Journal of Medicinal Plants Research Vol. 6(8), pp. 1403-1406, 29 February, 2012
Available online at http://www.academicjournals.org/JMPR
DOI: 10.5897/JMPR10.685
ISSN 1996-0875 ©2012 Academic Journals

Full Length Research Paper

Phytotoxic characterization of various fractions of *Launaea nudicaulis*

Rahmat Ali Khan[1,2]*, Muhammad Rashid Khan[2], Sumaira Sahreen[2], Naseer Ali Shah[2], Jasia Bokhari[2], Umbreen Rashid[2] and Shumaila Jan[2]

[1]Department of Biotechnology, University of Science and Technology, Bannu, Khyber Pukhtunkhawa, Pakistan.
[2]Department of Biochemistry, Faculty of Biological Sciences, Quaid-i-Azam University, Islamabad 4400, Pakistan.

Accepted 21 June, 2011

***Launaea nudicaulis* is a local medicinal plant of District Bannu, KPK, Pakistan, used traditionally for various diseases and having the phytotoxic ability. In the present study, allelopathic activity of the various fractions of *Launaea nudicaulis* was studied against radish growth. Two concentrations of the extract: 100 and 1000 ppm were used. Methanolic and ethyl acetate fraction markedly showed inhibition of root and radical growth compared to other fraction. The fresh and dry weight of whole radical and shoot showed significant results. The allelopathic activity of various fractions of *Launaea nudicaulis* may be due to the presence of bioactive constituents.**

Key words: *Launaea nudicaulis*, radish seeds, root inhibition.

INTRODUCTION

Many allelochemicals of plant sources exert their influence by such a mechanism which is not shown by commercial herbicide. Thus for new herbicide discovery, these natural allelochemicals play the role of ideal lead compounds. Therefore recently scientists have focused their great attention on searching for new secondary plant products to develop bio-herbicides and bio-pesticides. To enhance the synthesis and exudation of allelochemicals, the tow major factors, genetic characteristics and environmental conditions have played a very important role in this field (Inderjit, 2003). Many crops such as rice, oat and wheat are being studied. Medicinal plant have are useful in improving human health and amelioration of various diseases (Sahreen et al., 2010; Khan et al., 2009, Khan et al., 2010a, b; Khan et al., 2012a, b), as well as phytoxic effects (Khan et al., 2010; khan et al., 2011). Now days an extensive research has been going on to control weeds worldwide. Medicinal plants are screen for their allelopathic and or medicinal potential and to select the most bioactive ones for chemical analyses (Fujii et al., 2003; Khan et al., 2010c; Khan et al., 2012b, d). *Launaea nudicaulis* is traditionally used in the treatment of various diseases. Therefore the present project is designed to investigate the phototoxic potential of *Launaea nudicaulis* (Figure 1a and b).

*Corresponding author. E-mail: mrkhanqau@yahoo.com. Tel: +92 51 90643086. Fax: +92 51 9205753.

Abbreviations: DMSO, Dimethyl sulfoxide; **LNME,** *Launaea nudicaulis* methanolic extract; **LNHE,** *Launaea nudicaulis* n-hexane extract; **LNEE,** *Launaea nudicaulis* ethyl acetate extract; **LNCE,** *Launaea nudicaulis* chloroform extract; **LNBE,** *Launaea nudicaulis* butanolic extract; **LNWE,** *Launaea nudicaulis* water extract.

MATERIALS AND METHODS

Plant collection and extraction

Ariel parts of *Launaea nudicaulis* was collected from Town Ship, District Bannu at maturity, identified and were shade dried at room temperature, grinded mechanically and extracted with 80 % methanol. The methanolic crude extract is further fractionated with, n-hexane, ethyl acetate, chloroform, butanol and distilled water with increasing order of polarity. After rotary evaporation all the fraction extract are stored at 4°C for further for phytotoxic analysis.

