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Pharmacognostic Study of *Calligonum polgonoides*

Aziz Khan[1], Sultan Mehmood[1] and Zahid Rasheed[2]

1. Depart of Botany University of Science and Technology Bannu-Pakistan
2. Department of Mathematics, Women University of Azad Jammu and Kashmir, Bagh

***Corresponding Author**: azizfqk@yahoo.com

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ABSTRACT

Introduction: *Calligonum polygonoides* is a common plant of sand dunes in Southern Baluchistan, KPK and Trans-Indus plains, also found in certain area of District Bannu. The present study was carried out to report the phytotoxic, antibacterial and antifungal effect of *Calligonium poygonoides*

Materials and Methods: *Calligonium poygonoides leaves* were collected, washed, filter, extract was obtained, stock solution of was prepared. Seed of *Abelmoschus esculentus* and *Helianthus annus* were selected for this research. There are four replications: in each replica there were three Petri dishes. Three Petri dishes were selected for each concentration; 15ml of each concentration were prepared.

Results: The results showed that the methanol extract of this plant gradually decreased the germination percentage, especially at higher concentration. The radicle and plumule length were also affected by different concentration. We further study the effect of different dilute concentration of shade dry leaf methanol extract of *Calligonum, Polygonoide* on bacterial and fungal strains (*Stroptococcus byogenes, Salmonella typhi, Aspergillus fumigates* and *Candida albicans)* for antibacterial and antifungal properties.

Conclusion: It is concluded that extract of *Calligonum polygonoides* inhibit the germination and seedling growth of *Cucumus sativus* and *Brassica oleracea Abelmoschu.*

Key words: *Calligonium,* Phytotoxic, Bannu, *Abelmoschus.*

INTRODUCTION

Calligonum polygonoides is a common plant of sand dunes in Southern Baluchistan, KPK and Trans-Indus plains, also found in certain area of District Bannu. This shrubby plant is chiefly used as a fuel and Naswar preparation; flowers are also eaten in Sind. This plant is commonly known as Phog, but its local name is Bananza; it is a small much branched and leafless shrub found in sandy type soil xeric condition. It is usually 4-6 feet but occasionally may reach up 10 feet in height with a girth of 1-2 ft. leave very scanty sessile, minute linear and for caduceus, 7-15mm long; linear spathulate; stipules very short membranous, obliquely amplexicaul; flowers pink pedicellate, pedicel 3-8 mm long, slightly accresent in fruit; perianth 2mm long,2-3 mm broad cleft about two-third the way down; segments 5, obovate, thin, membranous, red with broad white margin: stamen 12, filament swollen, hairy and connate at the base; fruit densely clothed with branched bristles with dilated often confluent bases. It produces root suckers and is easily propagated by cutting and layering. This tree is also name orta in old Arabic poems so large number of people agrees that origin of Aorta for great human artery. It is very hardy and being capable of growing under adverse condition of soil and moisture. It is a dominant perennial shrub in active sand dunes and stabilize sand fields in most desert area (Tao, 2000). *Calligonum* genus belongs to family Polygonaceae ,with some 80 species distributed throughout Western Asia, Southern Europe and North Africa (Okasaka *et al*., 2004). *Calligonum* (L.) is an ancient genus of the arid desert flora of North Africa*,* Iran, Iraq, Pakistan, Russia, Turkey, Palestine and Syria.

Materials and Methods

The present study was conducted during 2012-14. *Calligonium poygonoides leaves* were collected from Domel area of District Bannu in Khyber Pakhtunkhwa (KPK) Pakistan. All leaves

were washed with distilled water to remove dust and other residues, than the leaves were dried under shade. The dried samples were than crushed to powder form by electric grinder. After that, leaf powders were soaked in 70% methanol for 72 hours at room temperature. The methanol extract was collected by use of Whatman filter (Al-Zahrani and Al-Robai, 2007). Methanol and water was evaporated while extract was obtained. After extraction, stock solution of .5g/50ml or 10mg/1ml was prepared, further dilute concentration of stock solution are (0mg/1ml, 5mg/1ml, 7mg/1ml, 10mg/1ml) were prepared, distilled water as the control treatment. Seed of *Abelmoschus esculentus* and *Helianthus annus* were selected for this research. There are four replications: in each replica there were three Petri dishes. Three Petri dishes were selected for each concentration; 15ml of each concentration were prepared. Added 5ml extract concentration to each Petri dish of replica. After drying blotter paper 7 seeds were grown in each petridish. Three petridishes of 0mg/1ml was taken as a control of all these treatment *Abelmoschus esculentus* and *Helianthus annus* were selected for this study. Statistical analysis of data was carried out by using SPSS and Excel soft ware. Comparison of mean was carried out by with the Duncan,s multiple test using SPSS.

