

Abstract:

Low soil nitrogen is an important biophysical constraint to common bean (*Phaseolus vulgaris* L.) production in East and Central Africa. An average of 660 kg N ha⁻¹ has been lost during the last 30 years from about 200 million ha of cultivated land in 37 countries. This has resulted into massive problems of food security because of the decreasing per-capita food production. This study was carried out to determine the genetic mechanisms for bean traits associated with better performance under low N soils. Knowledge of mode of inheritance for these desirable traits for enhanced performance under low N soil would be exploited to step up bean production through a rigorous breeding and selection program. Eight widely grown and well adapted cultivars; representing N tolerant (CAL 143, CIM 9314-36, AFR 708) and non-tolerant varieties (E5, E8, GLP2, CAL96, SCAM80-CM/15) were crossed in a diallel. The parents and F1 generation were evaluated under low soil N (Kabete) and moderate soil N (Thika) conditions and significant genetic differences were observed for both stress conditions and locations. Inheritance of the traits associated with better performance under low N soil were found to be mainly under additive fixable genetic components as opposed to interactions. Genotypes with well-developed basal root systems performed better than those with less developed basal roots. Crosses involving the low N tolerant and non-tolerant lines performed better under both locations, especially those involving CAL 143 as one of the parent. CAL 143 was the best in performance and had highly significant g.c.a. effects under both locations.