Effect of *Astragalus eremophilus* on the Growth of *Bracharia ramose*

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Abstract: *Astragalus eremophilus* is traditionally used as a potent antimicrobial, anti-inflammatory and antioxidant medicinal plant. In the present study we proposed to assess an allelopathic property of the aqueous extract of *Astragalus eremophilus*. Proposed plant of *Astragalus eremophilus* was collected from the catchment area of University of Science and Technology Bannu in its growing season. The plant parts were dried in shed, grounded to powdered form and saturated with de-ionized water to prepare aqueous crude extract. Promising effects were shown by the crude aqueous extract of *Astragalus eremophilus* (root and stalk) growth control and least stalk development at high concentration with respect to control. The effect of *Astragalus eremophilus* on roots and stalk development of *Bracharia ramose* is as follows; 40% > 30% > 20% > 10%. *Astragalus eremophilus* could be used as an alternative for weed control as evident by the present study, where further characterization studies are recommended for the production of plant based natural herbicides.

Keywords: Phytotoxicity, Allelopathic, Astragalus eremophilus, Bracharia ramose.

INTRODUCTION

Medicinal plants are ranked as an important character in the continuance of human health. Different portions of medicinal plants (roots, leaves and fruits etc.) have an important role in this respect. Since long they have paid their services for keeping human health and served humans in every field of life like cosmetics, beverages, dyes and medicines [1]. Medicinal plants have some biologically active compounds such as flavonoids, saponins, steroids, vitamin C, and phenolic compounds [2]. It is also known as alternative medicines in western countries and is used in modern pharmaceutical drugs [3]. Word allelopathy was coined by Prof. Hans Molisch in 1973 which revels biochemical association concerning the various medicinal plants. According to Rice [4] allelopathy is the straight or unintended association between the plant or organism through biochemicals and their free dissociated metabolites (byproducts) which disturb the physiological activities of the neighboring organisms and plants. Usually, allelopathy is the biochemical relationships between living organisms such as plants, microbes, and pests [5]. According to Putnam and Duke [6], these released biochemicals carry on for an extended period and intensely inhibit the development and progress of neighborhood flora. The present study was conducted to investigate the allelopathic behavior of aqoues *Astragalus eremophilus* extract for inhibition of weed growth.

MATERIAL AND METHODS

Plant Collection

Plants samples of *Astragalus eremophilus* were collected from the areas of UST Bannu, KPK, Pakistan and were identified by Dr. Fizan, Assistant professor Department of Botany UST Bannu. The plant was washed using distil water and were placed under shade for drying at room temperature. After shade drying they were grounded into fine powder.

Preparation of Plant Extracts

The powder form of *Astragalus eremophilus* was weighed using digital balance into 50g which then mixed with 500ml of distilled water. The mixture was air tightened in a reagent bottle and was shacked regularly for three days. After three days the mixture was filtered with whattman no.1 filter paper and the obtained extract was stored at 4^{o}C to use for experiment purposes in future.

Phytotoxic Assay (Disposable Glass Study)

Requirements

Aqueous crude extract of *Astragalus eremophilus*, distil water, digital balance, beakers, Spray bottle, disposable glasses, clay and Mercuric chloride.

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Preparation of Samples

From the respective stock solution of *Astragalus eremophilus* preparing 10%, 20%, 30% and 40% of concentrations were prepared in volume of 100ml of distilled water.

Assay Procedure

First of all the clay was put in the disposable glasses. The experiment was performed in triplicates; the seeds of *Bracharia ramose* were soaked in 0.02% of mercuric chloride for 2 min for sterilization purpose. After that the seeds of *Bracharia ramose* were washed with distilled water and soaked in the aqueous solutions i.e.10%, 20%, 30%, 40% for 1 hr. After that process 10 seeds of *Bracharia ramose* were sown in each of the disposable glass with clay. Every one of the glasses was incubated for seven days. Following seven days the shoots and roots inhibition were noted by ruler regarding control and average was taken. Again following three days the inhibition was noted by the similar technique and average was taken.

