1.Growth and physiological responses of *Solanum lycopersicum* to atonik and benzyl adenine under vernalized conditions

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Abstract:

A foliar application of Atonik (250, 500 and 1000 ppm) and benzyl adenine (25, 50 and 100 ppm) under vernalization was investigated on *Solanum lycopersicum* (var. Beto 86) plant. All determined growth parameters (root length, root fresh and weights, shoot length, number of leaves, number of nodes, total leaf area, shoot fresh and dry weights and relative water content) were inhibited in response to treatment with vernalization. Meanwhile vernalization in combination with varying concentration of Atonik or benzyl adenine (BA) led to a general significant increase in these parameters. Vernalization alone or in combination with Atonik or benzyl adenine accelerated flowering especially in response to 1000 ppm Atonik or 50 ppm BA under vernalization treatment. Vernalization treatment significantly increased the concentration of chlorophyll *a* and *b*, carotenoids and consequently total pigments. While chlorophyll *a/b* is insignificantly affected. In general, vernalization and different concentrations of Atonik or BA led to a massive increase in these pigments. Glucose, sucrose, polysaccharides, ammonia, amino and soluble as well as total nitrogen and protein were increased in tomato plants under the influence of vernalization alone or in combination with Atonik or BA. Moreover, a general significant increase in the content of K+, Na+ and Ca++, were detected in both tomato root and shoot as a result of treatments. Vernalization caused a significant decrease in total auxins, gibberellic acid and different cytokinin fractions in the shoot of tomato plants, whereas abscisic acid increased significantly by this treatment. At vernalization, all concentrations of Atonik or BA reverse this situation ascompared with control values.

Keywords: Atonik, benzyl adenine, *Solanum lycopersicum*, vernalization.

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2. Physiological Studies of Some Polyamines on Wheat Plants Irrigated with Waste Water. I. Osmolytes in Relation to Osmotic Adjustment and Grain Yield

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Abstract:

A pot experiment was conducted to evaluate the beneficial effect of grain presoaking in spermine (0.15 mM), spermidine (0.30 mM) and their interaction on tolerance of wheat (Triticum aestivum L. cv Sakha 94) plants irrigated with waste water mostly polluted by heavy metals. Osmotic pressure (OP), some osmolytes concentration and grain yield were determined. Waste water at all examined concentrations caused marked increases in OP, osmolytes [proline, organic acids, chloride and heavy metals (Cd^{++}, Pb^{++}, Cu^{++}, Ni^{++} & Zn^{++})] content in flag leaves of wheat plants at heading and anthesis stages. On the other hand, waste water stress induced marked decreases in total soluble nitrogen (TSN), total soluble sugars (TSS) and ions (Na^{+}, K^{+}, & Ca^{++}) as well as grain yield. Exogenous application of polyamines either spermine, spermidine or their interaction mitigated the deleterious effects of waste water on wheat plants. The effect was more pronounced with spermine + spermidine treatment. The applied polyamines increased the osmotic pressure, TSN, TSS, proline, organic acids and ions (Na^{+}, K^{+}, & Ca^{++}) concentration as well as grain yield. The osmotic pressure appeared to depend mainly on proline, organic acids, chloride and heavy metals content, where there is positive correlations between OP and proline, organic acids, and heavy metals. The economic yield (grain yield) was positively correlated with TSN, TSS and ion contents but negatively correlated with proline, organic acids, chloride, heavy metals and OP.

