

Average Stem Biomass of *Astragalus onobrychis* in Shanjan Rangelands, East Azerbaijan, Iran

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Abstract: Biomass of a plant is very important for kind of usage. Plants stems 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 *Astragalus onobrychis* to determine its stem biomass characteristics. Data were collected using an accidental sampling methodology (1*1 m). In total, 8 plots were identify and 40 samples were collected for this research. In the minimum, maximum and mean stem biomass for this plant were found to me 20.3, 51.2 and 31.5 g, respectively.

Key words: *Astragalus onobrychis*, 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; Bibalani *et al.*, 2011b; Mozaffarian, 2007; Shadkami-Til and Bibalani, 2010; Shadkami-Til and Bibalani, 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 (Fresquez *et al.*, 1990) reported an increase in vegetative production and forage quality of Blue Grama (Mata-Gonza'lez *et al.*, 2002). Benton & Wester (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;

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 *Astragalus onobrychis* (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. Objective of the study is estimate average biomass of *Astragalus onobrychis* in research area.

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). This research was conducted in summer of 2010.

Astragalus is a large genus of about 3,000 species of herbs and small shrubs, belonging to the legume family Fabaceae, subfamily Faboideae. The genus is native to temperate regions of the Northern Hemisphere. Common names include milk-vetch (most species), locoweed (in western US, some species) and goat's-thorn. Some pal-



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



Fig. 2: *Astragalus onobrychis* species

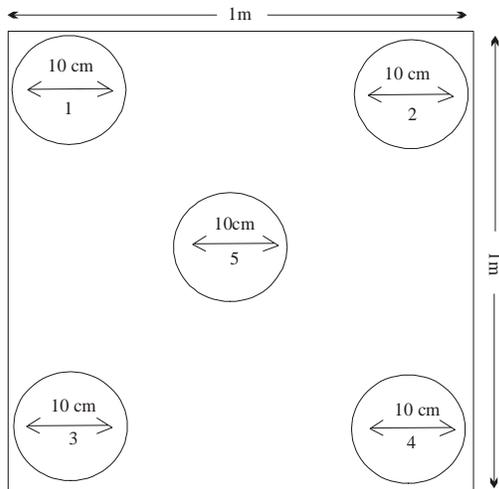


Fig. 3: Sampling design in 1*1 m plot (Xiaoyan *et al.*, 2001). 1, 2, 3, 4 and 5 is sub sample in each main sample

flowered vetches are similar in appearance, but vetches are more vine-like (Wikipedia, 2011). In this paper have been studied *Astragalus onobrychis* (Table 1, Fig. 2).

Table 1: Scientific name for *Astragalus onobrychis* classification report (USDA, 2011)

Kingdom	<i>Plantae</i> - Plants
Subkingdom	<i>Tracheobionta</i> - Vascular plants
Superdivision	<i>Spermatophyta</i> - Seed plants
Division	<i>Magnoliophyta</i> - Flowering plants
Class	<i>Magnoliopsida</i> - Dicotyledons
Subclass	<i>Rosidae</i>
Order	<i>Fabales</i>
Family	<i>Fabaceae</i> - Pea family
Genus	<i>Astragalus</i> L. - milkvetch
Species	<i>Astragalus onobrychis</i> L.

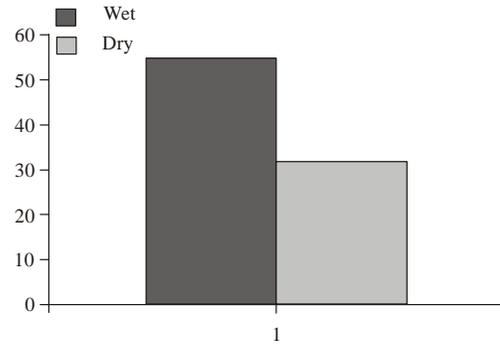


Fig. 4: *Astragalus onobrychis* stem weight (fresh and dried weight)

In this research, Stem biomass has been sampled in May and June, 2010. For sampling, we used an accidental sampling methodology (1*1 m plot) in this research and selected 40 (8 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 separately. This study have been in Shanjan rangeland at Shabestar district in East Azerbaijan, Iran in summer 2010.

RESULTS

Results from this study showed that the maximum, minimum and medium stem biomass of *Astragalus onobrychis* in the study area were 20.3, 51.2 and 31.5 g, respectively (Fig. 4).

Stem height *Astragalus onobrychis* was unsteady from 480 to 670 mm, that average of it is about 530 mm.

CONCLUSION

In total of 8 plots were identified and 40 samples were studied in this research work. From 40 samples about 42.73% of stem weight was lost when samples were dried.

Vegetation species can have an effect on soil chemical and physical properties (Ardekani, 2003). Increasing *Astragalus onobrychis* 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, b; 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 *Astragalus onobrychis* in the Shanjan rangelands, the plant has good biomass in this research area and probably also in other areas where the *Astragalus onobrychis* 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 *Astragalus onobrychis* 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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