

## Evaluation of Phytotoxic Potential of Methanolic Extract of *Calligonum polygonioids*

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**Abstract:** *Calligonum polygonioids* is used traditionally for the treatment of various ailments in Pakistan and in some other countries of the world. In the present study methanolic extract of various fractions of *Calligonum polygonioids* are used for the screening of phytotoxic potential. Two concentrations of crude methanolic extract i.e. 1000  $\mu\text{g ml}^{-1}$  and 100  $\mu\text{g ml}^{-1}$  was used in the assay. The *Calligonum polygonioids* methanolic extract (CPME) showed significant inhibition both in hypocotyls/shoot and radicals/roots growth i.e. *Calligonum polygonioids* showed maximum inhibition for the growth of *Avenasativa* and *Triticum aestivum*. These results provide evidence that *Calligonum polygonioids* might be used affectively as bio herbicide for weeds control.

**Key words:** *Calligonum polygonioids* • Methanolic extract • Phytotoxic activity • Rice

### INTRODUCTION

Different parts of medicinal plants have been playing very basic role in improving human health. 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].

Hansmolisch [4] Introduced the term “Allelopathy” for first time. Allelopathy means the chemical relationship between the different plants species. Rice, [5] Reported that allelopathy is the direct or indirect relationship among the plants or organism through chemicals and their released breakdown metabolites (end products and by products) which effects the physiological process of the nearby plants and organisms. Generally, allelopathy is the chemical interaction among living organisms like plants, insects and microorganism [6]. According to Khan *et al.* [7] these released chemicals persist for a long time and strongly interfere on the growth and development of neighboring plants and weeds. Khan *et al.* [8] reported that large number of weed resist the synthetic herbicide

thus badly effecting the environment, so those plants which have positive allelopathic activities for weeds control are very important. Thus allelopathy has very positive role in the agriculture sector for the biological control of weeds. For this purpose scientists have focused their attention on secondary plants products for the production of bioherbicides and biopesticides for the enhancement of crop production for the over growing population of the world. For these allelochemicals different plant species are responsible, thus we can say that medicinal plants produce various secondary metabolites which can be used for different purposes for the betterment of humanity.

### MATERIALS AND METHODS

**Plant Collection:** Fresh leaves of the medicinal plant *Calligonum polygonioids* was collected from Landidak, District Bannu, Khyber Pakhtunkhwa, Pakistan, during fruiting period and identified by an eminent taxonomist, Professor Abdur-Rehman, Chairman Department of Botany, Govt Post Graduate College Bannu. Fresh leaves were washed by the distilled water and shade dried at room temperature for three weeks then chopped and grinded mechanically of mesh size 1 mm.

**Preparation of Plant Extract:** Approximately 100 g powder of *Calligonum polygoniods* was soaked in 1.5 liter of 70% methanol (CH<sub>3</sub>OH) by random shaking. After 96 hours, the extract was filtered by using qualitative Whatman filter paper No.1. After filtration, the filtrate was further concentrated by using rotary vacuum evaporator at 38°C, in order to get the methanolic crude extract of the plant. The methanolic crude extract was stored at 4°C in the refrigerator for further in vitro investigation.

**Phytotoxic Bioassay:** Phytotoxic activity was conducted using the standard protocol [9]. 1mg/ml methanolic crude extract solution of *Calligonum polygoniods* was prepared in methanol and then diluted to get various concentrations. Petri plates were autoclaved and filter papers were set in them. 5 ml solution of various concentrations (100 µg/mg and 1000 µg/ml) was poured on each of the filter paper of the labeled petri plates by micropipette carefully, while the petri plates for control were not treated by the samples solution. After complete evaporations of methanol from filter, 5 ml distilled water was sprayed on these treated petri plates along with control. 8 seeds of *Triticum aestivum* and *Avena sativa* seeds were washed with 1% HgCl<sub>2</sub> solutions are placed on petri plates at equal distance and incubated in the growth room. After incubations of eight and fifteen days the germination of shoot and roots were measured and the inhibition was noted with respect to control.

**Statistical Analysis:** The laboratory bioassays were conducted in a complete randomized design with three replications. Graph prism pad was used, to analyze treatment differences.

