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THE EFFECTS OF INOCULATION BARLEY BY ENDOPHYTIC BACTERIA (*METHYLOBACTERIUM* SP.)

Food is the energy source for everyone around the world, we live in an age where we are growing and producing more food than before. Generally, food insecurity is linked to seed insecurity. The term endophyte was first coined in 1866 by De Bary, *Methylobacterium sp*. are frequently encountered as endophytes, and common in soil and on surfaces of leaves and other plant parts.*Methylobacterium* have the capacity for methylotrophy, biofilm formation, production of Cytokinin, quorum-sensing signals, heavy metal and other stress resistance, and its role in Induction of Plant Growth, and Inhibition of Plant Pathogens.

Our study was conducted to test for *Methylobacterium*sp. ability topromote plant growth and to reduce heavy-metal toxicity.In the experiment westerilize barleyseeds by using 70% Ethanol for 1 min, 2% sodium hypochlorite for 8 min, and 0.2% mercuric chloride for time 2 min. Bacterial irrigation water with inoculum *Methylobacterium* sp. (standard), at 7.23 log cfu/ml were prepared under sterile laboratory conditions. The water was applied to sterilized seedswhich grown in the laboratory during the whole experiment period. Finally, we measured Photosynthesis(Lamp: ParIn -> 1500 uml), andlipid peroxidation (LPO)with protocol (Health & Packer, 1997) [1].

The results showed that *Methylobacterium* sp. was able to promote plant growth of barley in control and in heavy metals conditions also increased metal uptake by the plants.

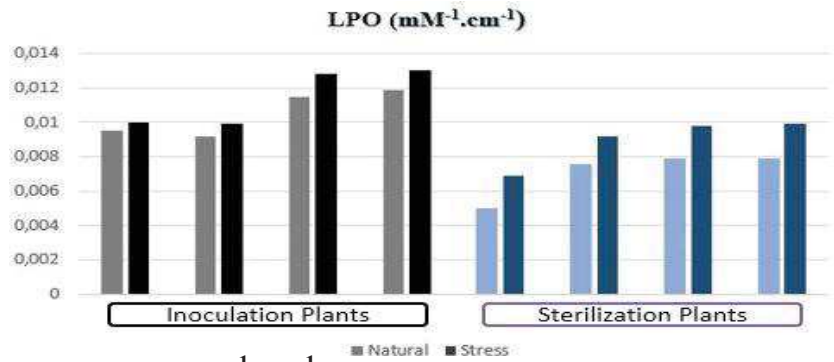

Fig 1. LPO ($mM^{-1}.cm^{-1}$) in inoculation and sterilization plants (natural, stress conditions)

Our results showed that the concentration oflipid peroxidation in plants which inoculated by *Methylobacterium* sp. were higher than steri-

lized plant in both conditions (natural, and stress).The LPO average number was 0.01053 $mM^{-1}.cm^{-1}$ in plants which inoculated by *Methylobacterium* sp. whereas the average number was 0.0071 $mM^{-1}.cm^{-1}$in sterilized plants and both numbers took in natural condition. Also, in stress condition the LPO average number 0.01143$mM^{-1}.cm^{-1}$ was higher than 0.00895 $mM^{-1}.cm^{-1}$ which measured Respectively.

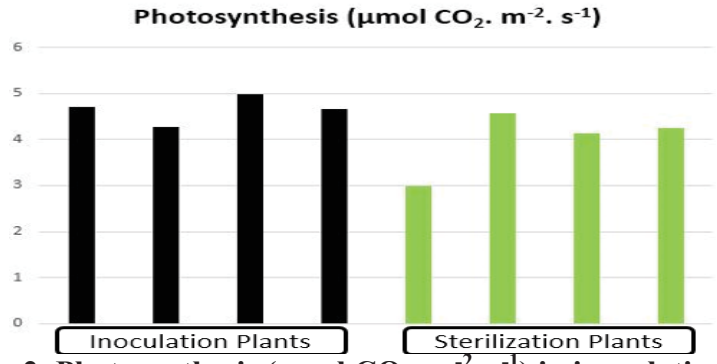

Fig 2. Photosynthesis (µmol CO_2. m^{-2}. s^{-1}) in inoculation and sterilization plants

Our results showed also that photosynthesis in plants which inoculated by *Methylobacterium* sp. higher than sterilized plants.Plant growth promoting bacteria can increase the growth and development of the plants either indirectly by reducing the toxic effects of metals or directly by producing the phytohormones [2].Interestingly, most of the endophytes studied so far have been shown to exhibit resistance to multiple HM (Lodewyckx et al. 2002) and our results agree with those studies[3]. Another study in 2010 showed that the light response curves of beet showed that photosynthetic capacity was significantly increased in endophyte-infected plants. Promotion of photosynthetic capacity in sugar beet was due to increased chlorophyll content, leading to a consequent increased carbohydrate synthesis. It is possible that the increased maximum yield of photosynthesis in sugar beet was promoted by phytohormones and produced by the bacteria.

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