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SHORT COMMUNICATION

First Record of Leaf Blast on Little Millet (*Panicum sumatrense* Roth ex Roemer and Schultes) from Mid Hills of Uttarakhand

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Incidence of leaf blast disease has been recorded for the first time in Little Millet at Plant Pathology Block, College of Forestry, Ranichauri. The isolate was studied by culturing on OMA medium and identified as *Pyricularia grisea* by cultural, morphological and microscopic characteristics. The pathogenecity test of the isolate was conducted following Koch's postulate on the susceptible cultivar of Little millet TNAU- 163 and confirmed as *Pyricularia grisea.*

Key words: Little millet, small millet, leaf blast, *Pyricularia grisea*

Small millets are small seeded annual cereal grasses used for food, feed and forage all over the world, particularly in the tropics and certain parts of the warm temperate regions. Principal members of the small millets group are finger millet (*Eleusine coracana* Gaertn.), barnyard millet [*Echinochloa frumentacea* (Roxb.) Link.], foxtail millet (*Setaria italic* Beauv.), proso millet (*Panicum milliaceum* Linn.), kodo millet (*Paspalum scrobiculatum* Linn.) and little millet (*Panicum sumatrense* Roth ex Roemer and Schultes) that are popular as 'nutri-cereals' owing to their rich calcium, iron, zinc and crude fibre content. These crops occupy 4.5 per cent of the total cultivated area (Kumar et *al,* 2007) and are cultivated in one or more states of India especially under rainfed and tribal agriculture.

Little millet (*Panicum sumatrense* Roth ex Roemer and Schultes), locally known as *Kutki, Samai, Samalu* and *Same* is cultivated throughout India in more than 0.5 million ha in the states of Tamil Nadu, Karnataka, Andhra Pradesh, Maharashtra, Jharkhand, Madhya Pradesh, Odisha and Gujarat. The crop is hardy and can withstand both water logging and drought conditions. Among the fungal diseases, grain smut, rust, *Udbatta*, sheath blight and leaf blight have been reported till date (Nagaraja *et al,* 2007). Although few phytonematodes infect the crop, but bacterial and viral pathogens are not reported.

Under the AICRP on Small Millets, a trial on Donor Screening Nursery (DSN) was conducted at the Ranichauri centre during *Kharif* 2014 for recording the incidence of important diseases of little millet in mid hills of Uttarakhand. Incidence of leaf blast, a new disease on little for the first time has been recorded by the monitoring team at Plant Pathology Block, Ranichauri centre. In the field, the disease manifested at the grain formation stage and covered the leaf areas. As a consequence, reduction in yield was observed in affected plants. The symptoms appeared on leaves in the form of spindle shaped spots that were of different sizes.

Initially, the spots were with yellowish margin and grayish centre. Later, the centers became ash colored. Under humid conditions, an olive grey overgrowth of fungus developed at the centre of spots. In the beginning, the lesions were isolated but coalesced afterwards.

Fig. 1 : Spindle shaped lesions of leaf blast

The pathogen causing leaf blast symptoms was isolated from the diseased leaf, depicting typical leaf blast symptoms (Fig. 1). The infected portions were cut into small pieces and surface sterilized. They were kept in a moist chamber at 28±2° C for 3 d to initiate vegetative growth and sporulation. The pieces were then transferred on the OMA (Oat

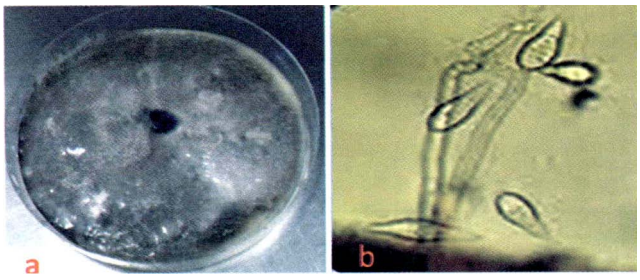

Fig. 2 : Cultural growth of the isolated pathogen on OMA (Oat Meal Agar) medium: a=luxuriant colony growth of the pathogen in culture; b= conidia viewed under microscope.

