ISSN 2320-1355

JOURNAL OF GLOBAL BIOSCIENCES

Volume 3, Number 7, 2014

Website: www.mutagens.co.in
E-mail: submit@mutagens.co.in
researchsubmission@hotmail.com

Journal of Global Biosciences
ISSN 2320-1355
Volume 3, Number 7, 2014, pp. 1089-1093
Website: www.mutagens.co.in
E-mail: submit@mutagens.co.in
researchsubmission@hotmail.com

Research Paper

DIVERSITY OF RHIZOSPHERIC FUNGI OF *CEROPEGIA BULBOSA* VAR. *BULBOSA* ROXB.

Mulani R. M. and Turukmane K. L.

Department of Botany,
DST-FIST, UGC-SAP Sponsored School of Life Sciences,
Swami Ramanand Teerth Marathwada University,
Nanded-431606

Abstract

Present investigation deals with the evaluation of fungal diversity in the rhizospheric soil of *Ceropegia bulbosa* var. *bulbosa*Roxb. It is tuberous monsoon perennial plant commonly called as "Khaparpodi" or " Hanma " belonging to family Asclepiadaceous. The rhizospheric soil was collected from Swami Ramanand Teerth Marathwada University Campus Vishnupuri, Nanded. The fungi were isolated by serial dilution method suggested by Aneja **[1].** In all 28 isolates were recorded from the rhizospheric soil of *Ceropegia bulbosa,* out of which 22 were identified to the species level and 6 up to the genera level. Most dominant genera were found to be *Aspergillus* and *Mucor* respectively.
Key words: Asclepiadaceae, *Ceropegia bulbosa*, *Aspergillus,* Rhizospheric fungi.

INTRODUCTION

Ceropegia bulbosa var. *bulbosa* Roxb. is a monsoon perennial tuberous plant of Asclepiadaceae family. The tubers are edible and traditionally used in the treatment of kidney stone and urinary tracts diseases. The tubers are considered to be tonic and digestive; contain bitter alkaloids *Ceropegine [*2]. Rhizosphere is the soil surrounding the rhizoplane(root surface) and the term was firstly introduced by Hiltner in 1904 [3]. The loss of organic materials from roots provides the driving force for the development of active microbial population around the root[4,5].Among the rhizospheric microorganisms, fungi play an important role in the rhizosphere. They mediate many ecological processes and are responsible for plant growth and health [6].Soil microorganisms play a very important role in maintaining soil fertility[7].The organic substances released from plant roots to rhizosphere soil support microbial biomass and microbial activity then in bulk soil[8].Soil fungi play an important role in nutrient cycling, plant health and development [9,10,11].

MATERIALS AND METHODS

Collection of rhizosphere soil

The rhizospheric soil and tubers of *Ceropegia bulbosa* var. *bulbosa* Roxb.were collected from the campus of Swami Ramanand Teerth Marathwada University Vishnupuri, Nanded. They were collected in clean,sterilized polythene bags and brought to the laboratory for analysis and processed immediately.

ISOLATION OF FUNGI FROM RHIZOSPHERIC SOIL

Serial dilution methods suggested by Aneja (2003) were used for isolation of rhizospheric fungi from soil.10 gm of rhizospheric soil were taken in conical flask containing 100 ml sterile water and it is shaken for 15 min. on magnetic shaker for soil separation. Serial dilutions were prepared as 10^{-2} to 10^{-6} in test tubes. One ml of the soil suspension of each dilution was spreaded in sterile petriplate containing PDA and Czapek- Dox agar supplemented with streptomycin in there replicates. After inoculation the plates were incubated for one week in an incubator at 25^0C. Daily plates were observed for the fungal growth.

Staining and mounting

Microscopic observations of the fungal isolated were initially done in water and glycerin mounting to be natural colour. However, different fruiting structures of taxonomic significance were observed by mounting in lacto phenol-cotton blue. They were observed under light microscope and were micro photographed by Digi Eye camera fitted to OLYMPUS CX 21 bright field light microscope.

Counting of fungal colonies:-

After3-4 day's fungal colonies started appearing on the plates. After seven days fungal colonies appeared on plate were counted and colony characters were noted. The percentage incidence was calculated by using the following formula.

$$\% \text{ incidence} = \frac{\text{No. of colonies of a particular species}}{\text{Total no. of colonies of all the species}} \times 100$$

Identification of the rhizospheric fungi:-

Sporulating structures of fungi were considered as diagnostic features for identification. Morphological identification was done according to thestandard taxonomic key given by Ainsworth [12].The isolated rhizospheric fungi were identified based upon colony morphology and microscopic observation of mycelia and colour, shape, size, and structure of spore. [13,14].

RESULTS

In all 28 fungi were isolated from the rhizospheric soil of *Ceropegia bulbosa*, Out of 28isolates, 22 were identified at the species and 06were at the genus level. These were distributed in 10 families on the basis of colonial character and microscopic characters. The identification was done by referencing the available literature as well as on the basis of the microscopic observation. Most dominant rhizospheric genera were *Aspergillus* and *Mucor.*The identified fungal organisms were listed in **Table 1.**and described below.

