Research Article

Introduction of *Salsola incanescens* as a Native Species with a Medicinal, Economic, and Suitable Value for Plantation in Arid and Semi-Arid Regions of Iran

Morteza Neghabi [a]*, Mahboubeh Hadinejad [b], Mohsen Adim [c]

[a] Master of Rangeland Management, Jovein County Natural Resources and Watershed Management Department, Khorasan Razavi province, Iran.
[b] Master Gratuated of Range Science and Engineering, Tarbiat Modares University, Iran.
[c] Expert of Rangeland and watershed management, Jovein County Natural Resources Department, Khorasan Razavi province, Iran.

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Abstract: Arid and semi-arid regions are among the important and valuable areas of natural resources. And covers a wide area of Iran. It is no exaggeration to say that more than half of the area and population of Iran consists of arid and semi-arid rangelands. Salsola incanescens is a valuable species in arid and semi-arid rangelands. In this article, we introduce the perennial species Salsola incanescens, which has high medicinal properties and economic value for rangeland owners and can be used to improve and regenerate arid and semi-arid regions. For this purpose, first, the habitat and uses of this species Indigenous Knowledge for the treatment of diseases and livelihood were identified using the information of local people. Then, some Salsola incanescens seeds were planted in plastic pots and after transfer to the field, their growth and development stages were monitored. The general results of this article indicate the importance of this very valuable plant species for breeding and regeneration in arid and semi-arid regions and other economic uses such as preparing animal Forage and using the ash of this plant for processing raisins and medicinal and industrial properties Be.

Keywords: Plantation, *Salsola incanescens*, Indigenous knowledge, Sustainable livelihood

1. Introduction

Identification, preservation and maintenance of plant species, especially useful and rare species in the world is of particular importance. The basis of sustainable development and any principled and rational exploitation of nature and natural resources is the preservation and protection of plant species and genetic treasures (Jalili and Jamzad, Z. 1999). arid and semi-arid rangeland ecosystems are strongly influenced by the constituents of the ecosystem due to their physical and environmental conditions, so recognizing the relationships between these factors has a positive effect on management. This will be achieved only by examining the relationships between plant species and the factors affecting their establishment (Moghimi Nejad et al., 2014). Many executive works have been done in Iran to rehabilitate arid and semi-arid regions, some of which have failed due to insufficient research. Atriplex, for example, is one of the species that is widely cultivated but does not have natural reproduction in the field. The results of many unsuccessful policies of the past have shown that to achieve the desired results in planning and decision making, ecological factors, management practices, and indigenous knowledge must be considered together. Indigenous knowledge is the knowledge that is associated with the culture of each region and has been created naturally over countless years and has been passed down from generation to generation. Individuals outside the local community may not necessarily be able to identify local community needs and prioritize, or identify the best ways to achieve them (Latulippe, & Klenk, 2020). Local knowledge enables indigenous peoples to supply their needs from natural resources without disrupting or endangering the natural cycle of nature. Hence, the world's indigenous knowledge collection is a valuable treasure trove of methods and tools that is used in the sustainable development of societies (Briggs, 2005). The genus Salsola is one of the major genera of the Conopodiaceae family that plays an important role in the improvement and restoration of almost dry pastures and saline lands (Rechinger and Wendelbo). Salsola with characteristics such as drought resistance, salinity resistance, pests and diseases resistance, grazing resistance, deep root system, high efficiency in water use, and as an important forage plant in dry and saline soils, is considered. Indigenous peoples' use of a substance called shaghar, which is derived from *Salsola incanescens*, and used in the preparation of raisins in the study area, created the first spark of research on the *Salsola incanescens* plant in our minds. Therefore, the present study was conducted with the aim of initial introduction of *Salsola incanescens*, uses of this plant (emphasizing the indigenous knowledge of the study area about *Salsola incense* plant), and study of the use of this plant to rehabilitate desert areas of Iran. We hope that the results of this research can be used by botanists, ecologists, anthropologists, and tourists, especially natural resource rehabilitation researchers.

