

English Abstract

University: King Saud University

College: College of Science

Department: Botany and Microbiology Department

Branch /Track: Plant Physiology

Title of Thesis: Physiological and Biochemical Study on the Interactive Effect of Seed Priming and Salt Stress on Germination and Growth of Barley *Hordeum vulgare* L. Seedlings.

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Degree: Master

Date of Discussion : 4/7/1430

Abstract :

ABSTRACT

The present study was conducted to investigate the effects of different process of NaCl (0, 100, 200 and 300 mM) on physiological and biochemical concentrations in two cultivars of barley, *Hordeum vulgare* L. c.v. Justo and Giza in the presence or absence of seed priming using 250 mM KNO₃ and 250 mM NaCl.

Seed priming was used together with different concentrations of NaCl in order to study if priming treatments could overcome the adverse effects of salinity.

The investigated parameters included seed germination, growth measurements, photosynthetic pigments, carbohydrates, proteins, proline, nucleic acids and minerals in different organs (roots, shoots) of barley cultivars.

The results showed a decrease in germination percentage, germination rate index (GRI) and the time to 50% germination (Gt50), by different concentrations of NaCl in the two barley cultivars, Justo and Giza.

Seed priming treatments (250 mM KNO₃ and 250 mM NaCl) reduced the effects of salt stress on seed germination. It increased seed germination of both cultivars of barley.

The results also showed that salt stress decreased seedlings growth of the two barley cultivars, Justo and Giza. Salt stress

decreased shoot and root lengths, fresh and dry weights of shoots and roots and leaf area of both cultivars of barley, as compared with the untreated control. Seed priming with 250 mM KNO₃ and 250 mM NaCl increased the different growth parameters of the salt stressed barley cultivars.

Salt stress (100, 200, 300 mM NaCl) caused changes in the photosynthetic pigments, carbohydrates, proteins, proline, nucleic acids and mineral contents of roots and shoots of the two cultivars of barley, Justo and Giza. The data showed that different concentrations of NaCl, decreased the above mentioned parameters in both shoots and roots, as compared with untreated control.

Seed priming with 250 mM KNO₃ and 250 mM NaCl, increased the level of photosynthetic pigments (Chlorophyll a, Chlorophyll b, total Chlorophyll, total pigments), carbohydrates (non-reducing sugars, totals soluble sugars), proteins, nucleic acids (DNA , RNA) and mineral (K, Ca, Mg, Fe, Cu) content of roots and shoots of the two cultivars of barley, as compared with untreated control.

The results also indicated that reducing sugars, proline and Na levels of shoots and roots of both cultivars of barley increased by different concentrations of NaCl, as compared with the untreated control. Seed priming treatments (250 mM KNO₃ and 250 mM NaCl) decreased the reducing sugars, proline and

Na levels in both organs of salt stressed Justo and Giza seedlings.

The results also showed that generally, Justo cultivar and the 250 mM KNO₃ priming treatment showed more significant changes than Giza cultivar and the 250 mM NaCl priming treatment.