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Comparison of the Germination of the Three Atriplex Species (*Atriplex halimus, Atriplex nummularia, Atriplex canescens*) by the Application of Different Doses of NaCl Salt

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ABSTRACT

This experiment was applied the germination test on three genera seeds of *Atriplex (halimus, canescens, nummularia*) at the application of different doses of Sodium Chlorid (NaCl) salt which: (0 g /l, 1 g / l, 2 g / l, 4 g / l, and 8 g / l), at the laboratories of the Faculty of Science of Nature and Life at the HAMMA LAKHDAR University of ELOUED during the year 2017. The number of sprouted grains was calculated daily to the stability of each applied dose. This experiment was done according to a random design in three repetition, the results showed the dominance of variety of *Atriplex nummularia* with respect to *Atriplex halimus* and *Atriplex. canescens* at germination level. The results also showed the dominance of *Atriplex halimus* versus *Atriplex nummularia* and *Atriplex canescens* at the level of adaptation for student concentrations. According to the results, it can be deduced that the grains of *Atriplex halimus* was the most potent for salt stress before the variety *Atriplex nummularia* following them, while the *Atriplex canescens* was too sensitive, and that the concentration (0 g / l) is the perfect concentration and suitable for all these.

INTRODUCTION:

Salinity remains the biggest constraint, which has crossed the agricultural soils and rangelands because it seriously decreases the fertility rate of its soils, even reaching sterility not suitable for growing or for the development of multi-species vegetation except for halophytes [7].

Les halophytes, plantes ayant des caractéristiques requises pour tolérer le sel, semblent être un outil précieux pour améliorer les zones marginales qui sont hautement salées et menacées par la désertification [4].

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 [3].

The mechanisms of salinity adaptation of *Atriplex* species have been extensively studied, but most studies have focused on one or two species. Until now comparative studies of different species of *Atriplex* with respect to this abiotic stress are exceptional [3].

The response of plants to salinity is very different depending on whether one is interested in the germination phase [8].

The study of germination under salt stress is indicative of a genetic potential for tolerance of species and varieties, at least at this physiological stage [6].

Germination becomes a critical factor for in vitro culture and has become increasingly important in plant breeding programs for the selection of salinity tolerant genotype [5].

MATERIALS AND METHODS

The test was conducted in the laboratory at the Institute of Biology, at Hamma Lakhdare University El-Oued, Algeria, trying to understand the behavior of the three genera of *Atriplex* seeds (*halimus, canescens, nummularia*), at application concentration of NaCl are presented with the respective conductivities in (mS / cm) in the following table n°1:

Table 01: Applied doses

Sodium Chlorid (NaCl) salt g/L	SodiumChlorid (NaCl) salt (mM)	CE (mS/Cm)
D_0 =0NaClg/L eau	0 mM	0.51
D_1 =0.1NaClg/L eau	1mM	15.50
D_2 =0.2NaClg/L eau	3mM	27.61
D_4 =0.4NaClg/L eau	6mM	51.10
D_8 =0.8NaClg/L eau	13mM	88.30
characteristics of Sodium Chlorid (NaCl) salt		
Sodium Chlorid (NaCl) salt	98%	
I	3%	
IK	84.25-50.55mg/kg	
T°	25	

Experimental

provides three species of healthy Atriplex by (HCD S), on 09/02/2017 we cultivated 10 grains in boxes Petri of cotton and distributed random complete (DAC) with 2 factors 3 genotype (*Atriplex halimus, Atriplex nummularia, Atriplex Cansence*) and 5 doses of NaCl figure 01

