Efficacy of Plant extracts on fruit rot pathogen of Pineapple (*Ananas comosus* Merr.)

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Abstract-The antifungal activity of leaf extracts of plants of *Azadirachta indica, Vitex negundo, Eupatorium birmanicum, Centella asiatica, Ageratum conyzoides, Gynura angulosa, Adhatoda vasica and Mentha aravensis* was investigated for the control of fruit rot pathogen of Pineapple (*Aspergillus niger*) at different concentrations (5,10,15 and 20 %). At 20 % concentration , the maximum inhibition of the growth of the fungus was observed with the extracts of *Eupatorium birmanicum*, followed by the extracts of *Vitex negundo*. The minimum inhibition rate of the fungus was found in the leaf extracts of *Adhatoda vasica* at all the level of concentrations.

Key words: *Ananas comosus, Aspergillus niger,* Fruit rot pathogen, Plant extracts

I. INTRODUCTION

Many naturally occurring plants are known to have anti-microbial properties. They are harmless as compared to synthetic chemical fungicides which often imposed many side effects. Several plants have been reported to have substances, which are toxic to microbial pathogens and serves as barrier to infection (Ushamalini et. al., 1997). Antifungal property of leaf extracts of certain indigenous plants was also reported by Reddy and Reddy (1984). As compared to other plant parasites, fungi cause the greatest impact with regard to diseases and crop production losses. The most important method of protecting the plants against the fungal attack is theuse of fungicides. However, the use of fungicides is not desireable from health view point.Considering the above facts, the use of fungicides on the fruits it is safe to use plant products as protectant of fruit from fungal infection.Also their use have also led to the development of fungicides resistant strains of the fungal pathogens. As such there is an all round compulsion to opt for bio-rational alternatives. Phytoextracts are the best alternative available today for control of fungal diseases of fruits during storage and in the market.

Many plants have been reported to have fungitoxic effect against fruit rot pathogens. The plant based pesticides are cheap, locally available, non- toxic easily bio degradable. Dubey and his co workers studied on the fungitoxic properties of some plant extracts to control sclerofsii rot disease of plant(1991). Plant metabolites and plant based pesticides appear to be one of the better alternatives in plant disease management, as they are known to have minimal harmful impact on the environment and danger to consumers in contrast to synthetic pesticides. Therefore, a study was conducted to test the efficacy of eight phyto extracts(*Azadirachta indica, Adhatoda vasica, Ageratum conyzoides, Centella asiatica, Eupatorium birmanicum, Gynura angulosa, Mentha aravensis and Vitex negundo*), against certain fruit rot pathogen, *Aspergillus niger* of pineapple found in the markets of Imphal areas.

II. MATERIALS AND METHOD

Fresh leaves of *Azadirachta indica, Adhatoda vasica, Vitex negundo, Eupatorium birmanicum, Centella asiatica, Ageratum conyzoides ,Gynura angulosa,* and *Mentha aravensis* were taken. Plants were first washed thoroughly 2-3 times with tap water and then with sterlile distilled water . The surface sterilization was done finally with 90% ethanol. Then 25 g of plant materials were crushed in 100ml distilled water. The macerate was filtered through double layered cheese cloth and centrifuged at 3500 rpm for 20 min. The supernatant was filtered through whatman No.1 filter paper. Extracts(75%) thus obtained was utilized for the experiments. The plant extracts was kept at 6 °C till the tests were carried out. The aqueous extracts were sterilized at 15 lbp.s.i. pressure for 15 min. prior to use.

