



Evaluation of Hydrogel and *Trichoderma* based Formulations on Root Characteristics and Water Use Efficiency in Linseed under Rainfed Ecology

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Abstract: In India, climate change is expected to reduce the overall crop production. Increased global CO₂ emissions could result in erratic weather conditions, especially uncertain rainfall and temperature, which may lead to soil moisture stress in several crops. Hydrogel was efficient in altering the water holding capacity of soil by absorbing significant amount of water and releasing it under moisture stress conditions in soil. *Trichoderma* is multi-tasking fungus and proven to enhance root proliferation and nutrient uptake in several crops. The current study was aimed to assess the effect of super absorbent polymer (Hydrogel) and *Trichoderma* based formulations on root characteristics and water use efficiency (WUE) in linseed varieties under no irrigation condition. The experiment was conducted on four linseed varieties viz. Kartika, Deepika, Garima, and RLC-92 with six hydrogel based *Trichoderma* formulated treatments. The varieties Garima and RLC-92 recorded highest root area, root biomass, WUE and seed yield. Furthermore, the soil amendment with hydrogel @ 2 g m⁻² + sowing of *Trichoderma* treated seed significantly improved the root area, root biomass, WUE, relative water content (RWC), soil microbial biomass carbon (SMBC) and seed yield over control. The super absorbent polymer (hydrogel) was able to improve physical property of soil i.e. water holding capacity (WHC), and the seed treatment with *Trichoderma* positively influenced root characteristics of linseed in the experimental location. Moreover, both the inputs showed potential to enhance crop yield. No negative impact of hydrogel was observed on *Trichoderma* population as well as growth and yield of linseed crop. Conclusively, soil amendment with hydrogel and seed treatment with *Trichoderma* fungus found effective in enhancing root growth and WUE in rainfed linseed at experimental location.

Keywords: Bio-inoculant, hydrogel, Linseed, Root biomass, Super absorbent polymer, Water use efficiency
