

## **What are the impacts and risks to agriculture from climate change and what role can new plant varieties play in delivering solutions?**

John DERERA

Senior Director Plant Breeding and Pre-Breeding, Consultative Group on International Agriculture (CGIAR)

### **Summary**

Climate change could cause catastrophic effects on agricultural productivity through increases of greenhouse gas emissions (GHGs). The climate change causes challenges of increasing incidence and severity of biotic and abiotic stresses which have compromised crop production, causing a mismatch of food production and population growth rates, especially in developing countries, and in the tropical environments. In sub-Saharan Africa annual population growth rate is over 2% but annual genetic improvements (genetic gains) are less than 1.5%, meaning productivity improvement lags behind population growth rate. Climate change has caused an estimated 21-34% loss in global agricultural productivity growth since 1961. In the global south loss of crop productivity amounts to about 26-30% in Africa, Latin America, and Caribbean. Impact of reduced productivity is high on small land holding, because of limited technology options including few adapted varieties, and lack of capital to mitigate. There is limited scope for expanding area under production because of reduced availability of agricultural land due to rapid urbanization. There is intense competition for land between agriculture and human settlements. This calls for the agricultural research and development community to collaborate on combating climate change and its impact. Agriculture contributes to climate change through emission of about 25% of GHG emissions. Therefore, there is need to adopt agricultural practices that contribute to capturing the excess carbon generated by agriculture, and other industries. Investments in research and implementation of improved agronomic practices, alongside development of new and climate resilient crop varieties would contribute to incredible yield improvements under a climate change crisis. Investments in breeding efforts will increase crop yields through breeding for a combination of high productivity, resistance to biotic stresses caused by emergence of new diseases and new pests and tolerance to abiotic stresses caused by increasing temperatures and drought. Indirectly improved productivity of crop varieties means that agricultural production can be increased without increasing land size hence a reduction on deforestation which contributes to GHGs emissions. This can be achieved by strengthening collaboration involving public-private partnerships such as CGIAR and national agricultural research systems and private sector crop improvement networks. Investments in breeding for adaptation for climate change, especially by the private sector, could be encouraged by protection of innovations or new varieties, using the effective UPOV's *sui generis* plant variety protection systems.