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OSMOTIC STRESS OR IONIC COMPOSITION: WHICH AFFECTS THE EARLY GROWTH OF CROP SPECIES MORE?
(ОСМОТИЧНИЙ СТРЕС АБО ІОННИЙ СКЛАД: ЩО БІЛЬШЕ ВПЛИВАЄ НА РАННЄ ЗРОСТАННЯ ВИДІВ СІЛЬСЬКОГОСПОДАРСЬКИХ КУЛЬТУР?)

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Засолення є ключовим процесом деградації ґрунту. За оцінками, 20% загальної оброблюваної землі та 33% зрошуваних сільськогосподарських угідь у всьому світі зазнають впливу високої солоності. Багато досліджень досліджували вплив солі (головним чином NaCl) на рослини, але дуже мало відомо про те, як це пов'язано з природною солоністю та осмотичним стресом. Тому наше дослідження було проведено для визначення осмотичних та іонних реакцій сольового стресу на вибрані культурні рослини С3 та С4.

Ключові слова: *засолення, осмотичний стрес, деградація ґрунту, солестійкість.*

Salinization is a key soil degradation process. An estimated 20% of total cultivated lands and 33% of irrigated agricultural lands worldwide are affected by high salinity. Much research has investigated the influence of salt (mainly NaCl) on plants, but very little is known about how this is related to natural salinity and osmotic stress. Therefore, our study was conducted to determine the osmotic and ionic salt stress responses of selected C3 and C4 cultivated plants.

Key words: *salinization, osmotic stress, soil degradation, salt resistance.*

Salinization is one of the most critical processes of soil degradation on Earth. It is caused by low precipitation, irrigation with saline water, a rising water table and inadequate irrigation. More than 6% of the world's total soil land area is saline . It has been estimated that, worldwide, 20% of total cultivated lands and 33% of irrigated agricultural lands are affected by high salinity. Excess NaCl inhibits plant growth in both shoots and roots . The ability of plants to tolerate salt is determined by multiple biochemical pathways that facilitate retention and/or acquisition of water, protect chloroplast functions and maintain ion homeostasis.

Crop plant species differ significantly in their growth response to salinity. The goal of improving salinity tolerance in crop plants is to develop cultivars that can grow and produce economic yields under moderately saline conditions. Although salt stress affects all plant growth stages, seed germination and early growth stages are more sensitive in most plant species. Seed germination is a major factor limiting the establishment of plants under saline conditions.

Many studies have reported that salinity reduces seed germination, seedling emergence, leaf elongation, and biomass accumulation at early growth stages . Another factor affected by salinity is

photosynthesis. Photosynthetic rates are usually lower in plants exposed to salinity, and especially to NaCl .

Limited information is available on the most common cultivated plants' responses to osmotic stress versus ionic toxicity stress under saline conditions. Salinity consists of two main elements: an osmotic component and an ionic component related to the accumulation of toxic ions at high concentrations (Na^+ and Cl^-). Hyperosmotic stress caused by excessive salt is responsible for the primary stress signals. In turn, secondary signals are generated by ions and their toxicity effects on cells.

The cations component of total soluble salts in soils generally include Na^+, Ca^{2+} and Mg^{2+} and the anions are Cl^-, SO_4^{2-} and carbonates (CO_3^{2-}, HCO_3^-). However, Na^+ as an anion and Cl^- as a cation are found in most saline soils.

Salinity limits growth in plantlets more than in germination and seedling stages. Salinity most affects plantlets' water absorption in C3 species (28% of total traits variation) and plantlet length in C4 species (17–27%). It can be concluded that plants are more affected by the osmotic potential of the compared solutions than by their ionic composition. However, more detailed physiological studies are needed to disentangle the ionic composition of brine and single NaCl effects on plants development.

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FOOD ADDITIVES AND THEIR EFFECT ON HEALTH
(ХАРЧОВІ ДОБАВКИ ТА ЇХ ВПЛИВ НА ЗДОРОВ'Я)

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У статті йдеться про харчові добавки, види харчових добавок, ризики для здоров'я людей від харчових добавок. Чому в нашу їжу додають хімічні речовини?

Ключові слова: *харчові добавки, хімічні речовини, вплив харчових добавок, види харчових добавок.*

This article discusses food additives, types of food additives, the risks to human health from food additives. Why are chemicals added to our food?

Keywords: *food additives, chemicals, effects of food additives, types of food additives.*

What are food additives? Food additives are substances added to food to maintain or improve its safety, freshness, taste, texture, or appearance. Some food additives have been in use for centuries for preservation – such as salt (in meats such as bacon or dried fish), sugar (in marmalade), or sulfur dioxide (in wine).

Many different food additives have been developed over time to meet the needs of food production, as making food on a large scale is very different from making them on a small scale at home. Additives are needed to ensure processed food remains safe and in good condition throughout its journey from factories or industrial kitchens, during transportation to warehouses and shops, and finally to consumers [1].

The use of food additives is only justified when their use has a technological need, does not mislead consumers, and serves a well-defined technological function, such as to preserve the nutritional quality of the food or enhance the stability of the food.

Food additives can be derived from plants, animals, or minerals or they can be synthetic. They are added intentionally to food to perform certain technological purposes which consumers often take for granted. There are several thousand food additives used, all of which are designed to do a specific job in making food safer or more appealing. WHO, together with FAO, groups food additives into 3 broad categories based on their function. There are flavoring agents, enzyme preparations and other additives.