rations induced by MB and PB following 2 and 24 hr treatment are provided in table 1. Control values are also furnished in each case. Chromosomal fragments at meta- and anaphases and bridges at anaphase were recorded. Some of the meta- and anaphases showed extreme fragmentation. Total percentage of aberrant cells seen after 2 hr treatment in ethanol control is statistically not significant as compared to distilled water controls. This is also true for PB treatments at all concentrations. In MB treatments a high rate of aberrant cells is noted at 50 and 100 ppm levels and they are statistically significant as compared to distilled water control. Chromosome aberrations induced following 24 hr treatment with ethanol, MB and PB are significantly higher compared to distilled water control. Aberrations in MB and PB treatments are higher than in ethanol controls and also show a statistical significance except for 100 ppm of MB. Phenylbenzimidazole is more potent in inducing chromosome damage than methyl benzimidazole following 24 hr exposure and it also reveals a dose-dependent response. Comparison between 2 and 24 hr treatments shows that the latter induce a higher rate of aberrations and indicate that delayed effects are more pronounced than non delayed effects[6]. These observations reveal a strong clastogenic action of benzimidazole derivatives in *Allium* test.

Varying degrees of chromosome contraction were noted in all concentrations in both treatments of benzimidazole and were found to be higher in MB series. Occurrence of these C-metaphases, due to dysfunction of the spindle, suggests mitoclasic property of methyl and phenyl benzimidazole. The colchicine-like effects suggest a possible use of benzimidazole as pre-treating agent for chromosome analysis[7].

Clastogenic and mitoclasic effects of MB and PB reported here are not very surprising since benzimidazoles are known to induce mutations in bacteria by base substitution or may interfere with the mitotic function by acting as a spindle poison as seen in *Aspergillus nidulans*[1]. Some of the fungicides which may not bear any resemblance to benzimidazoles may be metabolically converted by plants and animals to simple benzimidazoles by clevage of the side chain[8]. Hence the above findings with methyl and phenyl benzimidazole indicate that caution should be exercised in using benzimidazoles as fungicides or anti-helminthic agents. A detailed study on the stage specific effects and quantification of mitoclasic effects is necessary and work on these lines is in progress.

The authors thank Profs. G. M. Reddy, M. S. Rao, C. V. Ratnam and S. Subramanyam for their interest and encouragement.

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RICE CHAFF AND RACHILLAE—POTENTIAL INOCULUM SOURCES FOR SHEATH BLIGHT INFECTION

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RICE sheath blight (*Rhizoctonia solani* Kuhn (*Thanatephorus cucumeris* (Frank) Donk.) is hampering rice production in several rice growing states of India. It is reported that the causal fungus perpetuates from season to season as sclerotia or mycelia in soil[1, 2], infected rice straw[3], seed[4, 5] and on many weeds[6]. The role of chaff and rachillae of the infected panicles has not been investigated in the perpetuation and transmission of the pathogen, although sheath blight infection is known to increase empty grains[7, 8]. The present investigation was, therefore, carried out to elucidate the role of rachillae and chaff in the perpetuation of infection from season to season.

During the wet season of 1983 (June–October), plants of AC 360, a highly susceptible cultivar to sheath blight were grown in 1.2 m × 1.2 m size plots under a high fertility level of N_{120} P_{60} K_{60} kg/ha. When the plants were 75 days old, they were inoculated following the method described earlier[9] and the disease was

allowed to build up. During harvest, the percentage of chaffy grains in panicles ranged from 15–75% in October depending upon the severity of infection.

In order to study the viability of the pathogen, 50 g of the chaff along with rachillae on which they were borne on the infected plants were taken in a small earthen pot of 4 inch dia, and the pot was placed in the corner of a harvested field, exposing the infected material to natural conditions of survival. At monthly intervals, 1 g of chaff and bits of rachillae from the pot were tested for the viability of the pathogen by plating the samples on PDA medium after surface sterilization. It was found that large percentage of the fungus was viable for 5 months (November–March) in the wet season harvested crop.

When freshly collected chaff and bits of rachillae from infected panicles were scattered on the grassy bunds of a rice field, the 4 grasses *viz Brachiaria ramosa*, *Cynodon dactylon*, *Cyperus* sp. and *Echinochloa colonum* abundantly growing there, were all readily infected and showed the disease symptoms within 4 days thus proving that chaff and rachillae are potential sources of infection to collateral hosts. During the following dry season of 1984 (December–May), 25 days-old seedlings of AC 360 were transplanted in 4 glazed pots at the rate of one seedling per pot. The plants were grown under a fertility level of N_{120} P_{60} K_{60} kg/ha. When the plants were at maximum tillering stage, 5 g of chaff along with bits of rachillae from infected plants were added to water in each of the pots. The disease symptoms were first noticed at the water level on the culms within 5–7 days and by the 10th day, many tillers started showing the symptoms.

The infection rapidly spread upward and on the 20th day, 25% of the plant area was diseased. These results were confirmed by repeating the experiment in small field plots replicated thrice during the same season. The procedure adopted for the preparation of the plots and growing the plants was as described earlier. Twenty five grams of chaff and bits of rachillae were added to the irrigation water in each of the three replicated plots. The percentage of plants showing sheath blight was recorded on the 30th day. It was seen that 22% of plants showed disease symptoms. These results clearly indicate the positive role of infected chaff and rachillae in initiating infection in double cropped areas.

It is generally seen that a lot of chaff is being scattered or accumulated in small heaps in and around rice fields, near cattle sheds, adjacent to the irrigation canals and threshing floors etc. From such *loci*, the infected chaff can easily be carried to the rice fields either through winds, water or agricultural implements. The pathogen surviving in such chaff can easily infect the grasses and other weeds to form a perennial source of inoculum to rice crop all-round the year.

Kannaiyan and Prasad[10] found that chaff reduced seedling infection by *R. solani*. But in view of the present observations, one must be cautious about the use of rice chaff for such purpose especially in endemic areas for sheath blight. In order to reduce the inoculum potential for sheath blight, such infected chaff and rachillae also need to be eliminated from the vicinity of rice crop by burning as was suggested for rice straw earlier[11].

The author is grateful to Dr H. K. Pande Director of the Institute for his interest and encouragement.

26 October 1984

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