**High temperature tolerance in grain legumes**

Gaur PM1\*, Samineni S1, Krishnamurthy L1, Varshney RK1, Kumar S2, Ghanem ME2, Beebe S3, Rao I3, Chaturvedi SK4, Basu PS4, Nayyar H5, Jayalakshmi V6 and Babbar A7

1International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, Hyderabad 502 324, AP, India

2International Center for Agricultural Research in the Dry Areas (ICARDA), Rabat, Morocco

3International Center for Tropical Agriculture (CIAT), A.A. 6713, Cali, Colombia

4Indian Institute of Pulses Research (IIPR), Kanpur 208024, UP, India

5Panjab University, Chandigarh 160 014, India

6Regional Agricultural Research Station, Nandyal 518 502, AP, India

7Jawaharlal Nehru Agricultural University, Jabalpur 482 004, MP, India

[\*Corresponding author: p.gaur@cgiar.org](mailto:*Corresponding%20author:%20%20p.gaur@cgiar.org)

High temperature stress (or heat stress) during reproductive stages is becoming a serious constraint to productivity of grain legumes as their cultivation is expanding to warmer environments and temperature variability is increasing due to climate change. Heat stress adversely affects pollen viability, fertilization, pod set and seed development leading to abscission of flowers and pods and substantial losses in grain yield. Photosynthate remobilization has been identified to play an important role in heat tolerance. A high temperature of 35°C was found critical in differentiating heat tolerant and heat sensitive genotypes in chickpea, lentil and faba bean, while heat sensitive lines of common bean lose yield when night temperature is higher than 20°C. Field and laboratory screening techniques have been standardized for screening of genotypes for heat tolerance and sources of heat tolerance have been identified in most of the grain legumes. A heat tolerant chickpea line ICCV 92944 has been released in three countries (India, Myanmar and Kenya) and area under its cultivation is expanding rapidly. Several heat tolerant varieties of faba bean have been released in Sudan giving up to 2-fold increase in yield as compared to the sensitive cultivars. Interspecific crosses have been successfully used for enhancing heat tolerance in beans. Studies on physiological mechanisms and genetics of heat tolerance and identification of molecular markers and candidate genes for heat tolerance are in progress and would help in developing more efficient breeding strategies for heat tolerance in grain legumes.