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Effect of Two Species Mycorrhizal Fungi on Quantitative and Qualitative Yield of Sesame (*Sesamum indicum* L.) Landraces in Different Levels of Drought Stress

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Introduction

Drought stress is considered to be one of the most adverse abiotic stresses that influence plant growth and their physiological and biochemical aspects. In addition, drought stress influences the social and economic life of humans. Sesame (*Sesamum indicum* L.) is a drought tolerant plant. *Sesamum indicum* L. is one of the oldest and very important oil seed crops. It is usually cultivated in arid and semi - arid regions of the world for its quality edible oil and is very responsive to changing environmental conditions. Mycorrhizal symbiosis plays an important role in nutrient cycling in agricultural and natural ecosystems and reduces the effects of drought stress in plants by helping water absorption. AM fungi colonize the root cortex of plants and develop an extrametrical hyphal network that can absorb nutrients and water from the soil. So the objective of this study was evaluation of the influence of different levels of drought stress and two kinds of mycorrhizal fungi on oil percentage and yield, protein percentage and yield and seed yield of eight landraces sesame (*Sesamum indicum* L.).

Materials and Methods

This experiment was conducted by using factorial split plot based on randomized complete block design with three replications in research field of Urmia agricultural high school in 2014-2015. The main factor consisted of different levels of irrigation, normal irrigation (irrigation after 70 mm evaporation of crop (ETC)), moderate drought stress (irrigation after 90 mm evaporation of crop (ETC)) and severe drought stress (irrigation after 110 mm evaporation of crop (ETC)), sub plots including two kinds of mycorrhizal fungi *Glomus mosseae*, *Glomus intraradices* and non-inoculated (control). Sub-sub plots consisted of eight landraces of sesame names Jiroft13, Zanjan Tarom landrace, Moghan landrace, Naz of several branches, TC-25 ،TS-3, Darab 14 and Dashtestan 5.

Results and Discussion

The results of analysis showed that the effect of different levels of irrigation, mycorrhizal fungi and genotypes on studied traits were significant. Means comparison showed that with increasing severity of drought stress, seed yield, oil percentage, protein percentage, oil yield, protein yield and biological yield decreased significantly. Severe drought stress reduced oil yield and protein yield about 67 and 66 percent, respectively. Oil and Protein yield loss are due to seed yield loss because of water scarcity and applying water stress. Inoculation with mycorrhizal fungi species (*Glomus mosseae* and *Glomus intraradices*) in comparison with non-inoculated (control), seed yield improved about 33 and 11 percent, respectively. The reason for that may be related to the effect of mycorrhizal on absorption phosphorus and sulfur, lasting more leaves the plant, maintaining and increasing the leaves size and improving the photosynthesis by more chlorophyll. Reason of increasing biological yield in normal irrigation conditions was also due to the development of more and better durability of the leaf surface which causes physiological source sufficient to make greater use of light and dry matter production.

With using two kinds of mycorrhizal fungi (*Glomus mosseae*, *Glomus intraradices*) in compared to non-inoculated (control), seed yield and seed qualitative traits increased. Among sesame landraces under studied in this research, Moghan landrace and Zanjan Tarom landrace based on traits such as seed yield, oil yield and protein yield had superiority on other landraces. Based on results of this study, for improvement oil and protein percentage using mycorrhizal fungi especially, *G.mosseae* species would be recommended.

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Conclusions

The results of this study showed that drought stress and water deficit substantially reduced the quality traits such as oil content, protein content, oil yield, protein yield and seed yield of landraces of sesame. Application of mycorrhizal fungi in three different conditions increased seed yield and quality of all landraces. According to the results, not only the use of mycorrhizal fungi increased seed yield under drought stress but also in optimum irrigation conditions using mycorrhizal fungi, especially the species *G. mosseae* can be improved quantitative and qualitative yield. Landraces had different reactions to drought stress. Landraces Moghan and Tarom Zanjan had superiority on other genotypes and can recommend as suitable genotypes for planting.

Keywords: Biological yield, *Glomus mosseae*, *Glomus intraradices*, Oilseed, Water deficit