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Average Stem Biomass of *Chenopodium album* 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. Researchers studied *Chenopodium album* 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 1.4, 3.8 and 2.2 g, respectively.

Key words: *Chenopodium album*, evaporation and transpiration, rangeland, stemb biomass, vegetation coverage, Iran

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 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-Gonzalez *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^{-1} 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-Gonzalez *et al*., 2002). Most evidence is related to its negative effect on aboveground vegetative and reproductive plant biomass (Day *et al*., 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, 1998), the decrease

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

in the availability of safe micro-sites for plant re-establishment (Oesterheld and Sala, 1990) and the invasion of woody plants (Milchunas and Lauenroth, 1993; Rodriguez *et al*., 2007; Schlesinger *et al*., 1990). Above-ground defoliation can modify the partitioning of assimilates between below- and above-ground 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 *Chenopodium album* (Gharaman, 2003) (Fig. 1) at the rangeland area of Shanjan

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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 researchers carried out the study on a site with a northerly aspect (Bibalani *et al*., 2011a, b) (Fig. 1). This region is component of Iran-Turan Flora with elevation between 1700-1850 m (Bibalani *et al*., 2011b). *Chenopodium album* is a fast-growing weedy annual plant in the genus Chenopodium (Table 1, Fig. 2). It tends to grow upright at first but typically becomes recumbent after flowering (due to the weight of the foliage and seeds) unless supported by other plants. The leaves are alternate and can be varied in appearance. The first leaves near the base of the plant are toothed and roughly diamond-shaped, 3-7 cm long and 3-6 cm broad. The leaves on the upper part of the flowering stems are entire and lanceolate-rhomboid, 1-5 cm long and 0.4-2 cm broad; they are waxy-coated, un-wettable and mealy in appearance with a whitish coat on the underside. The small flowers are radially symmetrical and grow in small cymes on a dense branched inflorescence 10-40 cm long.

Table 1: Scientific name for *Chenopodium album* classification report (USDA, 2011)

Kingdom	Plantae-plants
Sub-kingdom	Tracheobionta-vascular plants
Superdivision	Spermatophyta-seed plants
Division	Magnoliophyta-flowering plants
Class	Magnoliopsida-dicotyledons
Sub-class	Caryophyllidae
Order	Caryophyllales
Family	Chenopodiaceae-goosefoot family
Genus	*Chenopodium* L.-goosefoot
Species	*Chenopodium album* L.-lambsquarters

Fig. 2: *Chenopodium album* species

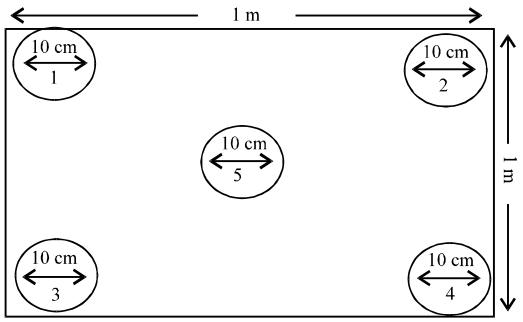

Fig. 3: Sampling design in 1×1 m plot (Ping *et al*., 2010); 1-5 is sub-sample in each main sample

In this research, stem biomass has been sampled in May and June, 2010. For sampling, there was used an accidental 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 (Ping *et al*., 2010) (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 (Ping *et al*., 2010) and scaled dried weight separately. This study have been research 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 *Chenopodium album* in the study area were 1.4, 3.8 and 2.2 g, respectively (Fig. 4). Stem height *Chenopodium album* was unsteady from 200-800 mm that average of it is about 450 mm.

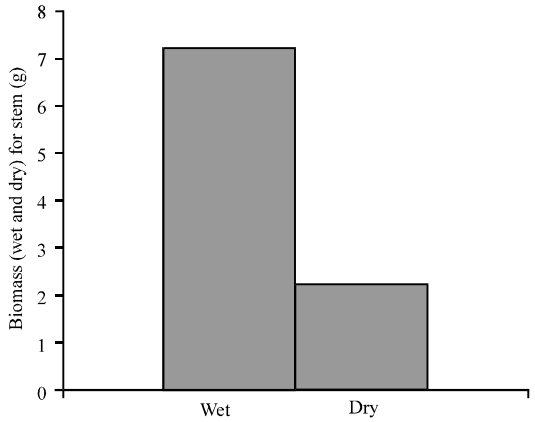

Fig. 4: *Chenopodium album* stem weight (fresh and dried weight)

In total of 6 plots were identified and 30 samples were studied in this research. From 30 samples about 69.44% of stem weight was lost when samples were dried. Vegetation species can have an effect on soil chemical and physical properties (Ardekani, 2003). Increasing *Chenopodium album* species in the study area could cause specific biological qualification and as this species increasing density of aboveground 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, b; Shadkami and Bibalani, 2010, 2011). Study on this plant over ground biomass is so much important information, especially for medicinal plant. Bibalani *et al*. (2010) have been studied and recognized some medicinal plant of Ilkhji region, Eastern Azerbaijan province (Northwestern Iran).

In this study, researchers 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-c; Rodriguez *et al*., 2007; Shadkami and Bibalani, 2010, 2011) and the difference of wet weight and biomass of this plant would be expected in this area (Bibalani, 2011a-c; Shadkami and Bibalani, 2010, 2011).

CONCLUSION

This study has revealed and quantified the stem biomass of the *Chenopodium album* in the Shanjan rangelands, the plant has good biomass in this research area and probably also in other areas where the *Chenopodium album* 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 *Chenopodium album* for the 1st 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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