DISCUSSION

In present investigation the fungal isolation were done from the rhizosphere soilof *Ceropegia bulbosa*var. *bulbosa.*28 fungal isolates were obtained from the rhizosphere soil of *Ceropegia bulbosa.* Out of these22 isolates were identified at the species level and 06 were identified at the genus level. The dominant genera were *Aspergillus* and*Mucor* and represented with eight and four species respectively. Rebecca (2012) isolated six isolate from rhizosphere of the *Barleria cristata* and four were identified as*Aspergillus* sp*. Sporothrix*sp. *Arthiriniums*p*.* and *Fusarium* sp[15].Lone, *et.al*(2011)isolated 26 fungal isolates from the rhizosphere *Juglansregia*L. from Kashmir Valley [16].

The genus *Aspergillus* is most dominant fungus followed by *Penicilliums*p*., A. niger* and *Mucor hiemalis*. Similar observations were made by us. Sharma*et.al* (2010) isolated 22 fungal species and the dominant species were *Aspergillusfumigatus;A. niger* followed by *A. flavus A. luchensis* and *Mucor* sp. [17]. Abdel-Hafez, *et.al*(2012) isolated sixteen species of *Fusarium* from rhizosphere (13 species) of and rhizoplane (11 species) of lentil and seasame plants at different stages from Egypt [18].The species of *Fusarium* were *F. chlamydosporum, F. culmorum, F. nygamai, F. oxysporum, F. poae, F. iporotrichioides, F. subglutinans, F. tricinctum, F. verticillioides, and Fusarium* sp. They observed *F.oxysporum, F. solani, F. verticillioides*. The only *F. solani was*

recorded at the three stages of the both plants studied fungi other than only *Aspergillus* and *Penicillium* species while in our observation. They have reported *Fusarium* as the common rhizospheric fungus[19]. Isolated eight species by using two different media such as Czapak's Dox Agar and Malt Extract Agar they reported 8 species of *Aspergillus* mainly *A. ficcum, A. flavus, var. columnariris, A. terreus* var*. aureus, A. fumigatus, Emericella nidulans, E. rugulosa* and *A. terricola* var*. ameicana.* while we reported 7 species of *Aspergillus* sp.

Figure 1.Cultural plates of isolated rhizospheric fungi from *Ceropegia bulbosa* var*. bulbosa.*

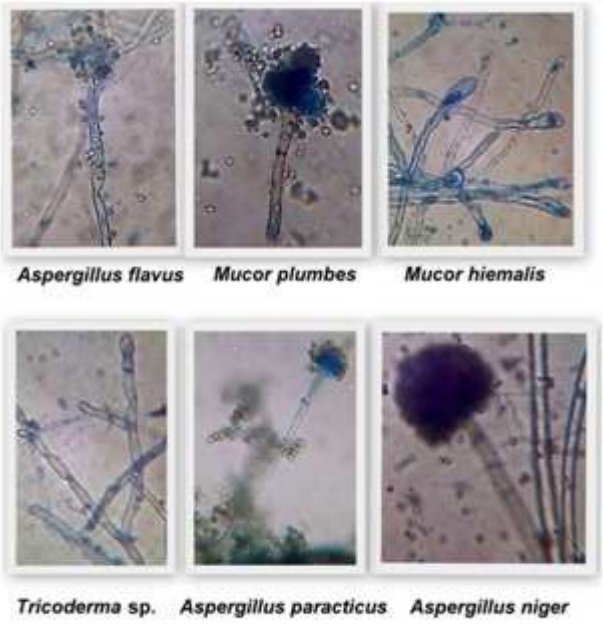

Table 1. % Fungal colonies isolated from rhizospheric soil of *Ceropegia bulbosa.*

Sr.No	**Name of fungi**	**% fungal colonies**
1	*Alternaria alternate* keissi	3.125
2	***A Aspergillus flavus* link ex**	**9.375**
3	*A. fumigates* Fresen	3.125
4	*A.melleus*Yukawa	1.562
5	*A. niger*	3.125
6	*A. sulphureus*	3.125
7	*A.oryzae*	3.125
8	*A. parasiticus*	3.125
9	*A. nidulans*	3.125
10	*Candidus* sp.	3.125
11	*Fusarium solani*	4.687
12	*Fusarium moniliforme*.	3.125
13	*F. oxysporum*	3.125
14	***Mucorhiemalis***	**7.8125**
15	*M. racemosus*	3.125
16	*M. praini*	3.125
17	*M.plumbeus*Wehmer	3.125
18	*Rhizopus stolonifer*	3.125
19	*R. oryzae* Went and PrinsGeeri	6.25
20	*Penicillium chrysogenum* Thom	3.125
21	*Penicillium* sp.	3.125
22	*Penicillium* sp.	3.125
23	*Phomaexigua*	3.125
24	*Phomaglomerata*	1.5625
25	*Trichoderma*Viride Pers. Ex. S. F. Gray.	3.125
26	*Trichoderma*sp.	3.125
27	*Cladosporium* sp.	3.125
28	*Rhizoctonia s*p.	3.125

CONCLUSIONS

Ceropegia bulbosa var *.bulbosa* Roxb. have great importance in the Indian medicine. For the first time rhizospheric fungi were isolated from *Ceropegia bulbosa.*In the present investigation in all 28 fungi were isolated from rhizospheric soil of *Ceropegia bulbosa* var. *bulbosa*, out of which22 were identified at the species level and six 6 were identified at the genera level. The dominant genera were *Aspergillu s*and *Mucor* represented with eight and four species respectively.

