Effect of *Centaurea pullata* Methanolic Extract on the Growth of *Portulaca oleracea*

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Abstract: Phytotoxicity or allelopathy means poisonous results by a composite on plant growth, composites may be trace metals, pesticides salinity or phytotoxins. Some of the medicinal plants have phytotoxic activities which inhibit the growth of weeds and unwanted plants which are not of our desire. The present study is aimed to investigate the phytotoxic assessment of *Centaurea pullata* methanolic extract (CPME) roots. Dried plant were ground and extracted with methanol to prepare methanol crude extract. *In-vitro* phytotoxicity activity was conducted using these methanolic extracts as per standard procedures. The inhibitory effect of *Centaurea pullata* extract is tested on stalk and root of *Portulaca oleracea* and using four concentrations (3, 1.5, 0.75 and 0.37mg/ml) of plant extract and distal water in control. The result is noted on 5^{th} and 10^{th} days. The results obtained from these experiments showed that the crude methanolic extract of *Centaurea pullata* slightly inhibits the roots and shoots of *Portulaca oleracea* seeds as compared to the control plate which was not treated by the above mentioned sample extracts shown in Figures as. From the results obtained that, Phytotoxicity activity of *Centaurea pullata* methanolic extract showed non-significant results. Purification and *in vivo* studies of these plant are required for further verification.

Keywords: Phytotoxicity, Alelopathic, *Portulaca oleracea, Centaurea pullata.*

INTRODUCTION

Medicinal plants are ranked as an significant character in the persistence of human health. Medicinal plants have different parts which 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 medicines, beverages and dyes. Medicinal plants contains so many different types of phytochemicals such as saponins, tannins, steroids, flavonoids, vitamin C, and phenolic compounds. In western countries it is also known as alternative medicines and is used in modern pharmaceutical drugs. Word Phytotoxicity or allelopathy means poisonous results by a composite on plant growth, composites may be trace metals, pesticides salinity or phytotoxins. Allelopathy word was coined by Prof. Hans Molisch in 1973 which revels biochemical connection regarding the different medicinal plants [1]. Every year, about 13% of the world's crops are lost due to damages caused by weeds [2]. Penetration of seawater and extreme application of fertilizers etc, are the sources of excessive mineral salts. Urea is one of the example which is used as a nitrogenous fertilizer, in agriculture, but if this is used too much, then phytotoxic effects can result, moreover by urea harmfulness or by the "ammonia formed over hydrolysis of urea by soil urease". Then by aerobic bacteria ammonia (NH_3) dissolves into ammonium salts (NH_4^+), and then followed by oxidation into nitrites (NO_2^-) and nitrates (NO_3). The production of nitric acid and nitrous might be too acidic for the plant. There are different types of herbicides intended to destroy plants, and are also used to regulate undesirable plants such as agricultural weeds, though herbicides can also have phytotoxic properties [3]. Therefore recently scientists have focused their great attention on examining for novel secondary plant yields to improve bio-herbicides and bio-pesticides. To enhance the synthesis and exudation of allelochemicals, the two major factors, genetic characteristics and environmental conditions have played a very important role in this field [4]. Many crops such as rice, oat and wheat are being studied. Fujii *et al*., 2003 and Khan *et al*., 2016 [5, 6] examined that medicinal plants are screened for their allelopathic and or medicinal potential and to select the most bioactive ones for chemical analyses. The genus *Centaurea* had been extensively used in folk medicine for hundreds of years [7]. It is a medicinal herb from the *Asteraceae* family which seems to grow everywhere [8]. The *Centaurea* species had been also used in traditional medicine as diuretic, to treat fever and diabetes due to the presence of many bio active compounds [9]. Therefore, this study was established to evaluate the allelopathic properties of the crude extract of *Centaurea pullata* against the root and seedling growth of *Portulaca oleracea* under controlled conditions.

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MATERIALS AND METHODS

Plant Collection

The roots of *Centaurea pullata* medicinal plant were purchased from local market in District Bannu and the plant were identified via a taxonomist of department of Botany UST Bannu Dr. Sultan wazir. The roots of plant were dried at room temperature and grinded to powder.

Plant Extraction

When the plant samples were collected, they were cleaned from sand particles and kept it for drying under room temperature for fortnight. Using of 60-mesh size of Willy Mill to make powder of the selected dried samples were ground and then this powder was used for plant as a sample for more solvent extraction. After that fine powder of 100g of plant sample was dipped in 500 ml methanol with continuous shaking and kept for 5 days at room temperature. The plant sample was removed by Whatman filter paper after 5 days, followed by concentration on rotary evaporator. Extra methanol was evaporated at 37^{o}C after the concentration to obtain crude extract.

