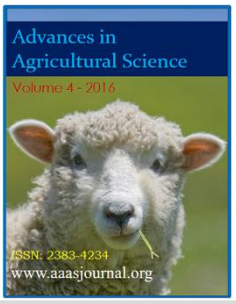
Advances in Agricultural Science

Volume 4 (2016), Issue 02, 08-12

Journal homepage: www.aaasjournal.org

ISSN: 2588-3801



Research Article

A Preliminary Study on Some Factors Affecting The Performance of Some Species of Salt Bush Plant (*Atrilpex Spp*., L.)

Ahmed Kandil [1], Ahmed Attia [1] and Ali Fahmy [1]

[1] *Agronomy Department, Faculty of Agriculture, Mansoura University, Egypt.*

ARTICLE INFO

Article history:
Received: January 16, 2016
Revised: March 09, 2016
Accepted: March 26, 2016
Available online March 30, 2016

Keywords:
Atriplex species
Germination treatments
Growth regulators
Reproductive vegetation types

* Corresponding Author;
E. Mail: aakandil2@yahoo.com

ABSTRACT

Six species of *Atriplex* i.e. *A. nummularia, A. halimus, A. canescense, A. undulata, A. leucoclada* and *A. lentiformis* were studied at Agron. Dept., Fac. of Agric., Mansoura Univ. in 1999 season under laboratory conditions as well as in green house. Seeds of some of these species were collected from plants grown naturally in Saudia Arabia desert, where others were introduced from Australia. The laboratory expts. included two trials to evaluate *Atriplex* species response to germination treatments such as growth regulators and seed scratching to accelerate seed activity and to remove seed dormancy. The greenhouse exits. were initiated to evaluate patterns of vegetative reproduction for convenient position of stem internode cuttings for asexual reproduction with a suitable soil type. Three positions of stem cuttings were taken from *A. nummularia* plants to study the number of new leaves /plant, number of roots as well as volume of roots /plant. Results revealed that *Atriplex* species significantly differed in germination % since *A. halimus* and *A.nummularia* produced the highest germination %. Seed scratching, also, accelerated germination % compared with those unscratched. Gibberellic acid evidently promoted seed germination and seedlings formation especially when this substance was applied at the150 ppm. Results of greenhouse trial inferred that the best results concerning number of leaves/plant, number and volume of roots /plant were realized due to planting bottom internode cuttings in soil media of 50% sand +50% clay followed by medium internode cuttings while the terminal internode cuttings produced the least averages of these traits.

Introduction

Salt bush plants (*Atriplex spp*., L.) are candidates of halophytes that are adapted to saline and aride regions of the world (Young *et al*.1980, Mahmoud & Malik,1988). Introducing the *Atriplex* species to the Egyptian agriculture seems to be important, especially, where the relatively salt intolerant crops can not grow. These halophytic plants could be established in saline soils distributed across the Nile Delta and Valley, in the sandy desert seacoast and in other soils where the water sources for irrigation are limited. In addition to their high declarative potential, *Atriplex* species have a good forage value and can be used for the biomass production on saline soils (Kleinkopf *et al*.1995, O'Leary 1986 and Abd EL-Razek1993). Moreover, *Atriplex* plant is characterized as halophyte tolerating a relatively high concentrations of salt due to the presence of vesiculated hairs on the surface of the leaves and stems (Uchiyama,1984) and its ability for excreting the absorbed salt through leaves surface (Khafaga,1995). It has