Determination of Seed Germination (%)

Seed germination (%) was determined as:

Seed germination (%) = Germinated seeds / Total seeds x 100

Determination of Seed Germination Index

Seed germination index = No of seeds germinated at first count + No of seeds germinated at final count / Days of first count + days of final count

Germination Rate Index (GRI)

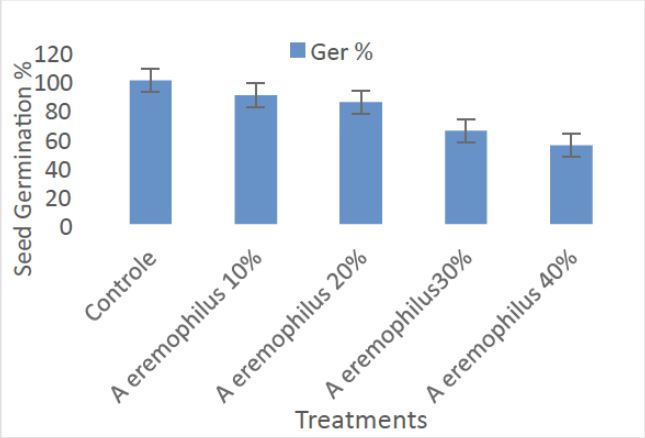
GRI for was calculated as following.

GRI = Germination index / germination percentage

Determination of Seedling Relative Water Content

Seedling relative water content was determined as:

Seedling relative water content: SFW – SDW / STW-SDW X 100



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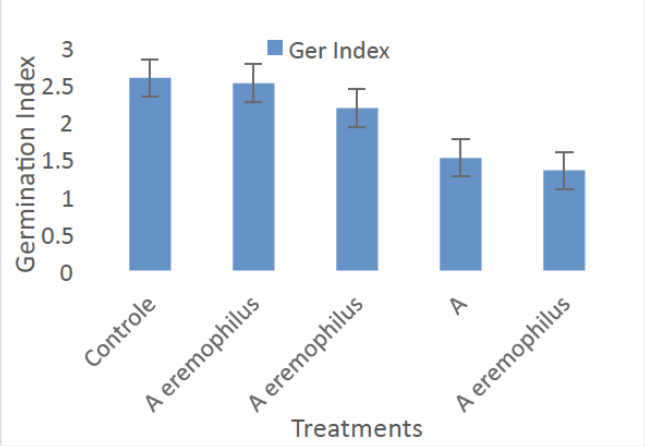

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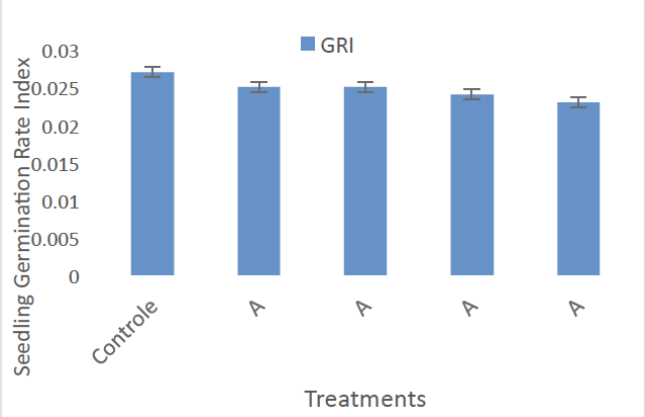

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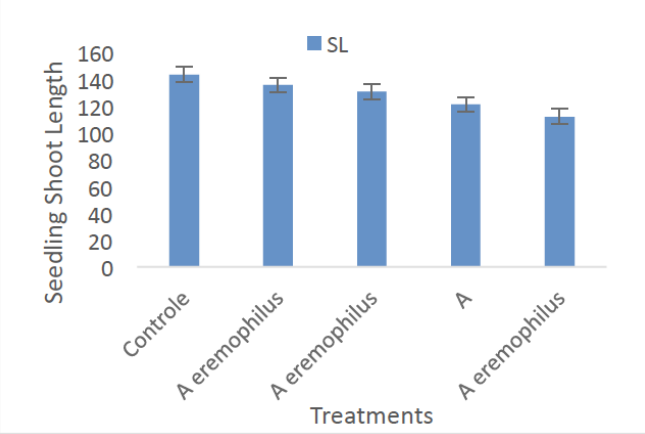

