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RESISTANCE TO DROUGHT IN SHORE ELUROPE (*Aeluropus litoralis*) AND WEEPING ALKALIGRASS (*Puccinellia distans*)

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Abstract

Two rangeland grass species, Shore Elurope (*Aeluropus litoralis*) and Weeping Alkaligrass (*Puccinellia distans*) were studied. The research was done under a split plot experiment and completely randomized design. Plants were grown under two irrigation treatments (seven and fourteen day periods of irrigation treatments). Morphological response included determination of wilting percentage, leaf water potential, production of yield, root dry weight, weight ratio of root/stem and finally total dry weight of species. Anatomical studies included leaf descriptive structure such as comparison of stomata and their density in area unit, study of vascular structure, mesophyl tissues and epiderm. Results showed increment of wilting percentage with increased of drought periods. This percentage was higher in Shore Elurope in comparison with Weeping Alkaligrass. Increment of stress reduced stem dry weight and total dry weight in species such that the decrease was higher in Weeping Alkaligrass. It was determined that Weeping Alkaligrass was more resistant to drought than Shore Elurope.

Keywords: Rangeland grass species, irrigations, yield, root to stem ratio, wilting percentage, leaf water potential.

Introduction

Drought stress is a natural phenomenon that occurs in plants. Water stress may be either water deficiency or excess water. Drought is one of the problems that humans have been challenged for thousands of years (Levitt, 1980). Importance of drought has been found in the first half of 20^{th} century. 64% of Iran (100 million ha) is covered by dry lands and this area is increasing. Determination of high resistant plant to drought is necessary because these plants tolerate water deficiency (Firouzabadi, 1999). The aim of this research was to compare two rangeland grass species in respect to drough in glasshouse trials. The effect of drought on production in different periods irrigation was studied. Drought stress is the deficiency of plant usable water that can cause plant internal stress and reduce production (Hsiao and Acevedo, 1976).

Material and Methods

The present study was carried out in glasshouse of the Research Institute of Rangelands and Forests. Experimental design was split plot. Shore Elurope and Weeping Alkaligrass were planted in three replications, with 7 days and 14 days treatment of irrigation in plastic pots. The experiment began in October 1998. Sixty days after planting, plants were thinned.

Drought stress was started after thinning. At the beginning, all of the pots were irrigated. After 24 hours, samples were weighted (base weight). The pots were weighted (second weight) again after seven days. Difference between primary and secondary weights was the amount of evapotranspiration from soil and plant. Reduced weight was compensated with water in graduated cylinder. Fourteen days treatments were irrigated too. This work continued until plant wilting time. Number of dried leaves, wilting percentage, root dried weight, root/stem ratio and leaf water potential were recorded in this research.

Anatomy characteristics such as number of stomata and cuticule thickness were also measured. Leaf descriptive structure was also studied. Transversal cutting, collering and separating of epiderms were other methods employed for this research.

Results and Discussion

According to data analyses, wilting percentage of plants increases with increment of stress time. Comparison between averages shows that in all of the treatments, Shore Elurope has more wilting point in comparison with Weeping Alkaligrass.

Table 1 shows that water potential is significantly different between two irrigation periods. Fourteen days treatment has higher water potential as compared to seven days. Weeping Alkaligrass has higher water potential as compared with Shore Elurope. There is no significant difference between two grass species in terms of stem dried weight. Comparison between data average shows that Weeping Alkaligrass has higher dried weight as compared to Shore Elurope (Table 1). There is some differences between two species in terms of cells and leaves. Some differences between species are summarized in Table 2. According to table's data, Weeping Alkaligrass has higher resistance to drought. With application of drought stress, root/stem ratio increases. The growth increment in Weeping Alkaligrass is more than Shore Elurope. Low wilting percentage and high anatomical changes in Weeping Alkaligrass are important reasons to confirm the high resistance of this species (in comparison with Shore Elurope). Weeping Alkaligrass can be regarded as tolerant species.

References

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Table 1 - Average leaf water potential (bar) and plant dry matter (gram) in two rangeland grass species as affeched by irrigation periods.

Species	Irrigation period (days)			
	7		14	
	bar	g	bar	g
Weeping Alkaligrass	14.54	8.49	16.75	4.79
Shore Elurope	11.25	9.45	14.41	3.22

Table 2 - Anatomical characteristics of two rangeland grass species as affected by irrigation periods.

Species	Irrigation period (days)	
	7	14
	Stomata density	
Shore Elurope	Low	Very high
Weeping Alkaligrass	Low	Very high
	Vascular groups	
Shore Elurope	Many	Few
Weeping Alkaligrass	Many	Few
	Mesophyl thickness	
Shore Elurope	Low	Low
Weeping Alkaligrass	Low	Very thick
	Cloroplast density	
Shore Elurope	Low	High
Weeping Alkaligrass	Low	Very high