Phytotoxicity bioassay

Protocol of McLaughlin and Rogers (1998) was used for checking the phytotoxic efficacy of the various fractions of plant extract. Two concentrations (100 and 1000 ppm) in respective solvents are

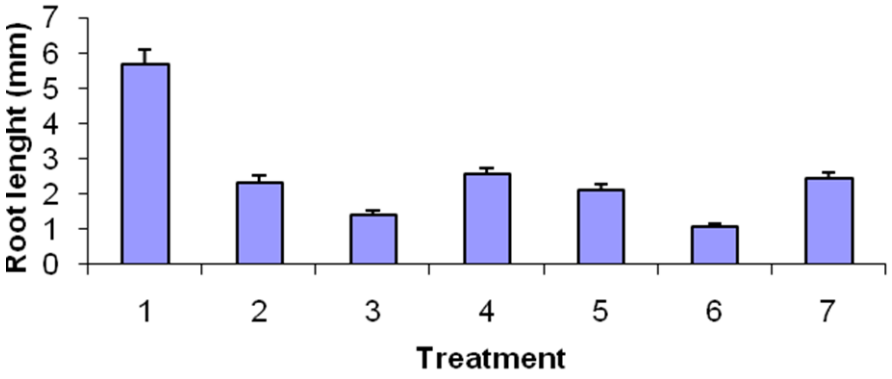

Figure 1a. Root inhibition at 100 ppm concentration of various fractions of *Launaea nudicaulis 1* (non treated control), 2 (n-hexane fraction), 3 (ethyl acetate fraction), 4 (chloroform fraction), 5 (butanol fraction), 6 (methanol fraction), 7 (water fraction).

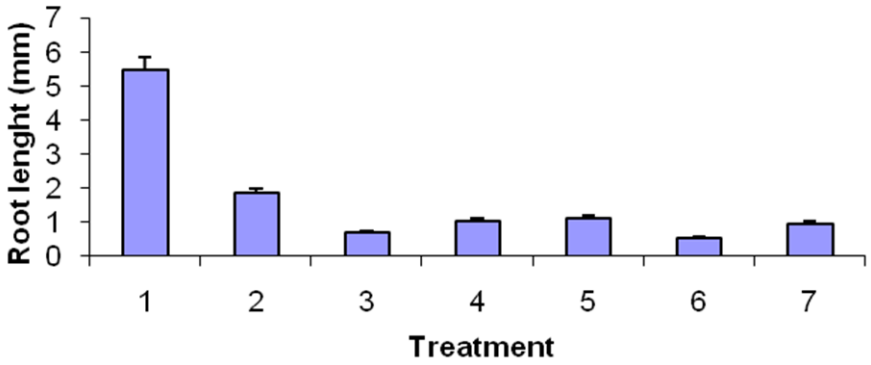

Figure 1b. Root inhibition at 1000 ppm concentration of various fractions of *Launaea nudicaulis 1* (non treated control), 2 (n-hexane fraction), 3 (ethyl acetate fraction), 4 (chloroform fraction), 5 (butanol fraction), 6 (methanol fraction), 7 (water fraction).

prepared and preceded. Radish seed was washed with dH_2O and then with 1% mercuric chloride. Filter paper was put in each autoclaved Petri plates. 5 ml of each fraction was poured in each plate and the respective solvent was evaporated. 10 seeds were placed in each plate and incubated in growth room for five days. After 5 days root and shoot inhibition was noted. Fresh weight and dry weight of whole plant was also recorded.

RESULTS

Phytotoxicity assessment

Effect of various fractions on root growth

Various fractions of *Launaea nudicaulis* revealed methanolic (LNME) and ethyl acetate fraction (LNEE) showed significant (P< 0.01) inhibitory effect on root growth of radish as compare to other fraction of extract. Phytotoxic (allelopathic) effects of *Launaea nudicaulis* were evaluated against radish seed growth under control environmental condition in growth room at both 100 ppm and 1000 ppm, respectively.

Effect of various fractions Shoot growth inhibition

Launaea nudicaulis also effects the shoot growth of radish. Data of the present data revealed that methanolic fraction of *Launaea nudicaulis* as well ethyl acetate fractions of *Launaea nudicaulis* have markedly (P<0.01) the growth of radish at 5th day of treatment both at 100 and 1000 ppm respectively as presented in Figure 2a and b.

