Full Length Research Paper

Average stem biomass of Gundelia (Gundelia tournefortii L.) in Shanjan Rangelands, East Azerbaijan, Iran

Ghassem Habibi Bibalani* and Hamideh Shadkami-Til
Department of Agriculture, Shabestar Branch, Islamic Azad University, Shabestar, Iran
Accepted 25 April, 2011

The stem of plants can be used for animal grazing, wind erosion control, reduction of water flow, increase of evaporation and transpiration. In NW of Iran (East Azerbaijan Province), rangelands were utilized for animal grazing, but were later changed to agricultural land. Moreover, this vegetation has unsuitable vegetation coverage. We studied Gundelia tournefortii L. to determine its stem biomass characteristics. Data were collected with accidental sampling method (1*1 m) in this area. A total of 15 plots were collected and 75 samples were studied in this study. However, the minimum, maximum and mean stem biomass of this plant was 5.5, 22.6 and 10.5 g, respectively.

Key word: Gundelia tournefortii L., Iran, rangeland, stem biomass.

INTRODUCTION

Stabling of the rangeland ecosystem, and optimum and continuous utilization of the range without studying and knowing the effective factors on its segments and animal pasturage have special importance (Mozaffarian, 2007; Shadkami-Til and Bibalani, 2010, 2011). There are different methods used for evaluating range position; and all of them have special advantages and disadvantages, but each of them have different factors, such as species composition percentage, production, coverage, density, soil position (soil surface coverage and erosion), cadaver, birthing, constitution, and succulence. Plants were used (Bidlock et al., 1999; Mogaaddam, 2001), but estimation of these parameters were time consuming and expensive. Fresquez et al. (1990) reported an increase in the vegetative production and forage quality of blue grama (Bouteloua gracilis (H.B.K.) Lag. ex Steud.) (Mata-Gonzalez et al., 2002), while Benton and Wester (1998) reported an increase in tobosa grass (Hilaria mutica (Buckl.) Benth.) 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 (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; Mazzarino et al., 1998; Schlesinger et al., 1996), the reduction of soil seed banks (Bertiller, 1996, 1998; Mayor et al., 2003), the decrease in the availability of safe microsites for plant re-establishment (Bisigato, 2000; Oesterheld and Sala, 1990) and the invasion of woody plants (Milchunas and Lauenroth, 1993; Schlesinger et al., 1990; Rodriguez et al., 2007). 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; Snyder and Williams, 2003; Rodriguez et al., 2007).

In this study, we have studied the amount of over ground biomass and Gundelia tournefortii L. species (Gharaman, 2003) (Figure 1) in the rangeland area of Shanjan village, Shabestar district, NW Iran. This parameter needs more attention, but it is one of the determined factors of rangeland ecosystem stabilbing in that place.

*Corresponding author. E-mail: ghhabibi@iaushab.ac.ir.
Figure 1. A part of Shanjan rangeland from Shabestar district, East Azerbaycan province, Iran.

Table 1. Scientific name for *G. tournefortii* L. classification report (USDA, 2011).

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Plantae – Plant</th>
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<tbody>
<tr>
<td>Subkingdom</td>
<td>Tracheobionta – Vascular plants</td>
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<tr>
<td>Superdivision</td>
<td>Spermatophyta – Seed plants</td>
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<tr>
<td>Division</td>
<td>Magnoliophyta – Flowering plants</td>
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<tr>
<td>Class</td>
<td>Magnoliopsida – Dicotyledons</td>
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<tr>
<td>Subclass</td>
<td>Asteridae</td>
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<tr>
<td>Order</td>
<td>Asterales</td>
</tr>
<tr>
<td>Family</td>
<td>Asteraceae – Aster family</td>
</tr>
<tr>
<td>Genus</td>
<td><em>Gundelia</em> L. – gundelia</td>
</tr>
<tr>
<td>Species</td>
<td><em>Gundelia tournefortii</em> L. – Tournefort’s gundelia</td>
</tr>
</tbody>
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**MATERIALS AND METHODS**

The research area is a part of Shanjan rangeland, from Shabestar district with a distance of about 5 Km from it (Figure 1). This area is hilly and we study the N aspect of it (Salimi, 2003). This region is a component flora of Iran and Turan with elation between 1700 and 1850 m (Pabot and Beck, 1990).

The Gundelia is a spiny (Table 1 and Figure 2), thistle-like flowering plant of the genus *Gundelia* L. in the sunflower family (Asteraceae). They occur in the semi-desert areas of Syria, Jordan, Palestine, Iraq, Iran, Azerbaijan, Armenia, and Anatolia (Karis et al., 2001; Cakilcioglu and Khatun, 2010). *Gundelia* species have been used as medicinal plants in folk medicine, but gundelia itself was used for diarrhea, mumps, vitiligo and diabetes disease (Özgökçe
RESULTS AND DISCUSSION

The results of this study showed that the maximum, minimum and medium stem biomass of *G. tournefortii* L. in the study area was 5.5, 22.6 and 10.5 g, respectively (Figure 4). However, the stem height of *G. tournefortii* L. was unsteady from 950 to 100 mm, and the average was about 670 mm.

A total of 15 plots were collected and 75 samples were studied in this research. In the 75 samples that were
studied in this study, about 82.2% of the stem weight was lost when the samples dried.

Vegetal species can affect soil chemical and physical properties (Ardekani, 2003) in that, increasing G. tournefortii L. species in the study area can cause specific biological qualification. As this species increase, the density of over ground biomass will increase, and also, the amount of soil protection and stabilizing will increase specially as a result of wind erosion protection and soil lost with runoff (Shadkami-Til and Bibalani, 2010, 2011).

This study has revealed and quantified the stem biomass of G. tournefortii L. in Shanjan rangelands, due to the fact that the plant has good biomass in this research area and probably in other areas also, where G. tournefortii L. is growing and need to be studied separately in other areas. It is a pioneer study, and the results have given estimations of the stem biomass of G. tournefortii L. for the first time in Shanjan rangeland. There is need to study all shrubs and plants in this area and in other places, in order to recognize the best plant for ‘rangeland ecosystem’ stabilizing and the stabilizing surface soil erosion, especially wind erosion.

ACKNOWLEDGEMENTS

The authors greatly acknowledge the scientific support given to the first author from the Islamic Azad University, Shabestar Branch. This paper is a part of a project entitled “Study on Root development forbs and shrubs on Shanjan Range of the Shabestar area, and their effects on soil surface and subsurface erosion” with project number 51955880630001. The authors also express their sincere appreciation to the anonymous reviewer(s) for their help in improving the quality of the paper.

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