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Occurrence of blast disease in hybrid napier

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Introduction

Hybrid napier, a cross between pearl millet (*Pennisetum glaucum*) and napier grass (*Pennisetum purpuriam*) is a popular cultivated fodder grass in India. It is popular due to high yield, palatability and adaptability to varying soil and climatic conditions. It is relatively free from most of the pests and diseases and the question of plant protection normally does not arise. However, sporadic incidence of blast like symptoms has been observed in hybrid napier maintained in the college farm and the disease has been confirmed as blast caused by *Pyricularia grisea* Sacc. The disease causes severe leaf blight in some cultivars leading to leaf senescence. Leaf blast reduced photosynthetic rate of the remaining green parts of infected leaves (Bastiaans, 1991). Bastiaans and Kropff (1993) reported reduction in canopy photosynthesis because of the effect of blast lesions and shading by dead leaf area. Severe leaf blight caused by the pathogen induces production of phytotoxins and disruption of normal biochemical and physiological balance (Young-Ki *et al*., 2010).

Materials and Methods

The present investigation was carried out to assess the performance of hybrid napier cultivars under rainfed condition. Observation on the incidence of blast was also an objective of the experiment. The field experiment was conducted at the Agronomy Farm, College of Horticulture, Kerala Agricultural University, Vellanikkara, during 2011. The experimental design was Randomized Complete Block Design with three replications. There were 11 treatments comprising of popular cultivars 'Co-2', 'Co-3', 'Co-4', 'KKM-1', 'Suguna', 'Supriya', 'IGFRI-3', 'IGFRI-7', 'DHN-6', 'PTH' and 'PBN-16'. Rooted slips were planted at 60 cm X 60 cm in plots of size 20.16 m^2 with the onset of South west monsoon. The first harvest was taken after 75 days after planting and subsequently at 45 days interval. There were four such harvests in a year. During the course of experiment occurrence of blast disease was noticed in the last week of October, that is, after the second harvest, but before the third harvest. The extent of incidence and severity varied with each cultivar. As it was a fodder crop, which is to be cut in green state for immediate feeding, biological control was tried. In this case, talc based formulation of *Pseudomonas fluorescence*, found effective against fungal disease in many crops such as rice and vegetables, was sprayed on the plants at 10g/litre. The intensity of disease incidence was noted using the disease rating scale of IRRI (1996) as given in Table 1. Based on this scale, per cent disease incidence (PDI), per cent disease severity (PDS) and coefficient of disease index (CODEX or CI) were worked out. The rating was done before the application of pseudomonas and 10 days after the application. PDI is a measure of the percentage of diseased plants in the plant population, and PDS is a measure of the percentage of leaf area damaged by the disease which was calculated as [Sum of all disease rating/ (total no. of leaves observed X maximum grade) X100]. The grading was on a scale from 0 to 9. CODEX was calculated by dividing the products of PDI and PDS by 100. There were 56 plants in each plot and observations were taken from 40 plants leaving the border plants. To assess the severity, 160 leaves were observed from each plot. The leaves were selected from the top, middle and lower parts of plant canopy. Further observations were not taken after the third harvest, as the incidence of disease was not noticed. The third harvest was done three weeks after pseudomonas application.

Table 1. 0-9 grade disease rating scale used for screening of blast disease (IRRI, 1996)

Grade	Disease severity
0	No lesion observed
1	Small brown specks of pin point size
2	Small roundish to slightly elongated, necrotic gray spots, about 1-2 mm in diameter, with a distinct brown margin. Lesions are mostly found on the lower leaves
3	Lesion type same as in 2, but significant number of lesions on the upper leaves
4	Typical susceptible blast lesions, 3 mm or longer infecting less than 4% of leaf area

5	Typical susceptible blast lesions of 3mm or longer infecting 4-10% of the leaf area
6	Typical susceptible blast lesions of 3 mm or longer infecting 11-25% of the leaf area
7	Typical susceptible blast lesions of 3 mm or longer infecting 26-50% of the leaf area
8	Typical susceptible blast lesions of 3 mm or longer infecting 51-75% of the leaf area many leaves are dead
9	Typical susceptible blast lesions of 3 mm or longer infecting more than 75% leaf area affected

