

## EFFECT OF PRIMING ON GERMINATION AND INITIAL GROWTH OF MELON PLANTS UNDER SALT STRESS

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### ABSTRACT

The objective of this work was to evaluate the effect of different osmotic agents and priming durations on the germination and initial growth of melon in salinity. The osmotic agents were NaCl and CaCl<sub>2</sub> and durations 2 and 4 days. First a response curve of germination to salinity was made. After priming the seeds were placed to germinate in a saline medium (14 dS m<sup>-1</sup>). The germination percentage was determined. The two treatments with the best results (NaCl and CaCl<sub>2</sub> 2 days in both salts) were selected to evaluate the initial growth of the plants in salinity. It was sown in pots, irrigated with nutrient solution and 60 mM NaCl. The germination was reduced to 50% with 14 dS m<sup>-1</sup> and inhibited with 22 dS m<sup>-1</sup>. The best germination was achieved with NaCl and CaCl<sub>2</sub> 2 days with 99 and 94% respectively. Both treatments showed an increase in growth parameters and chlorophyll content.

*Key words: priming, germination, salinity, stress.*

### RESUMEN

#### **Efecto del priming en la germinación y crecimiento inicial de plantas de melón en estrés salino.**

El objetivo del trabajo fue evaluar el efecto de diferentes agentes osmóticos y tiempos de *priming* en la germinación y crecimiento inicial de melón en salinidad. Los agentes osmóticos fueron NaCl y CaCl<sub>2</sub> y los tiempos del tratamiento 2 y 4 días. Primeramente se confeccionó una curva de respuesta de la germinación a la salinidad. Luego del *priming* las semillas se colocaron a germinar en

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un medio salino (14 dS m<sup>-1</sup>). Se determinó el porcentaje de germinación. Se seleccionaron los dos tratamientos con los mejores resultados (NaCl y CaCl<sub>2</sub> 2 días en ambas sales) para evaluar el crecimiento inicial de las plantas en salinidad. Se sembró en macetas, regándose con solución nutritiva y 60 mM de NaCl. La germinación se redujo al 50% con 14 dS m<sup>-1</sup> y se inhibió a 22 dS m<sup>-1</sup>. La mejor germinación se logró con NaCl y CaCl<sub>2</sub> a los 2 días con 99 y 94% respectivamente. Ambos tratamientos mostraron un incremento de los parámetros de crecimiento y clorofila.

*Palabras clave:* priming, germinación, salinidad, estrés.

## INTRODUCTION

Soil salinity is one of the most important conditions for growing melon. Salinity can conduce to a reduction of percentage and germination rate (6; 46). In addition, in severe salt stress conditions, the seedlings can show a reduction of aerial biomass (28), inhibition of stem, leaf and root growth (5), reduction of leaf water potential and stomatal conductance (29), metabolic alterations with photosynthesis decrease (14) and reduced fruit yield and quality (32; 14). However, if development of plants is considered, germination and initial seedling growth phases have the highest sensitivity to salinity, increasing tolerance between fruit development and harvest (37; 17; 9; 45). The technique of pre-conditioning seeds (priming) can become a technological alternative to overcome limitations imposed by salinity.

Priming is a controlled seed hydration technique that allows activating the metabolic and repair processes (activation of DNA repair pathways and antioxidant mechanisms) that occur in early stages of imbibition (pre-germinative metabolism),

without radicle emission (germination) (38). Priming treatments have proven their advantages and are investigated for the following purposes: a) seed invigoration during storage; b) increase, acceleration and synchronization of germination and establishment of seedlings; c) overcoming or alleviation of different types of dormancy and; d) improvement of germination and establishment of seedlings under adverse environmental conditions (25; 41).

Controlled hydration can be achieved with an osmotic agent that reduces the osmotic potential ( $\Psi_0$ ) of water (osmopriming), a substance that retains surface water (matrix priming) or the addition of a limited amount of water (hydropriming) (49). Osmopriming is the main technique used because of simplicity and satisfactory results (22).

The beneficial effects of priming are not exclusive of seed germination and can be extended to later stages by increasing tolerance to different biotic and abiotic stresses (11; 13; 35).

The objective of this work was to evaluate the effect of different osmotic agents and priming durations on germination and initial growth of melon plants under salinity stress.