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Diseases of Brown Top Millet and their Management

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INTRODUCTION

Browntop millet (Brachiaria ramosa (L.) Stapf.), native to south-east Asia is a quickly maturing traditional cereal crop belongs to the family Poaceae and one of the rarest among small millets. It has potential to give sustainable yield in resource poor and fragile ecological conditions. The crop is hardy, drought tolerant but can also be grown in low lying areas that can flood. In India, the the crop is cultivated in dry tracts of Andhra Pradesh- Karnataka border areas, Tamil Nadu, Maharashtra and in erratic pockets of Madhya Pradesh. Locally, it is called Koralee in Kannada, Andu Korralu in Telugu, Pala Pul in Tamil and Chotti Kangni or Basara in Hindi. Brown top millet is a moderately erect to decumbent warm-season annual grass. Leaf blades are broad, flat, and hairless. Nodes are often fringed with hair, and the ligule is a membrane fringed with hair. Mature plants are typically 2.5 feet tall with erect, branched panicles measuring from 2 to 7 inches in length. The grains of browntop millet are consumed as boiled whole grain, porridge, kheer or unleavened bread. The grains are also used as a bird feed, forage crop for domestic animals and game animals. The crop is also used to suppress root knot nematode populations in tomato and pepper crops. The crop also has the ability to accumulate significant amounts of metals such as lead and zinc in its shoot and root tissues making it an important plant for remediation of contaminated soils. The crop is also grown for several other purposes as well as cover crop in coconut and areca nut groves for for soil erosion control and for high straw production. The sharp leaf structure of the plant obstructs the intrusion of rats into the fields. Hence, farmers grow this crop also to control rodents in coconut and areca nut groves. Brown top millet is a rich source of iron, zinc and fibre. This millet contains phytochemicals such as flavonoids, guinones, tannins, and resin. This is also a gluten-free and non-acid-forming, easyto-digest type of millet and an alternative to replace rice and wheat in the daily diet. Browntop millet is not only nutritious but also very delicious. The grains contain about 12.55 fibre, due to which it serves as medicine for dealing with life style diseases. Consumption of browntop millet regularly leads to a lower risk of cardiovascular diseases, duodenal ulcers, and hyperglycemia or diabetes.



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Recently the crop is reported to suffer with few fungal diseases namely leaf blight, banded blight, leaf blast and rust, that can limit the vield significantly under favourable conditions. Browntop millet was also found good host for Helminthosporium nodulosum, the causal agent of finger millet blight. Occurrence of Ephelis oryzae on browntop millet was also reported. The crop also showed positive reaction for rice tungro virus and exhibited leaf yellowing, stunting. reduction in number of tillers and interveinal chlorosis with typical symptoms of tungro disease as expressed in rice crop.

1. Leaf blight

Leaf blight of browntop millet caused by Bipolaris setariae is one of most important disease and occurs in very severe form across the geographical regions limiting production and productivity of the crop. The disease was first time noticed from UAS, Bengaluru during Kharif 2018 and about 75% of the plants in the field of 0.5 ha were found infected. The most common symptoms include small brown pinhead size spots (1 - 5 mm) on leaves and stems surrounded by yellow halo on both sides of leaves. As the disease progress, the spots grow larger exhibiting light brown centers and coalesce resulting in a blighted appearance. The host range of *B. setariae* is limited only to browntop millet and found non-pathogenic to other six small millets.

The pathogen formed light grey to greyish white colonies with irregular margin and black colour pigmentation on reverse side of petri plate. Czapek dox agar (CDA) and host leaf decoction agar with 2 percent sucrose are ideal for better growth and abundant sporulation, while pH 6.0 to pH 7.0 were found to be ideal for radial mycelial growth and sporulation. However, large size conidia (10 celled) were produced in pH 4.5.My celium of the fungus was light brown to brown in colour, thin septate and branched profusely. Conidiophores can be up to 120 μ m long and 4.92 to 6.04 μ m thick, dark brown in colour with intercalary and terminal conidia. Conidia

were fusoid, pale brown to dark brown, cylindrical with a slight curvature, with 4 to 10 pseudosepta and a flat to inconspicuous or slightly protruded hilum. Conidia were formed singly or in whorl on conidiophores. Conidia germinate in one of two ways, unipolar or bipolar.

