Alternative & Integrative Medicine
ISSN: 2327-5162

Khan et al., Altern Integ Med 2014, 3:1
DOI: 10.4172/2327-5162.1000150

Research Article Open Access

Phytotoxic Potential of Methanolic Extract of *Cardia obaliqua*

Hanif Ullah Khan[1], Rahmat Ali Khan[1]*, Mushtaq Ahmad[1], Nadia Mushtaq[1], Muhammad Rashid Khan[2] and Nowshad Muhammad[1]

[1]*Department of Biotechnology, Faculty of Biological Sciences, University of Science and Technology Bannu, Khyber Pakutunkhwa, Pakistan*
[2]*Department of Biochemistry, Faculty of Biological Sciences, Quaid-i-Azam University Islamabad, Pakistan*

Abstract

Cardia obaliqua 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 *Cardia obaliqua* are used for the screening of phytotoxic potential. Two concentrations of crude methnolic extract i.e. 1000 µg ml^{-1} and 100 µg ml^{-1} was used in the assay. The *Cardia obaliqua* methanolic extract (COME) showed significant inhibition both in hypocotyls/shoot and radicals/roots growth i.e. *Cardia obaliqua* showed maximum inhibition for the growth of *Aveenasativa* and *Triticumaestivum*. These results provide evidence that *Cardia obaliqua* might be used affectively as bio herbicide for weeds control.

Keywords: *Cardia obaliqua*; Methanolic extract; Phytotoxic activity; *Aveenasativa*; Triticumaestivum

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].

Prof. Hansmolisch in 1937 introduced the term "Allelopathy" for first time. Allelopathy means the chemical relationship between the different plants species [4]. 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 [5]. According to Khan et al. [6] these released chemicals persist for a long time and strongly interfere on the growth and development of neighboring plants and weeds. Khan et al. [7] 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 allele chemicals 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.

Material and Method

Plant collection

Fresh leaves of the plant *Cardia obaliqua* was collected from Landidak, District Bannu, Khyber Pakhtunkhwa, Pakistan, during fruiting period and Identified by aneminent taxonomist, Professor Abdur-Rehman, Chairman Department of Botany, Govt Post Grageuate 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 *Cardia obaliqua* was socked in 1.5 liter of 70% methanol (CH_3OH) 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 protocol of McLaughlin (1988). 1 mg/ml metanolic crude extract solution of *Cardia obaliqua* 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 ug/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 distil water was sprayed on these treated petri plates along with control. 8 seeds of *Triticum aestivum* and *Avena sativa* seeds were washed with 1% $HgCl_2$ 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

***Corresponding author:** Rahmat Ali Khan, Department of Biotechnology, Faculty of Biological Sciences, University of Science and Technology Bannu, Khyber Pakutunkhwa, Pakistan, Tel: 92 928633425; Fax: 92 51 9205753; E-mail: Rahmatgul_81@yahoo.com

Received December 26, 2013; **Accepted** Janaury 21, 2014; **Published** Janaury 23, 2014

Citation: Khan HU, Khan RA, Ahmad M, Mushtaq N, Rashid M, et al. (2014) Phytotoxic Potential of Methanolic Extract of *Cardia obaliqua*. Altern Integ Med 3: 150. doi:10.4172/2327-5162.1000150

design with three replications. Graph prism pad was used, to analyze treatment differences.

Results

Effect of *Cardia obaliqua* methanolic extracts on shoot growth of *Avena sativa*

Effect of *Cardia obaliqua* 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 Figure 1.

Effect of Effect of *Cardia obaliqua* methanolic extracts on root growth of *Avena sativa*

Growth of root play important role in development of plants. The treatment of various concentrations of *Cardia obaliqua* methanolic extracts on root growth of *Avena sativa* revealed inhibition in root growth as compare to control. The findings are presented in Figure 2.