## RESULTS

**Effect of Effect of *Calligonum polygoniods* Methanolic Extracts on Shoot Growth of *Avena sativa*:** Effect of *Calligonum polygoniods* methanolic extracts on shoot growth revealed that both 100 and 1000 µg /ml concentration significantly inhibited the growth of *Avena sativa* comparatively to control as shown in Fig. 1.

**Effect of Effect of *Calligonum polygoniods* Methanolic Extracts on Root Growth of *Avena sativa*:** Growth of root plays an important role in development of plants. The treatment of various concentrations of *Calligonum polygoniods* Methanolic extracts on root growth of *Avena sativa* revealed inhibition in root growth as compare to control. The findings are presented in Fig. 2.

**Effect of Effect of *Calligonum polygoniods* Methanolic Extracts on Shoot Growth of *Triticum aestivum*:** Effect of *Calligonum polygoniods* methanolic extracts on shoot growth revealed that both 100 and 1000 µg/ml concentration slightly inhibited the growth of *Triticum aestivum* comparatively to control as shown in Fig. 3.

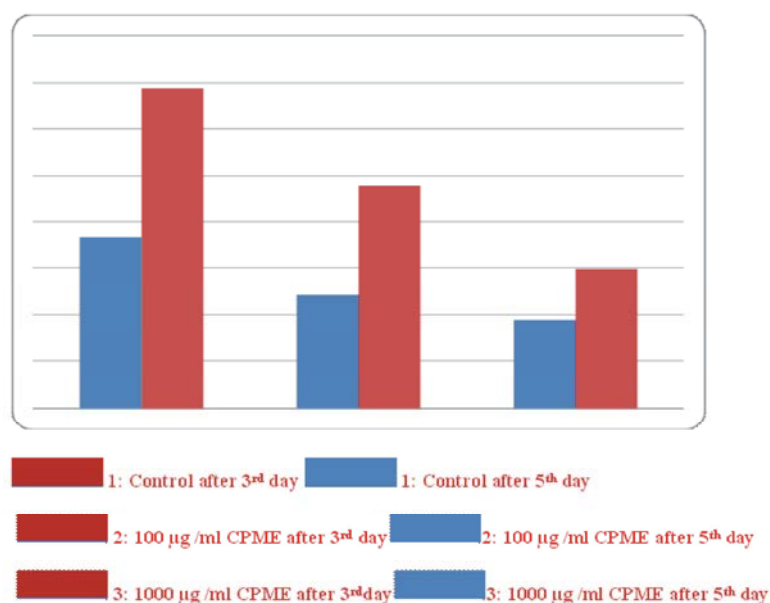


Fig. 1: Effect of Effect of *Calligonum polygoniods* methanolic extracts on shoot growth of *Avena sativa*

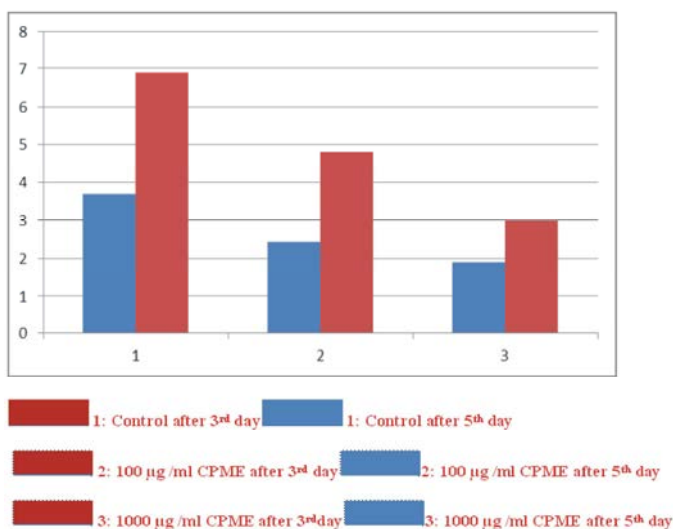


Fig. 2: Effect of Effect of *Calligonum polygoniods* methanolic extracts on root growth of *Avena sativa*