RESULTS AND DISCUSSION

Phytotoxic Activity: In treatment of 10mg/1ml, germination percentage of seeds of *Helianthus annus* were 73.91%, while germination percentage of 7mg/1ml, 5mg/1ml and control were 73.91%, 82.60%, 100% respectively similarly the germination percentage of *Abelmoschus esculentus* seeds at control were 100% while germination of *Abelmoschus esculentus* treatments at concentration of control, 5mg/1ml, 7mg/1ml and 10mg/1ml were, 100% 39.13%, 28.69% and 21.73%. Therefore**,** the greatest and least inhibitory effect of leaf extract on percentage of seed germination was belonged to *Abelmoschus esculentus* plant seeds. Effects of different

concentration level of plant extract on *Helianthus annus* seed germination were shown in Table.1 and 2. In all plants, the highest reduction in plumule length observed in 10mg/1ml treatment.

Anti-Bacterial Activity: An Anti-microbial activity was performed by disc diffusion method. Aseptic Dextrose potato liquid nutrients medium for bacteria were prepared and poured in autoclave Petri plate up to a depth of 4mm. Bacteria strains *(Stroptococcus byogenes, Salmonella typhi*) were swabbed on Petri plate after solidification of the media, four wells were cut in the agar layer of each Petri plate with an aluminum bore. In each well equal amount of DMSO (Dimethol Sulfoxide), tetra cycline and 5mg/1ml, 10mg/1ml concentrations were added**.** The leaf extract with a concentration of (5mg/1ml, 10mg/1ml) dissolved in DMSO were added; wells of tetracycline used as a control while DMSO as a standard. The plates were incubated for twenty four hrs at 37^{o}C. The area of inhibition was measured in mm. Bacteria growth were compare with tetracycline, in which 5mm inhibition in surrounding area occur; in *Calligonum polygonoides,* extract of (5mg/1ml and 10mg/ml) inhibition were 5mm and 10mm (Table 3).

Anti-fungal Activity: Anti-fungal activity was performed by the same process as used in antibacterial study but the nutrient media was different. Dissolved 6.2g (SDA) in 100ml distilled water, autoclave the SDA media along with test tube and kept the media for 24 hrs to solidifying. Prepared the solution of terbinofine as a positive control while DMSO was added as a negative control, weight the terbinofine and prepared stock solution of the concentration(5mg/1ml, 1omg/1ml) further solution(200microgram/1ml) of the extract and terbinofine by dissolving in 800 microgram. After 24hrs poured the extract and terbinofine in to media (100 micro liters) to each test tube and applied the fungal strain of *Aspergillus fumigatus* and *Candida albicans.* After one week the result showed that the *Calligonum polygonoides* extract inhibit the growth of fungi

strain; terbinofine inhibit the growth of fungi while maximum growth occur in DMSO test tube (Table 4).

Stem Anatomy: The T.S of *Calligonum polygonoides* is circular in out line, the transverse section consist of cubic shape epidermal cells, covered by cuticle, several layer of cortex, inner most layer of cortex is endodermis. Vascular bundle occur in ring form, consist of phloem and xylem; pith occupy the central area where starch cells are also present; the green stem of this plant is covered with a wax deposit, in addition to an epidermal cuticle which is the unique characters for drought stress condition, that protect these cells from the, dehydration. The only places that permit the water exchange are anomocytic stomata and lenticels. The presence of mucilage in the external partitions is another reason to avoid the water loss because mucilage is able to absorb and to stock water. All these anatomical characters; the wax disposition, the epidermal cuticle and mucilage in addition to other morphological characters indicate the important, adaptation of these species against the aridity of sites where they exist.

Conclusion: In general**,** it was concluded that extract of *Calligonum polygonoides* inhibit the germination and seedling growth of *Cucumus sativus* and *Brassica oleracea Abelmoschu* due to its phytotoxic effect, the extract of this xeric plant have fruitful biological activities as compare to antibiotic, this plant will be soon come to endangered condition due to more use of the local community and lose of its habitat.

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Availability of data: We have included all relevant data in the manuscript that were collected during the field survey.