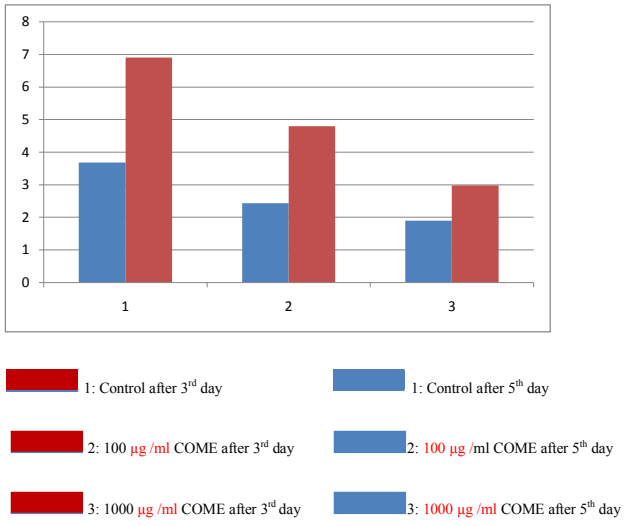

Figure 1: Effect of *Cardia obaliqua* methanolic extracts on shoot growth of *Avena sativa*.

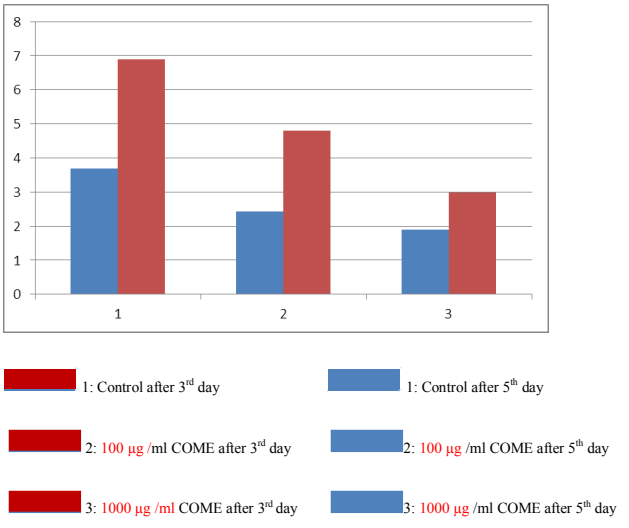

Figure 2: Effect of *Cardia obaliqua* methanolic extracts on root growth of *Avena sativa*.

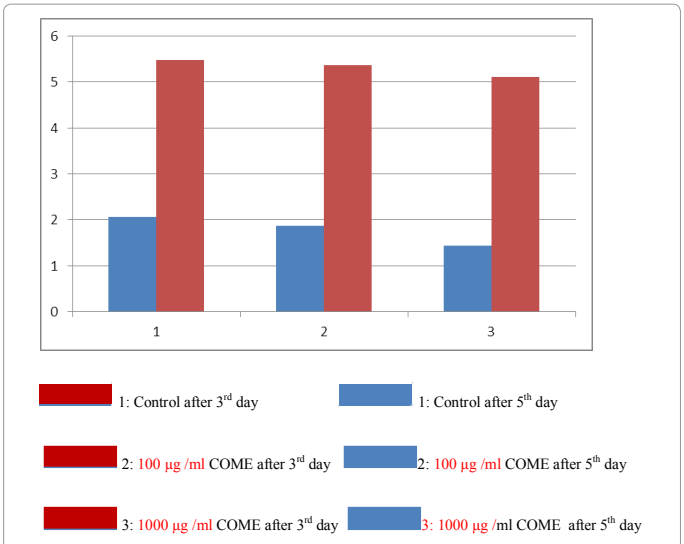

Figure 3: Effect of *Cardia obaliqua* methanolic extracts on shoot growth of *Triticum aestivum*.

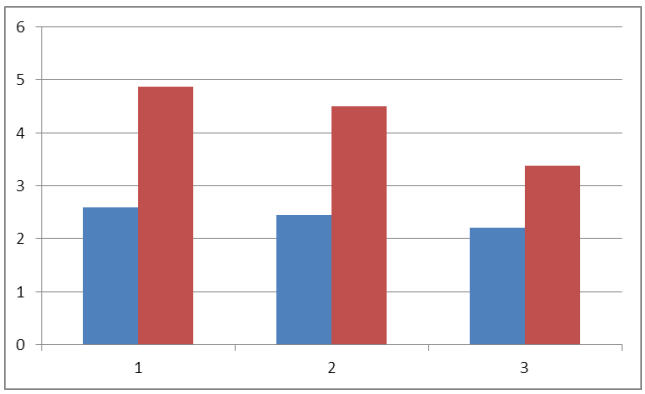

Figure 4: Effect of *Cardia obaliqua* methanolic extracts on shoot growth of *Triticum aestivum*.

