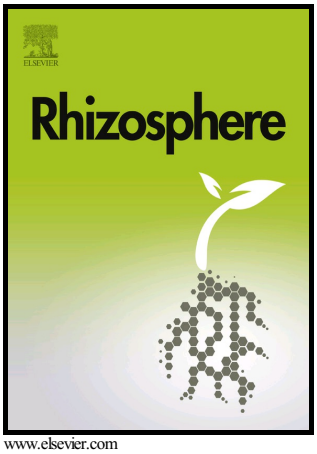

Alleviation of water stress effects and improved oil yield in sunflower by application of soil and foliar amendments

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Alleviation of water stress effects and improved oil yield in sunflower by application of soil and foliar amendments.

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Abstract

We used small field plot experiments to evaluate alleviation of water stress damage with four soil or plant amendments. The experiment was conducted in two places during the 2012 growing season with sunflower (*Helianthus annuus* L.) as the crop. The water stress treatments were no stress (S_0), moderate stress (S_1) and severe stress (S_2) as main factors. Two soil amendments were control (none), zeolite (4.5 t h^{-1}) and a super absorbent hydrogel (100 kg h^{-1}). Two plant amendments were applied as foliar sprays, with three levels: control (none), calcium silicate (4 mmol l^{-1}), and the triazol hexaconazole (12 mg l^{-1}). The results showed the experimental treatments had significant effect on Biological yield, seed yield, oil percent, oil yield, 1000 seed weight, seed per plant, irrigation water productivity, economic water productivity rate in base of seed oil and economic water productivity rate in base of seed oil. 58% oil yield reduction was caused by water deficit stress in severe stress without amendments. The hydrogel and calcium silicate reduced this damage to 19%. Zeolite in all conditions increased the percent yield of oil. The application of both zeolite and hexaconazole resulted in the greatest improvement in irrigation water productivity. Severe water deficit stress reduced irrigation water productivity, economic water productivity rate, and economic water productivity rate in yield of seed oil by 31%, 32% and 24% in comparison with control respectively. Measured indicators showed yield and water use efficiency improvements when use in combination.