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Na^+ and K^+ accumulation at *Atriplex* grains (Halimus, Nummularia, Canescence) after application of NaCl at the germination stage

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Key words: 3 kinds d' *Atriplex* plant, NaCl, Accumulation of Na^+, Germination stage.

Abstract

This study is based on showing the extent to accumulation of the Na+ and K+ As a way to tolerate high grades of salinity Which is characterized by the plant Atriplex. This experiment was applied to the laboratories of the faculty of science of nature and life at the Echahid Hamma Lakhdar University of Eloued during the year 2016-2017, To understand the behavior of the three kinds of seeds of *Atriplex* (*halimus, canescens, nummularia*), at the application of different doses of (Na Cl) which: (0 g/L, 1 g/l, 2 g/l, 4 g/l, and 8 g/l). Up to the germination stability make the analysis of salt accumulated (Na+ and K+) at the grain level of each dose applied by spectrometer a flamm. This experiment was done according to a random design in three repetition, the results showed the dominance of variety of *A. halimus* with respect to *A. nummularia***.** and *A. canescens* at germination level and . The results also showed the dominance of *A. halimus* versus *A. nummularia* and *A. canescens* at the level of adaptation for high concentrations. Also the results have generally shown that the *A. nummularia* 5150 (mg/l) has a strong storage with respect to *A. canescens* 4800 (mg/l) and A. *halimus* 3250 (mg/l) at both low and high Na+ concentrations, for K+ concentration the strong storage in *A. nummularia* 173(mg/l) with respect to *A. canescens*158 (mg/l) and A. *halimus* 132 (mg/l) . According to the results it can be deduced that the grains of *A. halimus* was the most potent for salt stress before the variety *A. nummularia* following them, while the *Atriplex. Canescens* was too sensitive, and the concentration (0 g/l) is the perfect concentration and suitable for all.

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Introduction

Salinity remain the greatest constraint, which has crossed agricultural soils and rangelands because it seriously decreases the fertility rate of its soils, even arriving to be sterile not adapted to growing or for the development of vegetation multi species except halophytes (Mahrouz, 2013), In order to re-establish saline soils and select resistant and stored plant species for salinity, resistance and salt accumulation of Na+ and K+ were studied.

Halophytes are naturally salt-tolerant plants and grow as well, see better in a saline environment than under normal conditions. They represent the upper limit of the adaptive capacities of plant organisms to salinity. Halophytes, plants with characteristics required to tolerate salt, seem to be a valuable tool for enhancing marginal areas that are highly saline and threatened by desertification. (Bouzid *et al.*, 2009), The genus *Atriplex* of the family Chenopodiaceae, belongs to halophytes of great ecological and economic importance, considering its tolerance to the salts, its adaptation to the conditions of aridity and its pastoral interest, particularly attracted the attention of the services of enhancement agricultural. *Atriplex* species are geographically ubiquitous in the world and grow naturally in saline habitats. (Bouda and Haddioui, 2010).

The mechanisms of salinity adaptation of *Atriplex* species have been extensively studied, but most studies have focused on one or two species. So far, comparative studies of different species of *Atriplex* with respect to this abiotic stress are the rare (Bouda & Haddioui, 2010), *Atriplex* is among the halophyte plants that is the most resistant species of salinity, in this study we compared the accumulation of Na + and K + on the three genera of *Atriplex* seeds (*halimus, canescens, nummularia*) in each dose. applied NaCl, at laboratory levels to understand the behavior of the species studied.

Material and methods

This study of the behavior of three genera seeds of *Atriplex (halimus*, *canescens, nummularia*), at the application of four concentrations of Na Cl. During the year 2017 at the laboratory level at the Institute of Biology, University Hamma Lakhdare El-Oued algeria.

Applied doses

Saline treatments are presented with the respective conductivities in (mS/cm) in the following Table 1.

Condition of the experimental

Irrigation once a day, 25 ml. From pH 8.25. No need to measure the temperature every morning or evening because he entered the laboratory at a temperature of 25 C °. From date of application of NaCl until the date of sampling.

Plant material

The experiment consists of studying accumulation of Na + and K + at seed levels of the three species of *Atriplex* after germination:

A. Halimus: Is a native species and its resistance to harsh environment can be rational for its exploitation in countries with high salt content on which some species can develop, where the natural vegetation is deeply degraded, and where the agricultural production is very irregular (Benayed 1975, Héla El Ferchichi 2005).

