RESEARCH REPORT

Potential of Some Botanicals Against *Curvularia & Fusarium* Species

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ABSTRACT

Impatiens balsamina L. is one of the most potent medicinal plants extensively grown worldwide including India. The seeds of this plant are reported to be heavily infested with diverse group of fungi. The fungal organisms associated with seeds are known to deteriorate the nutrient content of seeds. As the plants serve as ecofriendly and economic bio control agents, the potential of aqueous extract of three plants each of family Acanthaceae and Euphorbiaceae was determined against three species each of seed borne isolates of *Curvularia* and *Fusarium* from stored seeds of *Impatiens balsamina* L employing poisoned food technique. Majority of the plant extracts were reported to be toxic, leading to inhibition for the growth of the test fungi. The aqueous leaf extract *Adathoda vasica* was found to be most potent reducing significant level of mycelial growth of test fungi.

Key Words: *Impatiens balsamina* L., *Curvularia*, *Fusarium*, fungicides, seed borne fungi, inhibition, antifungal activity.

INTRODUCTION

An annual herb, *Impatiens balsamina* L. (Gulmendi) of family Balsaminaceae, is native to southern Asia in India, Myanmar and Burma and extensively grown as ornamental plant worldwide in response to its use in traditional Ayurvedic medicine. Application of the extracts had a long lasting skin moisturizing effect and prevent dryness, rough skin chap, dandruff and splitting hair ends, hence it is used to prepare lotions, creams, hair tonics, cosmetics, bath preparations and detergents (Toki *et al*., 2000). Alcoholic extract of the flowers has been reported to be useful for pains in the joints. Roots are used to treat jaundice and digestive disorders. Juice from balsams leaves treats warts and snakebite; while the flower can be applied to burns to cool the skin. The plant has been used for the

treatment of thorn or glass -puncture wounds, abscesses, in grown nails and chronic ulcers cause by allergic reaction of detergents (Rajasekaran *et al*., 2009).

Impatiens balsamina L. is infested with several fungal organisms and most of them are seed-borne. Rajendran et. al., (2014) has isolated some microbial population including fungal and bacterial species from various parts of this plant. Moreover, the seeds are reported to be heavily infested with variety of fungal species (Madavi & Bhajbhuje, 2015). Fungal organisms associated with seeds bring about several undesirable changes making these hazardous for Ayurvedic preparation (Gangwar and Ghosh, 2014). An application of synthetic fungicides in minimizing spread of pathogenic fungal diseases is traditional practice. The foliar spraying of these fungicides is hazardous to the environment and also responsible to disturb the food chain. Moreover, the indiscriminate use of pesticides may result into development of resistance in the pathogens. To overcome these problems, treatment of extract of various parts of some plants may serve as alternative control remedy because the plants serve as ecofriendly and economic bio control agents.. Keeping this in view, the present report aims to study the potential of some plant extracts against seed-borne species each of *Curvularia* and *Fusarium* encountered on seeds of *Impatiens balsamina* L.

MATERIALS AND METHODS

Locally available plants each belonging to family Acanthaceae and Euphorbiaceae were collected. After oven drying, powder of various plant parts was made and stored at room temperature. The aqueous extracts of various plant parts were screened to study their antifungal potential on the mycelial growth of seed-borne fungal isolates of *Impatiens balsamina* L by poisoned food technique (Swami and Alane, 2013). After grinding, ten grams of the plant part with 100 ml sterile water; it was filtered through two layers of muslin cloth. The extract was heated to 55^0C in water bath for 15 minutes then poured to Potato Dextrose Agar (PDA) medium to obtain 1:1 final concentration. After autoclaving the medium at 15 lbs pressure for 20 minutes, it was allowed to cool at room temperature and then poured into sterile Petri plates. A small disc (0.7 cm diameter) of the actively growing fungus culture grown on Potato Dextrose Agar for seven days was cut with a sterile cork borer and transferred aseptically in the centre of the Petri plate containing agar medium along with plant extract. Suitable controls were kept where the culture discs were grown under the same condition on Potato Dextrose Agar medium without plant extract. The diameter of fungus colony was compared with the control, and considered as a measure of the fungitoxicity. Per cent inhibition was computed (Vimal and Das, 2015)