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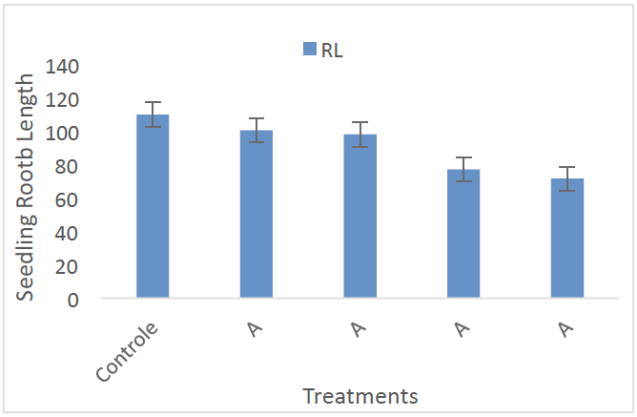

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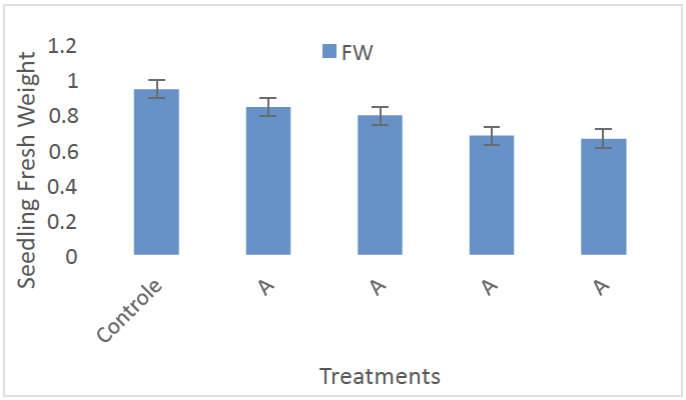


F

Figure 1: Effect of aqueous extract of Astragalus eremophilus on (**A**) Germination (Ger %) %, (**B**) Germination Index (Ger Index), (**C**) Germination Rate Index (GRI), (**D**) Seedling Shoot Length (SL), (**E**) Seedling Root Length (RL), (**F**) Seedling Fresh Weight (SWF).

Where SFW- Seedling fresh weight, SDW-seedling dry weight, STW-seedling turgid weight.

Statistical Analysis

Statistical analysis were carried out using Microsoft excel 2010 and SEM was find through SPSS 13.

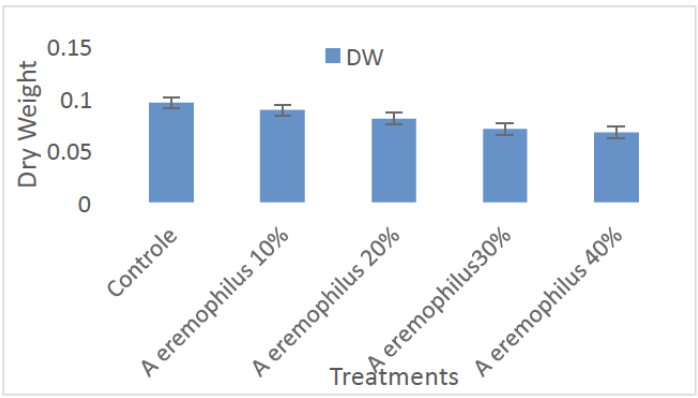
RESULTS

Seed germination and germination index plays a crucial role in the study of allelopathy. In the present study we find % seed germination and germination index, which reveals that high seed germination was reported in 10 % concentration of plant extract as compare other concentrations weed germinations were recorded in control as shown in Figure **1A** and **1B**.

Seed germination rate index (GRI) is important parameter during assessment of allelopathic effects of plant extracts. Results of the present study shows that rate of germination index were inversely proportional to concentrations of extract. Maximum rate germination index rate was reported at high concentration as compare to low concentration as well as normal control as demonstrated in Figure **1C**.