Authors' contributions: Khan[1] designed this study and Mehmood supervised; Rasheed helped in statistical analysis; and approved as a final manuscript.

REFERENCES

Ahmad. M. M, M.A Khan and Zafar. 2005. Ethnobotanical Approaches for the treatment of diabetes. By the local inhabitants of District Attock, Department of Botany, Arid University Rawalpindi, Pakistan.

Ahmad. M. M. A. Khan and R. A, Qureshi. 2003. Ethnobotanical study of some cultivated plants of Chuch Region (District Attock). Department of Biological Sciences Quaid-e-Azam University, Islamabad, Pakistan

Ali N, G. Ahmad, S. W. Ali shah, I.Shah, M. Ghias and I. khan. 2011. Acute toxicity, brine shrimp cytotoxicity and relaxant activity of fruits of Callistemon citrinus Curtis.BMC.Complementry and alternative Medicine.11: 99.

Alsaadawi. I.S. and N.M.M. Salih. 2009. Allelopathic potential of *Cyperus rotundus* L., Interference with crop. Allelopathy Journal. 23(1): 297-304.

Al-Zahrani, H. S and S. Al-Robai. 2007. Allelopathic effect of *Calotropis procera* leaves extract on seed germination of some plants. JKAU: Science. 19: 115-126.

Baravalia Y, Y. Vaghasiya and S. Chanda. 2011. Brine Shrimp Cytotoxicity, Anti-inflammatory and Analgesic Properties of Woodfordia fruticosa Kurz Flowers.Iranian Journal of Pharmaceutical Research. 11(3):851-861.

Bauer I.V. and J. V. Staden. 2006. studied the Antibacterial and Antifungal activity of many,medicinal plants used venereal disease. South Africa, Journal, Ethnopharmacol.103. 139-42.

Bayoub K, T. Baibai, D. Mountassif, A. Retmane and A. Aziz. 2010. Antibacterial activities of crude ethanol extracts of medicinal plants against *Listeria monocytogenees* and some other pathogenic strains. African Journal of Biotechnology. 9(27): 4251-58.

CAB International. 2005. Forestry compendium. Wallingford, Uk: CAB International Channappagoudar BB. Jalager, BR and Biradar, N.R.(2005). Allelopathic effect of aqueous extracts of Cyperus rotundus and *Commelina bengalensis* on germination and seedling length of wheat, green gram and soybean.Karnatak .J.Agriculture18:916-920.

Ghasemi, S.,M. Ghasemi, N.Moradi and A.M.Shamili. 2011. Effect of *Calotropis procera* Leaf Extract on Seed Germination of Some Plants. Journal of Ornamental and Horticultural plants.: 2251-6433.

Gonzales G. F,Valerio Jr.L.G (2006).Medicinal plant from peru: a review of plants as potential against cancer,, Anti-cancer Agents in Medicinal Chemistry. 6(5): 429-44.

Grace, B.S.2006.The biology of Australian weed 45.Calotropis procera(Aiton) W.T,Aiton. Plant protection quarterly. 21: 152-160.

Hamayun, M. A. Khan and M.A. Khan, 1905. common Medicinal folk recipes of District Buner, N.W.F.P Pakistan. Department of Biological Sciences Quaid-e-Azam University, Islamabad.

Hemalatha S, S. A. Allayie and C. Elancheziyan. 2013. Prelimnary Assessment of Cytotoxic Effect of Naringi Crenulata Leaf xtracts for Antitumours Study using Brine shrimp(Artemia Salina). International Journal of Current Zoological Research. 1(1). 001-004.

Kavitha D., J. Prabhakaran and KArumugam. 2012. Phytotoxic effect of Purple nutsedge (*Cyperus rotundus* L.) on germination and growth of Finger millet (*Eleusin coracana* Gaertn.). IJRPBS. 3: 615-619.

Kayode, J. and Aayeni, J.M. 2009. Allelopathic effect of some crop residues on the germination and growth of maiz (*Zea mays*L). The pacific Journal of Science and Technology. 10(1): 345-349.

Kensa V. M and S. S Yasmin 2011. The Phytochemical Screening and Anti-bacterial Activities on *Ricinus communis* L.1(9): 167-173.

Kery A, A. Balazs, L. Kursinszki, P. Apati, E. Szoki, A. Blazovics and Hagymas (2003).Radical Scavenger and Antioxidant Activities of Selected MedicinalPlants. Department of Pharmacognosy,Semmelweis University, H-108 Budapest, Üllői út 26., Hungar

Mateen, A., P.V.K.Suresh and P. Ahmed. 2011. Evaluation of Anti-bacterial activities of Cuscuta reflexa and Abutilon indicum. International Journal of Pharma and Bio Sciences.Vol.2(1): 0975-6299.

