

Effect of Phosphorus Solubilizing Bacteria on Yield and Seed Quality of Camelina (*Camelina sativa* L.) under Drought Stress

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Abstract : New strategies aimed at increasing the resilience of crop plants to the negative effects of climate change represent important research priorities of plant scientists. The use of soil microorganisms to alleviate abiotic stresses like drought has gained particular importance in recent past. A field experiment was planned to investigate the effect of phosphorous solubilizing bacteria on yield and seed quality of Camelina (*Camelina sativa* L.) under water deficit conditions. The study was conducted at Agronomic Research Farm, University College of Agriculture and Environmental Sciences, The Islamia University Bahawalpur, during 4th week of November, 2013. The available seeds of Camelina sativa were inoculated with two bacterial strains (*Pseudomonas* and *Bacillus* spp.) and grown under various water stress levels i.e. D0, (four irrigations), D3 (three irrigation), D2 (two irrigations), and D1 (one irrigation). The results revealed that drought stress significantly reduced the plant growth and yield, consequently reducing protein contents and oil concentration in camelina. The exposure to drought stress decreased plant height (16%), plant population (27%), number of fertile branches (41-59%), number of pods per plant (35%) and seed per pod (33%). Drought stress also exerted a negative impact on yield characteristics by reducing the 1000-seed weight (65%), final seed yield (52%), biological yield (22%) and harvest index (39%) of camelina. However, the inoculation of seeds with *Pseudomonas* and *Bacillus* spp. promoted the plant growth characterized by increased plant height and enhanced plant population. It was noted that inoculation of seeds with *Pseudomonas* resulted in the maximum plant population (113.4 cm), primary branches (19 plant⁻¹), and number of pods (664 plant⁻¹), whereas *Bacillus* inoculation resulted in maximum plant height (113.4 cm), seeds per pod (15.9), 1000-seed weight (1.85 g), and seed yield (3378.8 kg ha⁻¹). Moreover, the inoculation with *Bacillus* also significantly improved the quality attributes of camelina and gave 3.5% and 2.1% higher oil contents than *Pseudomonas* and control (no-inoculation), respectively. Similarly, the same strain also resulted in maximum protein contents (33.3%). Our results confirmed the hypothesis that inoculation of seeds with phosphorous solubilizing bacterial strains is an effective, viable and environment-friendly approach to improve yield and quality of camelina under water deficit conditions. However, further studies are suggested to investigate the physiological and molecular processes, stimulated by bacterial strains, for increasing drought tolerance in food crops.

Keywords : Camelina, drought stress, phosphate solubilizing bacteria, seed quality

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