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RESEARCH ARTICLE

EFFICACY OFLEAF EXTRACTS IN CONTROLLING LEAF BLAST AND BROWN SPOTIN RICE (*ORYZA SATIVA L.*)

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ABSTRACT

Aqueous extract of leaves of *Azadirachtaindica*, *Emblicaofficinalis*, *Pongamiaglabra* and *Acacia nilotca* were tested in-vitroat 0.2% and 0.5% concentration using poisoned food technique for antimicrobial activity against mycelial growth of *Magnaportheoryzae*causing leaf blast and *Bipolarisoryzae*causing brown spot in rice. The leaf extracts were found significantly effective in reducing mycelial growth of the pathogens. The result reveals that *A.indica* leaf extract @ 0.5% was found most effective in minimizing the mycelial growth of both the pathogens28.35 mm and 27.12 mm, closely followed by *P.glabra* leaf extract 29.57 and 30.10 mmin the same concentration, 96 hrs after incubation.

INTRODUCTION

Rice is one of the staple food crops and grown in about 11% of the total cultivated land area globally and serves as the major food for nearly half of world's population (Rout and Tiwari, 2012a). Many biotic stresses hamper rice production and specifically, fungal diseases cause huge economic losses (Kumar *et al*, 2009)Among these the seed-borne diseases mainly leaf blast caused by *Magnaportheoryzae* represents a serious threat to global rice production (Xue *et al*, 2014),and brown spot caused by *Bipolarisoryzae* reduces rice yield and shows substantial global impact (Nejad *et al*, 2014)to the crop. The losses due to these diseases in developing countries are estimated to be 60-80% higher than in industrialized countries and conservatively estimated, they cause losses in the order of 50 million ton of food annually (Vishunavat, 2012). The uses of fungicides to control the disease have been effective. However the excessive use of these synthetic chemicals has caused environmental contamination and toxicity to living organisms. It has also increased costs to growers (West *et al*, 2003), and their repeated use over decades has disrupted natural biological systems, and sometimes resulted in development of fungal resistance along with producing undesirable effects on non-target organisms, and fostered environmental and human health concerns (Yoon *et al*, 2013). Therefore merits attention of all concerned to look into the potential of integrating in the management of economically important diseases, the products prepared from green plants should be preferred as they are environmentally non-pollutive and non- hazardous in preparation and use (Rout and Tiwari, 2012b).The secondary components of some plants contain medicinally active fractions of plant tissue that are toxic to pathogens (Gurjar *et al*, 2012) and thus can be utilized in plant disease management programme. Earlier several workers have successfully reported the effective control of rice diseases using plant extracts (Sena *et al*, 2013;Harlapur *et al*, 2007;Dutta *et al*, 2004;Madhusudan, 2004;Raji, 2004). Therefore the present research aimed to study the efficacy of aqueous plant extracts of various plants in managing the leaf blast and brown spot pathogens in rice.

MATERIALS AND METHODS

Single spore isolation of fungus

Infected leaves were collected showing the typical lesions of blast and brown spot in the field for single spore isolation. The diseased leaves were cutted into small pieces using sterilized blades. These pieces were surface sterilized by dipping in mercuric chloride solution (1:1000) for one minute and were washed by sterilized water for several times. Potato Dextrose Agar medium (Riker and Riker, 1936) was taken as basal medium for in vitro studies. The pieces were inoculated in sterilized petri discs containing Potato Dextrose Agar medium amended with streptomycin sulphate under aseptic condition. The pure fungal culture was maintained for further study.

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Preparation of leaf extracts

The fresh leaves of four plant species viz. *Azadirachtaindica*(Neem), *Emblicaofficinalis*(Anwala), *Pongamiaglabra*(Karanj) and *Acacia nilotica*(Babool) were collected(Table 1). These leaves were washed with tap water and sterilized water. They were air dried and their powder sample were prepared. The cold water extract were obtained by adding 20 (0.2%) and 50 g (0.5%) of the powder of each plant leaf to 100 ml of sterile distilled water. The extracts were filtered by cheese cloth and centrifuged at 3500 rpm for 20 min. The supernatant was filtered through Whatman's No. 1 filter paper (Bisht and Khulbe, 1995).

