

Efficacy of Partially Purified Components and a Newly Developed Chemical Against Fruit Rot of Chilli in Pots

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Abstract

The most effective partially purified plant products, bitter temru fruits and datura leave preparations and a fungicide emcop-L were tested on chilli fruit rots in pots and found that disease severity was much reduced with emcop-L followed by bitter temru fruits and datura leave preparations. On the basis of present investigation, it was concluded that partially purified plant product preparations were effective in management of plant pathogens and if proper attention is given on them, they can replace synthetic fungicides easily. These products are eco-friendly and cause no environmental pollution.

Key words : Purified plant products, Fungicide, Chilli fruit rot, Pots.

Chilli (*Capsicum annuum* L.) is one of the important commercial spice crop of India, grown in all the states. In Rajasthan, it is mainly grown in arid and semi-arid areas and the area under cultivation is 52,200 ha with the annual production of 58,800 t (1). The chilli crop, though widely cultivated in the country is largely attacked by several diseases, particularly fungal diseases. The fungal diseases affecting chilli production are fruit rots which cause severe damage to mature fruits in the fields and harvested fruits during transit and storage. The losses which occur due to post-harvest rots in chillis range from 10 to 15% (2). Fungicides have excellent effects on controlling plants pathogens but they may leave residual toxic effect on the crop. Amongst the different biocontrol techniques, the plant product components can be effective in the management of plant diseases without any toxic effect and replace the synthetic fungicides. A number of angiospermic plants have been reported for the presence of antimicrobial activities by several workers (3—5). The preparation from several parts of plants such as seeds, leaves, flowers, fruits have been used for the presence of antifungal activities. Therefore, the present studies were aimed at searching out the commonly grown natural plant product preparation and a newly developed chemical for effective management of fruit rot pathogens of chilli *in vitro*.

Methods

Isolations were carried out from diseased tis-

ues of fruits and four pathogens viz., *Colletotrichum capsici* (Syd.) Butler and Bisby, *Alternaria alternata* (Fr.) Keissler, *Fusarium oxysporum* (Schi.) and *Aspergillus niger* Van Teigh were invariably found to be associated with the infected tissues of chilli fruits. After isolation of pathogens, cultures were purified by adopting single spore technique. The pathogenicity test was done by the cork wounding method and inoculum spray technique.

Following plants were used for extraction of partially purified components :

	Name of plant	Botanical name	Plant part used for extraction
1	Bitter Temru	<i>Diospyros cordifolia</i> Roxb.	Fruits
2	Datura	<i>Datura stramonium</i> L.	Leaves
3	Amltas	<i>Cassia fistula</i> L.	Fruits
4	Brhati	<i>Solanum indicum</i> L.	Fruits
5	Sandal	<i>Santalum album</i> L.	Fruits
6	Mehandi	<i>Lawsonia inermis</i> L.	Seeds
7	Babool	<i>Acacia nilotica</i> L.	Seeds

Plant materials viz., amaltas, datura, sandal, mehandi and babool were collected from RCA farm, while bitter temru were collected from rural area of Udaipur and Brhati was collected from Jaipur region. All the plant materials were air dried till they become completely dry and then ground in a grinder to a fine powdery mass. Extraction of partially purified prod-

Table 1. Efficacy of most effective partially purified components and a newly developed chemical against colletotrichum rot of chilli in pots.

Treatments (ppm)	Infection index (II)	Per cent efficacy of disease control (PEDC)
Bitter Temru 1000	27.58	66.44
Datura 1000	34.23	58.39
Emcop-1 1000	26.53	67.70
Control	82.23	0.00
SE ±	0.99	0.97
CD (5%)	3.05	2.98
CD (1%)	3.04	2.97
CV (%)	4.65	4.01

ucts from plants viz., amaltas, brhati, sandal, mehendi, babool and bitter temru fruits were done by the method given by Sharma and Sinlot (6). Method given by Nicholis (7) was followed for extraction of partially purified products from Datura leaves. The antifungal activity of partially purified products collected from different plants was tested *in vitro* against mycelial growth of pathogens, by poison food technique at different concentrations viz., 500, 1000 and 2000 ppm. The most effective partially purified products, viz., bitter temru and datura found *in vitro* were assessed for their efficacy under pot condition along with biorational fungicides emcop-L (copper based fungicides of PI Industries Ltd.) against chilli fruits rots caused by *Alternaria alternata*, *Aspergillus niger*, *Colletotrichum capsici* and *Fusarium oxysporum* by foliar spray method in the cage

Table 2. Efficacy of most effective partially purified components and a newly developed chemical against alternaria rot of chilli in pots.