2. Materials and Methods

Introduction of the study area

Jovin city is located in Khorasan Razavi province and at a distance of 75 km northwest of Sabzevar city and between longitude 57º 25′ 19″ Eastern and latitude 36º 42′ 22″ Northern and the average altitude of the region is 1100 meters.

Botanical characteristics of *Salsola incanescens*

Salsola incanescens is from chenopodiaceae Family, It has hairy stems, fleshy and juicy leaves, along with erect and narrow stems, and alternating and wide branches. It is a perennial forage plant with a height of 70 cm from the branching base and its canopy covers an area of 1.5 meters. Propagation of *Salsola incanescens* is by seed. It is also the flowering season in late summer and the fruit-forming season in autumn.

Research Methods

At the end of March 2018, the seeds of *Salsola incanescens* in the study area were collected. *Salsola incanescens* seeds were placed in water for germination. After 24 hours, the sprouts emerged from the seeds (Figure 1). Then, from the germinated seeds, 2 germinated seeds were randomly selected for planting in plastic pots with a ratio of 2: 3 sand and 1: 3 clay. Samples grown in plastic pots emerged from the soil after 3 days (Figure 2). The seedlings obtained after irrigation and care, when they reached the age of 60 days and a height of 20 to 25 cm, were transferred to the main site in May and planted (Figures 3 and 4). The seedlings started growing in the field after 30 days (Figures 5 and 6) and after 4 to 6 months the seedlings started to Propagated by seeds (Figures 7 and 8). The final result of cultivating *Salsola incanescens* in the field can be seen in Figure 9.

Figure 1. *Salsola incanescens* seeds germination within 24 hours

Figure 2 - *Salsola incanescens* seeds germination from the soil within 3 days

Figure 3- Transfer and cultivation of seedlings to the field (pot 1)

Figure 4- Transfer and cultivation of seedlings to the field (pot 2)

Figure 5- Growth of pot 1 seedlings after 30 days in the field

Figure 6- Growth of pot 2 seedlings after 30 days in the field

Figure 7- Growth of pot 1 seedlings after 5 month in the field and seed production

Figure 8- Growth of pot 2 seedlings after 5 month in the field and seed production

Figure 9 - Final growth of *Salsola incanescens* seedlings in the field

Natural habitat of *Salsola incanescens*

The altitude distribution of *Salsola incanescens* is between 300 and 1200 meters above sea level. *Salsola incanescens* belongs to semi-desert and steppe pastures. And is usually used by camels, sheep and goats after autumn rains (Figure 10). It is in class 3 of palatability and resistant to grazing, and its average forage production is 132 kg of dry forage per hectare (Figure 11). This plant grows in clay soils (Figure 12), rocky (Figure 13) and river bank (Figure 14) and It has natural growth and regeneration (Figure 15). This plant is found in terms of geographical distribution in Iran in Southern desert areas, center, and east of the Iran.

Figure 10 - *Salosala incanescens* distribution in field

Figure 11. Natural resistance of *Salosala incanescens* to continuous grazing

Figure 12 - Natural Establishment of *Salosala incanescens* in Clay Soil

Figure 13 - Natural deployment of *Salosala incanescens* in rocky areas

Figure 14- Natural deployment of *salosala incanescens* on the rivers bank

Figure 15. natural reproduction of *salosala incanescens* in field

Chemical compounds and medicinal properties of *salosala incanescens*

In the part of the Historical Book of Changiz Khan Mughol (Pourhormozan 2014), writed about use of Extract soap from ashes of Saline plants, Then It was used to cure skin and stomach diseases and strengthen the gums. The substances extracted from this plant have a laxative, anti-sour, anti-scurvy effect, a large amount of potassium carbonate is found in its ashes, it is effective in treating the complications caused by vitamin C deficiency and relieving itchy skin.

