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ASSOCIATION OF PATHOGENIC FUNGI WITH SHEATH MITE, *STENEOTARSONEMUS SPINKI* INFESTATION IN RICE

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The association of pathogenic fungi with grains from sheath mite (*Steneotarsonemus spinki* Smiley) infestation in fifteen rice entries grown under aerobic and normal puddled conditions was ascertained during *kharif* 2009 and summer 2010 in Mandya district of Karnataka. Seven species of pathogenic fungi namely, *Alternaria* sp., *Aspergillus flavus, A. niger, Curvularia* sp., *Drechslera* sp., *Fusarium* sp. and *Pyricularia oryzae* were recovered from discoloured (chaffy or filled) grains from sheath mite infested rice fields. More of grain samples from summer crop harboured pathogenic fungi compared to samples from *kharif* season crop. Also, the pathogenic fungi were more prevalent in grain samples from aerobic situations compared to those from normal puddled crop.

Key words : Pathgenic fungi, sheath mite, rice, *Steneotarsonemus spinki*, infestation.

INTRODUCTION

"Rice is life" was the slogan of "International year of rice – 2004 AD" to declare rice crop as a way of life, a source of livelihood and an essential element in the environment, as it supports the web of life and biodiversity. Rice (*Oryza sativa* L.), a staple food of more than half of the world population, is grown in a wide range of environments. Annually the area under rice in the world is 145.60 million hectares with a production of 483.35 million tonnes with an average productivity of 3320 kg per hectare. India has the largest area among the rice growing countries of the world, but it ranks only second in production after China (Anonymous, 2008). Low yields of rice have been attributed to number of abiotic and biotic factors. Loss caused by insect pests, pathogens, nematodes and mites has been significant. Of these pests, mites being microscopic, are least studied and less understood by researchers as well as by the rice growers. Among mites, *Steneotarsonemus spinki* Smiley which belongs to family Tarsonemidae infests flag leaf sheath (Figs. 1a & b) causing brown discolouration. Also, infestation of this mite in the panicle results in chaffy grains as well as discolouration of either filled or ill-filled grains (Srinivasa *et al.*, 2004). This mite pest was reported to cause sterility in rice plant and also aided the spread of various fungi. According to Feng (1980) the fungus merely caused the grain discolouration and browning of leaf sheath, but not the plant sterility. Lakshmi *et al.* (2008) also reported the association of *S. spinki* with the sheath rot fungus, *Acrocylindrium oryzae* (syn. *Sarocladium oryzae*), which resulted in grain discolouration, ill-filled grains, chaffy grains *etc.* Ghosh *et al.* (1997) reported that sheath mite along with fungus *S. oryzae* significantly reduced the number of tillers, panicle size and weight of rice grains as compared to damage by mites and fungi alone in Orissa. In the present study the association of sheath mite infestation with pathogenic fungi was explored.

MATERIALS AND METHODS

Association of pathogenic fungi with the rice grains from sheath mite infested plants was studied in 15 rice entries *viz.*, ARC36, BI33, CTH3, KMP105, KMP148, KMP152, KMP153, KMP160, KMP169, KMP175, KMP183, MAS26, MAS946, Rasi and Vikas grown under aerobic and puddled conditions during *kharif* 2009 at the Zonal Agricultural Research Station, VC Farm, Mandya and during summer 2010, at Kyathumgere village near Mandya. The rice entries had natural infestation of sheath mite. At harvest, 100 g grain sample from each variety was drawn. Partially or completely discoloured grains were incubated in Petri plates with Potato Dextrose Agar medium at 25±1^{0}C in a BOD incubator for 48 to 96 hours to observe the growth associated of the fungi, if any (Fig. 2).

RESULTS AND DISCUSSION

Different species of pathogenic fungi recovered from the grain samples from *kharif* and summer seasons under puddled conditions and aerobic situations are presented in Table I & II.