Results and Discussion

The screening of 11 cultivars revealed that there was 100 per cent disease incidence for the cultivars 'Co-2', 'Co-3', 'Co-4', 'KKM-1', 'Suguna', 'Supriya' and 'PBN 16'. The cultivars 'DHN 6', 'PTH', 'IGFRI-3' and 'IGFRI-7' recorded less than 100 per cent disease incidence (Fig 1). During the week of observation, the total rainfall was 192.80mm/week with mean surface air temperature of maximum -30.70 ^{0}C, minimum- 23.3^{0}C and maximum relative humidity of 90 per cent; these conditions seems to be conducive for the development of the disease. After the harvest, no further incidence was noticed probably because the above ground portion including stems and leaves were harvested and there was no or little rain. Before the application of pseudomonas, the PDS was more than 50 per cent for cultivars 'Co-2',' Co-3', 'Co-4', 'Suguna', 'Supriya' and 'PBN 16'. Among the cultivars which showed less than 50 per cent PDS, 'DHN6' and 'PTH' showed less than 2 per cent PDS only (Fig 1). The highest PDS was recorded by 'Co-4' (75.87), followed by 'Co-3' (66.84) and 'Co-2' (66.18). The above trend of PDS was reflected in CODEX too (Fig. 1c) as it is the product of PDI and PDS. The cultivar 'Co-4' (75.87) recorded maximum CODEX followed by Co-3(66.84) and Co-2(66.18). Lower CODEX values were observed for the cultivars 'DHN6' (0.88) and 'PTH' (1.13). After the application of pseudomonas, none of the cultivars showed more than 60 per cent disease severity (Fig. 1). The fast growth of hybrid napier can also be a reason for the reduction in PDS after pseudomonas application. For example, the green fodder yield from the third harvest alone ranged from 18.5 tonnes/ha to 39.5 tonnes/ha (from 45 days growth). The cultivars 'Suguna', 'Supriya', 'Co-3' and 'Co-4' recorded more than 30 per cent disease severity. The highest PDS and CODEX value were recorded by the cultivar 'Suguna'(PDS-57.16; CODEX-57.16), followed by 'Supriya'(PDS-42.31; CODEX-42.31), 'Co-3'(PDS-0.62; CODEX-0.37) and 'Co-4'(PDS-35.46; CODEX-35.46). The rest of the cultivars showed less than 30 per cent disease severity. Among these, 'DHN-6' (PDS-35.99; CODEX-35.99) and 'PTH' (PDS-1.24; CODEX-0.79) showed less than 2 per cent disease severity.

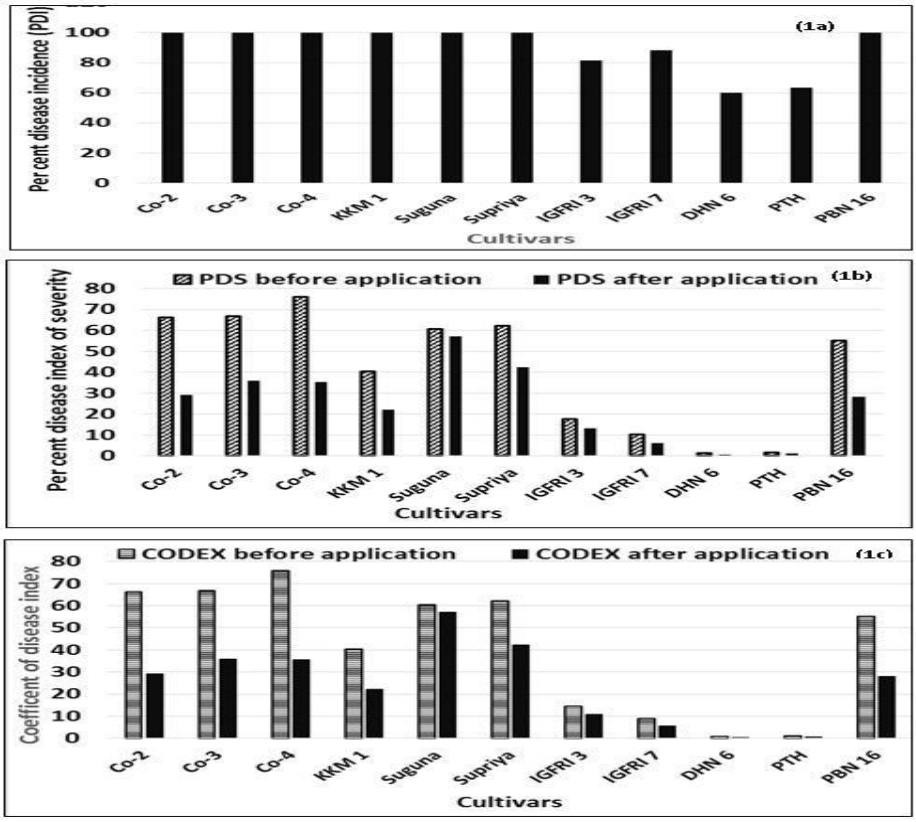

Fig. 1: PDI, PDS and CODEX values before and after the application of *pseudomonas*

Conclusion

Adoption of good pasture management practices such as selection of suitable cultivars, which are location specific, high yielding and less susceptible to pest and disease incidence along with suitable biological control measures will help to maintain sustainable pasture productivity at its best. The results indicate that *pseudomonas* application is helpful in managing blast disease in hybrid napier along with other agronomic practices.

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