

## Investigation on Stem Biomass of *Carthamus oxyacantha* in Shanjan Rangelands, East Azerbaijan, Iran

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**Abstract:** Stem of plants can be used as animal grazing, wind erosion control, reduce water flow, increase evaporation and transpiration. In NW of Iran (East Azerbaijan province), rangelands was utilized with animal grazing and changed to agricultural land use; this vegetation is unsuitable vegetation coverage. Researchers studied *Carthamus oxyacantha* to determine its stem biomass characteristics. Data were collected with accidental sampling method (1 × 1 m) in this area. In total of 4 plots were collected and 20 samples were studied in this research. Minimum, maximum and mean stem biomasses of this plant were 6.5, 20.3 and 10 g, respectively.

**Key words:** *Carthamus oxyacantha*, rangeland, stem biomass, vegetation, Iran

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### INTRODUCTION

Rangeland ecosystem stabling, optimum and continuum utilization of range without studding and knowing effective factors on its segments and animal pasturage have special importance (Mozaffarian, 2007; Shadkani-Til and Bibalani, 2010, 2011a, b). There are different methods for evaluating range position that all of them have special advantages and disadvantages and 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 are time consuming and expensive. Fresquez *et al.* (1990) reported an increase in vegetative production and forage quality of blue grama (*Bouteloua gracilis* (H.B.K.) Lag. ex Steud.) (Mata-Gonzalez *et al.*, 2002). Benton and Wester (1998) reported an increase in tobosagrass (*Hilaria mutica* (Buckl.) Benth.) yield following applications of biosolids at levels of 7, 18 and 34 dry Mg ha<sup>-1</sup> 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



Fig. 1: A part of Shanjan rangeland from Shabestar district, East Azerbaijan province, Iran

(Adler *et al.*, 2001; Bertiller and Coronato, 1994; Callaway, 1995; McNaughton *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 micro-sites for plant reestablishment (Oesterheld and Sala, 1990) and the invasion of woody plants (Milchunas and Lauenroth, 1993; Schlesinger *et al.*, 1990; Rodriguez *et al.*, 2007).

Above-ground defoliation can modify the partitioning of assimilates between belowground and above-ground 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 research, researchers have studied the amount of over ground biomass and *Carthamus oxyacantha* species (Ghahraman, 2002) (Fig. 1) at 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 stabling in that place.

## MATERIALS AND METHODS

Research area is part of Shanjan rangeland from Shabestar district with distance is about 5 km from it (Fig. 1). This area is hill area and researchers study on N aspect (Salimi Faed, 2003). This region is component Flora Iran and Turan with elation between 1700-1850 m

Table 1: Scientific name for carthamus oxyacantha classification report (Encyclopedia of Life, 2011)

|                |                                |
|----------------|--------------------------------|
| Kingdom        | Plantae-plants                 |
| Sub-kingdom    | Tracheobionta-vascular plants  |
| Super-division | Spermatophyta-seed plants      |
| Division       | Magnoliophyta-flowering plants |
| Class          | Magnoliopsida-dicotyledons     |
| Sub-class      | Caryophyllidae                 |
| Order          | Caryophyllales                 |
| Family         | Asteraceae                     |
| Genus          | Carthamus                      |
| Species        | <i>Carthamus oxyacantha</i>    |



Fig. 2: *Carthamus oxyacantha* species

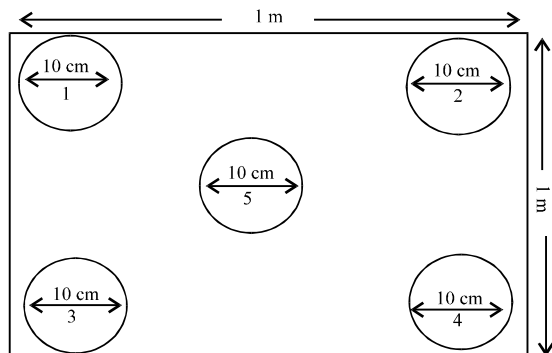


Fig. 3: Sampling design in 1×1 m plot (Ping *et al.*, 2010)

(Pabot and Beck, 1990). One of the *Carthamus* specie is *Carthamus oxyacantha* (Table 1, Fig. 2) that commonly grow in this studying area. The genus *Carthamus* includes about 14 species of Mediterranean plants in the daisy family. The best known species is the Safflower. Stem biomass was sampled in May and Jun, 2010. For recognition of species for sampling, there was used of accidental sampling method (1×1 m plot) and select  $4 \times 5 = 20$  samples totally (Ping *et al.*, 2010) (Fig. 3). Produced sapling from area studding plants after sending to laboratories, they scale fresh weight of over ground part with careful and sensitive scale then dry weight of over ground part of plant is determined by Avon set after drying in 80°C temperature during 24 h (Ping *et al.*, 2010).

## RESULTS AND DISCUSSION

Results of this study have been showed that the maximum, minimum and medium stem biomass of *Carthamus oxyacantha* in studding area were 6.5, 20.3 and 10 g, respectively (Fig. 4). Stem height *Carthamus oxyacantha* was unsteady from 250-920 mm that in average it is about 700 mm.

In total of 4 plots were collected and 20 samples were studied in this research. In total of 20 samples of about 80% of stem weight have been losses when samples dried. Vegetal species can effect on soil chemical and physical properties (Ardekani, 2003). Increasing *Carthamus oxyacantha* species in studying area can cause specific biological qualification and as this species increase density of over ground biomass will increase and also the amount of soil protection and stabling will increase specially protection with wind erosion and soil losing with runoff (Shadkami-Til and Bibalani, 2010, 2011b).

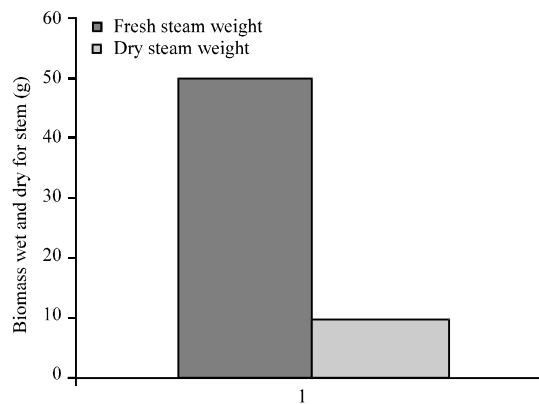


Fig. 4: *Carthamus oxyacantha* steam weight (fresh and dried weight)

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

## CONCLUSION

This study has revealed and quantified the stem biomass of the *Carthamus oxyacantha* in the Shanjan rangelands, the plant has good biomass in this research area and probably also in other areas where the *Carthamus oxyacantha* 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 *Carthamus oxyacantha* for the 1st time in Shanjan rangeland. It is need for studding such as this for all shrubs and plant in this area and another place for recognizing the best plant for rangeland ecosystem stabling and stabilizing surface soil erosion, specially wind erosion.

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