عنوان مقاله:

Impact of mycorrhizal fungi and water stress on oil and protein harvest index in sesame

محل انتشار:

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خلاصه مقاله:

Drought stress is one of the most important environmental stresses affecting plant growth, yield and crop production around the world. It is believed that arbuscular mycorrhizal fungi are used for protecting plants against drought damage.Vesicular-arbuscular mycorrhizal fungi have been used in recent years to cope with water stress in many plants. In this study, the relationship between water deficit stress and mycorrhizal fungi were analyzed with mycorrhizal dependence index and chlorophyll stability in sesame (Sesamum indicum L.). The experiment was conducted in a split-plot design based on randomized complete blocks with three replications in the research field of Agricultural Research Center, West-Azerbaijan during years 2015 and 2016. The main factors consisted of normal irrigation, moderate and severe water stress and subplots included two different species of mycorrhizal fungi namely, Funneliformis mosseae and Rhizophagus intraradices. A non-inoculated plant served as the control. Mean comparison based on 2-years data showed that with increasing severity of water stress, biological water use efficiency (WUBE), oil harvest index (OHI) and protein harvest index (PHI) decreased. Using two kinds of mycorrhizal fungi F. mosseae, R. intraradices compared to non-inoculated, caused an increase in WUBE and PHI about 28 and 20% and 6 and 2%, respectively. Also in three different irrigation conditions, the effect of F. mosseae and R. intraradices was similar on chlorophyll b stability index (CSIb). The maximum and minimum WUBE (0.96 and 0.43 kg/m3), OHI (17.61 and 10.03%) and PHI (9.36 and 5.80%) were obtained under optimal irrigation and severe drought stress conditions, respectively. The maximum (34.69%) and minimum (20.26%) of mycorrhizal dependence index based on biological yield (MDIBY) were observed under severe drought stress and optimal irrigation conditions, respectively. Therefore, inoculation with mycorrhizal fungi (measured by MDIGY and MDIBY) under drought stress caused an increase in the chlorophyll (measured by TCSI). Increasing the chlorophyll led to an enhancement in the photosynthesis and promoted WUEE and WUBE. Improvement of the WUEE and WUBE caused an increase in oil and protein (measured by OHI and PHI). In severe and moderate water stresses mycorrhizal dependence index based on grain yield (MDIGY) and MDIBY increased compared to optimal irrigation. It can be concluded that for achieving high WUEE, WUBE, OHI and PHI, TCSI and as a result tolerance to the water stress can be increased.

کلمات کلیدی:

Biological water use efficiency, Oil harvest index, Mycorrhiza, Sesame, Total chlorophyll, water stress