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# USE OF A NEW, INNOVATIVE AND ECO FRIENDLY CONTROL METHOD FOR THE CONTROL OF BLAST DISEASE OF PADDY (*ORYZAE SATIVA* L)

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**ABSTRACT**

*The ultimate aim of recent research in plant pathology has been the development of alternative control strategies to reduce dependency on synthetic fungicides and to discuss research and development of some of the energy saving and ecologically sound methods for sustainable management of plant diseases This study focused at evaluating the phyto toxic activity of locally available substance viz. vinegar against Pyricularia oryzae. Different concentrations of vinegar were prepared. It can be concluded that the maximum inhibition occurred Vinegar at 1.0% concentration (91.48%) and then at 0.5% concentration (81.44%). The results showed that the antifungal activity of such control agent can be used as an alternative source to the systemic fungicides*

***Key Words: antifungal ,eco friendly, inhibition, inoculum. Vinegar***

## I. INTRODUCTION

During the second half of the 20th century, we have witnessed an unprecedented growth in human population, agricultural production and technology. Plant diseases need to be controlled to maintain the quality and abundance of food, around the world. Control of plant diseases will remain a high priority as growers adopt new measures for sustainable crop production (Conway 1996). The overzealous and indiscriminate use of most of the synthetic fungicides has created different types of environmental and toxicological problems and also the indiscriminate use of these chemicals has led to development of fungicide resistance [Okigbo 2004 and Carvalho 2004] and more importantly, environmental pollution, posing a potential risk to animal and human health. Rice blast, *Pyricularia oryzae*, is so widespread because its spores are present year-round in the high humidity common in rice growing areas. Rice blast pathogen is constantly evolving, and therefore resistant varieties soon become susceptible to the disease. The ultimate aim of recent research in this area has been the development of alternative control strategies to reduce dependency on synthetic fungicides and to discuss research and development of some of the energy saving and ecologically sound methods for sustainable management of plant diseases Therefore, the main objective of the present study was to assess the impact of vinegar on the mycelial growth of *P. oryzae*.

This study focused at evaluating the phyto toxic activity of locally available substance *viz*. vinegar, against *Pyricularia oryzae*

## II. MATERIAL AND METHODS

All the glassware were sterilized in an autoclave at 1.1 kg/cm2 pressure for 15 minutes and then kept in hot air oven at $55^0$C for one hour. The solid and liquid media were sterilized at 1.1 kg/cm2 pressure for 15 min. Infected plant tissues were collected from rice fields of Bundi district, Rajasthan as the source of inoculum. The pathogen was isolated by following standard tissue isolation procedure (Tuite, 1969). Under aseptic conditions, the infected plant tissue were cut in small section 5-10 mm square from the margin of the infected lesions such that it contained both diseased and healthy looking tissue. The tissues were surface sterilized for two minutes in 90% ethanol, washed with three changes of sterile water and blotted dry on clean sterile paper by use of forceps and finally plated in Petri dishes containing oat meal agar (OMA) supplemented with paddy powder medium **[**Oat flakes 20.0g, Agar– agar 20.0 g, Paddy powder 10g, Distilled water (to make up) 1000.00 ml. The culture media inoculated with diseased tissues were incubated under continuous light at 25°C for 24 hours after which the light was put off and incubation continued for seven days allowing the growth of mycelia and spores and observations were made daily for emergence of culture. Under sterile condition a drop of sterile water was put on the slide and a small piece of mycelia placed on it, covered with a cover slip and placed under a light microscope for observation. After the identification of the fungus, the pathogen was sub-cultured in order to isolate rice blast fungus and accelerate the sporulation. The Petri dishes were re incubated in the laboratory for seven days during which growing fungi were viewed under a light microscope. Further sub-culturing was done to obtain pure cultures. After the development of the fungal colonies stock cultures had been prepared using O M A supplemented with paddy powder in test tubes and stored in refrigerator at 4°C.

