

## ***In-vitro* investigation on efficacy of natural plant extracts to manage rice blast fungus *Magnaporthe grisea* in organic rice cultivation**

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### **Introduction**

Rice blast caused by *Magnaporthe grisea* is one of the most devastating rice diseases in the world. It causes tremendous yield losses each year and is a threat to Sri Lankan rice production. Fungicides have been used as the prominent option to control this disease for decades. However, over-usage of fungicides raised many concerns on human health and ecosystem. Therefore, this study was aimed to explore the possibility to use plant extracts against *Magnaporthe grisea*.

### **Methods**

Sixty medicinal plants reported to have antifungal properties were investigated against rice blast fungus and out of them, five plant species; *Datura stramonium*, *Eucalyptus* spp., *Ziziphus mauritiana*, *Syzygium cumini* and *Acacia acuminata*, which gave promising results, were tested for antifungal activity and phytotoxic activity. For antifungal activity, the plant leaves collected from *Kalmadu* herbal garden in Kilinochchi, Sri Lanka, were shade-dried at  $28 \pm 2$  °C and milled into a fine powder. Fifty grams of the pulverized leaves were extracted with 250 mL ethyl acetate using standard procedure and re-dissolved in 1 mL of the extraction solvent, diluted to 10%, 20%, 30%, 50% concentrations and then mixed with culture media and tested for antifungal activities by inoculating blast fungus with three replicates per concentration along with non-plant extract treated standard control. For the phytotoxic activity test, 100 paddy seeds were treated with above mentioned concentrations. The experimental setups were arranged in a Complete Randomized Design. Data on mycelial growth of blast fungus, seed germination, shoot height or root length were measured from the day of inoculation to fully growth of test pathogen (14 days) and complete germination of seeds in control (10 days). ANOVA was performed to find out the best treatment combination using Duncan's Multiple Range Test (DMRT) in SAS software version 9.4.

### **Results**

Mycelial growth inhibition of blast fungus was observed at 50% concentration in all plant extracts tested. *Eucalyptus* spp. extracts showed the highest significant inhibition of 90.6% at  $P < 0.01$ , whereas in *D. stramonium*, *Z. mauritiana*, *S. cumini*, *A. acuminata*, the inhibition was 60%, 68%, 40% and 50%, respectively. Plant extracts did not have any phytotoxic effect on seed germination, shoot height or root length.

### **Conclusions**

*Eucalyptus* sp and *Z. mauritiana* extracts could be potential alternatives to synthetic fungicides for use as a seed treatment or foliar applicant to manage rice blast disease.

**Keywords:** *Plant extracts, Eucalyptus sp, Antifungal activity, Rice blast, Magnaporthe grisea*