Evaluation of Phytodesalination Capacity of Four Halophytes for a Saline-Sodic Soil

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Introduction

Sodic and saline-sodic soils have an excess amount of sodium (Na^+) and soluble salts + Na^+, respectively. Phytoremediation can be considered a low-cost alternative for chemical amelioration. Halophytes are plant species with a significant removal capacity of salts and Na^+ from salt-affected soils.

The study aimed to evaluate the potential of four halophytes to desalinize a saline-sodic soil.

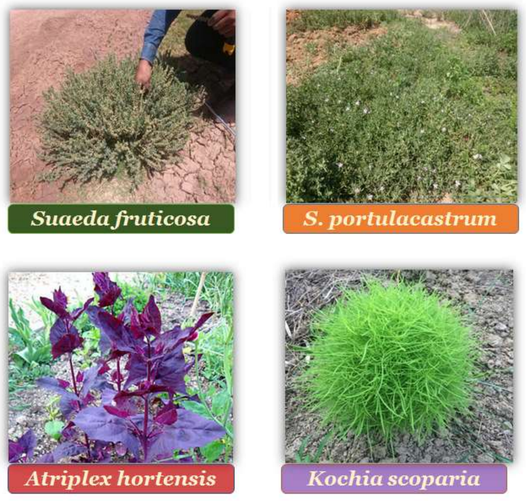

Figure 1: Evaluated halophytes

Methodology

Four halophytes were: assessed: Two native (*Suaeda fruticosa* Moq, and *Sesuvium portulacastrum*), and two alien (*Atriplex hortensis* and *Kochia scoparia*).

Salinity parameter of the soil were: EC_e of 47.0 dS m^{-1} and 3.4 g Na^+ kg^{-1} soil. The soil and the native halophytes were collected from the High Valley of Cochabamba-Bolivia.

The pot experiment was carried out under non-leaching conditions for 70 days and using 37-day-old seedlings at the green hose of the Faculty of Agricultural and Livestock Sciences (Universidad Mayor de San Simón), Bolivia.

Evaluated parameters based on [1], [2] and [3].

Results and Discussion

The results showed that *Suaeda fruticosa* Moq, and *Sesuvium portulacastrum* were relatively better than the alien halophytes (*A. hortensis* and *K. scoparia)* in decreasing the soil EC_e ad Na^+ content compared to the soil before (Table 1).

Table 1: EC_e and Na^+ in soil after phytoremediation ($p<0.05$)

Halophyte	Ec_e (dS m^{-1})	Na^+ (g kg^{-1} soil)
S. fruticosa Moq	35.5 a	3.18 a
S. portulacastrum	36.1 b	3.23 b
A. hortensis	36.8 c	3.24 b
K. scoparia	37.6 d	3.00 c

S. fruticosa and *S. portulacastrum* outperformed the alien halophytes in biomass production (Figure 2), as well as for the sodium content in plant shoots (Figure 3).

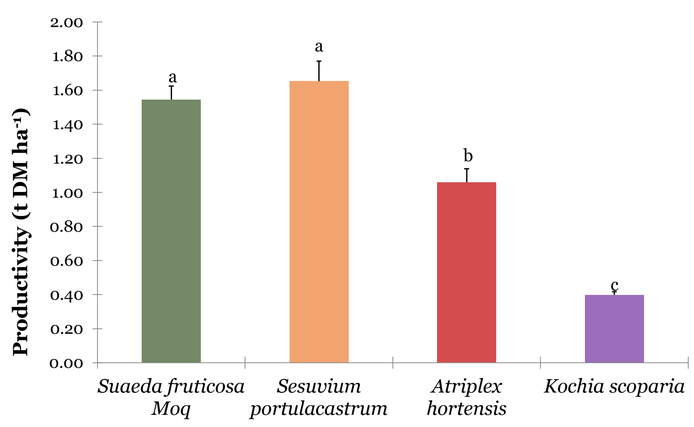

Figure 2: Productivity (dry matter) of halophytes after 70 days in pots.

Moreover, the native halophytes showed a higher Phytodesalination capacity (PC) than the alien species (Figure 4).

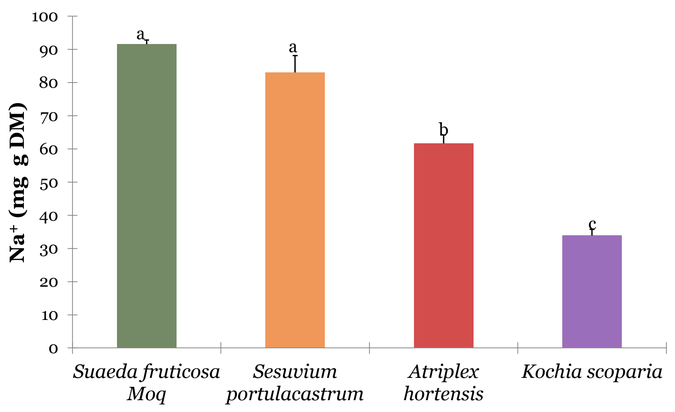

Figure 3: Sodium content in aerial part of halophytes after 70 days in pots.

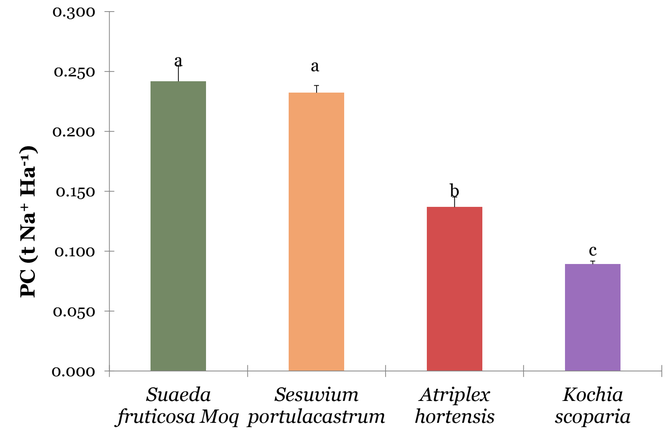

Figure 4: Phytodesalination capacity (PC) of halophytes after 70 days in pots.

Conclusions

Native halophytes (*S. fruticosa* Moq and *S. portulacas*trum) performed more effectively than the alien species in soil desalination as well as in productivity. *S. fruticosa* Moq and *S. portulacastrum* might be suitable for further field assessments on reclamation of saline-sodic soils in the study area.

References

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