

Climate change: Preparing for changes in occurrence and distribution of legumes disease

Raju Ghosh and Mamta Sharma

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, Hyderabad, Telangana 502324, India.

Email: r.ghosh@cgiar.org

Climate change will change patterns of disease distribution through changes in host distribution and phenology, changes in plant-associated microflora and direct biological effects on rapidly evolving pathogens. We initiated investigations to study changing scenario of diseases in two largest cultivated pulses - chickpea and pigeonpea in India as affected by climate change. These pulses are largely grown in rain-fed environments that are most vulnerable to climate change. Changes in the disease spectrum in chickpea and pigeonpea for the past one decade were monitored through extensive surveys and analysis of disease and weather and its comparison with the historical data indicated shift in the occurrence and distribution of diseases as well as emergence of new diseases in these two pulses. In chickpea, *Rhizoctonia* blight (dry root rot) is becoming more intense in typically tropical-humid areas, while viruses and rusts dominate in warm but dry zones. Extension in the range of *Ascochyta* blight and *Botrytis* gray mold in chickpea has been recorded due to the extended winters. In pigeonpea, increased incidence of *Phytophthora* blight (*Phytophthora cajani*), *Alternaria* blight and *Macrophomina* is observed.

Varied reaction of diseases was observed on genotypes under elevated CO₂ levels (550 and 700ppm) under Open top chambers (OTC) facility at ICRISAT, India. Positive, neutral and negative effect of elevated CO₂ was observed on diseases. Advancement in the incubation period in some diseases and increased incidence of sterility mosaic disease in pigeonpea was found under elevated CO₂. However, no significant effect was found on soil borne diseases. Enzyme activity was affected by the elevated CO₂ both in compatible and incompatible interactions. Detailed investigations to understand the combined effect of temperature and CO₂ on plant defence responses against these diseases is underway. The study is important under climate change scenario for long-term planning to prioritize adaptation and mitigation strategy.