ACKNOWLEDGEMENT

We are very much thankful to Director,DST-FIST, UGC-SAP Sponsored School of Life Sciences, Swami Ramanand Teerth Marathwada University Nanded, for providing the laboratory facilities for present research work.

REFERENCES

1) Aneja, K. R. (2003) *Experiment in microbiology, plant pathology and Biotechnology*, New Age International (P) Limited, Publisher, Eight Editions.
2) Anonymous. (1950) *The Wealth of India, Raw Materials. Vol. II,*CSIR, Delhi 67.
3) Brimecombe, M. J., Lelj F. A., and Lynch, J. M. (2001) *The Rhizosphere. The effect of root exudates on rhizosphere microbial populations. In: The Rhizosphere; Biochemistry and Organic Substances at the Soil-Plant Interface.* (Eds.): R. Pinton, Z. Varanini and P. Nannipieri. Marcel Dekker. New York. 95-140.

4) Whipps, J. M. (2001) Microbial interactions and biocontrol in the rhizosphere. *J. Expt. Bot*. 52: 487-511.
5) Morgan, J. A. W. and Whipps. J. M. (2001).Methodological approaches to the study of rhizosphere carbon flow and microbial population dynamic, pp. 373-409.In : *The Rhizosphere ;Biochemistry and Organic Substances at the Soil-Plant Interface.*(Eds): R. Pinton, Z. Varanini and P. Nannipieri. Marcel Dekker. New York.
6) Hawksworth, D. L. and A.Y. Rossmann. (1997) A study on microbial diversity in different cultivars of Brassica napus in relation to its wilt pathogen, Verticillium longisporum FEMS Micriobiol., *Lett*. 29: 269-276.
7) Gangawane, L. V. Saler, R. S. , and Pingle, U. D. (1995) Algalization in relation to nitrogen Fixation in rice and rhizosphere mycoflora. *Biologica* Indica: 6(1 & 2) 11-16.
8) Nannipieri, P., J. Ascher, M.T. Ceccherini, L. Landi, G. Pietramellara, G. Renella and F. Valori. (2007) Microbial diversity and microbial activity in the rhizosphere. *Suelo (Argentina).*, 25: 89-97.
9) Thorn G. (1997) *The fungi in soil. In: Modern Soil Microbiology* (eds JD van Elsas, JT Trevors, EMH Wellington). New York, Marcel Dekker 63–127.
10) Bridge P, Spooner BM. (2001)*Soil fungi: diversity and detection*. Plant and Soil 232, 147–154.
11) Martin F. M., Perotto S., Bonfante P. (2001) My-corrhizal fungi. In: The Rhizosphere – a fungal community at the interphase be-tween soil and roots (eds R Pinton, Z Varanini, P Nannipieri). New York, Mar-cel Dekker 263–296.
12) Ainsworth, G. C., Sparrow, F. K. & Sussman, A. S. (1973) *The Fungi. An Advanced Treatise.* Vols. 4 A and 4 B. New York & London: Academic Press.
13) Ellis, M. B. (1971) *Dematiaceous Hyphomycetes. Commonwealth Agricultural Bureau*, Kew, Surrey, England.
14) Booth, C., (1977) *The genus Fusarium." Common Wealth. Mycological Institute. Kew, Surrey, England, Bulletin No. 1Melbourn26*, 1- 71, Burgess Publishing Company. By Leonard Hill Books. 55-51.
15) Rebecca, L. J., Dhanalakshmi, V., Sharmila, S., Susithra, G., Kumar, S.,Bala, S. (2012) Isolation, Identification and Characterization of fungi from Rhizosphere soil of Barleria *Cristata*. *International Journal of Hoticulture & Crop Science Research*. 1: 1-6.
16) Lone, M. A., Hamid, B., Singh, P., Chauhan, D., Sahay, S. (2011) Isolation and characterization of fungal species from the rhizosphere of *Jungians regain* L. of Kashmir valley. *International Journal of Institutional Pharmacy and Life Science.* 1 (2): 18-27.
17) Sharma, K., Luka, R. and Lanje, S. (2010) Isolation of microflora of Gangtok, India. *Current Word Environment*. 5 (1) 123-125.
18) Abdel-Hafez, S. I., Ismail, M. A., Hussein, N. A., Abdel-Hameed, N.A. (2012) Fusarium and other fungi taxa associated with rhizosphere and rhizoplane of lentil and Sesame at different growth stages. *Acta Mycological.*35-48.
19) Afzal, H., Shazad, S. and Nisa, S. (2013) Morphological identification of *Aspergillus* species from the soil of larkana district (Sindh, Pakistan). *Asian. J. Agri. Biol.* 1 (3): 105-117.