good nutritive value, and, also, can be used as biological reclamation technique for desalinization of saline soils, therefore, it is recently cultivated in arid and semi arid lands of forage crops in ARE.Seeds of *Atriplex* species vary greatly in their ability to germinate due to dormancy stage after harvest. Several methods were used to remove and to explain the reason of dormancy of seed by using growth regulator substances. In this connection, Warren *et al*. (1984) in USA showed that when the pericarp was left intact, 45% of *Atriplex sp*. seeds germinated. Mechanical resistance was the most probable explanation of complete germination inhibition. Osmotic potential and limited oxygen supply only reduced germination. Al-Charachafchi and Clor (1989), also, in USA found that one-year-old *Atriplex canescense* seeds without bracts gave 100% germination. Germination was decreased to 80-85% when the removed dry bracts were placed in the vicinity of these seeds during germination. It showed similar effects on germination and seedling growth. Inhibitory effects were ascribed to the presence of inhibitor in bracts. Khan and Ungar (1985) in USA, reported that Gibberellic acid at 2.9mM promoted germination and growth of *Atriplex triangularis*. Many other workers including Turk (1998) in Jordan, reported that *Atriplex sp*. germination was increased by soaking in growth regulators which had an important effect and usually improved seed germination.

Salt bush *Atriplex* species could be produced by direct sowing or stem cuttings. Generally, very little information is available regarding the most suitable stem internode cuttings for vegetative reproduction.

The present work was conducted to evaluate the performance of some hormone like substances (GA_3) and seed scratching to improve seed germination and usage of some soil media as well as the optimum stem internode cuttings for good growth through asexual reproduction.

Materials and Methods

Laboratory experiment and greenhouse experiment were established at Fac.of Agric., Mansoura Univ.in 1999 to study the response of some *Atriplex spp*. to germination treatments as well as to their reproductive vegetation types. Seeds of six *Atriplex spp*. were sown at 26 ^{o}C on filter papers in petri dishes watered by distilled water and kept in incubators at this temperature. Data was taken after 2 weeks to evaluate germination % as recommended by ISTA (1993). The another expt. was tried on three *Atriplex spp* i.e. *A. canescense, A. undulata* and *A. lentiformis* where seeds of each were put in a sack of cloth, tied and was liable to running water for 24 hours to get rid of substances that stop growing. Seeds of each *sp*. were germinated in dishes filled with sand after soaking in GA_3 solutions of 50,100,150and 200ppm for 10 minutes. Factorial randomized complete design with 4 replicates was utilized.

The greenhouse trial was intiated using 3 kinds of stem internode cuttings i.e. bottom, medium and terminal cuttings planted in pots containing 7 types of soil as follows:

100% sand – 100% clay – 50% sand + 50% clay – 100% betmoss –50% betmoss + 50% sand – 50% betmoss + 50% clay – 33.3% sand + 33.3% clay + 33.3% betmoss.

Factorial experiment in randomized complete block design was also used with four replicates and average number of leaves /plant, number of roots as well as volume of roots (cm^3) per plant were estimated thereafter.

Results and Discussions

Part 1. Laboratory experiment:

This part was divided into two experiments. The first included 12 treatments comprising six *Atriplex spp. i.e. A.nummularia, A. canescense, A. leucoclada , A. halimus, A. undulata* and *A.*

Table 1: *Germination % as affected by Atriplex spp. and scratching of seeds.*

Treatments	**Germination %**	**Treatments**	**Germination %**
Atriplex spp:		***Atriplex spp***	
A.halimus	78.8	***A.canescense***	3.8
A.nummularia	65.0	***A.leucoclada***	6.2
A.undulata	3.8	***A.lentiformis***	5.0
Seed Scratching :			
Unscratching	20.4		
Scratching	33.8		
F- test	**		
LSD 5%	8.9		
LSD 1%	12.0		

Table 2: Germination % as affected by Atriplex species and GA_3 concentrations.

Treatments	**Germination %**
Factor A: *Atriplex* Species:	
A. canescense	**6.9**
A. lentiformis	**16.3**
A. undulata	**0.6**
F- test	**
LSD 5%	**9.0**
LSD 1%	**12.1**
Factor B:GA_3 concentration (ppm) :	
50	**6.7**
100	**5.8**
150	**11.7**
200	**7.5**
F- test	**NS**
Interaction A × B	**NS**

Table 3: *Mean numbers of new leaves, number of roots and volume of roots (cm^3) /plant as affected by media types and vegetative reproduction treatments.*

