

The Effects Evaluation of pretreatment Wheat Seeds by using Salicylic acid in the presence of Polyethylene Glycol (PEG)

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ABSTRACT: Salicylic Acid known as a Signal Molecule pretreatment, has a key role in the defensive responses to both environmental and non environmental tensions and it is shown that suitable density of foreign Salicylic Acid will cause increase in efficiency of antioxidant plant system. In this research, from pretreatment 100 micromole per liter and for 2 days long, Salicylic Acid in treatment plants and under Dryness Tension caused by the (PEG) 15.4% Polyethylene Glycol (PEG) in hydroponic environment, was used and the role of Salicylic Acid (SA) to some biochemical responses was studied and checked, too. The data of this study showed that Salicylic Acid (SA) pretreatment caused a meaningful decrease in Lipid per oxidation and increase in membrane resistance index in plants under dryness tension. In plants under tension, caused the increase in the amount of Proline and chlorophyll as well. It seems that safeguards effects of Salicylic Acid (SA) in tension conditions may be related to the ability of this material confronting Reactive oxygen species (ROS) and the reduction in Oxidative damages and the increase amount of chlorophyll.

Keywords: Dryness Tension, Salicylic Acid (SA), Polyethylene Glycol (PEG), Reactive oxygen species (ROS).

INTRODUCTION

Dryness Stress, affects the plant in cellular level, fiber and organs (Beeck and et al, 2007)]. The Secondary effect of water shortage and salinity tension is increase of Reactive Oxygen Species (ROS) which includes Oxygen uniqueness, Superoxidation radicals, hydroxyl radicals and Hydrogen peroxide (Simirnof .1998) .

The Reactive Oxygen Species (ROS) are toxic Molecules that can cause oxidative damages to proteins, DNA's and lipids.

In normal conditions, a low growth occurs in organelles like: chloroplast's, mitochondria and proxy zoom's .But at the time of tension, their production increases significantly.

In chloroplast, the main factors in production of Reactive Oxygen Species (ROS) are restriction of CO₂ fixation and reduction of electron transference (Suzuki and Mittler. 2006)

The main reason for the destructive and harmful effects of Reactive Oxygen Species (ROS), is their abilities for starting of Auto oxidative chain reactions of unsaturated fatty acid that leads to lipid peroxidation and membrane destruction (Zhang and Kirkham 1996) .

Salicylic Acid (SA) treatment in dryness tension caused increase of proline in stem of wheat plant and caused much more of potassium, magnesium and calcium absorption comparing witness plants (Mohamed and et al. 2001).

MATERIALS AND METHODS

This greenhouse test was done in the form of factorial in a completely randomized plan with 3 frequentations. The studied and checked actors were: Polyethylene Glycol (PEG) in two levels (zero &15.4%), Salicylic Acid (SA) in two levels (zero and 100 Micro molar) and methylenblue in two levels (0 and 100 Micro molar) .

At first, the seeds were disinfected with Naocl 10% and then rinsed carefully with water and then presoaked for 24 hours .

Then, seeds were put into vases with some (small) holes on the bottom and wall and a grid on their surfaces and then were put in Hydroponic surroundings including ½ Hoagland nutrient solution .

The solution was aerated with air pump. On sixteenth day, pretreatment, consists of Hoagland, Hoagland + Salicylic Acid (SA), Hoagland + Methyleneblue , Hoagland + Methyleneblue + Salicylic Acid (SA) , was applied . After a day, from each of pretreatment, three vases in Hoagland nutrient solution and three vases in %15 Polyethylene Glycol (PEG) were put and after 72 hours the air part was taken .

After measurement of Morphologic parameters, the treatments were frozen in liquid nitrogen and were kept in the freezer by the time of the test to measure the noted physiological characters.

All data were analyzed by using the SAS (Statistical Analysis System) software. The averages comparison was done by Duncan test in level 5% and by using of MSTAT-C software.

RESULTS AND DISCUSSION

In this research, dryness tension caused a meaningful reduction in membrane stability and resistance. Pretreatment SA (Salicylic Acid) caused increase of membrane stability and resistance and Methyleneblue neutralized this effect.

Also, Methylene blue *caused the* decrease of membrane resistance alone, but this reduction was not meaningful (Figure 1).

As Figure 2 shows, dryness tension caused a meaningful increase in the amount of Malondialdehyd in air organs of the plant.

Pretreatment SA (Salicylic Acid), caused a great decrease in Malondialdehyd and consequently, a meaningful decrease in Lipid peroxidation in plants under dryness tension and this effect was observed in plants which were not under the tension as well .