Keywords: Grain yield; wheat; osmotic pressure; osmoprotectants; polyamines; Triticum aestivum; waste water

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3. AMELIORATING EFFECT OF KINETIN ON PIGMENTS, PHOTOSYNTHETIC CHARACTERISTICS, CARBOHYDRATE CONTENTS AND PRODUCTIVITY OFCADMIUM TREATED *SORGHUM BICOLOR* PLANTS

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ABSTRACT

The objective of this study was to investigate the effect of solid rench with three different concentrations of CdCl2 on pigments content, photosynthetic activity, carbohydrate contents and productivity of *Sorghum bicolor* L. cv. 'Dorado' plants throughout various stages of plant growth and development. Also particular interest was focused on the effect of grain presoaking with kinetin to ameliorate the toxicity effects exerted by the different levels of CdCl2. In the majority of cases, grain pretreatment with kinetin increased photosynthetic pigments, photosynthetic activity, Hill reaction as well as carbohydrate contents in leaves of cadmium treated sorghum plants. In general, the observed decrease in yield and yield attributes of sorghum plants in response to Cd2+ treatments was accelerated particularly when grains were presoaked in kinetin. The ameliorating effect of kinetin was more pronounced at 1 mMCdCl2. Grain priming with kinetin increased grain biomass (i.e. fresh and dry weights), carbohydrates, protein and ion contents in yielded grains of cadmium treated sorghum plants. Cadmium treatments altered the balance of growth bioregulators in developed grains of sorghum plants. Thus, CdCl2 at all the used concentrations exerted a significant decrease in growth promotor levels with an increase in growth inhibitory substances equivalent to abscisic acid. On the other hand, grain priming with kinetin increased the growth promotory substances and reduced abscisic acid levels.

Key words: cadmium, carbohydrates, kinetin, photosynthetic activity, pigment, sorghum,yield

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4. Kinetin-induced modification in growth criteria, ion contents and water relations of sorghum plants treated with cadmium chloride

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The objective of this study was to investigate the effect of soil drench with three different concentrations of CdCl2 on growth criteria, ions content and water relations of *Sorghum bicolor* plants. Also particular interest was focused on the effect of grain presoaking with kinetin in order to ameliorate the toxicity effects exerted by the different levels of CdCl2. In general, the results showed, that the observed suppression in growth criteria (i.e. root length, root fresh and dry weights, plant height, shoot fresh and dry weights, cumulative leaf area as well as root/shoot ratio), ions content (i.e. K+, Na+, Ca2+ and Cd2+), water relations (i.e. total leaf conductivity, transpiration rate and relative water content) in response to CdCl2 was relieved either partially or completely when grains were presoaked in kinetin (50 ppm). The alleviating effect of kinetin for Cd2+ toxicity was more pronounced in response to 1 mM CdCl2 treatment.

Key words: cadmium, growth, ions content, kinetin, sorghum, water relations

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5. The promotive effect of algal biofertilizers on growth, protein pattern and some metabolic activities of *Lupinus termis* plants grown in siliceous soil

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Abstract

The effect of seed priming in culture filtrates of two blue-green algae namely Cylindrospermum muscicola and Anabaena oryzae (F_1 and F_2 respectively) on different growth criteria of Lupinus termis plants grown in siliceous soil collected from Gebel-El-Nargis was investigated. As compared to control plants, seed presoaking in the culture filetrate Cylindrospermum (F_1) increased ($P \leq 0.05$) the photosynthetic activity, growth criteria, content of nitrogenous compounds and carbohydrates in the shoot of tested plant. On the other hand, these parameters seemed to be non-significantly affected when the seeds were presoaked in F_2. In the majority of cases, seed pretreatment with F_1 or F_2 increased ($P \leq 0.05$) chl.a, chl.b, total chlorophylls and total pigments, whereas a reversed effect was manifested in carotenoid contents. The two culture filtrates; particularly F_1 caused significant increase in auxin, gibberellic acid and cytokinin, whereas abscisic acid showed a reverse situation. Amylase, protease and aminotransferase activities were progressively increased in response to presoaking in the algal filtrates. Protein banding patterns generally showed disappearance of a 34 and 42 KDa protein and induction of 129 and from 3-8 KDa by F_1 treatment, meanwhile certain protein (M wt: 18 KDa) were only induced following treatment with F_2 but not occurring in either the control or F_1 treatment. Application of both F_1 or F_2 increased the intensities of protein bands from 20-32 Kda.

Keyword: Protein; Metabolism; Biofertilizers; Lupinus termis; Growth

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