO4032 had the highest lysine mean value and was followed by CZHO521 with 4.24 and 3.99g/100g protein, respectively. The normal check ZM621 and SC527Q had the lowest lysine levels of 2.91 and 2.95g/100g protein, respectively and were below the accepted range. However, the differences observed among genotypes indicate that the expressivity of opaque-2 gene could also be influenced by the genetic background of the genotype. Results of the stability analysis for grain yield showed that QPM OPV genotypes were slightly more stable than hybrids and four QPM OPV genotypes had a regression coefficient (b-value = 1) and $sd^2 \leq 0$. Correlation analysis indicated that grain yield was positively and significantly correlated with 100 seed weight ($r = 0.92^{**}$), and shelling percent ($r = 0.81^*$) and was negatively and non-significantly correlated with anthesis silking interval ($r = -0.43$) and leaf senescing ($r = -0.61$). Low soil N had an influence on the expressivity of opaque-2 gene and QPM had comparable agronomic performance and required optimal conditions for maximum grain yield as its counterpart.