RESULTS AND DISCUSSION

The plants can provide a wealth of antimicrobial agents, and hundreds have been investigated for biological control. Scientific proof for antifungal activities of plants usually stagnates with the studies of respective plant parts against diverse group of fungal organisms (Gayatri and Ramesh, 2013). The literature survey concerns to antimicrobial activities of plants indicated that an aqueous as well as organic solvent extract of various parts of the plants have been used against the plant-pathogenic fungi to inhibit their activities involving degradation and deterioration of substrates (Swami and Alane, 2013; Nanthakumar *et al*., 2014; Vimal and Das, 2015). Majority of plants in the families Euphorbiaceae and Acanthaceae possess anti-microbial activity (Somchit *et al*, 2010; Sharma *et al*., 2013; Gangwar and Ghosh, 2014). The phenols and tannins content in extract may contribute to the antimicrobial effect (Nanthkumar *et al*., 2014).

The data presented in the table 1 indicated that all the plant extracts inhibited the mycelial growth of the fungal organisms on culture

Table 1: Effect of extract of plant parts against seed-borne fungal organisms

S. No	Plant	Diameter of fungal growth (mm)					
		Curvularia lunata (Wakker) Boedijn	*Curvularia ovoidea* (Hirosa & Watan) Munt	*Curvularia tetramera* (Mck.) Boe. ex Gilman	*Fusarium miniliformae* Sheldom	*Fusarium oxysporum* Schlecht	*Fusarium solani* (Mert.) APP. & Wollenw
	Control	75	72	78	62	71	78
1	*Acalypha indica*	36 (52.0)	41 (43.1)	44 (43.6)	32 (48.4)	33 (53.5)	36 (53.8)
2	*Adathoda vasica*	32 (57.3)	34 (52.8)	31 (60.3)	28 (54.8)	30 (57.7)	32 (59.0)
3	*Rungia repens*	39 (48.0)	37 (48.6)	40 (48.7)	34 (45.2)	34 (52.1)	38 (51.3)
4	*Euphorbia antiquorum*	34 (54.7)	39 (45.8)	34 (56.4)	37 (40.3)	38 (46.5)	40 (48.7)
5	*Euphorbia hira*	41 (45.3)	41 (43.1)	37 (52.6)	40 (35.5)	40 (43.7)	43 (44.9)
6	*Jatropha gossypifolia*	43 (42.7)	40 (44.4)	45 (42.3)	38 (38.7)	31 (56.3)	33 (57.7)

*Figures in parenthesis indicate percent inhibition of mycelial growth of fungus over control.