Treatments (ppm)	Infection index (II)	Per cent efficacy of disease control (PEDC)
Bitter Temru 1000	27.44	68.97
Datura 1000	33.21	62.40
Emcop-1 1000	23.56	73.33
Control	88.38	0.00
SE ±	0.98	1.02
CD (5%)	3.039	3.15
CD (1%)	4.25	4.42
CV (%)	4.56	4.00

Table 3. Efficacy of most effective partially purified components and a newly developed chemical against fusarium rot of chilli in pots.

Treatments (ppm)	Infection index (II)	Per cent efficacy of disease control (PEDC)
Bitter Temru 1000	25.01	68.36
Datura 1000	31.69	59.98
Emcop-1 1000	23.80	69.91
Control	79.18	0.00
SE ±	0.84	0.84
CD (5%)	2.59	2.60
CD (1%)	3.63	3.64
CV (%)	4.20	3.40

house of Department of Plant Pathology, RCA, Udaipur. The experiment was laid out in completely randomized design having four treatments with four replications. There were five plants in each replication. The inoculum was prepared using 7 day old culture in sterilized distilled water and the spore concentration was adjusted at 15–20 spore per microscopic field (10x × 10x) and automated. The first spray application of bitter temru, datura components and emcop-L at 1000 ppm concentration was applied after initiation of diseased symptoms (7 days after inoculation). Parallel control was maintained in which partially purified components and fungicides were not sprayed. Two more sprayings were done after 10-days interval. After 10-days intervals of third spray the diseased intensity was recorded by random by selection of 5 fruits per plant per treatment from all

Table 4. Efficacy of most effective partially purified components and a newly developed chemical against aspergillus rot of chilli in pots.

Treatments (ppm)	Infection index (II)	Per cent efficacy of disease control (PEDC)
Bitter Temru 1000	27.58	66.11
Datura 1000	32.52	60.08
Emcop-1 1000	23.54	71.10
Control	81.39	0.00
SE ±	0.99	0.70
CD (5%)	3.05	2.17
CD (1%)	4.27	3.04
CV (%)	4.79	2.85

the plants. For recording disease intensity 0—5 rating scale was used (8, 9) on the basis of fruits area covered.

Results and Discussion

Colletotrichum Rot

Table 1 indicates that all the three treatments were effective over control. However, maximum reduction in disease severity of colletotrichum rot was recorded in chilli fruit by emcop-L (67.70%) followed by bitter temru fruits (66.44%) and datura leaves (58.39%) preparation at 1000 ppm concentration. Both emcop-L and bitter temru fruits preparation were at par statistically but these treatments were found significantly different with datura leaves preparation.

Alternaria Rot

Table 2 reveals that all three treatments were effective over control. However, maximum reduction in disease severity of alternaria rot was recorded in chilli fruits by emcop-L (73.33%) followed by bitter temru fruits (68.97%) and datura leaves preparation (62.40%) at 1000 ppm concentration. Statistical analysis showed that all the three treatments differ significantly.

Fusarium Rot

Table 3 indicates that all the three treatments were effective over control. However, maximum reduction in disease severity of fusarium rot was recorded in chilli fruits by emcop-L (69.91%) followed by bitter temru fruits (68.36%) and datura leaves preparation (59.98%) at 1000 ppm concentration. Both emcop-L and bitter temru fruits preparations were at par statistically but these treatments were found significantly different from datura leaves preparation.

Aspergillus Rot

Table 4 reveals that all the three treatments were effective over control. However, maximum reduction in disease severity of aspergillus rot was recorded in chilli fruits by emcop-L (71.10%) followed by bitter

temru fruits (66.11%) and datura leaves preparations (60.08%) at 1000 ppm concentration. Statistical analysis showed that all the three treatments differ significantly.

The most effective partially purified chemical bio-rational fungicides i.e., emcop-L were tested on fruit rot of chilli in posts. The maximum reduction in disease severity of colletotrichum rot, alternaria rot, fusarium rot and aspergillus rot were recorded by emcop-L (67.70, 73.33, 69.91 and 71.10%, respectively) and datura leaves preparation (58.39, 62.40, 59.98 and 60.08% respectively) at 1000 ppm concentration. In post experiment all the four rots caused by *Colletotrichum capsici*, *Alternaria alternata*, *Fusarium oxysporum* and *Aspergillus niger* were effectively controlled by three spraying of both bitter temru fruits and datura leaves preparation and the fungicides emcop-L. Hence, these preparations can be used for the control of all four fruit rot pathogens in field also.

Nicholis (7) also tested the antifungal activities of a aqueous leaf extracts of *Calotropis procera*, *Azadirachta indica*, *Lentana camara* and *Ocimum basilicum* against *Curvularia tuberculata* and *Alternaria alternata* obtained from fruits of pear and observed 64% control of fruit rots of pear.

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