

The widespread use of genome editing technologies has created a greater need to understand the underlying role of crop genes. One of the fastest and most tractable ways to explore gene function in plants is via the use of virus induced gene silencing (VIGS) or viral expression of proteins in trans, because it obviates the need for tissue culture. However, until recently there were few viral systems to study gene function in monocots like maize and wheat. We have used an existing VIGS system based on Foxtail Mosaic Virus (FoMV) to study maize disease resistance. However, this system also appears to be amenable to CRISPR approaches. Previously there have been reports of using virus to deliver CRISPR guide RNA in planta as a way to achieve systemic editing in whole plants like *Nicotiana benthamiana*, but not yet in maize. We have found that FoMV can be used to deliver gRNA and target Cas9 to specific chromosomal sites in maize

We have developed transgenic maize carrying four different Cas9 variants designed to edit, increase, or decrease expression of a desired gene. We have also delivered FoMV carrying guide RNA specific to two maize genes in vivo, which resulted in altered gene expression. Our results indicate that this approach is potentially a powerful tool to advance maize genomics research and study maize disease resistance