Treatments	**No. of new leaves / plant**	**No. of roots / plant**	**Root volume/ plant (cm^3)**
Factor A: Media types :			
100% sand	**58.6**	**79.8**	**24.3**
100% clay	**49.2**	**41.9**	**16.7**
50% sand + 50% clay	**91.3**	**88.0**	**23.7**
100% betmoss	**17.1**	**15.7**	**7.8**
50%betmoss + 50% sand	**71.6**	**50.8**	**17.0**
50% betmoss + 50% clay	**56.8**	**33.7**	**9.3**
33.3%sand+33.3%clay+ 33.3%betmoss	**81.3**	**47.5**	**15.8**
F-test	**	**	**
LSD 5%	**17.5**	**37.4**	**6.9**
LSD 1%	**23.5**	**49.8**	**9.2**
Factor B: Vegetative reproduction treatments.			
Bottom internode cuttings	**81.4**	**72.6**	**23.5**
Medium internode cutting	**58.7**	**51.8**	**15.3**
Terminal internode cutting	**42.4**	**28.8**	**10.2**
F-test	**	**	**
LSD 5%	**11.5**	**24.5**	**4.5**
LSD 1%	**15.3**	**32.6**	**6.0**

lentiformis and scratching or unscratching of seeds to study germination %.The other expt. included,also, 12 treatments of 3 *Atriplex spp*.i.*e Acanescense, A.lentiformis* and *A.undulata* and 4 GA_3 concentrations i.e. 50,100,150,and 200ppm on germination %. It was evident that *Atriplex spp*. significantly differed in germination % since *A. halimus* and *A. nummularia* produced the germination % of 78.8 and 65.0, respectively. These results agree with those of other workers including Arif *et al*. (1994) who reported that seed of 5 forage shrubs significantly differed in germination %.

Scratching of seed increased germination % by 65.6% compared with those unscratched (Table1). Garvin *et al*. (1996) found that most work has concentrated on the indurate bracteoles and their role in inhibiting germination.

As regard to GA_3 effect on germination %, it was obvious that *Atriplex* species involved in this trial differed among themselves due to GA_3 treatment (Table 2), since *A. lentiformis* recorded the highest response (16.3%) followed by *A. canescense* (6.9%) while least response was with A. *undulata* (0.6%). Regarding to effect of GA_3 on germination of *Atriplex Sp* seed of *Atriplex undulata* was more effective than GA_3 treatment. This mean that using scratching more effective in germination percentage and less expensive compared with soaking in GA_3.

Part 2. Greenhouse experiment:

The aim of this expt. was to study both media and stem internode types on leaves and roots production of *Atriplex* seedlings. High number of new leaves /plant was produced from planting in media 50% sand + 50 % clay (91.3 leaves /plant) followed by using media 33.3% sand + 33.3% clay +33.3% betmoss (81.3 leaves /plant). Media of 50% betmoss +50% sand produced 71.6 leaves /plant. The lowest average number of new leaves /plant was recorded due to media of 100% betmoss (Table 3).

Planting using bottom stem internode cuttings produced the highest number of new leaves /plant (81.4) followed by medium internode cuttings (58.7), while the terminal internode cuttings produced the least number of new leaves /plant (Table 3). These results may be ascribed to higher content of carbohydrates in the bottom cuttings.

The interaction between media types and stem cuttings types did not induce an influence as this trait was concerned.

It is worthy to note that these findings could not be conformed by other workers since literature on this aspect is not available in the library.

As regard to average number of roots /plant, relevant data (Table3) showed that planting in media of 50% sand + 50% clay or 100% sand produced the highest average number of roots /plant while, planting in 100%betmoss produced the lowest average number of roots /plant. Maximum root volume (cm^3) per plant was resulted due to planting in media of 100% sand or 50% sand + 50% clay (24.3 and 23.7 cm^3, respectively) while the least root volume (cm^3)/plant was due to planting in media of 100% betmoss (7.8 cm^3). Concerning types of stem cuttings, it was evident that bottom stem cuttings resulted in the highest root volume (cm^3) per plant followed by medium cuttings while, the terminal cuttings produced the least root volume /plant (Table3).

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