Concentration of 5,10, and 15 percent were used to impregnate 7mm each of colony bits of 7 days old culture of the fungal pathogen. Each assay bit was transferred to the centre of petridishes containing 15 ml CDA. The plants were incubated at 28±1°C. Petridishes containing culture media but without plant extracts serves as control. The mycelia growth and zone of inhibition was measured using the undernoted formula suggested by Vincent 1947 (Cited by Pani and Patra,1997)

$$\text{Growth Inhibition\%} = \frac{\text{Control - Treatment}}{\text{Control}} \times 100$$

III. RESULTS AND DISCUSSION

Investigations on the antifungal activity of leaf extracts of the selected plants revealed inhibitory effect of the extracts against the pathogen, *Aspergillus niger* (Table 1). The rate of inhibition was highest at 20 % concentration of the extracts of *Eupatorium birmanicum*. The inhibitory effect of *Eupatorium birmanicum* was observed at all the level of concentrations. Thus, *Eupatorium birmanicum* is the most effective plant extracts against the tested pathogen (*Aspergillus niger*). However, different phytoextracts have their different inhibitory effect against different pathogens. Higher inhibition percentage was observed in higher concentration of the plant extracts used, the lower in the radial growth of the fungal colony and lower percentage inhibition. Similar findings was documented by Govindaiah, *et. al*.,(1993) ,Mehta *et.al.,* (2005), Biswas *et. al.*,(1995). Bansal and Gupta (2000) reported the effect of extracts of some medicinal plants on *Fusarium* wilt pathogens of fenugreek. Antifungal substance was isolated from flowers of *Rosa indica* which was effective against many causal organisms of fruit rot(Dixit et. at., 1975).Hiremath *et. al*.,(1993) also reported antimicrobial activity of various extracts of Acalypha sp. Gautam *et. al*.,(2003) reported the antifungal potency of some species of family *Asteraceae* (*Compositae*) against *Macrophomina phaseolina*. Inhibition of mycelia growth of *Fusarium* sp. Which caused *Fusarium* disease of Mulberry was reported by Gupta *et.al*.,(1996). Antifungal properties of various plant products of different species were tried as in against plant pathogens causing foliar disease in cereals, oilseeds and vegetable crops (Ganesan,1994). Efficacy of medicinal plant extracts on the growth of *Sclerotium rolfsii* on the root rot of tomato was reported by Tiwari and *et. al*.,*(*2004). Yadav and *et.al* ,reported on the efficacy of plant extracts and fungicides against *Lesidioplodia theobromae* causing die back of Guava (*Psidium guajava*) ,(2005).Other workers also reported on the effect of plant extracts against pathogens, Bandopadhyai and *et al.(*2003), Bhowmik *et. al*.(1982), Chary *et. al*.(1984).

Table 1 Efficacy of different plant extracts at different concentrations on the mycelial growth of *Aspergillus niger* isolated from infected pineapple (Result is an average of three replicates)

Plants used for extract preparation	**Radial growth (mm) after 48 hrs**				
	0%(Control)	*5%*	*10%*	*15%*	*20%*
Azadirachta indica	80.41	78.12	72.00	65.36	54
Vitex negundo	82.32	81.64	74.30	67.51	58.36
Centella asiatica	83.64	79.52	70.43	61.00	50.00
Eupatorium birmanicum	79.59	74.11	68.10	54.31	45.00
Mentha aravensis	90.15	89.00	89.00	80.00	80.00
Ageratum conyzoides	93.34	91.63	88.00	85.41	80.00
Adhatoda vasica	96.25	95.00	95.00	95.00	95.00
Gynura angulosa	92.74	91.16	89.41	86.00	86.00
± S.E	0.82	0.56	0.62	0.65	0.63
C.D. at 5%	1.96	1.35	1.49	1.23	1.38

Next to *Eupatorium*, it was *Centella asiatica* leaf extracts which has a percentage inhibition of 50 at 20 % concentration of the extracts after 48 hr. followed by the leaf extracts of *Azadirachta indica* with percentage inhibition of 54%, and leaf extracts of *Vitex negundo* by 58% at 20% concentration the extracts. The inhibition rate of leaf extracts *of Mentha aravensis*, *Ageratum conyzoides*, *Gynura angulosa* and *Adhatoda vasica* are 80,80,86 and 95% at 20 % concentration of the leaf extracts after 48 hr . The maximum mycelial growth of the tested fungus (*Aspergillus niger*) at 5% concentration was found in the leaf extracts of *Adhatoda vasica* (95%), followed by *Ageratum conyzoides*(91.63).

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