Indian Phytopath. 57 (1) : 107-109 (2004)

Management of fruit rot of chilli with different plant products

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Key words: *Colletotrichum capsici*, plant products, chilli

Several diseases, particularly of fungal origin, attack the chilli crop. Among these, fruit rots, which cause 10-15% losses to mature fruits during transit and storage, are quite important. Fungi belonging to genera *Colletotrichum, Alternaria, Aspergillus, Fusarium, Drechslera* and *Curvularia* mainly cause post harvest rots. In Udaipur region fruit rot caused by *Colletotrichum* is the most common. Normally, fungicides are recommended for control of post harvest rots. The infected chilli fruits were collected from fields as well as market of Udaipur. The pathogen was isolated by standard methods, purified and identified. For proving pathogenicity of the fungus two methods viz., inoculation after wounding with cork borer and spraying of the inoculum were used.

The plants used for studying the antimicrobial properties were Bitter Temru (*Diospyros cordifolia* Roxb.), Datura (*Datura stromonium* L.), Amaltas (*Cassia fistula* L.), Brhati (*Solanum indicum* L.), Sandal (*Santalum album* L.), Mehandi (*Lowsonia inermis* L.) and Babool (*Acacia nilotica* L.). Bitter Temru fruits were picked up at green stage and dried in the shade. Fine fruit powder was prepared and refluxed with methanol for one hour, boiled for three hours and subsequently filtered through a muslin cloth and filtrate was boiled till 1/3rd. The extract was acidified with conc. HCl (pH 2.0) and filtered through Whatman's filter paper No.1. The precipitate was dissolved in methanol again, boiled and filtered. The methanol in the filtrate was removed to 1/3rd of its volume and extract was solidified by vacuum evaporation method. Datura leaves were taken and extract was prepared as per method given by Nicholis (4). Extraction and partial purification of Amaltas (fruits), Brhati (fruits), Sandal (fruits), Mehandi (seeds) and Babool (seeds) was done as per method described above. Partially purified plant products were tested at three concentrations viz., 1/500, 1/1000 and 1/2000 against the fungal growth following poison-food technique, spore germination of *Colletotrichum capsici*, and against the fruit rot. 25 ml. medium was poured in each petridish. Petridishes were seeded with two mm disc of the fungus taken from periphery of seven days old culture and incubated at 28 ± 1^{0}C for seven days. Growth inhibition percentage was calculated following Bliss (1). To test the efficacy of partially purified plant products on spore germination of the fungus, cavity slide method was used (7). Efficacy of partially purified plant products was tested against fruit rot of chilli in both pre- and post-inoculation conditions. In pre-inoculation treatment, the fruits were first dipped in the test solution then inoculated with test fungus by cork borer wounding method, Whereas, in post-inoculation treatment the fruits were first artificially inoculated with test fungus and then dipped in test solution.The above purified plant products were further assessed for their efficacy under pot conditions along with biorational fungicide Emcop-L (Copper based fungicide of PI industries Ltd.) against chilli fruit rot. Percent infection/disease index and percent efficacy in controlling disease was calculated using formula described by Wheeler (8).

Colletotrichum capsici was found to be associated with infected chilli fruits. Similar symptoms of fruit rot were also observed on the artificially inoculated fruits 6 days after inoculation.

Table 1. Efficacy of partially purified products from different plants on fruit rot in chilli

Name of plants	Fruit rot severity (%)							
	Concentration						Mean	
	1/2000		1/1000		1/500			
	Pre-inoculation	Post-inoculation	Pre-inoculation	Post-inoculation	Pre-inoculation	Post-inoculation	Pre-inoculation	Post-inoculation
Amaltas (*Cassia fistula*)	32.1	34.5	34.2	38.1	37.3	40.5	34.5	37.7
Babool (*Acacia nilotica*)	34.2	36.2	38.2	41.1	41.3	46.2	37.9	41.2
Brhati (*Solanum indicum*)	14.2	15.5	18.2	20.2	20.2	23.9	17.5	19.8
Datura (*Datura stromonium*)	8.1	8.5	12.1	13.7	15.2	18.0	11.8	13.4
Mehandi (*Lowsonia innermis*)	17.3	18.0	21.0	38.1	24.5	40.5	20.9	32.5
Sandal (*Santalum album*)	27.2	32.2	31.1	36.1	34.1	37.2	30.8	35.2
Bitter Temru (*Diospyros cordifolia*)	6.5	7.2	9.2	11.2	13.1	14.9	9.6	11.1
Control	56.4	56.4	56.4	56.4	56.4	56.4	56.4	56.4
Mean	24.5	26.2	27.5	31.8	30.2	34.7	27.4	30.9
Pre-inoculation	SEM ±	CD at 5%	CD at 1%					
Treatment	0.34	0.96	1.29					
Concentration	0.21	0.40	0.79					
TxC	0.59	1.67	2.23					
Post-inoculation	SEM ±	CD at 5%	CD at 1%					
Treatment	0.36	1.01	0.36					
Concentration	0.22	0.62	0.83					
TxC	0.62	1.76	2.35					

In poison-food technique, maximum growth inhibition of the fungus 93.6% and 83.7% was observed after 6 days of inoculation with Bitter Temru fruit extract and Datura leaves respectively. Minimum growth inhibition was found in Babool seed extract (60.0%) at 1/2000 concentration. Choudhary et al. (2) have earlier reported Bitter Temru fruit preparation to be the best growth inhibitor for many fungi like *Colletotrichum capsici*, *Alternaria alternata*, *Fusarium udum* and *Helminthosporium maydis*. Shivpuri et al. (6) also reported that in *in vitro*, the ethanol extract of *Azadirachta indica*, *Datura stramonium*, *Ocimum sanctum* and *Polyalthia longefolia* were highly toxic to fungi like *Alternaria brassicicola*, *Colletotrichum capsici*, *Fusarium oxysporum*, *Rhizoctonia solani* and *Sclerotinia sclerotiorum.* Minimum spore germination of the fungus was recorded with Bitter Temru fruits (32.5%) followed by Datura leaves (37.7%) and maximum spore germination was found in Babool seed extract (71.2%) at 1/2000 concentration. Similar results in case of Bitter Temru fruits extract against fungi like *Fusarium udum*, *F. lycopersici* and *Helminthosporium turcicum* has also been reported (5). Partially purified preparations were reported to be effective against Colletotrichum fruit rot of Mango and Guava (3). Under artificial inoculation conditions, the lowest disease severity was recorded with Bitter Temru fruit extract (6.5%) followed by Datura leaf extract. Maximum severity of rot was observed with Babool seed extract (34.2%) at 1/2000 concentration in pre-inoculation treatment. Maximum reduction in severity of fruit rot was recorded with Emcop-L (67.7%) followed by Bitter Temru fruit extract (66.4%) and Datura leaf extract (53.3%) preparation at 1/1000 concentration in potted plants.

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Received for publication September 9, 2002