

Average Stem Biomass of *Ephedra procera* in Shanjan Rangelands, East Azerbaijan, Iran

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Abstract: Plants can be used for animal grazing, in wind erosion control, to reduce water flow rates, and to increase evaporation and transpiration. In the NW of Iran (East Azerbaijan Province), rangelands previously used to animal grazing were changed to agricultural land use; this vegetation is unsuitable vegetation coverage. We studied *Ephedra procera* to determine its stem biomass characteristics. Data were collected using an accidental sampling methodology (1*1 m). In total, 6 plots were identify and 30 samples were collected for this research. In the minimum, maximum and mean stem biomass for this plant were found to me 1.8, 4.3 and 2.5 g, respectively.

Key word: *Ephedra procera*, Iran, Rangeland, stem Biomass

INTRODUCTION

Rangeland ecosystem stabilizing, optimum and continual utilization of the range without studding and knowing the influencing factors on its segments and animal pasturage are of special importance (Bibalani *et al.*, 2011a, b; Mozaffarian, 2007; Shadkami-Til and Bibalani, 2010, 2011). There are different methods of evaluating rangelands and all of them have advantages and disadvantages. Factors such as vegetation species composition, annual production, area coverage, plant density, soil surface coverage, constitution, and presence of succulence plants were used (Bidlock *et al.*, 1999; Mogaaddam, 2001) but estimation of these parameters are time consuming and expensive.

Fresquez *et al.* (1990) reported an increase in vegetative production and forage quality of Blue Grama (Mata-Gonza'lez *et al.*, 2002). Benton and Wester (1998) reported an increase in Tobosagrass (*Hilaria mutica*) yield following applications of biosolids at levels of 7, 18, and 34 dry Mg/ha in the Chihuahuan Desert. Although dormant season applications of biosolids seem to be more beneficial for plant growth than growing season applications during the year of biosolids application (Benton and Wester, 1998), explanations for this phenomenon have not been documented (Mata-Gonza'lez *et al.*, 2002).

Most evidence is related to its negative effect on aboveground vegetative and reproductive plant biomass (Hutchings and John, 2003; Milchunas and Lauenroth, 1993), changes in the spatial patterning of plant canopies and soil resources (Adler *et al.*, 2001; Bertiller and Coronato, 1994; Callaway, 1995; Schlesinger *et al.*, 1990), the reduction of soil seed banks (Bertiller, 1996; Bertiller, 1998), the decrease in the availability of safe

micro sites for plant reestablishment (Bisigato, 2000; Oesterheld and Sala, 1990), and the invasion of woody plants (Milchunas and Lauenroth, 1993; Rodriguez *et al.*, 2007; Schlesinger *et al.*, 1990).

Aboveground defoliation can modify the partitioning of assimilates between belowground and aboveground organs and consequently the root growth of defoliated plants (Belsky, 1986; Richards and Caldwell, 1985; Rodriguez *et al.*, 2007; Snyder and Williams, 2003).

In this research we have studied the amount of above ground biomass and occurrence of *Ephedra procera* (Gharaman, 2003) (Fig. 1) at the rangeland area of Shanjan village, Shabestar district, NW Iran. This parameter needs more attention, but it is one of the determining Factors of rangeland ecosystem.

MATERIALS AND METHODS

The research area is part of Shanjan rangeland in Shabestar district with distance about 5 km from Shabestar city. The terrain in this area is hilly and we carried out the study on a site with a northerly aspect (Bibalani *et al.*, 2011a; Bibalani *et al.*, 2011b) (Fig. 1). This region is component of Iran-Turan Flora with elevation between 1700-1850 m (Bibalani *et al.*, 2011b).

Ephedra is a genus of gymnosperm plants, the only genus in the family Ephedraceae and order Ephedrales. These plants occur in dry climates over a wide area mainly in the northern hemisphere. They are also called Joint-pine, Jointfir, Mormon-tea or Brigham Tea (Wikipedia, 2011). EPHEDRA PROCERA (Table 1, Fig. 2) is one of species of this genus that have been studied in this research.

In this research, Stem biomass has been sampled in May and June, 2010. For sampling, we used an accidental



Fig. 1: Part of Shanjan rangeland in Shabestar district, East Azerbaijan province, Iran



Fig. 2: *Ephedra procera* species

sampling methodology (1*1 m plot) in this research and selected 30 (6 plots with 5 sub sample for each of them) samples in total (Xiaoyan *et al.*, 2001) (Fig. 3).