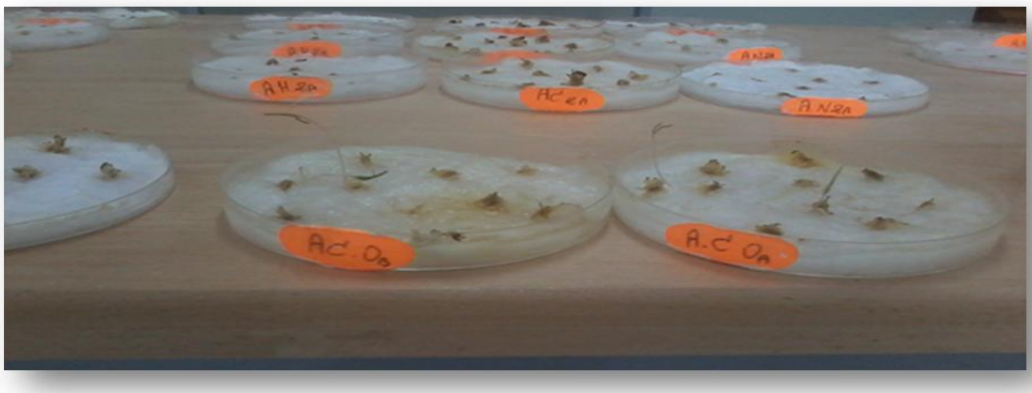

Fig 01: Sprouted grains

After application, the Cinque doses of Sodium Chlorid (NaCl) salt irrigated once a day in quantity 20 ml distilled water at a temperature of 25 ° C (ambient condition), after that

calculated the percentages of sprouted grains each day until 09/04 / 2017, and used software of (statistic XL 2007) analysis of variance and comparative analysis figure 02.

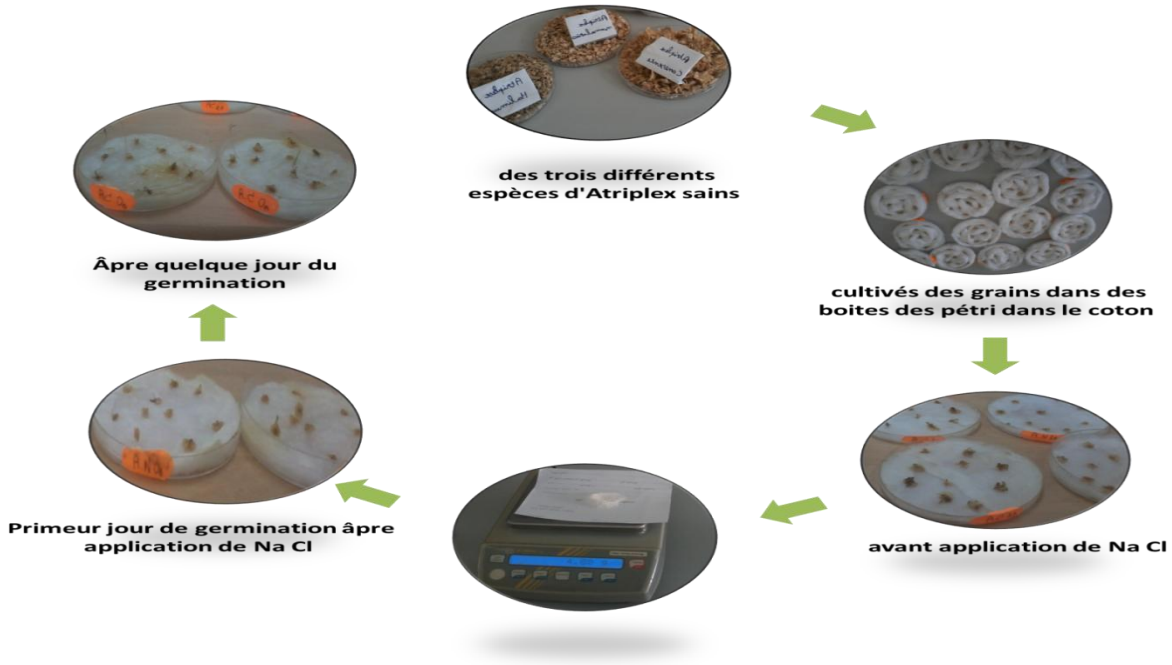

Fig 02: The steps of implantation

III. RESULTS AND DISCUSSION

From the results obtained for the three species studied, different responses may be tolerance or sensitivity to salinity. We have acquired the following results:

1 -The analysis of the variance at the beginning of germination level in the second week of *Atriplex* grains indicates that the results are very significant for the *Atriplex halimus* and not significant for the species *Atriplex canescens* and *Atriplex nummularia* (Table 02).

Table 02: Analysis of the variance of the NaCl effect on the germination of the three species of Atriplex during the second week

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Atriplex halimus	1	31,255	31,255	++ 11,74	0,002
Atriplex nummularia	1	9,187	9,187	3,45	0,074
Atriplex canescens	1	1,074	1,074	0,40	0,531

And for the third week indicates that the results are significant for the *Atriplex halimus* and not significant for the species *Atriplex canescens* and *Atriplex nummularia* (Table 03).

