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Effect of Different Botanicals Against *Colletotrichum capsici* Causing Anthracnose/Die- Back of Chilli

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Abstract

Anthracnose/die-back or fruit rot caused by *Colletotrichum capsici* (Sydow) Butler and Bisby causes 10—30% yield loss to mature and ripening fruits in chilli (*Capsicum annum* L.) during entire cropping period. The indiscriminate and over uses of a wide range of pesticides are prevalent and emerges many undesirable problems to the environment and ecology and ecosystem. So one of the options to overcome these problems are to replace the unilateral chemical approach with the search for alternate control of Anthracnose/die-back using plant product as bio-fungicides. These are tested in many laboratories and field trials showing restrict growth against this disease. It was found that among 16 selected bio-fungicides 5% methanol extract of papaya, garlic, *Ipomoea* gives around 100% inhibitory effect against redial growth of fungi over control plate using dual plate techniques. Similarly inhibitory effect resulted from leaves of pipal (92.8%), lantana (90%), and parthenium (90%). There are also some plants such as *Calotropis, Datura,* begonia, custard apple, turmeric, chilli (var Utkal Abha), *Eucalyptus, Bougainvillia* and ginger that are showing 85.5, 84, 5, 73.8, 71.4, 67, 64.6, 63 and 50%. All the observations were taken seven days after inoculation of text fungi in the petri plate.

Key words : *Colletotrichum capsici*, Anthracnose/die-back, Chilli, Biofungicides.

India is the largest producer, consumer and exporter of spices and spices product. India is one of the prime exporter of chilies to the rest of the world particularly USA, EU, Japan and Srilanka in large volume due to its high value for oleoresin content, vitamin C content and natural enzyme i.e. asparaginase and various alkaloids such as capsaicin present in the fruits (1). Presently India exports 204,000 tonnes of chilli which accounts value in Rs 153,554.00 lakh (Spices Board-2010-11). Anthracnose, die-back and fruit rot of chilli caused by *Colletotrichum capsici* make serious threats in field and in the storage and in the transit. These chemical and biochemical contents have been drastically reduced due to this disease for which India is losing money every year. At present chemical fungicides such as, mancozeb, benlate and ziram are used to control this disease. In India resistance to these fungicides has been registered in *Gloeosporium amelophaghum, Fusarium oxysporum. Colletotrichum capsici, Pythium* sp. and *Phytophthora* sp. (2), apart from the residues of these fungicides in the harvested produce (3). Due to resistance and residue in chemicals present in the harvested fruits which is affecting ecosystem and human health. Inhibition of plant pathogenic fungi by many antifungal compounds of plant origin led to the present study for eco-friendly management of anthracnose fungi, causing, anthracnose and die-back of chilli. So to find out the potential leaf extracts of wild plants growing nearby areas of Krishi Vigyan Kendra, Rayagada, Orissa, an attempt was initiated environment friendly in this study.

Methods

Collection of Leaf Extract. Fruits samples of chilies showing typical fruit rot symptoms, (4) were collected from chilli growing fields around KVK campus of Rayagada, Orissa. Cultures were identified as *Colletotrichum capsici (Syd.)* Butler & Bisby and tested for their pathogenicity. The leaves of the 16 botanicals were collected from nearby areas.

Table 1. Effect of methanol leaf extract at 5% against growth of the text fungi *Colletotrichum capsici.*