Methylene blue neutralized this effect. Increase in Lipid peroxidation or membrane stability and Ionic leakage in salinity tension conditions and dryness caused by production increase of reactive oxygen species, were under oxidative tension conditions that elimination , sweeping (cleaning) or turning them off was out of plant power and shows that the defense mechanism , created in the plant against oxidative tension , has not been enough . Kinds resistant to salinity and dryness because of having a strong antioxidant defense system (Enzymatic & Non Enzymatic) , challenges better with oxidative tension due to production of reactive oxygen species . Keeping the unity of cellular membranes in tension conditions, is one of the resistance components to face the tensions such as salinity and dryness (Masood and et al. 2006) .

The reactive oxygen species will lead to membrane lipids peroxidation and changing in membrane penetrance (Ionic leakage) and damage to the cells.

Therefore, the measurement of produced Malondialdehyd during lipids peroxidation and measuring the amount of Ionic leakage , both , are useful indexes for measuring the amount of oxidative damages exerted to membrane (Bandeoglu and et al. 2004).

Producing of Malondialdehyd (MDA) of an final and secondary production of unsaturated Fatty acid oxidation are known as a useful index in fat peroxidation (Hodges and et al. 1998)

But similar to the results of this research , the treatment of salicylic acid has caused decrease of lipid peroxidation and ionic leakage in wheat (Afzali and et al. 2006) and tomato (Zhang and Kirkham. 1996)in salinity tension and in wheat (Agarawal and et al. 2005)and barely (Bandurska and Stroinski. 2005) in dryness tension conditions .

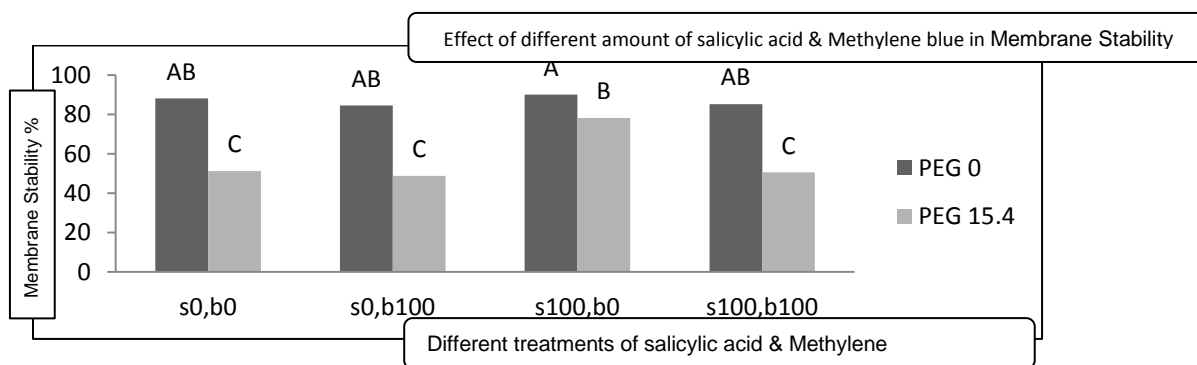


Figure 1.on Membrane Stability treatments Figure1 Effect of different (treatments)

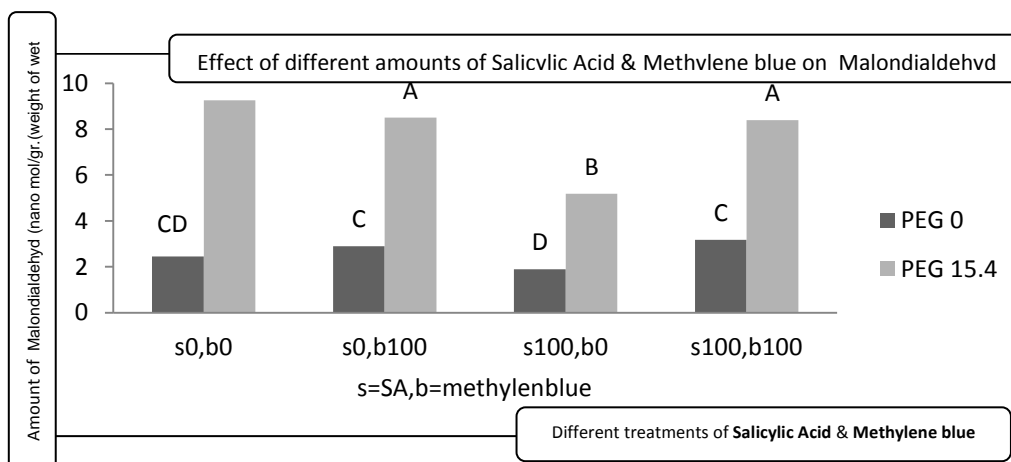


Figure 2. Effect of different (pretreatment) on Malondialdehyd

It has been reported that in Genotype of resistant to cotton dryness , regarding sensitive plants , the amount of Proline was much more increased(Sairam and et al. 1997) .In 2003,the increase of Proline in dryness tension has been reported by Nayyar , too (Nayyar .2003) .In this research,

With Salicylic Acid (SA) , caused the increase of Proline under tension conditions and Methylene blue neutralized this effect .