Phytotoxic Bioassay

The plant growth of *Portulaca oleracea* was tested against the phytotoxic activity of *Centaurea pullata* extract. This Phytotoxic test of plant extracts were performed according to the protocol given by McLaughlin and Rogers, 1998., [10]. Different fractions of plant extracts were prepared from the stock solution viz; 3, 1.5, 0.75 and 0.37mg/ml. 500µl of 3,1.5,0.75 and 0.37mg/ml solutions was taken from plant sample (with the help of micropipette) and was put on the petri plates labeled it. In control the Distilled H_2O was used. All the petri dishes were kept at 40 C° for drying, for the evaporation of methanol. Then 5 ml D/water was put on each filter paper set in the petriplates of all the four concentrations of plant samples as well as in the control. Five seeds of *Portulaca oleracea* from already washed by 1% $HgCl_2$ and soaked in DH_2O. Seeds were placed in every petri plate. All the petri plates were incubated in the growth room and after five days, the first reading i.e. length of root/ radical was taken and distilled water to each plate was added to maintain the moist condition. The last reading of the seed's growth was taken after ten days, and the % inhibition of growth was calculated. Dry and fresh weight was also recorded.

RESULTS

Phytotoxicity Assessment of *Centaurea pullata*

The herbicidal activity of the methanolic extract of *Centaurea pullata* shows non-significant result which are shown below in graphical form. The inhibitory effect of *Centaurea pullata* extract is tested on stalk and root of *Portulaca oleracea* and using four concentrations (3,1.5,0.75 and 0.37mg/ml) of plant extract and distal water in control. The result is noted on 5th and 10th days. The results obtained from this experiments showed that the crude methanolic extract of *Centaurea pullata* slightly inhibits the roots and shoots of *Portulaca oleracea* seeds as compared to the control plate which was not treated by the above mentioned sample extracts shown in Figures as.

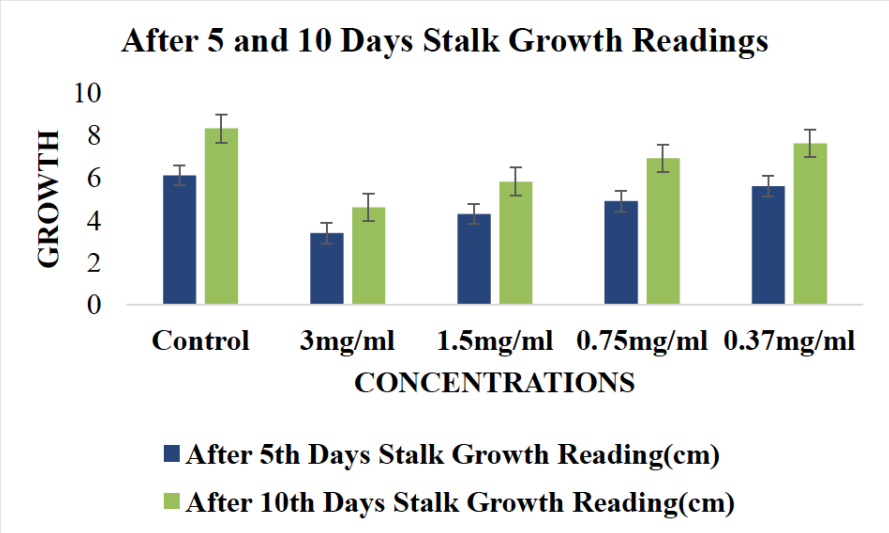

Figure 1: Effects of *Centaurea pullata* on *Portulaca oleracea* stalk growth.