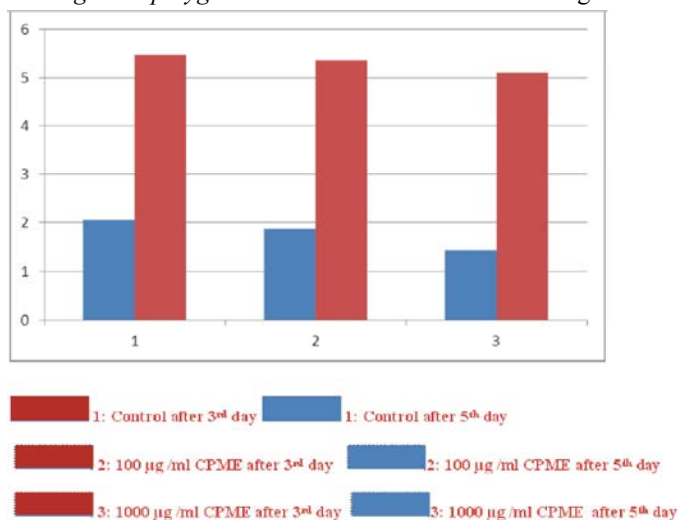


Fig 3: Effect of Effect of *Calligonum polygoniods* methanolic extracts on shoot growth of *Triticum aestivum*

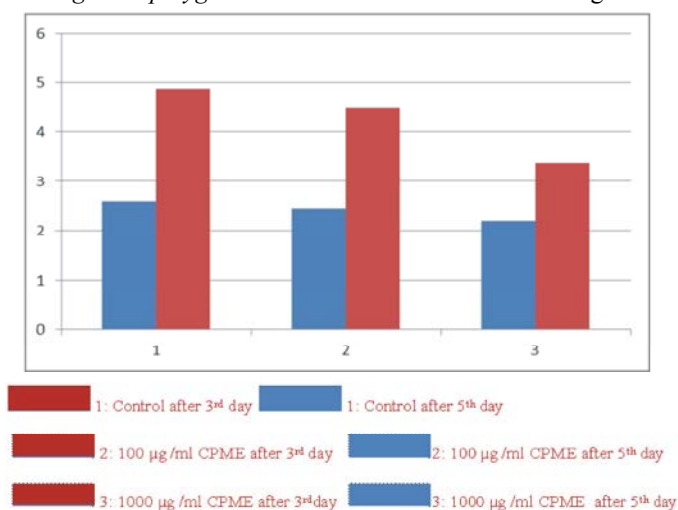


Fig. 4: Effect of Effect of *Calligonum polygoniods* methanolic extracts on shoot growth of *Triticum aestivum*

**Effect of Effect of *Calligonum polygoniods* Methanolic Extracts on Root Growth of *Triticum aestivum*:** Growth of root plays an important role in development of plants. The treatment of various concentrations of *Calligonum polygoniods* Methanolic extracts on root growth of *Triticum aestivum* revealed inhibition in root growth as compare to control. The findings are presented in Fig. 4.

### DISCUSSIONS

Allelopathy has been suggested as the key strategy for the impressive success of many invasive plants that has become dominant in their invaded plant communities. Phytotoxic potential of medicinal plants plays an important role because growth inhibition of weeds and other unwanted plants are much essential for success life of plant growth. The present phytotoxic studies revealed that 100 µg/ml and 1000 µg/ml of methanolic extract of *Calligonum polygoniods* (CPME) which was applied to the seeds of *Avenasativa* and *Triticum aestivum* sown in the separate petriplates showed maximum inhibition comparative control group which is only treated with distilled water. Similar results were obtained using the sandwich method while examining the phytotoxic effect of the extracts on the growth of weeds [10]. Extract bioassays are simple, rapid, inexpensive and straightforward. Therefore these can be used preliminarily to determine allelopathy for weed control. Ria *et al.* [11] Have also published similar results which justify and support the findings of our present study. Seed germination is considered to be the most critical stage of plant development and growth. The necessities of seed germination of any crop area are, i) water for reserves hydrolysis, ii) hydration of enzymes for operational iii) confirmation of cell membrane and organelles and iv) finally to provide the force for cell expansion induced by germination [12]. The presently available literature relevant to phytotoxic investigation suggests that *Calligonum polygoniods* has significant phytotoxic effects on plants tested in the present study. As a summary of our results cleared that phytotoxic results obtained from CPME showed that CPME inhibit the growth of roots and shoots of *Avenasativa* upto significant level. Other medicinal plant extract showed similar finding [13, 14].

### CONCLUSION

*Calligonum polygoniods* showed significant phytotoxic efficacy against the weeds but non-significant

potency against *Triticum aestivum* which can be studied for further potential herbicide.

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