Effect of fractions on fresh and dry weight

At the 5th day of treatment, fresh weight of all treatment groups was calculated and observed that LNME and LNEE of *Launaea nudicaulis* significantly reduced (P<0.01)

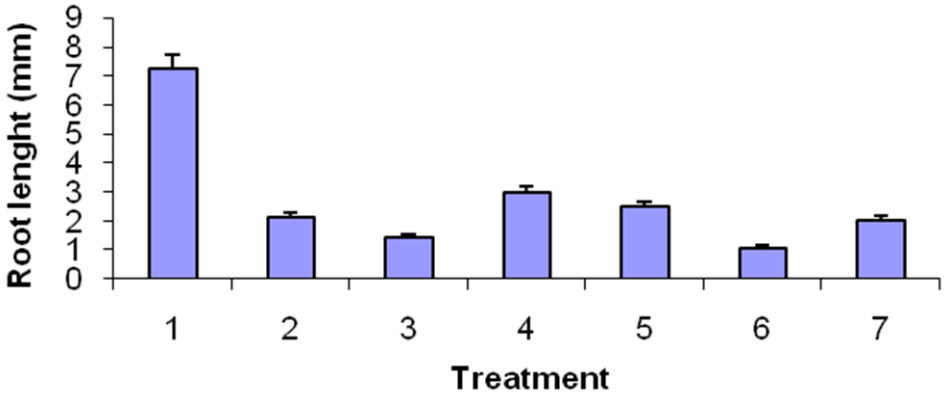

Figure 2a. Represents the shoot inhibition at 100 ppm concentration of various fractions of *Launaea nudicaulis 1* (non treated control), 2 (n-hexane fraction), 3 (ethyl acetate fraction), 4 (chloroform fraction), 5 (butanol fraction), 6 (methanol fraction), 7 (water fraction).

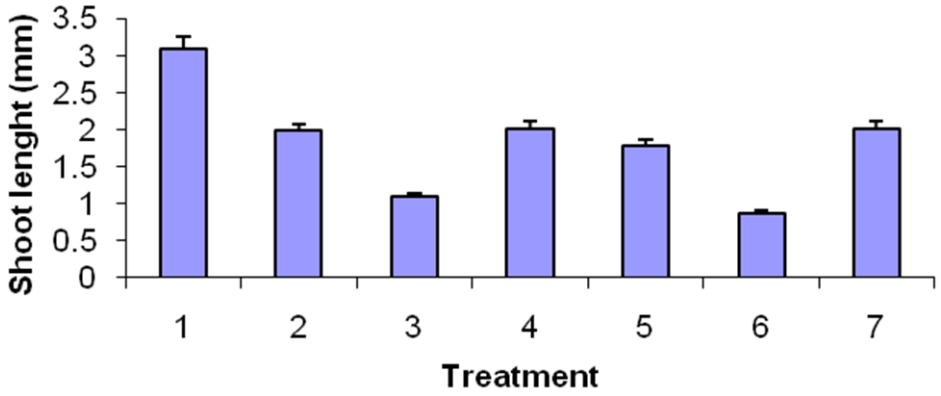

Figure 2b. Represents the shoot inhibition at 1000 ppm concentration of various fractions of *Launaea nudicaulis 1* (non treated control), 2 (n-hexane fraction), 3 (ethyl acetate fraction), 4 (chloroform fraction), 5 (butanol fraction), 6 (methanol fraction), 7 (water fraction).

fresh weight as well as dry weight of the radish plant which might be due the presence of bioactive allelochemicals in these fraction (Table 1).

DISCUSSION

The results of our present screening assays justify the use of the investigated plants against herbicides in Pakistan. Results of the present study revealed that Water, methanolic and butanolic fractions of *Launaea nudicaulis* showed marked inhibition comparatively to other fractions as well as control. Similar results were reported by Khan et al., (2010) and Khan et al., (2011) which justify the present study. Similarly water extract of *Withania somnifera* and *Datura alba* significantly inhibited the root, as well as shoot growth due the presence of bioactive polyphenolic compounds (Javaid, 2009).

Similar investigations was found that essential oil isolated from Turkish *Origanum acutidens* and their phenolic compounds completely inhibited the growth of seedling and roots and possessed antifungal activity when compared to standards compounds. The investigation of Hussain et al. (2010) also in accordance to our findings.