Seven species of pathogenic fungi species recovered from discoloured rice grains from sheath mite infested plants grown under puddled conditions and aerobic situation during *kharif* (2009) and summer (2010) seasons were *Alternaria* sp., *Aspergillus flavus*,

Table 1 : Association of pathogenic fungi with discoloured grains from sheath mite infested rice entries in different growing situations during *kharif* 2009

Rice entries	*Alternaria* sp.		*Aspergillus flavus*		*Aspergillus niger*		*Curvularia* sp.		*Fusarium* sp.		*Drechslera* sp.		*Pyricularia oryzae*	
	P	A	P	A	P	A	P	A	P	A	P	A	P	A
ARC36	-	-	+	-	+	+	-	-	+	+	-	-	-	-
BI33	-	-	+	-	-	-	-	-	-	-	-	-	-	-
CTH3	-	-	-	-	-	-	-	-	+	+	-	-	-	-
KMP 105	+	-	-	+	-	-	-	-	+	-	-	-	-	-
KMP 148	-	+	-	+	-	-	-	-	-	-	-	-	-	-
KMP 152	-	-	+	-	-	-	-	-	+	+	-	-	-	-
KMP 153	+	+	-	-	-	-	+	-	-	+	-	-	-	-
KMP 160	-	-	+	+	-	-	-	-	-	-	-	-	-	-
KMP 169	-	+	-	-	+	-	-	-	+	-	-	-	-	-
KMP 175	-	-	-	+	-	-	-	+	-	-	+	-	-	-
KMP 183	-	-	-	-	-	+	-	-	+	+	-	-	-	-
MAS26	+	-	-	-	-	-	-	+	-	-	-	-	-	-
MAS 946	-	-	+	+	-	-	-	-	-	+	-	-	-	-
Rasi	+	-	-	-	-	-	-	-	+	+	-	-	-	-
Vikas	-	-	-	-	-	-	+	-	+	+	-	-	-	-

P : Puddled conditions; A : Aerobic situations; + : Present; - : Absent.

Table II : Association of pathogenic fungi with discoloured grains from sheath mite infested rice entries in different growing situations during summer 2010.

Rice entries	*Alternaria* sp.		*Aspergillus flavus*		*Aspergillus niger*		*Curvularia* sp.		*Fusarium* sp.		*Drechslera* sp.		*Pyricularia oryzae*	
	P	A	P	A	P	A	P	A	P	A	P	A	P	A
ARC36	-	-	-	-	-	+	-	-	-	-	+	-	-	-
BI33	-	-	-	+	-	-	-	+	+	-	-	-	-	-
CTH3	+	-	-	+	-	+	-	-	-	+	-	-	-	-
KMP 105	+	-	-	-	-	+	-	-	-	-	-	-	-	+
KMP 148	-	-	-	-	+	-	-	-	+	+	-	-	-	-
KMP 152	-	-	-	-	-	-	-	-	+	+	-	-	-	+
KMP 153	-	-	-	-	-	-	-	-	-	+	-	-	+	+
KMP 160	-	-	+	-	-	-	+	-	-	+	-	-	-	-
KMP 169	+	-	-	+	-	+	-	-	+	+	-	-	-	-
KMP 175	-	-	-	-	-	+	+	-	-	-	-	-	-	+
KMP 183	+	-	-	-	-	-	-	-	-	-	-	-	-	+
MAS26	-	+	+	+	-	-	-	-	-	-	-	-	-	-
MAS 946	+	-	-	-	-	-	-	-	+	+	-	-	-	-
Rasi	-	-	+	-	-	+	+	-	-	+	-	-	-	-
Vikas	-	-	-	-	-	-	-	-	-	-	-	-	-	+

P : Puddled conditions; A : Aerobic situations; + : Present; - : Absent.

A. niger, *Curvularia* sp., *Drechslera* sp., *Fusarium* sp. and *Pyricularia oryzae*. When compared across the seasons, more number of grain samples from summer season harboured pathogenic fungi compared to grain samples from *kharif* season. *Pyricularia oryzae* was not recovered from grain samples of *kharif* season. Across the growing situations (puddled and aerobic), it was apparent that more number of discoloured grain samples from aerobic situations harboured pathogenic fungi compared to puddled conditions Rice grain samples from aerobic situations did not harbour *Pyricularia oryzae*, while all the seven species of fungi mentioned were recorded from puddle rice grains samples.

Damage by tarsonemid mites resulted in deterioration in the seed quality either by direct mite feeding on spikelets or by encouraging the infection by pathogenic fungi (Lindquist, 1972; White & Sinha, 1981) and in the present study the recovery of pathogenic fungi from rice mite infested plants could be the resultant effect of mite infestation, which encouraged the growth of these fungi. Feng (1980) opined that sheath mite infestation often aided the spread of the fungus to cause the grain discolouration, browning of leaf sheath, *etc*. However, Rao & Prakash (2003) attributed rice grain discolouration to toxaemia by sheath mite when no fungus was recovered from such discoloured grains from mite infested plants.

