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FUNGI ASSOCIATED WITH ROOT AND STEM OF BETELVINE IN PAKISTAN

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Abstract

A survey of betelvine fields in Karachi and Thatta districts of Sindh and Hub area of Balochistan was conducted during 1996 to 1999 where 38 funfal species belonging to 25 genera were isolated from root and stem of diseased betelvine plants. Of the fungi isolated, 26 fungi appear to be new records on betelvine in Pakistan.

Betelvine (*Piper betle* L.) is an important cash crop grown on a commercial scale in Karachi, Thatta districts of Sindh and Hub region of Balochistan. Sweet water, high humidity, moderate temperature and soft sandy soil of these areas provided excellent conditions for betelvine cultivation. The crop is grown in conservatories under shady and humid conditions necessary for the growth of plant. This atmosphere also favours the development of many diseases that greatly affect the growth of plants and produce heavy losses to the farmers (Chattopadhayay & Maiti, 1990).

During a survey of betelvine fields in Karachi, Thatta and Hub areas conducted during 1996-1999, a total of 950 diseased specimens were collected from 75 fields. The specimens were brought to the lab for isolation and identification of fungi associated with diseased tissues. Infected plant parts were cut into 1 cm long pieces which after surface sterilization with 1% $Ca(OCl)_2$ for 3 minutes were placed in Petri plates containing potato sucrose agar (PSA) (potato 200 g, sucrose 20 g, agar 20 g, Penicillin 100,000 units and Streptomycin 0.2 g per litre). The Petri plates were incubated at 28°C for 5-7 days and fungi growing from plant pieces were identified after reference to Barnett (1960), Ellis (1971, 1976), Booth (1971), Nelson *et al.*, (1983), Thom & Raper (1945), Domsch *et al.*, (1980), Plaats-Niterink (1981) and Dick (1990). Infection of plant parts by different fungi was recorded using the following formula:

$$\text{Infection \%} = \frac{\text{Total number of plants infected by the pathogen}}{\text{Total number of plants assessed}} \times 100$$

A total of 38 fungi were isolated from root and stem of diseased plants (Table 1). Of these, 15 fungi viz., *Alternaria alternata, Bipolaris australiensis, B. spicifera, Botryodiplodia theobrome, Cladosporium cladosporioides, Colletotrichum capsici, Curvularia lunata, C. tuberculata, Fusarium moniliforme, F. oxysporum, F. semitectum, F. solani, Macrophomina phaseolina, Pythium periplocum* and *Rhizoctonia solani* have already been reported from betelvine in Pakistan. The remaining 26 fungi (marked with asterisk in Table 1) appeared to be new records on betelvine in Pakistan (Ghafoor & Khan, 1976; Mirza & Qureshi, 1978; Doosani *et al.*, 1992; Shahzad & Ghaffar, 1993, 1995). *Fusarium solani, F. semitectum* and *F. sporotrichoides* were more frequent in almost all the fields visited. It was interesting to note that these species of *Fusarium* were also isolated from the bulbous roots of a grass weed *Cyperus bulbosus* that is very common in betelvine fields.

Table 1. Percentage of betelvine fields infected with different fungi with frequency of root and stem infection(%).

Fungus	Percentage of infected fields				Frequency of infection	
	Karachi	Thatta	Hub	Total	Root	Stem
Alternaria alternata	60	52	27	50	5-40	10-35
* *Aspergillus flavus*	32	23	14	24	2-15	5-15
* *A. niger*	20	12	14	15	5-30	10-25
* *A. quadrilineatus*	8	6	0	6	5-35	3-20
* *A. terreus*	16	43	34	32	5-35	3-15
* *A. variecolor*	4	9	0	6	3-10	3-10
Bipolaris australiensis	60	43	54	51	3-25	3-15
* *B. hawaiiensis*	12	0	14	7	1-5	3-5
B. spicifera	20	9	0	11	5-15	5-15
* *Blakeslea* sp.	8	3	0	4	3-12	-
Botryodiplodia theobrome	60	52	14	47	3-25	5-30
* *Cephaliophora irregularis*	8	15	0	10	-	2-5
* *Cephalosporium acremonium*	48	52	0	40	5-12	3-10
* *Chaetomium globosum*	40	55	0	39	5-15	4-12
* *Chulara elegans*	0	3	0	2	-	20
* *Circiniella* sp.	0	9	0	4	10-25	8-25
Cladosporium cladosporioides	8	15	0	10	1-10	1-10
Colletotrichum capsici	60	20	20	34	5-30	4-30
* *Corynascus* sp.	8	6	14	8	1-5	1-3
Curvularia lunata	60	46	27	47	5-15	5-15
C. tuberculata	32	23	14	24	1-5	1-6
* *Exserohilum rostrata*	20	15	14	15	3-5	2-6
Fusarium moniliforme	36	29	14	27	2-15	3-10
F. oxysporum	40	9	14	19	4-25	5-10
F. semitectum	72	72	54	55	4-20	3-20
F. solani	96	100	87	96	10-80	5-60
* *F. sporotrichoides*	44	92	27	63	10-40	10-30
* *F. subglutinans*	8	3	7	6	2-5	2-5
* *Humicola grisea*	4	3	0	3	2-4	2-3
Macrophomina phaseolina	40	29	20	31	3-40	3-25
* *Mucor* sp.	12	20	0	14	1-3	1-3
* *Nigrospora oryzae*	12	12	0	10	2-5	1-5
* *Pythium aphanidermatum*	12	12	0	10	2-10	-
P. periplocum	12	12	0	10	1-5	-
Rhizoctonia solani	48	49	27	44	5-40	5-25
* *Rhizopus* sp.	20	29	14	23	10-15	5-10
* *Sclerotium*	3	9	7	10	10-35	10-25
* *Stachybotrys atra*	20	15	20	18	1-10	5-10

*=New record on betelvine in Pakistan.

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