Table 03: Analysis of the variance of the NaCl effect on the germination of the three species of *Atriplex* during the third week.

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Atriplex halimus	1	21,000	21,0000	+6,03	0,021
Atriplex nummularia	1	0,088	0,0882	0,03	0,875
Atriplex canescens	1	4,000	4,0000	1,15	0,293

But Atriplex grain variance analysis of the fourth and fifth week indicates that the results are not significant for all species (*Atriplex halimus*, *Atriplex canescens* and *Atriplex nummularia*) (Table 04, 05).

Table 04: Analysis of the variance of the NaCl effect on the germination of the three species of *Atriplex* during the fourth week

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Atriplex halimus	1	0,372	0,3725	0,08	0,774
Atriplex nummularia	1	2,056	2,0556	0,46	0,501
Atriplex canescens	1	2,106	2,1064	0,47	0,496

Table 05: Analysis of the variance of the NaCl effect on the germination of the three species of *Atriplex* during the fifth week

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Atriplex halimus	1	0,423	0,4232	0,09	0,760
Atriplex nummularia	1	1,419	1,4193	0,32	0,577
Atriplex canescens	1	1,353	1,3534	0,30	0,586

***2-The comparison between the three species of Atriplex* concerns the percentage of germination during the whole week of the implant**

Throughout the results, we recorded the appearance of the majority of the *Atriplex halimus* species in comparison with the other species, and we also recorded the best germination value during the second, third and fourth week of implantation in the species of *Atriplex nummularia* which records a good result. This can be explained by a good adaptation of these two species to salt stress. This clearly shows the importance of *Atriplex nummularia* to consider the selection of genotypes that are more resistant to salinity. The inclusion of other species of *Atriplex* will certainly make it possible to elaborate a classification of the thresholds of tolerance to the salinity for the choice of the species to be retained in the projects of improvement of the pastoral routes and the fight against the desertification. [3] While we recorded the bad result at the *Atriplex canescens*. (Fig 03, 04, 05) The morphological phenomena of germination always begin with the exit of the radicle which pierces the integument, curls up and implants itself in the medium.

And start the germination process with the penetration of water in to the dry seeds drink, [9] and according to [1] the root length of *Atriplex canescens* increases slightly compared to the control by a difference 3.7 cm under salt treatment at 600 meq and under treatment with pure sea water, 5.9 cm.

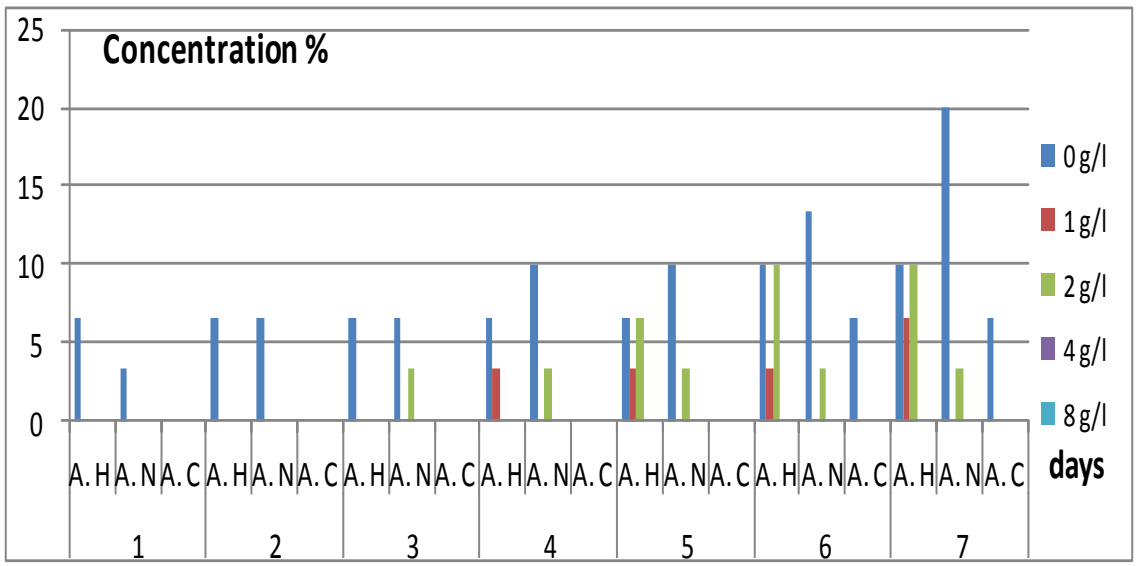

Fig. 03: The comparison between the three species of *Atriplex* concerns the percentage of germination during the second week of implantation.

