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Phytotoxicity of *Acropitilon repens* (Asteraceae) and *Nepeta pretervisa* (Laminaceae)

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Medicinally important plants *Acropitilon repens, Nepeta preatervisa* in Balochistan, were investigated for phytotoxicity. The methanol extracts of the whole plants were analyzed for the phytotoxic effects on development of fronds of *Lemna aequinoctialis*. The test species was significantly inhibited by methanol extracts of both *Acropitilon repens* and *Nepeta praetervisa*. *A. repens* showed 65 % phytotoxicity at high concentration and *N. praetervisa* significantly inhibited 50 % growth of test plant *Lemna aequinoctialis*.

Key words: Medicinal plants, Phytotoxicity, *Acropitilon repens* and *Nepeta praetervisa*

Introduction

The wild plants of medicinally important *Acropitilon repens, Nepeta pretaervisa,* were collected from Hazargangi, Karkhasa Zarghoon in Balochistan. *A. repens* (Russian knapweed) is a perennial herbaceous plant of aster family (Asteracea). It is extensively branched with solitary flower heads terminating on each branch (Cronquist, 1994).It is used in malaria, diabetes, hepatic diseases and dyspepsia by local people of different area of Balochistan. *Nepeta praetervisa,* locally known as Samsok, is a 40 cm tall, perennial herb, with erect stem and crenate leaves. Tea of *Nepeta praetervisa* is given for cold and it is used as a cure for pneumonia (Burkill, 1969). It is also used for children ailments such as measles, chicken pox, colic fevers, indigestion, nervousness, insomnia and hyperactivity. Its seeds are dried ground and mixed with flour to make special bread for treatment of Lumbago and internal injuries (Ali *et al,* 1996).). Field observations suggest that these species suppress growth of neighboring plants. Some wild plants are known to exhibit phytotoxicity by releasing water-soluble phytotoxins (Horshy 1977, Sterling 1987). These undesired plants that compete with crop plants for nutrients and produce toxic chemicals which inhibit germination and growth of desired plan. No researcj work has been carried out to check the phytotoxic effects of these two plants. Therefore this study was conducted to investigate the phytotoxic effect of *Acropitilon repens,* and *Nepeta pretaervis.a*

Materials and Methods

Sample preparation

Two kg of each *Acropitilon* and *repens, Nepeta pretervisa* were collected in June 2005. The whole plants were dried in shade, grinded and soaked separately in methanol for 15 days at room temperature. The filtered fraction was concentrated in a rotary evaporator at 40 °C to obtain thick crude extracts.

Phytotoxicity Bioassay

The bioassay was performed using 'Lemna' plant to detect the phytoxicity of plants. (Atta-ur-Rehman, 1991). *Lemna aequinoctialis*, a small aquatic monocot, was cultivated in laboratory under optimal conditions for one to two days at 28 °C and then transferred to aseptic nutrient solution containing 1% sugar, 0.5% casamineo acid and 0.004% yeast extract, to obtain a large number of healthy plants. Ten plants of *L. aquinoctialis* each containing rosette of three fronds, were selected for keeping in three sterilized conical flasks containing 20 ml of E.medium(KH_2PO_4,0.68- 0.69gm/L,KNO_3,1-515gm/L,$Ca(NO_2)_24H_2O$,1180gm/L, $MgSO_4.7H_2O$,0.492-0.50gm/L,$H_3BO_3$0.00286gm/L, $MnCl_2.4H_2O$,0.00362gm/L,$FeCl_3.6H_2O$,0.00540gm/LZn SO_4,0.0022gm/L, EDTA, 0.01120gm/L).

Flasks were formerly inoculated with 1000 µl, 100 µl, and 10 µl of solution pipette out from the stock solution for 500, 50 and 5 ppm. Stock solution was prepared

by dissolving 15mg of plant extract in 1.5mg of MeOH. From it 500, 50 and 50 ppm solution were prepared. Solvent was allowed to evaporate over night in sterilized condition. Other flasks were supplemented with solvent (MeOH) and plants growth inhibitor (Paraqual) serving as negative and positive controls, respectively. Plants were incubated for seven days in growth cabinet. On seventh day the number of fronds per flasks were counted and recorded.

Table 1. Phytotoxicity Test of *Acropitilon repens & Nepeta praetervisa*

Name of Plants	Dose µg/ml	No. of Fronds	*Lemna aequinoctialis*	Growth regulation %
		Sample	Control	
Acropitilon repens	500 50 05	13 15 16	20 20 16	65 25 0
Nepeta praetervisa	500 50 05	10 17 11	20 20 16	50 31.5 20
Paraqual (Reference Inhibition)	500 50 05	–	–	100 100 100

Experiment was repeated 3 times n=6

Results and Discussion

Acropitilon repens inhibited 65 % growth of plant *Lemna acqinotialis* at high dose of 500 µg/ml (Table 1). Low activity was observed at 50 µg/ml with only 25% inhibition. No growth inhibition was observed at 5 µg/ml.

Nepeta praetervisa inhibited 50 % growth of plant *Lemna acqinotialis* at a concentration of 500 µg/ml. However, some phytotoxicity was observed even at lower concentrations. Lemna growth was inhibited by 20 % at a concentration of 5 µg/ml (Table 1).

Nepeta praetervisa is found to be toxic to other competitive plants when growing abundantly in their natural environment. Its thick strands are found in the fields in Ziarat and Quetta district. Fewer plants grow in the vicinity of pure communities of *Nepeta praetervisa.* It may be concluded that it has allelopathic effects against other such plants. However, it shows no such association with plants as *Artemisia, Peroviskia* and *stachys.*

The affects of the extracts at high concentrations were also comparable to standard herbicide paraqual. This effect may be due to phenol compounds or glycosides present in methanol extracts.

It has been observed earlier that *A. repens* inhibits the growth of other competing plants (Watson 1980), and also shows strong allelopathic effects on neighboring plants (Kelsey and Bedunah, 1989). Once it established it can dominate an area and significantly reduces desirable vegetation e.g. perennial grasses. *A. repens* contains an allelopathic polyacetylene compound which inhibits the growth of competing plants (Watson 1980). This allelopathic effect, combined with dense vegetative reproduction, allows the Russian knapweed to quickly colonize and dominate new sites. These effects were due to water-soluble toxic compounds present in these wild plants, which are leached into the soil by irrigation, rain, or snowfall, making the entire soil unfavorable for cultivation. This allelopathy was similar to that observed by other plants like *Citrullus colosynthus, Euphorbia sps, Silybum marianum* and some weeds like *Eragostis poaides,* (Khan, 1982; Hussain *et al*, Shaukat *et al*, 1985; Chughtai *et al*, 1988). Allelopathy is mainly due to phenolic compounds (Niknam and Ebrahimzadeh, 2002), which are harmful for herbivores and they avoid consuming it. At the ecosystem level, phenolics can mediate interactions directly or indirectly link autotrophs to each other and to herbivores (Waterman and Mole, 1994).

These phytotoxic effects are also similar to allelopathic effects of these plants that inhibit the growth of crop seeds (Table 1). It causes serious reduction in yield, crop value, and devalues the land itself. Shoot densities of 11-64 shoots/m^2 have reduced grain yield by 28.75 % (Watson, 1980). Thus our result confirms the phytotoxicity of *A. repens.* Therefore, these must be removed from the crop fields

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