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Short Communication

Efficacy of leaf extracts of some medicinal plants on growth of *Colletotrichum capsici* butler and bisby

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Attempts were made to determine the effect of leaf extracts of *Azadirachta indica, Ocimum sanctum*, *Tridex procumbens*, *Clerodendron innermis, Cathranthus roseus, Ricinus communis, Citrus limon* against *Colletotrichum capsici*. Out of these medicinal plants tested, 15% alcoholic extract of *Azadirachta indica and O. sanctum* was found inhibitory for the growth of *Colletotrichum capsici.* The results show that extracts from leaves of different plants vary in their effects on growth of *C. capsici*. It is evident from the results that aqueous and alcoholic leaf extracts of *A. indica* and *O. sanctum* exhibited strong fungitoxicity against *C. capsici.* Alcoholic extract of all the seven plants showed significant result as compared to aqueous extracts.

Key words: Chilli, anthracnose, leaf extract, *Colletotrichum capsici*.

INTRODUCTION

The total area under the cultivation of chilli crop in India is about 0.7 to 0.9 million hectars. It is grown extensively in Tamil nadu, Andhra pradesh, Karnataka and Maharashtra. It is grown as a rain fed crop in most parts of Andhra pradesh and as an irrigated crop in other areas. There are several varieties of chilli grown in India and some are non-pungent with large sized fruits that are used mainly as vegetables. Chilli is one of the important crops grown for its valuable fruit in making spices and condiments. It forms a part of the Indian diet. The fruits are used either dry or raw. It is used in green as well as dry powder form, rich source of vitamin A and vitamin C among the vegetable.

In chilli, there are various types of diseases but anthracnose is a serious disease of chilli found in India, caused by *Colletotrichum capsici* where it occurs in severe form in all the southern states. The disease is developed due to hot and humid conditions. The disease has been identified in all the chilli producing regions of the world and has become a serious constrain in chilli production whenever the crop is grown. Anthracnose causes extensive pre- and post-harvest damage to chilli fruits causing anthracnose lesions. These fungal infection are known to cause heavy damages and impair the quality of fruit seeds. Even small anthracnose lesions on chilli fruits reduce their marketable value (Manandhar

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et al., 1995). Anthracnose disease can occur on leaves, stems and both pre- and post-harvest fruits (Isaac, 1992). Typical fruit symptoms are circular or angular sunken lesions, with concentric rings of acervuli that are often wet and produce pink to orange conidial masses under severe disease pressure, lesions which may coalesce. Conidial masses may occur in concentric rings on the lesions. Management and control of the anthracnose disease are still under extensive research (Yoon et al., 2004). Many studies have concluded that disease management practices are often inadequate to eliminate the diseases. Breeding to develop the long-lasting resistant varieties has also not been successful due to involvement of multiple *Colletotrichum* species in anthracnose infection.

MATERIALS AND METHODS

Collection of samples

Diseased chilli fruits were collected in polyethylene bags from fields and local market of Nanded city of Maharashtra State (India).

Identification of pathogen

The diseased chilli fruits were preliminary observed for sporulation characters like asexual or sexual spores or fruiting structures under compound microscope and their Identification was confirmed with the help of latest manuals (Subramanian, 1971; Jha 1993). Pure cultures of the identified fungus was prepared and maintained on Czapex dox agar slants for further experiments.

Preparation of plant extracts

Seven common and easily available plants like *Azadirachta indica, Ocimum sanctum, Tridex procumbens, Clerodendron innermis, Cathranthus roseus, Ricinus cummunis, Citrus limon* were selected. The leaves of the plant were collected separately, surface sterilized with 0.1% $HgCl_2$ and washed repeatedly with sterile distilled water for several times and kept for drying in hot air oven (Metalab) at 60°C temperature for 48 h.

Aqueous extract

The dried leaves of selected plants were crushed separately into fine powder with the help of blender 5, 10 and 15 g each of the plant powder was dissolved separately in 100 ml sterilized hot distilled water and filtered through Whatman No.1 filter paper. The filtrates were used as 5, 10 and 15% concentrations of aqueous plant extracts, respectively.

Alcoholic extracts

For alcoholic extract 5, 10, 15 g of each sun-dried medicinal plant material, were cut into small pieces and then macerated by blender 1 to 2 mm separately and the powder produced was blended in ethyl alcohol (1:10 w/v) and extracted under cold conditions for 24 h. The resultant extract was filtered through a glass wool filter and then rinsed with a small quantity (30 ml) of 96% alcohol. The extracts were evaporated under reduced pressure at 40°C. Subsequently, the extracts were diluted by distilled water and stored in the deep freezer at -10°C (Fardos, 2009).