A. Canescens: Is a bushy plant 1 to 3m high, more or less entangled, forming large tufts. The whitish russets are spreading, ascending or arching, drooping towards the tip. Their linear limbo, lanceolate and an inerviate are greyish green. Smaller axillary leaves are also present along the leaf axis (Moussaoui, 2013).

A. Nummularia: Is a halophytic salt encompassing species, is particularly well suited to arid, semi-arid and salt-affected regions (Bajji *et al.*, 1998). In this species, tolerance to salinity is often associated with the presence of structures to avoid (vesicular hairs).
And the grains provided by High Commission of the Steppe (H. C. D. S) of Tébessa, the choice of species was based on certain criteria: resistance to salinity, diversity, and origin.

The experimental mode

After the selection of the three different species of healthy *Atriplex* (*Halimus, Nummularia,* and *Canescens*), provided by (HCD S), on 09/02/2017, we have grown seeds in boxes of cotton kneaded, and bitter application the five doses of NaCl (0, 1, 2, 4, 8), with irrigation once a day of 20 ml quantity of distilled water and a temperature of 25 ° C (ambient condition), and until the date of stabilization of grain germination measured the levels of Na + and K + dosage of Na + and K + in plants.

To carry out these analyzes, we used the dry matter of the grains after the germination of application of NaCl of 1st stage, beforehand by cleaning the grains with distilled water and drying in the oven at 70 ° C during 24 hours, at the time of the chemical analysis the samples are dried again in an oven for 120 minutes at a temperature of 110 ° C. 100 mg of powder is put in a porcelain crucible, the sample and then transferred to a muffle furnace for 5 hours at a temperature of 550 ° C (Fig.1).

After cooling, the ashes are solubilized by adding 2.5 ml of HCl (37) and digested for a few minutes.

After filtration with distilled water, the filtrate is collected in a 50 ml flask and constitutes the stock solution from which the element determination is made the Na + and K + cation are assayed by emission spectrophotometer. to flame. (using a jenway, felsted, Essex type device) (Fig. 2).

Results and discussion

Concentration en Na^+

Through the results, we observed in the concentration (0 g/l) a minimum value that records (1950 mg/l) in the *Atriplex canescens*, and a maximum value that records (2500 mg/l) in the *Atriplex halimus*, we also noted in the concentration (1 g/l) a minimum value (1700 mg/l) in *Atriplex canescens*, and a maximum value that records (3300 mg/l) in *Atriplex nummularia,* D' on the other hand, we recorded in the concentration (2 g/l) a minimum value that records (2200 mg/l) in *Atriplex halimus*, and a maximum value that records (2600 mg/l) in *Atriplex canescens,* also we observed in the concentration (4 g/l) a minimum value that records (2550 mg/l) in the *Atriplex halimus*, and a maximum value that records (3250 mg/l) in the *Atriplex canescens* Table 02.

Table 1. Applied doses.

Na Cl	Na Cl (mM)	CE (mS/Cm)
D_0 =0NaClg/L eau	0 mM	0.51(mS/Cm)
D_1 =0.1NaClg/L eau	1mM	15.50(mS/Cm)
D_2 =0.2NaClg/L eau	3mM	27.61(mS/Cm)
D_4 =0.4NaClg/L eau	6mM	51.10(mS/Cm)
D_8 =0.8NaClg/L eau	13mM	88.30(mS/Cm)

Table 2. Concentrations of K + and Na + in samples in (mg/l).

Samples	Concentration of K^+ (mg/l).	Concentration of Na^+ (mg/l).
AC0	136	1950
AC1	158	1700
AC2	135	2600
AC4	135	3250
AC8	133	4800
AN0	136	2300
AN1	167	3300
AN2	119	2400
AN4	173	3200
AN8	128	5150
AH0	71	2500
AH1	103	2100
AH2	98	2200
AH4	132	2550
AH8	126	3250

Finally we observed in the concentration (8 g/l) a minimum value that records (3250 mg/l) in the *Atriplex halimus*, and a maximum value that is registered (5150 mg/l) in *Atriplex nummularia* (Fig. 3). Through the results, we explained that the strength of the Na + concentration in the planting medium, this cation becomes even toxic to the grains. Its toxicity in the cytosol would result from its character (because of its small size and thus of electric fields stronger on its surface, compared with K +, which probably implies its ability to compete with K + on important proteins. therefore, a high concentration of Na + in the cytoplasm would inhibit the activity of many enzymes and proteins, causing cell dysfunction (Jabnoune, 2008).