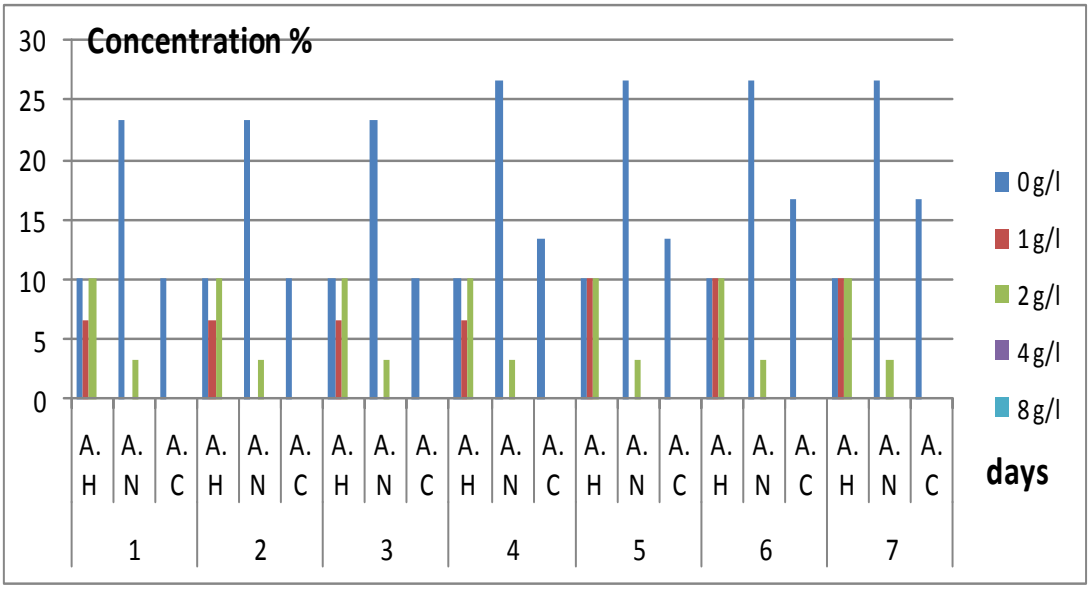

Fig. 04: The comparison between the three species of *Atriplex* concerns the percentage of germination during the third week of implantation.

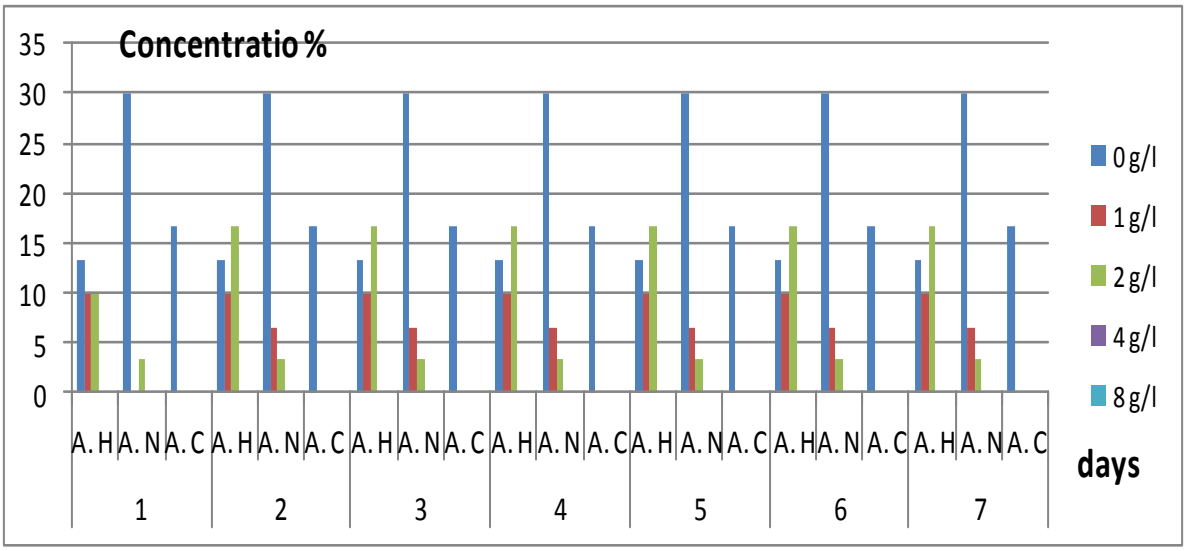

Fig 05: The comparison between the three species of *Atriplex* concerns the percentage of germination during the fourth week of implantation.