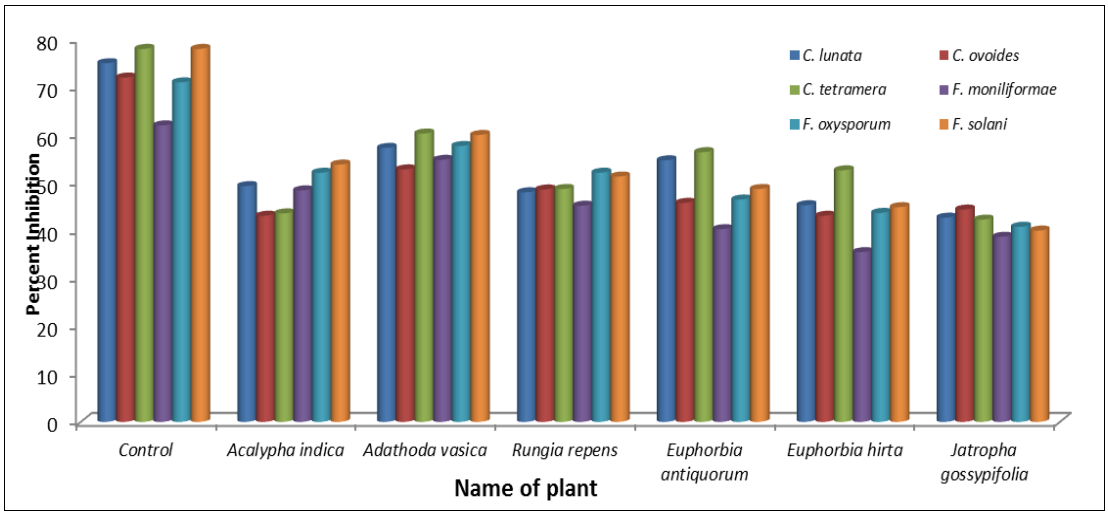

Fig.1: Effect of plant extract on mycelia growth of fungal organism

medium. The leaf extract of *Acalypha indica caused* maximum inhibition of mycelial growth of *Fusarium solani* (53.8%), *F. oxysporum* (53.5%) and *Curvularia lunata* (52.0%). *Adathoda vasica* effectively caused maximum inhibition of mycelial growth of test fungal isolates including *Curvularia tetramera* (60.3%), *Fusarium solani* (59.0%), *F. oxysporum* (57.7%) and *Curvularia lunata* (57.3%) *Fusarium moniliformae* (54.8%) and *Curvularia ovoides* (52.8%). *Rungia repens* was found to be inhibitory to *Fusarium oxysporum* (52.1%) and *F. solani* (51.3%), and it was less significant for other test fungi. *Euphorbia antiquorum* caused 56.7% and 54.4% inhibition of growth of *Curvularia lunata* and *C. tetramera* respectively while 40 – 48% inhibition was recorded for all three species of *Fusarium* and *Curvularia ovoides*. *Euphorbia hirta* proved highly inhibitory to *Curvularia tetramera* (52.6%) while *Jatropha gossypiflora* inhibited the growth of *Fusarium solani* (57.7%) and *F. oxysporum* (56.3%) (Fig. 1).

Much work has been done on the use of plant extracts against the plant-pathogenic fungi. Extract of *Acalypha indica* was effective against *Candida albicans, C. tropicalis, Microsporum canis, Aspergillus fumigatus* (Somchit *et al*., 2010). Leaf,

flower and stem extracts of *Adhatoda vasica* caused inhibition of mycelial growth of *Alternaria alternate, Phytophthora* sp., *Fusarium oxysporum, Aspergillus niger*, *Rhizoctonia solani, Curvularia lunata*, *Cladosporium* sp. *Curvularia penneseti* (Swami and Alane, 2013). *Rungia repens* was reported anti-pyretic and analgesic (Swain *et al*., 2011). The extract of *Euphorbia antiquorum* was effective against *Candida albicans, C. cruzi, Candida tropicalis, C. parapolisis and Aspergillis sp due to presence of many biologically active molecules such as alkaloids, cynogenic glycocides, phenols,flavonoids and terpenoids* (Vimal and Das, 2015). The extract of inflorescence of *Euphorbia hirta* exhibited antifungal activity against *Aspergillus flavus* targeting the cell membrane (Gayathri and Ramesh, 2013). The extract of *Jatropha gossypifolia* are active against human microbial pathogens thus emerging as potential sources of new antimicrobial compounds The plant has great promising potential as a source of antimicrobial compounds against microorganisms (Swain *et al*., 2011). These reports confirmed antimicrobial activity of the plant extract against the fungal organisms. *Euphorbia pulcherrima* was effective against *Colletorichum gloeosporioides, C. dematium, Aspergillus flavus and Fusarium oxysporum* (Swami and Alane, 2013).

CONCLUSION

The present report reveals that the aqueous extracts had antifungal activity in wide range of magnitude and can used as alternative control to the chemical fungicides. Application of extract of these plant parts to seeds, may control mycelial growth of seed borne fungal organisms associated with seeds of *Impatiens balsamina* L.

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