Maize streak virus (MSV) disease (MSD) decimates tropical maize yields in subSaharan Africa reaching 100% crop loss. The disease, characterized by yellow streaks along leaf vasculature, delimits host photosynthesis leading to reduced or no grain filling, stunting and death in old and young infected plants respectively. Control of MSD via development of resistant maize varieties through classical breeding compromises other agronomical traits in the maize. The resistance is also poorly defined thus difficult to sustain or up-grade, allowing brisk virus counter resistance. There is need to compliment classical breeding basing on MSV virology coupled with comprehensible genetic manipulations. MSV replication proteins Rep and RepA have motifs that serve different but specific functions. For viral replication, the motifs involved locate in the N-terminus. Such functional interactions are subject to interference using various means, including synthetic short peptides termed peptide aptamers.

The main objective of this study was to confer MSV disease resistance in maize by interfering with the function of Rep and RepA proteins using peptide aptamers. First, the peptide aptamers' interaction with isolated MSV Rep proteins was screened using yeast two hybrid (Y2H) assays. Of the 31-peptide aptamers tested, 22 indicated positive interaction with the N-terminus of MSV Rep and RepA. Two candidate peptide aptamers (Apt 5 and Apt 59) were selected for introduction into maize germplasm after consistent broad interaction with homologous Rep proteins from other geminiviruses. The peptide aptamers interfered with MSV replication in black Mexican sweet (BMS) com cell suspensions when assayed using semi-quantitative PCR. There was reduced viral replication in the BMS cells compared to uninhibited controls after co-bombardment with MSV replicons and peptide aptamers.

The exhibited inhibition supported introduction of the aptamers into maize plants. In the second objective, cereals are recalcitrant to *Agrobacterium-mediated* gene transfer and any susceptibility is highly genotype dependent. Several tropical maize inbred lines were evaluated for their response in tissue culture and susceptibility to *Agrobacterium* mediated gene transfer. The best performing lines were selected for peptide aptamer gene introduction. Immature zygotic embryos of two tropical maize inbred lines TL 23 and CML 216 were successfully transformed using *Agrobacterium,* selected in tissue culture and normal transgenic plants regenerated for inbred line CML 216. Transformed events were recovered using phosphomannose isomerase on medium containing 0.5% mannose supplemented with 2.5% sucrose. Transformation frequencies ranged from 3% to 33% for both inbred lines. However, an exceptional 47.17% was achieved in one of the set-ups for inbred line CML 216.

Recovered somatic embryos of inbred line CML 216 germinated 0.6 shoots per callus event, representing a transformation regeneration efficiency of 0.08 shoots per explant compared to 0.83-1.15 shoots per explant for non-transformed controls. PCR, southern blot RT-PCR and western blot analyses done on To and/or TJ plants confirmed stable transgene integration and expression in the maize lines. Out of 51 To plants, 32 and 25 were positive for the *Trx-A* and *pmi* genes by PCR analysis respectively. Among these, four independent lines indicated express transcription and translation of the transgene by R T - PCR and western blot analyses. In laboratory bioassays, agro-infection resulted in very low infections that could not comprehensively conclude resistance in the transgenic lines relative to non-transgenic controls.