Meal Agar) medium. The cultural and morphological characteristics of the isolate were studied to identify the fungus associated with the diseased plants. The fungus when cultured on OMA medium produced luxuriant growth and abundant dark

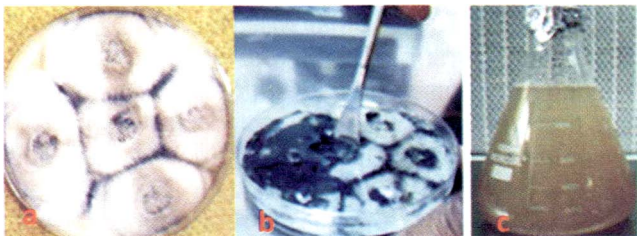

Fig. 3 : a= Mass multiplication of spores by growing isolate (5discs/plate) on OMA medium at 26+1°C for 15 days; b = harvesting of mycelium and conidia by scrapping; c= spore suspension of isolate

coloured chlamydospores in culture (Fig. 2a). Conidiophores were simple, septate, basal portion being relatively darker. Conidia produced acrogenously, one after another, were hyaline and obpyriform in shape Conidia were three celled, the middle cells being wider than end cells (Fig. 2b). Globose, thick walled, olive brown terminal or intercalary chlamydospores were common. On the basis of cultural, morphological and microscopic examinations, the fungus was identified as *Pyricularia grisea* (Cke.) Sacc.

The pathogenicity of the isolate was tested on susceptible Little millet cultivar (TNAU-163). Seeds of TNAU- 163, from the last year DSN trial, were used for conducting the pathogenecity test. Seeds of the susceptible cultivar were then sown in 15 cm diameter plastic pots filled with sterilized soil-sand-FYM (farmyard manure) mix (2:1:1) and placed in a greenhouse bay maintained at 30°C. Seedlings were thinned at one-leaf stage to keep 10 plants per pot.

The inoculum was prepared by inoculating 6 mm mycelial discs of isolate cut from 7 day-old-culture of *P. grisea* on OMA medium at 26±1ºC. Mass multiplication of spores for inoculation was achieved by growing isolate (5 discs/plate) on OMA medium at 26±1ºC for 15 days (Fig. 3a). The plates were flooded with 10 ml of distilled water and the fungal growth containing mycelium and conidia was gently removed by scrapping with a sterile plastic inoculation loop (Fig. 3b). Approximately 30 ml of a spore suspension of isolate was transferred into 100 ml conical flask, mixed thoroughly by vortexing for release of conidia into water (Fig. 3c). Harvested spores were filtered through a double-layer muslin cloth, the resultant concentration was adjusted to 1×10^5 conidia ml^{-1} and 0.02% (vol/vol) Tween 20 (polyoxylethylene sorbitan monolaurate) (Jia *et al*., 2003) was added to the suspension just before the inoculation. 15-day-old pot-grown seedlings were inoculated artificially by spraying the inoculum on the foliage using a hand-operated atomizer. Inoculated plants were allowed to partially dry for 30 min to avoid dislodging of the spores and the seedlings sprayed with water were maintained as control. All the inoculated seedlings were incubated at 23°C with >95% Relative Humidity (RH) and leaf wetness under 12 h photoperiod for 7 days.

Leaf blast severity of the isolate was recorded on leaves of the susceptible cultivar. The symptoms appeared on leaves in the form of spindle shaped spots. The spots were with yellowish margin and

grayish centered which later on became ash coloured (as observed in field). The pathogen was reisolated following the protocol as described previously and compared with the original culture. Based on cultural, morphological and microscopic studies the reisolated pathogen was confirmed as *P. grisea.*

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REFERENCES

Kumar, B., Kumar, J. and Srinivas, P. 2007. Occurrence of Downy Mildew or green –Ear Disease of Finger Millet in mid- hills of Uttarakahnd. *J Mycol Pl Pathol.* **37** :532-533.

Nagaraja, A., Kumar, J., Jain, A K., Narasimhudu, Y., Raghuchander, T., Kumar, B. and Gowda, H B. 2007. *Compendium of small millets diseases.* Project Coordination Cell, All India Coordinated Small Millets Improvement Project, University of Agricultural Sciences, Gandhi Krishi Vigyan Kendra Campus, Bangalore, 80p.

Jia, Y., Valent, B and Lee, F.N. 2003. Determination of host responses to *Magnaporthe grisea* on detached rice leaves using a spot inoculation method. *Plant Disease.* **87**: 129-133