1.1Preparation of the solutions of control agent

Different concentrations of vinegar were prepared by using commercial white vinegar diluted in distill water. For this purpose 2.5 ml pure vinegar was diluted with 1000ml of distilled water to make solution of 0.25%concentration and named as V1, 5ml vinegar was diluted with 1000ml distilled water to make solution of0.5% concentration and named as V2. 10ml of pure vinegar was diluted with 1000 ml distilled water to make the solution of 1.0% concentration, it was named as V3.

1.2Culture experiment to test the fungicidal / fungistatic property of the control agents

For testing the efficacy of vinegar on *Pyricularia oryzae*, fully and uniformly grown fungus culture plates were taken and three wells of 8mm were prepared at five cm apart from each other. Two ml each of vinegar conentration of 0.25%, 0.5% and 1% concentrations prepared, were loaded on separate filter papers of 8mm size under aseptic condition and dried. The process of loading was repeated until the saturation of filter paper. These loaded pieces were placed in wells made in culture plates. Appropriate control with distilled water loaded filter paper was maintained as check experiment. Each treatment was replicated three times. The plates were incubated for seven days at$25\pm2^0$C. Zone of Inhibition in mycelial growth was recorded when the growth of the selected pathogen was completed in the control treatment. Mean radial mycelial growth inhibition of each conc. of control agent was measured with scale, recorded and data were subjected to statistical analysis. Radial mycelial growths inhibition of fungus on different concentrations of vinegar were transformed into inhibition percentage by using the formula as given by Naz *et al* (2006.):

$$I = \frac{C - T}{C} x \ 100$$ Where

I = Per cent inhibition

C = Radial growth in control

T = Radial growth in treatment

## III. OBSERVATION

The data is presented in Table below. Both control agents *viz*., white vinegar had significant effect on inhibition of mycelial growth of *P. oryzae*.

**TABLE:** Effect of different control agents on inhibition of mycelia growth of *Pyricularia oryzae*

| S N | Treatments | Concentrations (%) | Percent Inhibition |
|---|---|---|---|
| 1 | Vinegar | 0.25 | 69.87 |
| | | 0.5 | 81.44 |
| | | 1.0 | 91.48 |
| SEM ± | | | 2.451 |
| CD=5% | | | 7.154 |
| CV=1% | | | 9.695 |

## IV RESULT AND DISCUSSION

The present study revealed the antagonistic property of vinegar solution against *Pyricularia oryzae*. The mycelial growth was reduced by 69.87%, 81.44% and 91.48% at 0.25%, 0.5% and 1.0% concentration of vinegar. The inhibition rates increased with increasing concentrations of the control agent. The results regarding the efficacy of vinegar are in accordance with Alahakoon *et al* (2010) who studied control of Powdery mildew disease of Rambutan (*Nephelium lappaceum*) incited by the fungus *Oidium nephelii* through Vinegar and Tripathy and Dubey (2004) as a fumigant to control post-harvest diseases in stored fruit and found it to be very effective against reduction of grey mold rot of strawberries caused by *Botrytis cinerea* conidia. The antifungal activity of vinegar may be due to its main component acetic acid which affects the cell membrane by interfering with the transport of metabolites and maintenance of membrane potential (Fresse *et al*1973, Davidson ad Juneja 1990).The inhibitory effect may also be due to the conduction of proton through membrane, effectively destroying the proton motive force which is needed for substrate transport and then killing of cells resulted due to holes in membrane (Sholberg *et al* 2003).

## V. CONCLUSION

White vinegar is in use from ancient time for protecting the food from spoiling. This property of vinegar can be utilized as antifungal agent in plant disease control. The study will able to provide us the efficient disease management of rice crop by using control agent which is very cost effective and eco-friendly in the present

contest of sustainable agriculture. The results of the present research work will be useful for devising effective eco-friendly strategies to manage the blast disease of paddy. The knowledge gained during the present investigations will serve as a foundation for further research work on the biology of the pathogen and epidemiology and management of the disease.

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