Agriculture and agricultural research is currently facing a race against time in the developing countries. The ensuing climate change has posed serious potential threats to the cultivation of crops in the most food insecure Semi Arid Tropic (SAT) regions that are likely to be most vulnerable because their economies are closely linked to agriculture. Despite many uncertainties, there is a growing consensus that these growing adversities could lead to an overall increase in the disease and pest pressure besides, harsher abiotic stresses. Grain legumes being the major food crops grown in these drylands are important constituents in the diets of a large number of people in the developing countries. Most of the grain legumes have a narrow genetic base, and levels of resistance to some biotic and abiotic constraints are low, their improvement becomes an overarching research-for-development challenge for maximizing the benefits that grain legumes offer to smallholder farmers. Running against the headwinds, grain legume research at ICRISAT has been immensely benefitted by applications of modern genetic engineering tools and approaches that have the potential to develop solutions for various pest and diseases, besides potentials against the complex problems of drought to develop future climate-ready crops for difficult environments. Several constraints are being addressed through transgenics that are in different stages of research and development with a pipeline approach for product development and commercialization. While some activities like the development of insect and virus resistance and biofortification are still under evaluation, others like drought tolerant and aflatoxin resistant transgenic groundnuts are in an advanced stage where the product validation and development of commercialization packages have to be addressed. A comprehensive picture of different transgenic interventions for various constraints to the productivity and improvement of key grain legumes including peanut, chickpea and pigeonpea, highlighting the pitfalls and possible solutions through an integrated approach to combat the altered environmental conditions will be discussed.

Keywords: Grain Legume, Transgenic Crop, Dryland agriculture