during the fifth week of implantation the results, we recorded the appearance of the majority of the concentrations in the species of *Atriplex halimus* and *Atriplex nummularia* compared to the *Atriplex canescens*, and we also recorded the best value of the germination of *Atriplex nummularia* which recorded a good result, while we recorded the bad result in *Atriplex canescens* compared to the appearance of concentration.

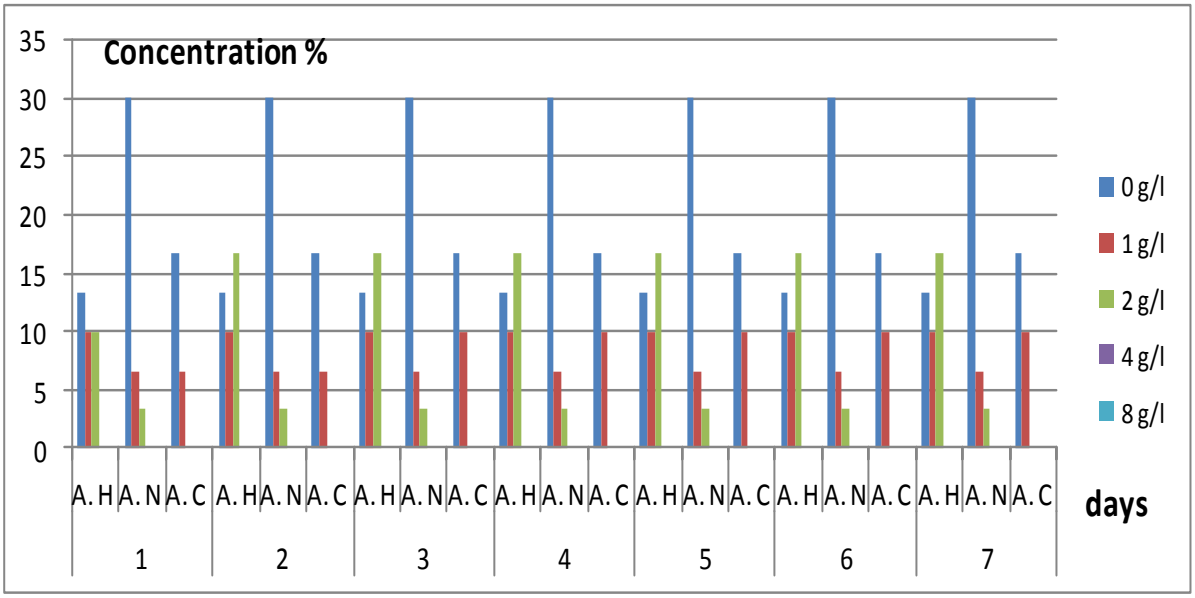

Fig. 06: The comparison between the three species of *Atriplex* concerns the percentage of germination during the fifth week of implantation.

CONCLUSION

the results, we recorded the appearance of the majority of the *Atriplex halimus* species in comparison with the other species, and we also recorded the best germination value during the second, third and fourth week of implantation in the species of *Atriplex nummularia* but for the fifth week of implantation the results, we recorded the occurrence of the majority of the concentrations in the species of *Atriplex halimus* and *Atriplex nummularia*, and which records a good result, while we recorded the bad result at the *Atriplex canescens*. Although halophytes have a very high salt content in their adult tissues, their seeds are not as tolerant to salt at the germination stage [2],the *Atriplex halimus* species the germination rate, from the fourth week to the last day of germination According to [2] That the seeds of *Atriplex halimus* germinates best in the absence or the presence of NaCl in the added medium at a low concentration (100 meq) and as soon as the salt concentration increases, a reduction rate of the germinated seeds Concentration (350 meq NaCl), followed by inhibition of seed germination exposed to high salinity (600 meq of NaCl).

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