International Journal of AgriScience Vol. 2(1): 35-47, January 2012 *www.inacj.com*
ISSN: 2228-6322© International Academic Journals

Alleviation of drought stress effects on wheat using arbuscular mycorrhizal symbiosis

Moucheshi A., Heidari B.*, Assad M.T.
*Department of Crop Production and Plant Breeding, College of Agriculture, Shiraz University, Shiraz, Iran. *Author for correspondence (email: bheidari@shirazu.ac.ir)*

Received October 2011; accepted in revised form December 2011

ABSTRACT
Arbuscular mycorrhizal (AM) fungi are obligate symbiotic soil microorganisms that colonize the roots of the majority of plants and this symbiosis enhances the performance of crop plants in stress condition. The effects of the fungus, *Glomus intraradices*, on some agronomic and morphological traits and pigment contents of three wheat (*Triticum aestivum* L.) cultivars (Darab 2, Shiraz and Falat) were studied under four water regimes of 100, 75, 50 and 25% soil Field Capacity (FC). The experiment was conducted at the greenhouse of the College of Agriculture, Shiraz University, Shiraz, Iran in 2010. The mean values for grain number per ear (GN), 100-grain weight (100GW), ear weight (EW) and ear length (EL), spikelet number per ear (SN), and grain yield per plant (GY) in the AM-inoculated cultivars were 31.11%, 5.3%, 39.71%, 21.32%, 19.30%, and 30.8% greater than the results from their non-inoculated counterparts. The results showed that mycorrhizal inoculation enhanced chlorophyll (*Chl*) *a*, *b* and total *Chl* contents (13.71%, 33.50% and 17.46%, respectively) of flag leaves in all cultivars and at all water regime levels. Inoculation with mycorrhizal fungus significantly increased (8.67% greater than that of the non-inoculated cultivars) carotenoid (*Car*) contents in the middle leaves. The difference between AM-treated and those plants which were not treated were not significant for day to ear emergence (DEE). Higher levels for Shoot Water Contents (SWC) and lower levels of Water Saturation Deficit (WSD) were observed in the AM-treated cultivars in comparison with those that were not treated.

Keywords: Chlorophyll, Carotenoids, Drought, *Glomus intraradices*, Wheat

INTRODUCTION
Drought is among the phenomena that have serious detrimental effects on crop yield in many parts of the world. Plants' responses to drought stress are complex and involve molecular and biochemical mechanisms (Condon *et al.* 2004). Drought and conditions of limited water supply change *Chl* contents and components and damage photosynthetic apparatus in crop plants (Iturbe-Ormaetxe *et al.* 1998). Inoculation of plants with beneficial bacteria and fungi has received attention in recent years (Arzanesh *et al*. 2011, Daei *et al*. 2009, Evelin *et al*. 2009, Quilambo 2003, Ruiz-Sánchez *et al*. 2010, Subramanian *et al*. 2011, Talaat and Shawky 2011, Wu and Xia 2006). The symbiosis between plant roots and AM fungi is one of methods used to enhance nutrient and water uptake in plants under stress conditions (Abdul-Wasea and Elhidni 2011). It has been shown that symbiosis in AM-inoculated plants, not only affects growth but also contributes to improved tolerance to biotic and abiotic stresses (Augé 2001). AM – inoculated plants absorb greater amounts of nutritional elements such as phosphorus