Table 1 Plant sp. and parts used for management of various pathogens of rice in-vitro

Plant	Scientific Name	Family	Parts Used
Neem	*Azadirachtaindica*	Meliaceae	leaf
Emblica	*Emblicaofficinalis*	Euphorbiaceae	leaf
Karanj	*Pongamiaglabra*	Fabaceae	leaf
Babool	*Acacia nilotca*	Fabaceae	leaf

Efficacy test

The leaf extract were taken at concentration of 0.5% and 0.2% and amended with poisoned food Potato Dextrose Agar media and were poured in sterilized petri disc. 5 mm mycelium disc of the test fungus were cutted from the margins of the old test culture and were placed centrally in each of the petri discs. The inoculated plates were incubated at room temperature and the colony diameter was recorded at an interval of 24 hours.

RESULTS

Antimicrobial activity of plant extracts was assayed and results on effect of plant extracts on mycelial growth of *Magnaportheoryzae* and *Bipolarisoryzae*is presented in table 2. The data revealed that the plant extracts were found significant($P<0.05$) in suppression of mycelialgrowth at higher concentration over untreated check; however the suppression rate decreases with the passage of time. The result reveals that *A. indica* leaf extract @ 0.5% concentration was found most effective in minimizing radial growth of the *Magnaportheoryzae*(28.35mm) after 96 hrs. which gradually increases to 37.05 and 38.00mm after 120 and 196 hrs of incubation, respectively. It was closely followed by *P. glabra* leaf extract suppressing radial growth to 29.57 mm after 96 hours which also gradually increase to 37.58 and 38.70 mmafter 120 and 196 hrs of incubation, respectively.

The leaf extract of *E. officinalis* in the same concentration was also found effective reducing mycelial growth 30.23, 38.05 and 40.80 mm after 96, 120 and 192 hours of incubation respectively.

The suppression of mycelial growth of leaf brown spot pathogen *Bipolarisoryzae* follows similar pattern in all the tested plant extracts (Table 2). The rate of suppression of radial growth of *B. oryzae* was comparably more than *M. oryzae* .The highest concentration of aqueous leaf extracts were more pronounced compare to low concentration in reducing the radial growth of the fungus as observed in case of blast pathogen. Among the treatments*A. indica* leaf extract @ 0.5% was found highly effective in reducing the radial growth of the fungus(27.12 mm) after 96 hrs. which gradually inclined to 34.90 and 37.20 mm after 120 and 196 hrs of incubation, respectively. The *P. glabra* leaf extract was the second effective treatment minimizing radial growth to 30.10 mm after 96 hours which gradually increase to 35.20 and 37.80 mm after 120 and 196 hrs of incubation, respectively. Similarly, the leaf extract of *E. officinalis* shows effective suppression in radial growth in the range31.22, 37.80 and 38.90 mm after 96, 120 and 192 hours of incubation, respectively.

DISCUSSION

The mycelial growth of *M. oryzae* decreases with the increasing concentration of all plant extracts tested. The findings are similar to Amadioha, (2000) who reported that the cold water extract of neem compared favourably with Cardendazim at 0.1% a.i.in controlling the rice blast in vivo.

The observations supports the findings of Sireesha and Venkateswarlu (2013) who found the efficacy of plant parts extract of Neem seed kernel, Neem oil, Pongamia spp. extracts Panchagavya and Asafoetida spp. extract in descending order against rice blast fungus. Hajano *et al* (2012) studied efficacy of the extracts of garlic, neem and calatropisby food poisoning method, and observed that only higher dose of garlic completely inhibited the mycelial growth of *M. oryzae*. Gohel and Chauhan (2015) reported that Neem leaf extract were found effective but comparably less significant than standard fungicides and bio-agent in minimizing leaf blast intensity in rice. Hubert *et al* (2015) observed that extracts from *C. Arabica, N. tabacum, A. vera, A. indica*, were found significant to manage rice blast diseasein-vitro and in-vivo.

Table 2 Effect of leaf extract on mycelial growth (mm) of *M.oryzae* and*B. oryzae*in rice

Leaf extract	Conc.	Period of incubation (Hrs.)					
		96		120		192	
		M.oryzae	***B.oryzae***	***M.oryzae***	***B.oryzae***	***M.oryzae***	***B.oryzae***
Neem	0.50%	28.35	27.12	37.05	34.90	38.00	37.20
	0.20%	34.90	33.89	47.17	45.10	51.80	50.60
Emblica	0.50%	30.23	31.22	38.05	37.80	40.80	38.90
	0.20%	36.53	38.18	48.15	48.90	54.20	53.10
Karanj	0.50%	29.57	30.10	37.58	35.20	38.70	37.80
	0.20%	38.43	36.90	37.58	45.90	52.60	51.10
Babool	0.50%	32.20	28.65	38.60	35.90	38.90	38.00
	0.20%	39.87	37.52	48.70	46.8	53.20	52.10
Control		47.32	47.69	59.00	58.21	65.76	66.10
SEm±		0.24	0.10	0.23	0.02	0.17	0.18
CD (P≤0.05)		0.89	0.40	0.86	0.09	0.64	0.67

The research is also in accordance with Khoa *et al* (2011) who observed that foliar spray of aqueous extracts of herbal plants have been found effective in reducing rice blast severity.