Conclusion

From the present data it is inferred that *L. nudicaulis* methanolic and ethyl acetate fractions have significant herbicidal potency, might be the presence of allelochemicals. Therefore, further study on isolation and purification of these allelochemicals are suggested.

Table 1. Effect of various fractions of *Launaea nudicaulis* on radish whole plant fresh and dry weight.

Treatment	Fresh weight (g)		Dry weight (mg)	
	100 ppm	1000 ppm	100 ppm	1000 ppm
Control	5.67±0.6[a]	5.45±0.2[a]	7.23±0.4[a]	3.09±0.02[a]
LNHE	2.34±0.2[b]	1.87±0.05[b]	2.12±0.02[b]	1.98±0.09[b]
LNEE	1.41±0.02c	0.69±0.001[c]	1.45±0.006[c]	1.09±0.001[c]
LNCE	2.56±0.1[b]	1.02±0.01[b]	3.09±0.1[b]	2.01±0.1[b]
LNBE	2.12±0.5[b]	1.1±0.2[b]	2.54±0.2[b]	1.78±0.3[b]
LNME	1.09±0.06[c]	0.54±0.002[c]	1.08±0.003[c]	0.87±0.001[c]
LNWE	2.45±0.1[b]	0.97±0.3[b]	2.02±0.1[b]	2.01±0.12[b]

Each value in the table is represented as mean ± SD (n = 3), means not sharing the same letter are significantly different (LSD) at $P < 0.01$ probability level in each column, LNHE (n-hexane fraction), LNEE (ethyl acetate fraction), LNCE (chloroform fraction), LNBE (butanol fraction), LNME (methanol fraction), LNWE (water fraction).

REFERENCES

Fujii Y, Parvez SS, Parvez MM, Ohmae Y, Iida O (2003). Screening of 239 medicinal plant species for allelopathic activity using sandwich method. Weed Biol. Manag., 3: 233-241.

Hussain F, Hameed I, Dastagir G, Shams-un-Nisa, Khan I, Ahmad B (2010). Cytotoxicity and phytotoxicity of some selected medicinal plants of the family Polygonaceae. Afr. J. Biotech., 9 (5): 770-774.

Inderjit DSO (2003). Ecophysiological aspects of allelopathy. Planta, 217: 529-539.

Javaid A (2009). Role of Effective Microorganisms in Sustainable Agricultural Productivity. In: Advances in Sustainable Agriculture. Springer Publishers (in Press).

Khan RA, Khan MR, Sahreen S, Jan S, Bokhari J, Rashid U (2012). Protective effect of *Launaea procumbens* against KBrO3 induced nephrotoxicity in rats. Afr. J. Pharm. Pharmacol., pp. 317-321.

Khan RA, Khan MR, Sahreen S, Ahmed M (2012b). Evaluation of phenolic contents and antioxidant activity of various solvent extracts of Sonchus asper (L.) Hill. Chem. Cent. J. 6:12 doi:10.1186/1752-153X-6-12.

Khan RA, Khan MR, Sahreen S, Jan S, Bokhari J, Rashid U (2011) Phytotoxic characterization of various fractions of *Launaea procumbens.* Afr. J. Biotech., 10: 5377-5380.

Khan RA, Khan MR, Sahreen S, Jan S, Bokhari J, Rashid U (2011). Protective effects of various fractions of *Launaea procumbens* on molecular markers in rat kidney. Afr. J. Pharm. Pharmacol., 6(3): 157-161.

Khan RA, Khan MR, Sahreen S, Jan S, Bokhari J, Rashid U (2012). Protective effect of *Launaea procumbens* against $KBrO_3$ induced nephrotoxicity in rats. Afr. J. Pharm. Pharmacol., pp. 317-321.

McLaughlin JL, Rogers LL (1998). The use of biological assays to evaluate botanicals. Drug Inform. J., 32: 513-524.

Sahreen S, Khan MR, Khan RA (2010). Hepatoprotective effects of methanol extract of *Carissa opaca* leaves on CCl4-induced damage in rat. BMC Comp. Alter. Med., 11:48 doi: 10.1186/1472-6882-11-48.

Sahreen S, Khan MR, Khan RA (2010). Evaluation of antioxidant activities of various solvent extracts of *Carissa opaca* fruits. Food Chem., 22: 1205-1211.