Fig. 1. Measure and burning the samples.

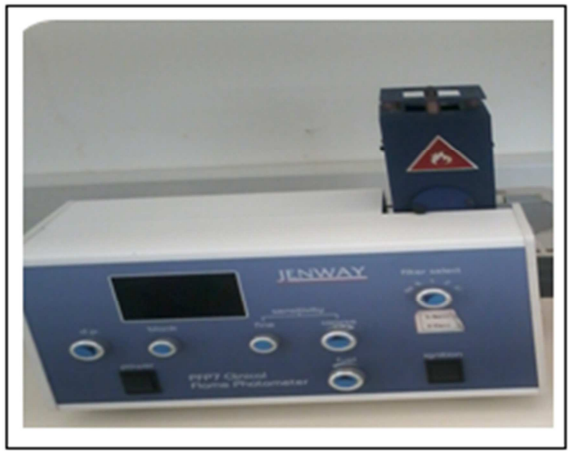

Fig. 2. Spectrometer reading.

Concentration en K+

Throughout the results, we observed in the concentration (0 g/l) a minimum value that registers (71 mg /l) in *Atriplex halimus,* and a maximum value that records (136 mg/l) in both species.

Atriplex nummularia and *canescens,* we also noted in the concentration (1 g/l) a minimum value (103 mg/l) in *Atriplex halimus*, and a maximum value that records (167 mg/l) in *Atriplex nummularia* On the other hand, we recorded in the concentration (2 g/l) a minimum value that records (98 mg/l) in *Atriplex halimus,* and a maximum value that records (135 mg/l) in the *Atriplex canescens,* we also observed in the concentration (4 g/l) a minimum value that records (132 mg/l) in *Atriplex halimus*, and a maximum value that records (173 mg/l) in *Atriplex nummularia* in the end we observed in the concentration (8 g/l) a minimum value which records (126 mg/l) in the *Atriplex halimus*, and the maximum value that records (133 mg/l) in *Atriplex canescens* (Fig 4).

Through the results, we explained that the accumulation of K + at concentrations up to a hundred times higher than those of the external environment.

Its accumulation in the vacuole attracts water by osmosis (Rezkallah, 2001). Potassium is involved in essential cellular functions, in addition to its role in controlling the electrical polarization of the plasma membrane and the intracellular osmotic potential, it is also involved in the control of vacuolar turgor pressure Finally, it plays a role in the control of gas exchange by the opening movement and the closing of stomatal guard cells (Jabnoune, 2008).