Results on suppression of *Bipolarisoryzae*under various concentration of plant extracts were significant.

The results are similar with the findings of Al-Hazmi (2013) who reported that Neem leaf extract were mostly affective in growth retardation of the *Helminthosporium sp.* fungi when applied at the highest concentration (1:1 , v:v). The findings of the research are also in close conformity with Ahmed *et al* (2002) who found that the plant extracts of neem and garlic were the most effective against *Bipolarisoryzae* at 1:1 dilution. Similarly, Devi and Chhetry (2013) reported that the plants extracts of *Acoruscalamus, Centellaasiatica, Artemisia vulgaris* and *Azadirachtaindica* shows reduction in the mycelial growth of *D. oryzae*at different concentrations. The findings are also in accordance with Farooq *et al* (2015) observed that seed treatment with Neem and Almanda leaf extract shows effective reduction in brown spot incidence but comparatively less significant than standard fungicides and hot water treatment at flowering, milking and maturity stage of seed growth in vivo. Harish *et al* (2008) observed that under glasshouse conditions, post-infectional spraying of rice plants with neem cake extract and *N. oleander* leaf extract were significantly effective however comparably less than *T. viride* in reducing the incidence of brown spot of rice.

CONCLUSION

Thus it can be concluded that plant extracts were found effective in reducing mycelial growth of leaf blast and brown spot fungus and therefore used for the management of the diseases in rice. Moreover, they are nature friendly, reduces chemical hazards and are economical and feasible thus easily accessible to the growers.

References

Ahmed, M.F., Khalequzzaman, K. M., Islam M.N., Anam M. K., and Islam M.T. 2002. Effect of Plant Extracts Against *Bipolarisoryzae* of Rice under *In vitro* Conditions,Pakistan *Journal of Biological Sciences*,5,442-445.

Al-Hazmi, R. H. M. 2013. Effect of Neem (*Azadirachtaindica*) leaves and seeds extract on the growth of six of the plant disease causing fungi. Glo. Adv. Res. J. Microbiol, 2, 089-098.

Amadioha, A.C. 2000.Controlling rice blast *in vitro* and *in vivo* with extracts of *Azadirachtaindica*, Crop Protection, 19,287-290.

Bisht,G.S., and Khulbe,R.D.1995. In-vitro efficacy of leaf extracts of certain indigenous medicinal plants against brown leaf spot pathogen of rice, Indian phytopathol, 4, 480-482.

Devi, O.J., and Chhetry, G.K.N. 2013. Evaluation of Antifungal Properties of Certain Plants against DrechsleraOryzae Causing Brown Leaf Spot of Rice in Manipur Valley, International *Journal of Scientific and Research Publications*,3,1-3.

Dutta, S., Chaudyary, A., Chaudhary, A. K., and Laha, S.K. 2004.In vitro fungi toxicity of plant extracts against *Pyriculariaoryzae* and *Rhizoctoniasolani,* incident of blast and sheath blight disease of rice. *Souvenir and Abstr*. Nat. Sym. on Crop Surveillance: Disease Forecasting & Management. Indian Phytopatholocical Society., Feb 19-21, 92.

Faruq, A. N., Amin, M. R., Islam, M. R., Islam,M. T., and Alam, M. M. 2015.Evaluation of some selected seed treatments against leaf blast, brown spot and narrow brown leaf spot diseases of hybrid rice. Adv. Agric. Biol.,4, 8-15.

Gohel, N. M., and Chauhan, H. L. 2015. Integrated management of leaf and neck blast disease of rice caused by *Pyriculariaoryzae*. Afr. J. Agric. Res.,10, 2038-2040.

Gurjar, M.S., Ali, S., Akhtar, M., and Singh, K.S. 2012. Efficacy of plant extracts in plant disease management, Agricultural Sciences, 3, 425-433.