Oudhia, P. and Tripathi, R.S.2001. Allelopathic effects of *Ageratum conyzoides* and *Calotropis gigantean* on germination and seedling vigour of rice. Agric.Sci.Digest. 21(1): 69-70.

Prabha M.R and K. Vasantha 2012. Phytochemical and Antibacterial Activity of *Calotropis procera* (AIT) R.BR. Flower. International Journal of Pharma and BioScience.Vol.3(1).

Sajid, B., E. Alia, K. Rizwana, S. Uzm, Alamgeer and M. I. Hafiz. 2011. Phytochemical Screening and Antimicrobial activities of *Fagonia cretica* plant extracts against Selected microbes. Journal of Pharmacy Research. 4(4): 962-63. `

Simao A. A, F. F, Lage, P. M.B.Chagas, R.M. Fraguas, J. M. Freire, T.R. Marques and A. D. Correa. 2013. Antioxidants from Medicinal Plants Used in the Treatment of Obesity. European Journal of Medicinal Plants.3(3): 429-443.

SyahmiA. R.M, S. Vijayarathna, S. Sasidharan, L. Y. Latha, Y.P.Kwan, Y. Lau, L. Ngitshin and Y. Chen. 2010. Acute Oral Toxicity and Brine Shrimp Lethality of Elaeis guineensis Jacq., (Oil Palm Leaf) Methanol Extract. Molecule. 15(11): 8111-8121.

Tanveer, A., A. Rehman, M.M. Javaid, R.N.Abbas, M. Sitan, A. U. H. Ahmad, M.S. Ibin-i-zamir, K.M Chaudhary and A. Aziz. 2010. Allelopathic potential of *Euphorbia helioscopia* L. against wheat (*Triticum aestivum* L.), chickpea (*Cicer arietinum* L.) and lentic (*Lens culinaris* Medic.). Turk. J. Agric.For, 34: 75-81.

Tao L., J. Ren, X. M. Liu. 2000. Study on water-absorbing model of two *Calligonoum* species seeds. J Arid Land Res. Environ., 14: 89-91.

Yasin, M., E. Safdar, and Z. Iqbal. 2012. The Phytotoxic Effect of *Calotropis procera* Extraction on Germination And Seeding Vigor of Wheat.Pak.J.Weed Science.Res.18(3): 379-392.

Zain M. E, A. S. Awaad, , M. R. Al-Quthman, R. M. El-Meligy. 2012. Antimicrobial Activities of Saudi Arabian Desert Plants. Phytopharmacology. 2(1). 106-13

Table 1: Radicle and Plumule Growth of *Helianthus annus*

Mean Value	Radicle Growth	Plumule Growth
Control	2.2±0.4	2.1±0.3
5mg/ml	1.9±0.5	1.8±0.2
7mg/ml	1.7±0.6	1.6±0.3
10/ml	1.7±0.7	1.6±0.2

Table 2: Mean Value of Radicle and Plumule Growth of *Abelmoschus esculentus*

Extract	Radicle growth	Plumule Growth
Control	1.7±0.3	1.6±0.6
5mg/ml	0.9±0.1	0.8±0.1
7mg/ml	0.6±0.3	0.5±0.2
10/ml	1.0±0.2	1.01±0.3

Table 3: Anti-Bacterial effect of *Calligonum polygonoides* extracts on Bacteria strains

Bacteria Strain	Extract Concentration.		DMSO	Tetracycline
	10mg/1ml	5mg/1ml		
Stroptococcus byogenes	Inhibition in (mm) (8- 10)	Inhibition in (mm) (4-5)	Maximum Growth in (mm) (0-0)	Inhibition in (mm) (8-10)
Salmonella typhi	(7-10)	(3-5)	(0-0)	(7-10)

Table 4: Anti-Fungal effect of *Calligonum polygonoides* extract on strains of fungi.

Fungal Strain	Extract Concentration.200ug/1ml	DMSO.200ug/ml	Tetracycline.200ug/1ml
Aspergillus fumigates	Inhibition of fungal strain occur mm (10-12)	Inhibition in mm (0-0)	Inhibition in mm (10-12)
Candida albicans	(10-13mm)	(0-0)	(8-12)