

Studies on Heat Sensitivity in Lentil

Anjali Bhardwaj, Kumari Sita, Akanksha Sehgal and Harsh Nayyar

Department of Botany, Panjab University, Chandigarh

Abstract—High temperature (Heat Stress) is a major factor affecting the productivity of cool season legumes. The effects of heat stress vary with the stages of plant life cycle. In our studies, vegetative and reproductive damages were observed in lentil at high temperature. Studies conducted in outdoor conditions (late-sown) showed morphological symptoms like sunburns in leaves, leaf tip burning, chlorosis, leaf abscission, flower drop, flower and pod abortion. In the present study, core lentil accessions were screened for heat stress tolerance by sowing 2 months later (first week of January; max/min temperature $>32/20^{\circ}\text{C}$ during the reproductive stage) than the recommended date of sowing (first week of November; max/min temperature $<32/20^{\circ}\text{C}$ during the reproductive stage). Heat stress resulted in marked reduction in the rate and duration of seed filling to decrease the final size. Screening revealed some promising heat-tolerant genotypes (IG2507, IG3263, IG3297, IG3312, IG3327, IG3546, IG3330, IG3745, IG4258, and FLIP2009), which can be used in a breeding program. Five heat-tolerant (HT) genotypes (IG2507, IG3263, IG3745, IG4258, and FLIP2009) and five heat-sensitive (HS) genotypes (IG2821, IG2849, IG4242, IG3973, IG3964) were selected from the screened germplasm for further analysis. HT genotypes produced more sucrose in their leaves and anthers than HS genotypes, which was associated with superior reproductive function. Studies on leaves of HT genotypes suggested significantly less damage to membranes, photosynthetic function and cellular oxidizing ability as compared to HS genotypes. Our studies indicated that temperatures ($>35/25^{\circ}\text{C}$) were highly detrimental for growth and yield in lentil. While HT genotypes tolerated temperatures up to ($40/30^{\circ}\text{C}$) by producing fewer pods, the HS genotypes failed to do so even at ($38/28^{\circ}\text{C}$).