Hajano, J.,Lodhi, A.M., Pathan, M.A, Khanzada, M.A., and Shah, G.S. 2012. In-vitro evaluation of fungicides, plant extracts and bio-controlagents against rice blast pathogen *Magnaportheoryzaecouch,* Pak. J. Bot., 44, 1775-1778.

Harish, S., Saravanakumar, D., Radjacommare, R., Ebenezar, E.G., and Seetharaman, K. 2008. Use of plant extracts and biocontrol agents for the management of brown spot disease in rice, Biocontrol, 53, 555-567.

Harlapur, S.I., Kulkarni, M.S., Wali, M.C., and Kulkarni, S. 2007. Evaluation of Plant Extracts, Bio-agents and Fungicides Against *Exserohilumturcicum*(Pass.) Leonard and Suggs. Causing Turcicum Leaf Blight of Maize, Karnataka J. Agric. Sci., 20, 541-544.

Hubert,J., Mabagala, R., and Mamiro, D. 2015. Efficacy of Selected Plant Extracts against *Pyriculariagrisea*, Causal Agent of Rice Blast Disease, *American Journal of Plant Sciences*, 6, 602-611.

Khoa, N.Đ., Thuy, P.T., Thuy, T.T., Collinge, D.B., and Jørgensen, H.J. 2011. Disease-reducing effect of Chromolaenaodorata extract on sheath blight and other rice diseases, Phytopathology, 101, 231-40.

Kumar, K.V.K., Raju, S.K., Reddy, M.S., Kloepper, J.W., Lawrence, K.S., Groth, D.E., Miller, M.E., Sudini, H., and Du, B. 2009. Evaluation of Commercially Available PGPR for Control of Rice Sheath Blight Caused by *Rhizoctoniasolani*,J PureApplMicrobio 3, 485-488.

Madhusudan, T. 2004. Comparative performance of botanicals against rice blast in low land rice, Int, Symp.on Rice, Hyderabad, India, Abstr 281, 484-485.

Nejad, M.S., Gholam, H.S.B., and Dehkaei, F.P. 2014.Control of BipolarisOryzae the Causal Agent of Rice Brown Spot Disease Via Soil Streptomyces Sp. Isolate,G. J. Adv. Biologic. Biomed. Res, 2, 310-317.

Raji, P. 2004. Inhibitory effect of plant oils on *Helminthosporiumoryzae* causing brown spot of rice, Souvenir and Abstract, Nat. Sym. on Crop surveillance: Disease Forecasting and Management, Indian Phytopathological Society, Feb.19-21;79.

Rieker, A.J., and Reiker, R.S. 1936. Introduction to research on plant disease, John s. swiff co. st. Louis.

Rout, S., and Tewari, S.N. 2012(a).Amalab-e, a formulated botanical product potential against rice blast incitant *Pyriculariagrisea*, The Bioscan 7, 547-552.

Rout, S., and Tewari, S.N. 2012(b).Fungitoxic spectrum of Amalab-a against fungal pathogens in rice under in-vitro, JBiopest, 5,161-167.

Sena, A.P.A., Chaibub, A.A., Côrtes, M.V.C.B., Silva, G.B., Silva-Lobo, V.L., Prabhu, A.S., Filippi, M.C.C., and Araújo, L.G. 2013.Increased enzymatic activity in rice leaf blast suppression by crude extract of Epicoccum sp.,Tropical Plant Pathology, 38, 387-397.

Sireesha, O., and Venkateswarlu, N. 2013.In vitro evaluation of botanicals and panchagavya against leaf blast fungus *Pyriculariagrisea*, Asian J Pharm Clin Res, 6, 84-86.

Vishunavat, K. 2012. An overview on seed-borne diseases and effective protection against them, Proc. Diseases and management of crops under protected cultivation, Sept. 04-24, 2012, G.B. Pant Uni. of Agri.and Tech., Pantnagar (UK), 115-121.

West, J.S., Bravo, C., Oberit, R., Lemaire, D., Moshou, D., McCartney, H.A. 2003.The potential of optical canopy measurement for targeted control of field crop diseases, Annual Review of Phytopathology, 41, 593–614.

Xue, Y., Shui, G., and Wenk, M.R. 2014.TPS1 drug design for rice blast disease in magnaportheoryzae, Springer Plus, 3, 18.

Yoon,Mi-Young., Cha,B., Kim, Jin-Cheol. 2013. Recent Trends in Studies on Botanical Fungicides in Agriculture, Plant Pathol J, 29,1–9.

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