# Performance of Some Forages Species (*Festuca arundinacea* L., *Chloris gayana* var. Katambora, *Lotus corniculatus* L. and *Medicago sativa* L.) in Saline Soil

Süleyman Temel
*Igdir University, Turkey*

Uğur Şimşek
*Igdir University, Turkey*

Bilal Keskin
*Igdir University, Turkey*

İbrahim H. Yılmaz
*Igdir University, Turkey*



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*Süleyman Temel, Uğur Şimşek, Bilal Keskin and İbrahim H Yılmaz*

Igdir University Agricultural Faculty, Igdir, Turkey, www.igdir.edu.tr
Contact email: stemel33@hotmail.com

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## Introduction

Salinity is a soil degradation process which reduces plant diversity and agricultural productivity, decreases fertility and devalues the land in regions with arid and semi-arid climate. This process inhibits water and nutrient intake of plants from soil due to changeable nitrogen percentage and/or the intensity of soluble salt concentration. When the fact that agricultural lands are limited around the world and that the need for nutrition increases incrementally is taken into consideration, it is obvious that available lands should be used more effectively. Hence, it is quite crucial to reclaim saline soil and utilize it more economically (Woods 1996).

Wrong irrigation methods, poor quality irrigation water and insufficient drainage have resulted in salinity and alkalinity problems and limited production capacity in the lands. Improving these soils can be possible either by using different chemical treatment, appropriate drainage systems, or by growing plant species durable to salt-alkaline (Yadav 1980; Chaturvedi *et al.* 1987; Singh 1989; Garg 1998). Many previous studies were conducted on bio-reclamation, which is easy and economical to apply and significant results were obtained in the improvement of disturbed soil (Quadir and Oster 2002; Akhter *et al.* 2004; Sandhu and Qureshi 1986; Qureshi and Barrett-Lennard 1998). In this study, it is aimed to determine fodder plant species to be used in the utilization of saline soil in the plain of Iğdır.

## Methods

The study was conducted on irrigable lands of Iğdır plain in Eastern Turkey in 2011. Annual precipitation and evaporation rates of the study area were 254 mm and 1094 mm, respectively. The experiment was established on two locations with different soil properties (Saline = 9.74 ECe ds/m and Control= 0.42 ECe ds/m). Study materials were two grasses (*Chloris gayana* var. Katambora and *Festuca arundinacea* L.) and two legume (*Medicago sativa* L. and *Lotus corniculatus* L.) forages with different salt tolerance degrees. For both locations, grasses plants were harvested twice throughout the year. In legume plants, while alfalfa was harvested three times in both locations, bird's foot trefoil was harvested three times in the control and four times in saline. Leaf area index and fresh hay and hay weights were measured. In the results, average harvests and total harvests were presented in leaf area index and plant weights, respectively. The experiment was started with micro plots of 3 m x 4 m in randomized complete block design with three replications. The data were assessed with variance analysis and the differences between mean values with Duncan multiple comparison test.

## Results

Average leaf area index of plants grown under normal soil conditions (3.3 $cm^2$) and total fresh hay yield (33 t/ha) and hay yield (8.8 t/ha) were found to be significantly higher than saline soils. For both locations, the highest leaf area index, fresh hay yield and hay yield were in Alfalfa plant, and the lowest values were in Tall fescue. As for reducing rates in fresh hay yield and hay yield of plants, it is clearly observed that the decrease in legumes is more than that in grasses. For instance, while reducing rates in the fresh hay yield and hay yield for the plants of *M. sativa* and *L. corniculatus* ranged between 56 % and 62 %; the rate for *C. gayana* var. Katambora and *F. arundinacea* was between 10 % and 27 % (Table 1).

**Table 1. Fresh hay yield and hay yield and leaf area index of some plants grown in saline and non-saline soils.**

| Species | Fresh hay Yield (t/ha) | | | | Hay Yield (t/ha) | | | | Leaf Area Index($cm^2$) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NSS | SS | RR(%) | Av | NSS | SS | RR(%) | Av | NSS | SS | RR(%) | Av |
| *F. arundinacaea* | 14.60 | 11.49 | 21.2 | 13.05 c | 5.70 | 4.15 | 27.0 | 4.93 c | 1.81 | 1.61 | 11.0 | 1.71 c |
| *C. gayana* | 27.47 | 21.16 | 22.95 | 24.32 b | 6.53 | 5.86 | 10.26 | 6.20 b | 4.04 | 3.69 | 8.6 | 3.87 b |
| *M. sativa* | 55.97 | 21.24 | 62.03 | 38.61 a | 14.33 | 6.10 | 57.4 | 10.22 a | 5.03 | 4.48 | 10.93 | 4.75 a |
| *L. corniculatus* | 34.53 | 15.24 | 55.85 | 24.89 b | 8.75 | 3.53 | 59.67 | 6.14 b | 2.19 | 1.98 | 9.5 | 2.09 c |
| Mean | 33.14 a | 17.28 b | | | 8.83 a | 4.91b | | | 3.27 a | 2.94b | | |

NSS: non-saline soil, SS:saline soil, AV:average, RR: reducing rate

Although *M. sativa* L. is more vulnerable in saline soil than other species, fresh hay yield and hay yield and leaf area index from these two plants within the year was found to be high. Also, it was found that leaf area index and fresh hay yield and hay yield from *C.gayana* in saline soil were similar to those of alfalfa.

## Conclusion

For higher fresh hay and hay yield in saline soils, it is recommended that *M. sativa*. and *C. gayana* var. Katombora are planted. *L. corniculatus* and *F. arundinacea* can also perform reasonably well in saline soil. On the other hand, a mixture of grasses and legumes is also preferable.

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