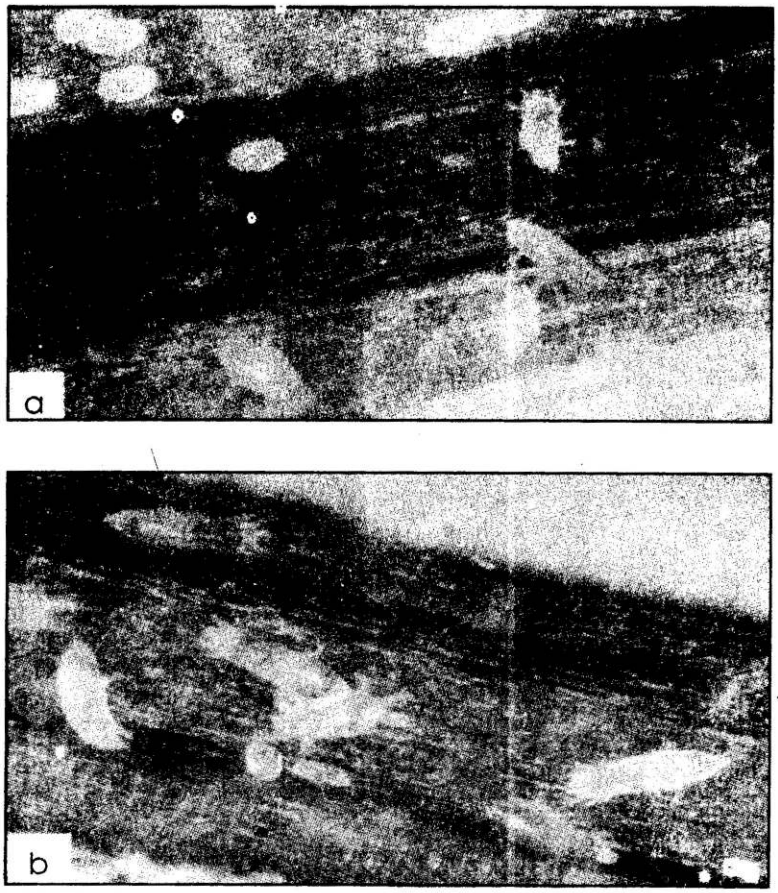

Fig. 1a & b : Colony of *Steneotarsonemus spinki* Smiley with different life stages on flag leaf sheath

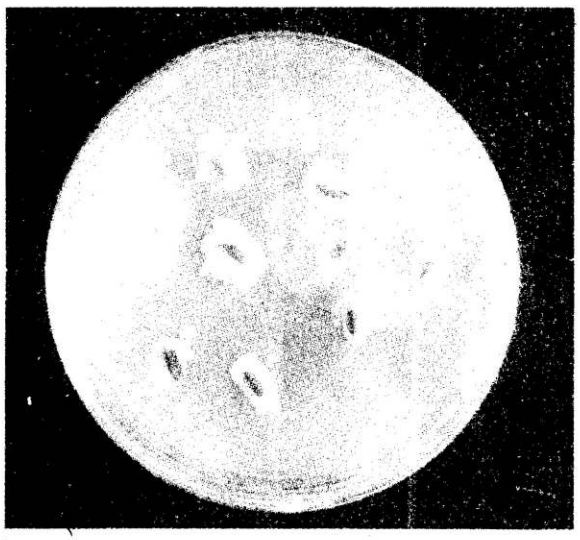

Fig. 2 : Pathogenic fungi recovered from discoloured (chaffy/filled) grains from Sheath mite infested plants

Rao & Prakash (1996) reported that combination of *S. spinki* and pathogenic fungi like, *Curvularia lunata, Fusarium moniliformae, Fusarium graminearum, Sarocladium oryzae* and *Helminthosporium oryzae* increased the frequency or intensity of grain discolouration than with infestation by fungi alone. Srinivasa *et al.* (2004) observed the association of pathogenic fungi *Alternaria* sp., *Aspergillus* sp., *Curvularia* sp., *Fusarium* sp. and *Helminthisporium* sp. with discoloured grains from sheath mite infested rice plants and Prabhakara (2002) recorded lesser proportion of discoloured grains from fungicide treated plots as it might checked the multiplication of fungi, otherwise would have involved in the discolouration of the grains.

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