Maize (Zea mays L.) is one of the most important staple human food crop for over 90% of Kenya's population. However production has lagged behind due to drought, pests, diseases, Striga and low soil fertility despite much effort put in using conventional breeding methods. An efficient *in* vitro regeneration system is an important step for genetic improvement of maize against production constraints. Biotechnology offers an impressive option to supplement the ongoing efforts on developing genetically enhanced germplasm for achieving sustainable food production. This study was done with the objectives of assessing the regenerative capacity and assessing the genetic transformation ability of tropical Kenyan maize genotypes. Somatic embryogenesis and plant regeneration was achieved from immature maize embryos. Callus was initiated on N6 medium supplemented with different concentrations of 2,4-D, 3% sucrose, 10 mgl^{-1} silver nitrate, 100 mgl^{-1} casein hydrolysate and 2.875 mgl^{-1} proline. The concentration of 2,4-D, genotype and age of embryos had a significant effect ($p<0.5$) on the percentage of primary and embryogenic callus formed. The induction of primary callus ranged between 0 and 97% and embryogenic callus from 0 to 84%. Somatic embryos were matured on N6 medium supplemented with 6% sucrose and 1 mgl^{-1} NAA. Regeneration was achieved using MS medium supplemented with 3% sucrose. Plants formed from maize genotypes ranged between 0 and 12 per culture vessel. Callus initiation and plant regeneration were genotype dependent. Maize lines H627 and CML216 had the highest mean number of shoots formed. Plantlets were transferred into half MS medium supplemented with IBA for enhancement of root development. *In* vitro regenerated plants were successfully transferred into pots in the greenhouse and into the field and they grew to maturity and set seeds in Ro and R_1 generations. Transgenic plants expressing Bar and Gus genes employing the Agrobacterium-mediated transformation technique were obtained. Agrobacterium-mediated transformation technique was used for the introduction of a Gus reporter and bar into the immature embryos and embryogenic callus. Transformation experiments were carried using Agrobacterium strains EHA101 containing pTF102 binary vector, EH10I, AGL1 and LBA4404 containing pBECK2004, LBA4404, GV and EHA105 containing pCAMBIA2301 and AGL1 containing pSB223. The four vectors harboured a Gus gene. In this study transformation of the maize embryos was demonstrated, however the efficiency was low. Transient Gus activity was used as an initial step to assess if transformation had taken place. Transient Gus gene expression was confirmed by histochemical β-glucuronidase (Gus) activity on the $3^{`d}$ day of co-cultivation of infected immature embryos and embryogenic callus. Transient Gus expression was also observed in the tissues of the putative transformants. Transient Gus gene expression was influenced by the co-cultivation period, genotype and *Agrobacterium* strain. Co-cultivation on the third day realized the highest proportion of embryos showing transient gene expression as compared to the fourth day of co-cultivation. *Agrobacterium* strains EHA105 containing pCAMBIA2301 and EHA101 containing pTF102 vector were more effective in producing high transient Gus gene expression. Despite EHA 105(pCAMBIA2301) producing the highest transient gene expression in immature embryos and embryogenic callus, plants were not regenerated. PCR amplification of bar and Gus gene confirmed the transfer of the transgenes. Southern blot hybridization confirmed the integration of the Gus gene into maize genome. In conclusion, the study established a reproducible regeneration and transformation system from immature embryos of tropical maize genotypes