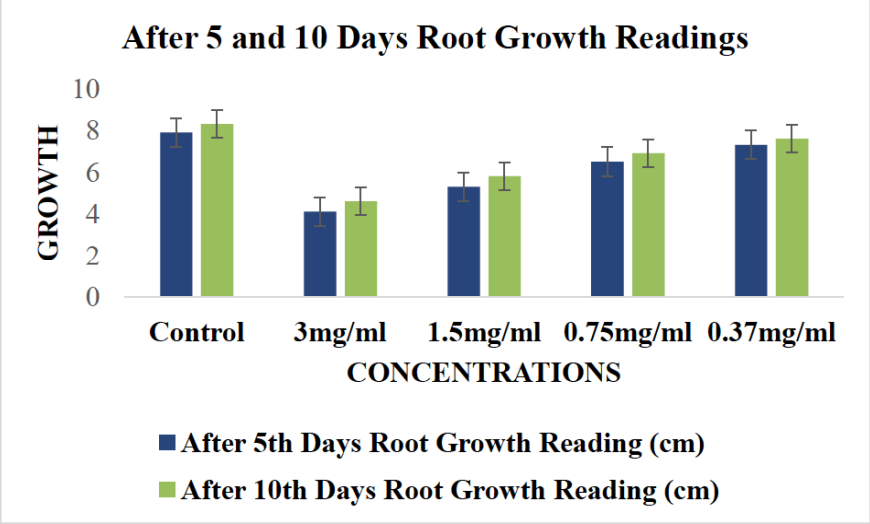

Figure 2: Effects of *Centaurea pullata* on *Portulaca oleracea* root growth.

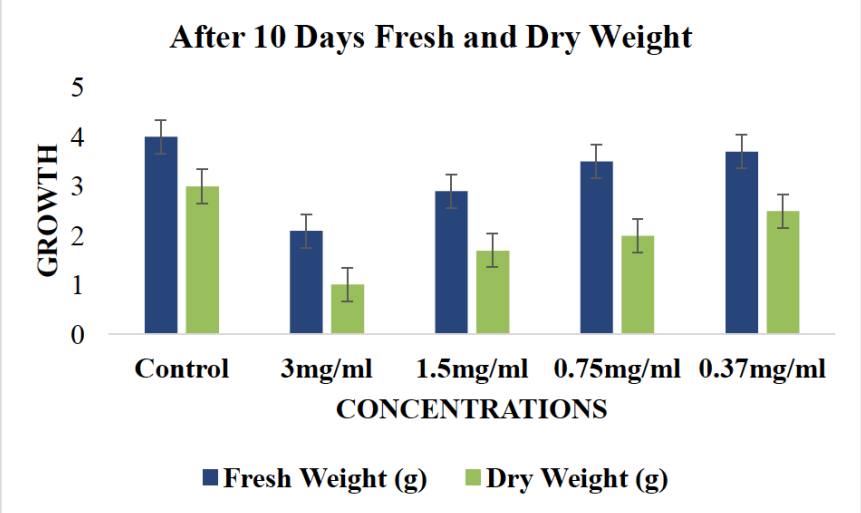

Figure 3: Effects of *Centaurea pullata* on *Portulaca oleracea* fresh weight and dry weight.

Effects of *Centaurea pullata* Plant on Fresh and Dry Weight

After the 10 days of the treatment, fresh and dry weight was calculated and it was observed that, methanolic extract of *Centaurea pullata* significantly reduced the fresh and dry weight; indicating the occurrence of the bioactive allelochemicals in the methanolic extract. After the completion of experiment, the experimental seedlings were dried under controlled condition and it was found that, the weight of methanolic extract of *Centaurea pullata* was efficiently less as compared to the control.

DISCUSSION

Medicinal plants are good source to obtain a wide range of drugs in view of the fact that, a single plant can be used to treat more than one ailment and traditional medicines are extensively used. According to World Health Organization (WHO) 80% people in the world use conventional medicines of plant extracts [11].

Phytotoxic Potential of *Centaurea pullata*

Some of the medicinal plants have phytotoxic activities which inhibit the growth of weeds and unwanted plants which are not of our desire. The phytotoxic results obtained from the *Centaurea pullata* showed they inhibit the germination of roots and shoots of the *Portulaca oleracea* plants but not to a significant level as compared to the other medicinal plants. The significant results were found by Kordali *et al.,* 2008., [12] that the necessary oils and phenolic compounds isolated from Turkish *origamum acutidens* totally

inhibited the germination of roots and shoots and possess antifungal activity when compared to the standard compounds.

According to Javid, 2009, [13] the water extracts of *Withania somnifera* and *Datura alba* have the same bioactive compounds which considerably inhibited the growth of roots and shoots *Rumex dentatus* L (Highly competitive Weeds in Wheat).

CONCLUSION

The conclusion obtained from this experiments showed that the crude methanolic extract of *Centaurea pullata* slightly inhibits the roots and shoots of *Portulaca oleracea* seeds.

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