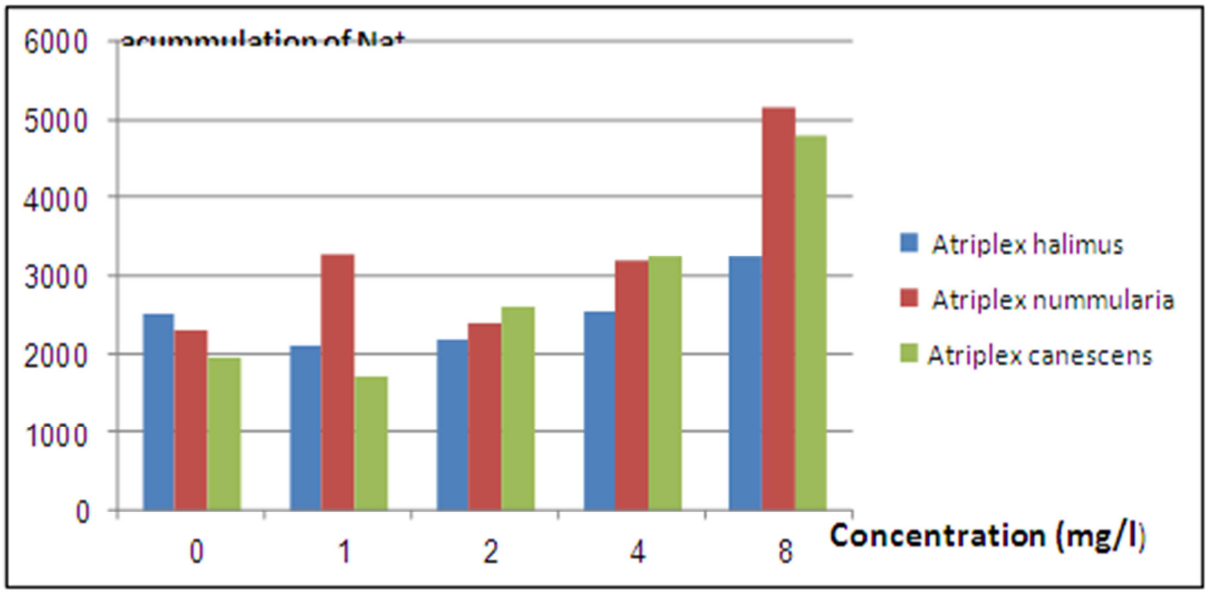

Fig. 3. Na + accumulation in the grains of three species of *Atriplex (Halimus, Nummularia* and *Canescens*).

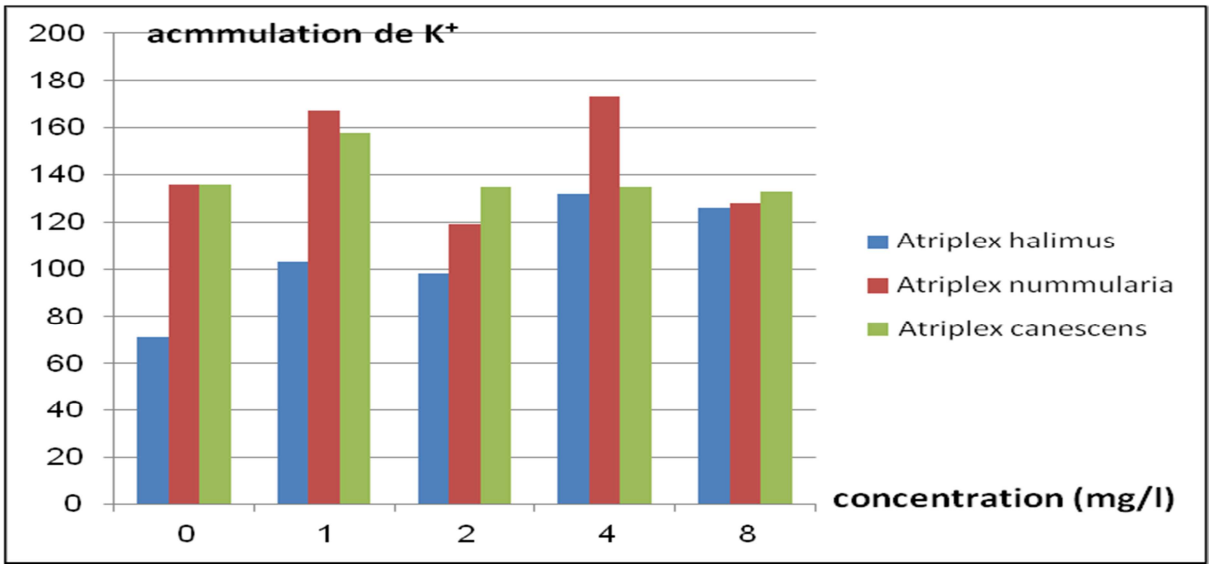

Fig. 4. Accumulation of k+in the grains of three species of *Atriplex (Halimus*, *Nummularia* and *Canescens*).

Conclusion

the accumulation of two Na + and K + cations in the *Atriplex* grains, the results have generally shown that *Atriplex nummularia* has a strong Na + storage and K+ compared with *Atriplex canescens* and *Atriplex halimus* at both low concentrations and high.

Through comparable analysis, we observed that there is deference report the tolerance of the three species

of *Atriplex* sodium chloride, the latter explains variation of the genetic pigments of the species, where the species that was most tolerant to salinity is *Atriplex nummularia* then *Atriplex, halimus*, while the *Atriplex canescens* was too sensitive, and that the concentration (0 g/l) is the perfect concentration and suitable for all these varieties. In general, studies have been unanimous that salinity lead to a decline in overall growth of plant types in high salt dose concentrations. The genus *Atriplex* belongs to halophytes of great ecological and economic importance, considering its salt tolerance, its adaptation to arid conditions and its Pastoral, has particularly attracted the attention of agricultural development service.

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