What is Shaghar

Shaghar is referred to as alkalis and ash masses resulting from the burning of the aerial parts of *Salsola incense*, which are in the form of amorphous boards (Figure 16). Shaghar is often dark brown in color and resembles igneous rocks. Shaghar is a water absorber. To use the alkaline compounds of Shaghar in industrial centers, first the amorphous Shaghar masses are pulverized and then poured into water to increase the contact surface of the ash with water. Experiments performed of shaghar mineral decomposition showed The major constituents of its include sodium and potassium carbonates. Its elements include nitrogen 35%, phosphorus 2%, potash 4.25%, carbon 4% and organic matter 7%.

Figure 16- Shaghar

Method of production and consumption of Shaghar

Simultaneously with the ripening of grapes and its harvest season in autumn and the preparation of raisins, the villagers prepare shaghar (Figure 15). This season coincides with the mellow and juicing of Salsola **incanescens** (late September to late October). The villagers of Salsola collect incense and store it so that some of the plants of this plant wither. Then they prepare a fire and put salt grasses on it so that the flames from below cause them to burn. The villagers collected *Salsola incanescens* and store it. Then they prepare a fire and put *Salsola incanescens* on it so that the flames from below cause them to burn. The flame must be at the same time as the wind blows. This action causes the fire to ignite and the burning speed of the *Salsola incanescens* to rise, which causes the water in the leaves to melt and collect in the form of a gray rock at the bottom of the stove. The resulting material, which resembles a piece of rock and smells like sewage, is called a shaghar. Shaghar has been used more in the past to turn grapes into raisins**.** Recently, with the introduction of relatively easy chemical methods (sulfur), this method is less used. also, due to the harmful effects of residual sulfur on raisins on the market, the use of Shaghar has flourished again.

Figure 17 - Burning of *Salsola incanescens* to prepare shaghar

Regarding the use of *Salsola incanescens* in natural resource management, the following can be mentioned

The researchers found that *Salsola incanescens* needed much less water than (*Medicago sativa*). Most studies have proven drought resistance and high water use efficiency of this plant.

1- Protection and prevention of destruction: Due to the fact that this plant has a lot of fluff in the early stages of growth (carbohydrate storage), livestock does not have much desire to use it, and this leads to the growth of this plant and the protection and prevention of pasture destruction.

2- Revitalization: development of pastures, increase of vegetation, natural reproduction in the field

3- Development: This plant is known and used in the local knowledge of the region as a medicinal plant that can be used and developed industrially by introducing its capabilities.

Exploitation: Using the extracted Shaghar of *Salsola incanescens* in the production of organic raisins, its excellent detergent and degreasing properties, use in color stabilization and dyeing

The executive objectives of cultivating *Salsola incanescens* in arid and semi-arid regions of Iran:

1. Use of sub productivity if rangeland
2. Helping to improve the economy of villagers and ranchers
3. Prevent the destruction of pastures
4- Preventing the migration of villagers
5. Helping to develop and revive the region's ecotourism industry
6- Creating a balance between livestock and pasture
7- Creating more shelter for wildlife and plants with more palatability
8. Impact on improving the microclimate of the region.

References

1. Briggs, J. (2005). The use of indigenous knowledge in development: problems and challenges. Progress in development studies, 5(2), 99-114.
2. Jalili, A. and Jamzad, Z. 1999. Red data book of Iran. Research Institut of Forests and Rangelands. Tehran, 748 P.
3. Latulippe, N., & Klenk, N. (2020). Making room and moving over: knowledge co-production, Indigenous knowledge sovereignty and the politics of global environmental change decision-making. Current Opinion in Environmental Sustainability, 42, 7-14.
4. Moghiminejad, F., Zare Chahouki, M. A., Ghasemi Arian, Y. and Kohandel, A. (2014). Comparison of soil physical and chemical properties between the sites of exclosure and grazing (Case study: Nazarabad-Karaj). Iranian journal of range and desert research, 21(4): 643-650.
5. Mohammad., Pourhormozan 2014. Goyesh Noo Publications, Tehran, 549-624.
6. Rechinger, K.H. and Wendelbo, P. 1976. Plants of the Kavir protected region (Iran). Iran. Journ. Bot. 1: 23-56.