ABSTRACT

Title of the thesis Dissertation	:	**Physiological and biochemical basis of drought stress in *Brassica juncea* genotypes in Jammu region**
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Degree to be awarded	:	MSc (Plant Physiology)
Year of award of Degree	:	2017
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Drought stress, the most important factor limiting growth and yield of crops, affects about 40 to 60 percent of global agricultural lands The average annual yield loss of crops due to drought in the world is about 17 percent that can increase to more than 70 percent and particular in J&K 21 percent in a year. Due to limited water resources, it is recommended that deficit irrigation be used as an efficient option for increasing water productivity. The present investigation was carried out on five brassica genotypes vizi) Pusa Bold in NRCDR-2 in) Kranti iv) RSPR-01) RSPR-03. Some physiological and biochemical traits of genotypes of Brassica, a pot experiment was conducted in October, 2016-17 in the Division of Plant Physiology The pot experiment was examined in a factorial experiment form in a completely randomized design with three replications The factors to be studied include five *Brassica* genotypes and drought stress in three different growth stages (45, 60 and 90 days after sowing (DAS) to drought stress) Drought stress induced changes in physiological traits víz for plant water status 1.e. relative water content (RWC %), relative stress injury (RSI %), total chlorophyll, chlorophyll stability index (CSD), and canopy temperature depression (CTD). biochemical ie. total soluble carbohydrate (TSCS), proline accumulation, and antioxidant enzymes were studied and reproductive changes, yield attributing characters were studies at harvestingstage.

The results showed that drought stress induced at 45. 60 and 90 days after sowing (DAS) and live days of exposure to drought stress RWC of leaf declined in Kranti genotype (57.4% to 47.4%) followed by RSPR-03 (57 0% to 40.0%) and RSPR-01 (54.0% to 38.28) and in other two varieties such as NRCDR-2 (43.6% to 33 9%) and Pusa Bold (43.0% to 33.9%) were performed minimum, CSI % decreased with increased DAS to drought stress and was more in Kranti followed by RSPR-03 than RSPR-01 and minimum was observed in other two varieties NRCDR-2 and Pusa Bold. TSCs (39.0 to 79.0 mg g^{-1} DW) and proline content (2.5 to 6 2 mg g^{-1} DW) increased in all genotypes with increased DAS Drought stress induced the specific activity of antioxidant enzymes such as superoxide dismutase (SOD) peroxidase (POX) and ascorbate increased with the increased days of exposure from 45 to 90 days. Morphological parameters such as total biomass and total seed yield per plant also

decreases as increases days of exposure to drought stress and maximum was found in Kranti followed by RSPR-01 and RSPR-01 Drought stress increased the activity of antioxidants superoxide dismutase and peroxidase in brassica genotypes, and it was observed that the genotypes that have higher yields under drought stress had higher levels of enzyme activity The results of this study suggest that, drought stress greatly influence yield components and physiological functions that affect plant growth and biomass production in *brassica* genotypes. This effect is highly dependent on drought stress intensity Although chlorophyll content might act as part of a survival mechanism under stress conditions however stronger relationship was found between drought tolerance and chlorophyll content under severe stress condition. Results of all physiological and biochemical traits indicated that B juncea genotypes Kranti followed by RSPR-03 and RSPR-01 were more tolerant to drought stress condition and can be used in breeding programme for developing drought tolerance*B.juncea*genotypes.

Key words: *Brassica juncea*: plant water status; proline, antioxidant enzymes

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