Seedling shoot length (SL) and seedling root length (SL) has much greater correlation with inhibitory activity plant extract against unwanted weed toxicity investigation. In the current assay we observe that aqueous extract of *Astragalus eremophilus* significantly controlled the seedling root and shoot length of weed *Bracharia ramose* as compare to normal group. It is also reported that the inhibitory potential is directly proportional to the concentration of extract i.e. 40% > 30% > 20% > 10% solutions as was shown in Figure **1D** and **1E**.

Dry and fresh weight of seedling shoot and root play key role in the inhibitory potential of medicinal plant



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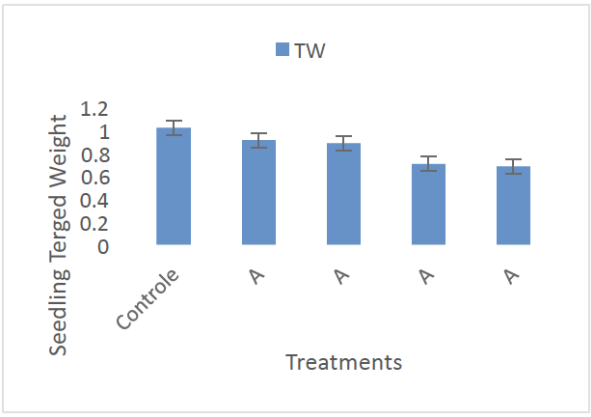

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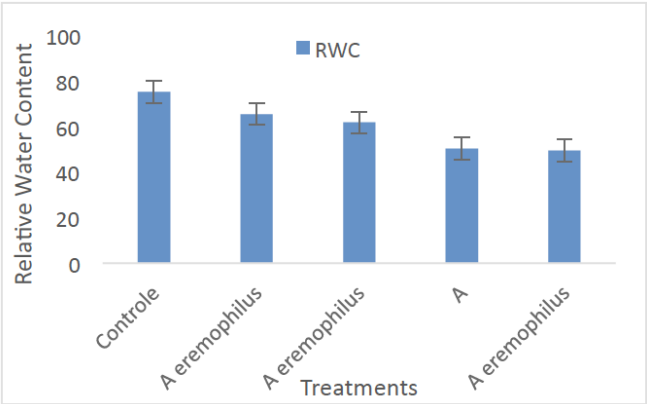

C

Figure 2: Effect of aqueous extract of Astragalus eremophilus on (**A**) Seedling Dry Weight (DW), (**B**) Seedling Turgid Weight (TW), (**C**) Relative water content (RWC).

extract which is a screening step for identification of allelochemicals. Results reveals that aqueous extract of *Astragalus eremophilus* significantly controlled the seedling root and shoot fresh and dry weight of weed *Bracharia ramose* as compare to normal group dose dependently i.e. 40% > 30% > 20% > 10% solutions as was shown in Figure **1F** and **2A**.

Seedling turgid weight (TW) and relative water contents (RWC) assessment has more significant in determination of medicinal plants allelopathy potency. In the current study we observed that comparatively to normal group and low concentrations, higher concentration i.e. 40 % solution of extract has great inhibitory effect on seedling turgid weight (TW) and on seedling relative water content (RWC) as shown in Figure **2B** and **2C**.

DISCUSSION

As bioactive mixes are available in therapeutic plants, they can be utilized for treatment of various components in human including oxidative stress, infection, inflammation, and heart diseases. All through the world therapeutic plants are utilized for treatment of different diseases because they have almost no or no side effects. Some of the therapeutic plants have phytotoxic actions which reduce the growth of weeds and undesirable plants which are not of our need. The allelopathic potency of *Astragalus eremophilus* reveals that they showed significant inhibition in germination of roots and shoots of weeds [7]. It reported that necessary oils and phenolic compounds separated from Turkish plant totally restrained the sprouting of shoots and roots and have antifungal action when compared to the standard compounds. According to Javaid, [8] the water extracts of *Withaniasomnifera* and *Daturaalba* have the same bioactive compounds which significantly inhibited the growth of root and shoots. According to Khan *et al*., [9] studied by the sandwich method four different species of medicinal plants for allelopathic activities. According to HAQ *et al*., [10] the defatted seeds methanolic extract of *Jatropha curcas* has strong inhibitory effect on root and shoot germinations of *Raphanus sativous* due to presence of high phenolics, flavonoids and alkaloids contents.

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