

# Genetic Improvement for Development of a Climate Resilient Food Legume Crops

Relevance of cowpea breeding approach in improvement of food legume crops for future

## **ABSTRACT**

Global population increment coupled with the adverse effects of climate change pose horrendous possibilities for food shortage and hunger. Nevertheless, climate change embedded in several biotic and abiotic stresses affects food crops' productivity, despite breeding accomplishments. Consequently, there is urgent need for mapping out sustainable and environmentally friendly food crops as well as their efficient and appropriate improvement and production systems. This will enable genetic improvement for climate resilient, high-yielding, and nutritionally valuable food crops. Food legume crops, which represent the most valuable food source globally after cereals, are ideal for meeting the global food demand; thus, improving their productivity becomes crucial. Conversely, understanding and documenting limitations of food legume yield is a step toward a defined breeding goal. Having in-depth knowledge about the genetics of drought and heat, and deployment of molecular platforms, will enhance prospects of developing food legume varieties with improved agronomic traits. This accomplishment will be reflected in the output of any programmed and systematic improvement programs: development and release of high-yielding and early maturing food legume varieties that are tolerant and resistant to biotic and abiotic stresses. Hence, this chapter will constitute a repository for legume breeders interested in developing climate-resilient food legume varieties capable of adapting to marginal environments and giving appreciable yield in the face of climatic stressors: drought and heat stress. It could be concluded that co-occurrence of drought and heat stress during both vegetative and reproductive developmental phases of food legume crops would lead to impeded tissue development, loss of organelle functions, production of non-viable pollen, abortion of ovaries, and oxidative stress in the leaves. These will result in failure to fertilize and poor quality and quantity of assimilates produced and stored. Thus, the key to improvement for climate resilience is better understanding of pathways associated with yield, resistance, and tolerance to biotic and abiotic stresses.