	Name of the bio-fungicides (plant extract)	Plant parts used in the assay	Colony diameter (cm) in control plate	Colony diameter (cm) in text plate	Reduction in growth	Persent age reduction in the growth
1	Papaya	Leaves	6.6	Nil	Full	100
2	*Ipomoca*	Leaves	6.6	Nil	Full	100
3	Garlic	Cloves	6.6	Nil	Full	100
4	Pipal	Leaves	7.0	0.5	6.5	92.8
5	Lantana	Leaves	7.0	0.7	6.3	90.0
6	Parthenium	Leaves	6.6	0.6	5.0	90.9
7	Calotropis	Leaves	7.0	0.8	6.2	88.5
8	Datura	Leaves	6.6	1.0	5.6	84.0
9	Begonia	Leaves	6.5	1.2	5.3	81.5
10	Custard apple	Leaves	6.5	1.7	4.8	73.8
11	Turmeric	Rhizome	7.0	2.0	5.0	71.4
12	Nox vomica	Leaves	6.5	2.0	4.5	69.2
13	Chilli (var Utkal Abha)	Leaves	7.0	2.3	4.7	67.0
14	Eucalyptus	Leaves	6.5	2.3	4.2	64.6
15	Bougainvillia	Leaves	6.5	2.4	4.1	63.0
16	Ginger	Rhizome	7.0	3.5	3.5	50.0

Phytoextracts were prepared by grinding 10 gm of each leaf/clove/rhizome in 10 ml of methanol solution separately with the help of pestle and mortar and kept for 12 h and the extracts were filtrated using watman filter paper no. -1. Efficacy of phytocxtracts were tested by poisoned food technique using 5% methanol in the PDA medium. PDA plates without any leaf extract served as control. The inoculums of the test fungi measuring 6 mm disc of 6 days old culture were inoculated at the centre and maintained at 28 ± C till the test fungi covered the PDA plate in control plates. The radial growth of the colony in each treatment replicated thrice was measured in two directions as right angles to each other. The per cent inhibition for stimulation of growth in each treatment was calculated after 4 days of inoculation. One set of data has been taken in the month of November 2008 and other is being taken in the month of December 2008.

Results and Discussion

Among the 16 botanicals the green leaf extracts of papaya and *Ipomoea* and garlic gives 100% inhibition against the test fungi *Colletotrichum capsici.* Leaves of *Lantena* pipal, *Parthenium* and cloves of garlic gives up to 90% inhibition effect and *Calortopis, Datura* and *Begonia* leaves gives more than 80% inhibition effect and rest such as leaves of chilli (var Utkal Abha.) Eucalyptus, *Nox vomica, Bougainvillia,* ginger and turmeric gives 65—70% of inhibition effect. Kurucheve and Padmavathi (5) reported the fungi static nature of extracts of ginger cake and *Eucalyptus.* These plant extracts shows only 12 and 20% of damping of diseases control in the brinjal field respectively. But the same Eucalyptus leaves shows 64.6% radial inhibition of mycellial growth *in vitro* in this case. Gomathi and Kannabiran (6) suggested that the aqueous extract of *Lantana camera* and *Datura metel* reduced the radial growth of *C. capsici* by 57.1 and 69.3% but the methanol extract shows 90 and 84% of radial growth of inhibition after 4 days. Mittal et al. (7) have found dried leaf extract of *ipomoea fistulosa* spp. at 4% caused 36% reduction in radial growth after 4 days of inoculation which has come up to 100% inhibition of mycelium in *in vitro* in *C. capsici.* Kumar and Yadav (8) suggested that *Datura stramonium* shows fungicidal efficacy against *Colletrichum* spp. causing anthracnose leaf spot in betel vine which has revealed in our test that the radial growth was noticed up to 84% after 4 days of inoculation.

The possible region for this is that the compounds present in the plant extract is inhibiting the synthesis of DNA and mitosis processes there by withdrawal of this anti-fungal drugs (9). The difference in the inhibiting effect of various plant extracts may be due to quantitative and qualitative differences

in the antifungal principles present in them (10), Singh and Singh (11). The fungi static nature of the bio-fungicides influencing the restricted radial growth of the text fungi needs to be studied further (1).

Conclusion

It is suggested that out of 16 plant extracts *Ipomoea carnea,* papaya and garlic extracts showing 100% inhibition and parthenium, pipal and lantana showing 90% inhibitor effects against mycelia growth of the pathogens can be used effectively to control the anthracnose, die-back and fruit rot disease in chilies. Further *in vivo* studies in the field are in progress to confirm the anti-fungal activities of the above plant extracts as bio p-fungicides. The inhibitory effect of the bio-fungicides is presented below.

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