Similar to the results of this research , Salicylic Acid(SA) in plants like barley Tayeb MA .2005) and wheat (Shakirova and et al. 2003) in salinity tension conditions and in plants like barley (Bandurska and Stroinski. 2005) and wheat (Singh . 2003) in dryness tension , increased the amount of Proline .

El-Tayeb [2005] (El-Tayeb . 2005) and Singh and Usha [2003] (Singh .2003) , cognized that the cause of Proline increase in cared plants Treated plants with Salicylic Acid(SA) , was reduction(Decreasing) of Soluble proteins .

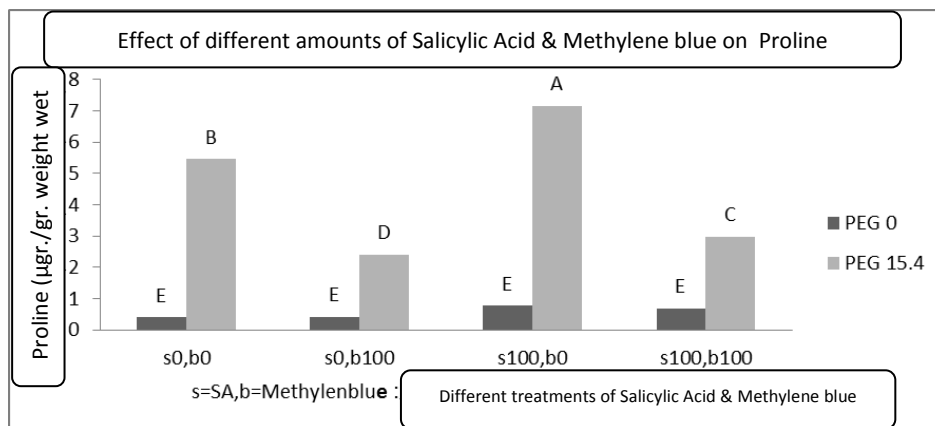


Figure 3. Effect of different(treatments) on Amount of Proline

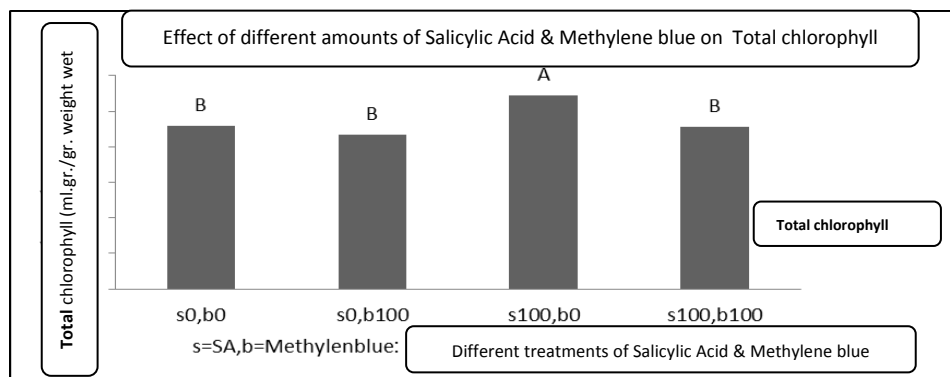


Figure 4. Effect of different treatments treatments on the amount of the chlorophyll

In this study ,salinity tension and osmosis , did not cause the decrease in amount of chlorophyll a , b , total chlorophyll and Carotenoids, but Salicylic Acid (SA) caused increase in chlorophyll and, Methylene blue neutralized such effect of Salicylic Acid .

salinity tension in *Sueda salsa* Plant (Lu and et al. 2002).

There is also a report that shows the increase in amount of Carotenoids /in wheat plants under dryness tension (Bartoli and et al. 19990). The use of Salicylic Acid (SA) in corn (Lichtenthaler . 1987) , wheat (Agarawal and et al. 2005), spinach (Eraslan and et al. 2008) and peas plants (Parida and et al . 2008) , caused the increase in amount of chlorophyll that corresponds the results of this research.

Regarding the results of this research, it seems that protective effects of Salicylic Acid(SA) in tension conditions may be related to the ability of this article against any kinds of the reactive oxygen species (ROS) and a decrease in amount of oxidative damages and increase of chlorophyll amount .

Also regarding the effect of Methylene blue, the sweeper of nitrous oxide on the neutralizing effects of Salicylic Acid (SA) , probably this article exerts its effects through nitrous oxide .

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