Influence of Biochemical Composition of Rice Leaf Sheaths on Sheath Rot Incidence

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SUMMARY

Boot leaf sheath contained almost three times more carbohydrate than non-boot leaf sheaths in all the three rice cultivars tested. The maximum amount of carbohydrate was recorded in healthy boot leaf sheath of ADTRH 1(306.3 mg/g), followed by ADT 39 (281 mg/g) and CO 43 (271.7 mg/g). There was a significant reduction in carbohydrate content of boot leaf sheath due to *S.oryzae* infection. The *S.oryzae* infected boot leaf sheath of ADTRH 1 recorded 182.0 mg/g of carbohydrate followed by ADT 39 (167.3 mg/g) and CO 43 (132.0 mg/g). The decrease in carbohydrate content of infected boot leaf sheath over healthy boot leaf sheath varied from 40.46 per cent to 51.12 per cent. The per cent decrease in protein content of infected boot leaf sheath over healthy boot leaf sheath was 41.67, 41.38 and 33.33 in ADTRH 1, CO 43 and ADT 39, respectively. The healthy boot leaf sheath recorded significantly higher amount of protein than healthy non-boot leaf sheath and infected boot leaf sheath. The per cent increase in phenolic content of infected boot leaf sheath over healthy boot leaf sheath was 37.71, 29.79 and 43.10 in ADTRH 1, CO 43 and ADT 39, respectively.

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The fungal sheath rot incited by *Sarocladium oryzae* is present in all the rice growing countries worldwide. The disease is considered a highly destructive disease in Tamil Nadu and other rice growing states of India (Chakravarty and Biswas, 1978; Lakshmanan, 1993). The fungus, *S.oryzae* primarily attacks the flag leaf sheath through stomata or injuries and ramifies intercellularly in the vascular bundles and mesophyll tissues of some susceptible cultivars (Shahjahan *et al*., 1977).

Lesions start at the uppermost leaf sheath enclosing young panicles as oblong or irregular spots, with brown margins and gray centre or brownish gray throughout. Panicles remain within the sheath or may partially emerge with discoloured and ill filled grains. Affected leaf sheaths have abundant whitish powdery mycelium. The pathogen infects rice plants at all growth stages, but it is most destructive after the booting stage (Milagrosa, 1987). In some of the tillers of the infected plants, panicles do not develop at all (Singh and Mathur, 1992; Mew and Gonzales, 2002). The present study was carried out to find out the biochemical composition of healthy boot leaf sheaths, healthy non boot leaf sheaths and changes due to *S.oryzae* infection, since the pathogen manifests only on boot leaf sheaths during flowering.

MATERIALS AND METHODS

Both healthy and sheath rot infected boot leaf sheath (5 g each) of three ruling varieties of rice in Tamilnadu *viz*., ADTRH 1, CO-43 and ADT 39 were collected, shade dried and powdered. The ethanol extract was prepared and used for further analysis. Four healthy leaf sheaths immediately below the boot leaf were also collected and used for bio-chemical analysis. They were used for estimation of total carbohydrate, total soluble protein and total phenols.

Total soluble protein:

The seed sample (1g) was homogenated in 10 ml of acetate buffer (0.1 M, pH 4.7), centrifuged at 5000 g for 15 minutes and the supernatant was saved. The reaction mixture consisted of 0.5 ml of enzyme extract, 0.5 ml of distilled water and 5 ml of dye solution (Coomassic brilliant blue). The intensity of colour developed was read at 595nm in a Hitachi Spectrophotometer. The protein content was estimated as BSA equivalent (Sadasivam and Manickam, 1996).

Total carbohydrate :

One hundred mg of the leaf sheath sample was weighed and transferred to a boiling tube. The sample hydrolyzed by keeping in a boiling water bath for 3 hour with 5 ml of 2.5 N HCl