

Control of Rice Sheath Blight by Solid and Liquid-based Spore Formulations of a Sri Lankan Isolate of *Aspergillus niger*

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Sheath blight caused by *Rhizoctonia solani* Kühn is a major biotic constraint of rice production worldwide. Our previous investigations have identified *Aspergillus niger*, a fungus dwelling on the sheath of local rice varieties, as an effective biological control agent in controlling sheath blight *in vitro*. Moreover, phosphorus solubilization ability of *A. niger* has been reported by previous workers. The present study was conducted to determine the effectiveness of different solid and liquid based formulations of *A. niger* in controlling rice sheath blight together with their effects on increasing phosphorus content in plant tissues and soil.

Nine different treatments involving three different formulations (i.e. spore suspension, talc-based and straw-based) of the antagonist and the presence or absence of the pathogen, along with positive and negative controls, were applied on rice (variety BW 361) using a completely randomised design with four replicates. ERASER 5 EC (hexaconazole 50 g/L EC), a recommended fungicide for sheath blight was sprayed on the sheath as one of the treatments at the recommended dosage to compare the effectiveness of the formulations of *A. niger*. Rice plants were established in 5 L pots at five hills per pot. *R. solani* was inoculated to the soil (one sclerotium/tiller) 45 days after transplanting (DAT). Plants were treated with different treatments three times, namely 60, 68 and 75 DAT. Disease incidence and disease severity (i.e., % area of lesion development on sheath) were quantified over a period of 32 days after inoculation of *R. solani* and phosphorus content in rice sheaths and soil was quantified three weeks after the final application of treatments. Treatment effects were highly significant ($p < 0.0001$) on disease incidence and disease severity. According to the findings, out of the three formulations of *A. niger*, the straw-based formulation showed the highest sheath blight control both in terms of disease incidence and severity. All the tested formulations of *A. niger* had similar levels of disease control as the fungicide treatment recommended for controlling sheath blight. Phosphorus content in rice sheath differed significantly ($P < 0.01$) between treatments. Plants treated with straw-based formulations containing *A. niger* had higher sheath phosphorus contents than plants treated with straw without *A. niger*. The soil phosphorus content did not differ significantly between treatments.

Based on the findings, it can be concluded that the biological control agent, *A. niger*, in solid and liquid-based formulations has the potential to replace fungicide applications, either partially or completely, to control rice sheath blight. An additional advantage of *A. niger* was its ability to increase the availability of phosphorus to the plant, when applied as a solid-based formulation with straw.

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