After sapling from studding area, they have been scaled fresh weight of above ground part of plant with sensitive scale then dried by Avon set in 80°C during 24 h (Xiaoyan *et al.*, 2001) and scaled dried weight

Table 1: Scientific name for *Ephedra procera* classification report (USDA, 2011)

	<i>Plantae</i> – Plants
Subkingdom	<i>Tracheobionta</i> – Vascular plants
Superdivision	<i>Spermatophyta</i> – Seed plants
Division	<i>Gnetophyta</i> – Mormon tea and other gnetophytes
Class	<i>Gnetopsida</i>
Order	<i>Ephedrales</i>
Family	<i>Ephedraceae</i> – Mormon-tea family
Genus	<i>Ephedra</i> L. – jointfir
Species	<i>Ephedra procera</i> – jointfir

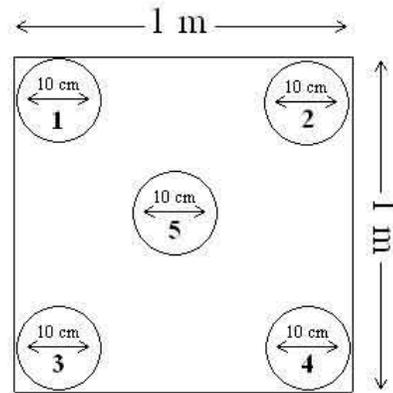


Fig. 3: Sampling design in 1*1 m plot (Xiaoyan *et al.*, 2001). 1, 2, 3, 4 and 5 is sub sample in each main sample

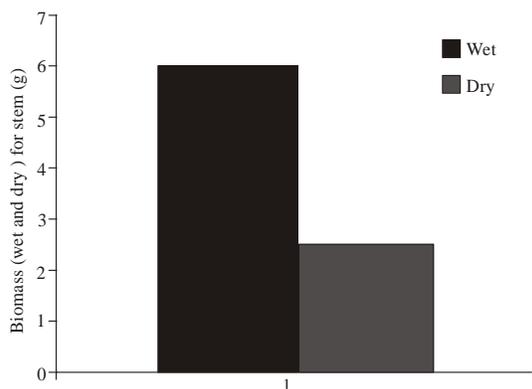


Fig. 4: EPHEDRA PROCERA stem weight (fresh and dried weight)

separately. This study have been work in Shanjan rangeland at Shabestar district in East Azerbaijan, Iran in summer 2010.

RESULTS AND DISCUSSION

Results from this study showed that the maximum, minimum and medium stem biomass of *Ephedra procera* in the study area were 1.8, 4.3 and 2.5 g, respectively (Fig. 4).

Stem height *Ephedra procera* was unsteady from 800 to 400 mm, that average of it is about 550 mm.

In total of 6 plots were identified and 30 samples were studied in this research study. From 30 samples about 58.3% of stem weight was lost when samples were dried. Vegetation species can have an effect on soil chemical and physical properties (Ardekani, 2003). Increasing *Ephedra procera* species in the study area could cause specific biological qualification, and as this species increasing density of above ground Biomass will increase, and also the amount of Soil protection and stabling will increase specially protection with wind erosion and soil lost with runoff (Bibalani *et al.*, 2011a; Bibalani *et al.*, 2011b; Shadkami-Til and Bibalani, 2010, 2011). Study on this plant over ground biomass is so much important information especially for medicinal plant. Joudi and Bibalani (Bibalani *et al.*, 2010) have been studied and recognized some medicinal plant of Ilkhji region, Eastern Azerbaijan Province (Northwestern Iran).

In this study we examined the biomass of this plant and results suggest that changes in the above ground cover of this plant affect by grazing or soil compaction with animal at this area as found in other studies (Bibalani, 2011a, b, c; Bibalani *et al.*, 2010; 2011a, b; Rodriguez *et al.*, 2007; Shadkami-Til and Bibalani, 2010, 2011) and The difference of wet weight and biomass of this plant would be expected in this area (Bibalani, 2011a, b, c; Bibalani *et al.*, 2010, 2011a, b; Shadkami-Til and

Bibalani, 2010, 2011).

This study has revealed and quantified the stem biomass of the EPHEDRA PROCERA in the Shanjan rangelands, the plant has good biomass in this research area and probably also in other areas where the EPHEDRA PROCERA is growing that need studding separately in another areas. It is a pioneer study, and the results have given estimations of the stem biomass of the EPHEDRA PROCERA for the first time in Shanjan rangeland. It is needed for studying this and other shrub species in the area and could be used in identifying plants best suited for rangeland ecosystem stability and specifically for stabilizing surface soil layers especially from water and wind erosion.

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