Effect of *Cardia obaliqua* methanolic extracts on shoot growth of *Triticum aestivum*

Effect of *Cardia obaliqua* 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 Figure 3.

Effect of *Cardia obaliqua* methanolic extracts on root growth of *Triticum aestivum*

Growth of root play important role in development of plants. The treatment of various concentrations of *Cardia obaliqua* methanolic extracts on root growth of *Triticum aestivum* revealed inhibition in root growth as compare to control. The findings are presented in Figure 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 play 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 *Cardia obaliqua* (COME) which was applied to the seeds of *Aveena sativa* and *Triticum aestivum* sown in the separate petri plates 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 [6]. Extract bioassays are simple, rapid, inexpensive and straightforward. Therefore these can be used preliminarily to determine allelopathy for weed control. Riaz et al. [8] have also published similar results which justify and support the findings 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 [9,10]. The presently available literature relevant to phytotoxic investigation suggests that *Cardia obaliqua* has significant phytotoxic effects on plants tested in the present study. As a summary of our results cleared that phytotoxic results obtained from COME showed that COME inhibit the growth of roots and shoots of *Avena sativa* up to significant level. Other medicinal plat extract showed similar finding [11,12].

Conclusion

Cardia obaliqua showed significant phytotoxic efficacy against the weeds but non-significant potency against *Triticum aestivum* which can be studied for further potential herbicide.

References

1. Sahreen S, Khan MR, Khan RA (2010) Evaluation of antioxidant activities of various solvent extracts of Carissa opaca fruits. Food Chemistry 122: 1205-1211.
2. Khan RA, Khan MR, Sahreen S, Bukhari J (2010) Antimicrobial and Phytotoxic activity of various fractions of *Sonchus asper*. African Journal of Biotechnology 47: 3877-3683.
3. Bakhtiar M, Rashid K, Yasir A, Khan RA (2012) Phytochemical and cytotoxic analysis of Pharthenium hysterophosis selected from District Bannu, Pakistan. African Journal of Biotechnology 11: 11857-11860.
4. Fujii Y, Hiradate S (2007) Allelopathy: New concepts and methodology, Science publishers.
5. Rice EL (1984) Allelopathy. (2ndedn). Academic press, New York.
6. Khan RA, Khan FU, Ahmad M, Shah AS, Khan NS, et al. (2011) Phytotoxic and antibacterial assays of crude methanolic extract of Mentha longifolia (Linn.) African Journal of Pharmacy and Pharmacology 5: 1539-1533.
7. Khan RA, Khan MR, Sahreen S, Ahmed M (2012) Evaluation of phenolic contents and antioxidant activity of various solvent extracts of Sonchus asper (L.) Hill. Chem Cent J 6: 12.
8. Riaz M, Rahman N, Zia-Ul-Haq M (2013) Anthelmintic and insecticidal activities of Verbascumthapsus L. Pakistan Journal of Zoology 45: 1593-1598.
9. Zia-Ul-Haq M, Raza Shah M, Qayum M, Ercisli S (2012) Biological screening of selected flora of Pakistan. Biol Res 45: 375-379.
10. Kaleem WA, Nisar M, Qayum M, Khan S, Zia-Ul-Haq M, et al. (2012) Biological screening of oils from *Zizyphus oxyphylla edgew*. Pak J Bot 44: 1973-1976.
11. Kordali S, Cakir A, Ozer H, Cakmakci R, Kesdek M, et al. (2008) Antifungal, phytotoxic and insecticidal properties of essential oil isolated from Turkish Origanum acutidens and its three components, carvacrol, thymol and p-cymene. Bioresour Technol 99: 8788-8795.
12. Javid A (2009) Role of effective microorganisms in sustainable agriculture. Springer Publishers.