Evaluation of plant extracts against *C. capsici*

The effect of 5, 10, and 15% aqueous and alcoholic leaf extract was determined by measuring the mycelial dry weight. 50 ml of glucose nitrate medium was poured into each flask containing different concentrations (5, 10 and 15%) of the respective extracts (2 ml each). With a sterile cork borer (3 mm), mycelial disc of seven days old cultures of the isolates were inoculated in the flask and incubated at 28 ± 2°C. After seven days, the content of flasks were filtered through Whatman No. 1 filter paper The content were dried at 70°C for 24 h and percentage inhibition of mycelial growth was evaluated using the poisoned food techniques (PFT), and calculated using the formula given by Vincent (1927) and Ogbebor et al. (2007).

$$\% \text{ Inhibition} = \frac{100\ (\text{Control} - \text{Treatment})}{\text{Control}}$$

RESULTS AND DISCUSSION

Biological control of fruit rot and dieback of chilli with plant products tested in many laboratories and field trials showed that the *O. sanctum* leaf extract and neem (*A. indica*) oil could restrict growth of the anthracnose fungus (Jeyalakshmi and Seetharaman, 1998). It is clearly evident from the results that the aqueous and alcoholic leaf extracts of all the plants tested against *C. capsici* significantly reduced mycelial dry weight, leaf extract of *A. indica* showed high percentage inhibition of mycelial dry weight (60.62, 71.05 and 81.57%) at 5, 10 and 15% aqueous extract while leaf extract of *Ricinus cummunis* showed very low percentage inhibition of mycelial dry weight (25, 37.36 and 35.52) (Tables 1 and 2). The alcoholic leaf extracts of all the plants tested were found to be more effective as compared to aqueous leaf extracts. The leaf extract of plants which vary in their effect on growth of *C. capsici* may be due to differential effect of active ingradient present in plants. Percentage inhibition of mycelial dry weight of *C. capsici* was highly inhibited in 15% alcoholic leaf extract of *A. indica* followed by leaf extract *O. sanctum.* Upadhyaya and Gupta (1990) reported the control of *Curvularia lunata* with extracts of *Ocimum sanctum*. Singh et al. (1993) reported the effectiveness of aqueous extracts of *O. sanctum* and *A. indica* in the control of disease development in banana. In this study, the differences in the inhibition of mycelial growth of *C. capsici* may be due to variations in fungitoxicity of leaf extract. Similarly, Kurucheve et al. (1997) observed that the variation in the inhibitory effect of plant extracts may be due to qualitative and qualitative differences in antifungal principles. The strong fungitoxicity exhibited by the leaf extract may be due to presence of chemical constituents including tannins, glycosides, alkaloids and flavonoids (Harborne, 1984).

It is clear from the results that all the leaf extracts of seven plants exhibited antifungal activity. Among these, many

Table 1. Effect of aqueous leaf extracts of some medicinal plants on *C. capsici.*

Plant name	% inhibition of mycelial dry weight at different concentrations		
	5%	10%	15%
Azadirachta indica A. Juss.	60.62	71.05	81.57
Ocimum sanctum L.	51.31	65.78	76.31
Clerodendrum inerme (L.) Gaertn.	35.52	50.00	53.94
Tridax procumbens L.	44.73	57.89	68.42
Catharanthus roseus (L.) G. Don	42.10	55.26	63.15
Ricinus communis L.	25.00	37.36	35.52
Citrus limon L.	31.57	42.89	46.05

Table 2. Effect of alcoholic leaf extracts of some medicinal plants on *C. capsici.*

Plant name	% inhibition of mycelial dry weight at different concentrations		
	5%	10%	15%
Azadirachta indica A.Juss.	68.42	76.31	89.47
Ocimum sanctum L.	63.15	75.00	84.21
Clerodendrum inerme(L.) Gaertn.	53.94	68.42	72.36
Tridex procumbens L.	57.89	72.36	76.31
Catharanthus roseus (L.) G.Don	54.47	71.05	75.00
Ricinus communis L.	50.00	62.63	67.36
Citrus limon L.	52.63	65.26	71.05

workers have reported antifungal activities of different plant species and stressed the importance of plants as possible sources of natural fungicides (Tewari, 1995; Lakshmanan, 1990; Singh et al., 1993; Ogbebor et al., 2005).

Conflict of Interests

The author(s) have not declared any conflict of interests.

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