Management

- Aqueous leaf extract of agave (Agave americana) @ 30% was found promising against *B. setariae* causing leaf blight disease in brown top millet under *in vitro* condition.
- Seed treatment with Arka microbial consortia @10g/kg + spraying with Azoxystrobin 23% SC @ 1ml/L at 35-40 days after sowing was found effective for management of browntop millet with maximum grain(1653 Kg/ha.) and fodder yield (4031 Kg/ha) and minimum (2.5G) disease incidence. Maximum BCR of 1:3.10 rupees as against 1:1.46 in untreated control is also reported.
- Seed treatment with Arka microbial consortia @10g/kg + spraying with Propiconazole 25 % EC @ 1ml/L at 35-40 DAS) is also effective to reduce the disease incidence.
- Foliar spray of Propiconazole 25% EC @ 1 ml/l of water at 35-40 days after sowing was effective in reducing leaf blight incidence by 65.43 per cent and increased grain yield by 191.1 per cent with 2.28:1 B: C ratio.
- Three germplasm viz., IC 0613551, IC 06135512, IC 06135518 and one variety GPUBT-2 are moderately resistant for leaf blight. Other promising cultivars are KMBT-1, GPBT-9, TNBr 012 and GPUBT-5.

2. Banded blight

Banded blight caused by *Rhizoctonia* solani is an emerging disease of browntop millet. The disease starts at tillering stage of the crop and continues in the succeeding stages. First symptoms appear



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as gravish green lesions on the leaf sheath between soil level and leaf blade. The lesions are ellipsoid, ovoid, 2-3 cm long that become grayish white with brown margins. The disease spreads upward causing blighting of the leaf sheath and leaf blades. The avoidable grain and fodder yield loss was accounted 34.5% and 13.9 %, respectively and yield loss increased with increase in disease severity. Browntop millet was also reported a good host for maize isolate of Rhizoctonia solani f.sp. sasakii. Browntop millet cultivars namely HBr 2, DHBT 11-8 D, IIMR BTC TNBr 017 and were promising for banded blight

Management

- Clean cultivation, draining out of excess water and removal of grass weeds can reduce the disease incidence.
- Soil application at the time of field preparation with *Pseudomonas fluorescens* + *Bacillus subtillis* + *Trichoderma asperellum* each 1 kg with 25 kg farm yard manure or 15 kg vermicompost effectively reducing the inoculums.. Spraying of Propiconazole @ 1 ml/ 1 of water is recommended to reduce the disease.

3. Leaf blast

Leaf blast of browntop millet caused by Pyricularia grisea (CKe.) Sacc. was first time recorded during Kharif 2019 from Ranichauri (UK). India. The disease manifested from vegetative to grain formation stage and covers the leaf areas. The symptom appears on leaves in the form of typical spindle shaped spots of different sizes. Initially, the spots were with yellowish margin and gravish centre. Later, the centers become ash coloured. Under humid conditions, an olive grey overgrowth of the fungus developed at the centre of spots. In the beginning, the lesions were isolated but coalesced afterwards.

The fungus produces luxuriant growth and abundant dark coloured chlamydospores in oat meal agar medium. 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. Globose thick walled olive brown, terminal or intercalary chlamydospores were common.

Management

- Use of disease free seeds.
- Use of resistant cultivars viz. HBr-2, KMBT-1, TNBr 012 and GPBT-9.

4. Rust

Pathogen causing rust on browntop millet was identified as *Uromyces* species based on morphological characters of spores at Bengaluru during *Kharif* 2019.

Numerous narrow minte brown postules arranges in linear rows appear on the upper surface of the leaves. Raised yellow to white spots appear on both sides of the leaf. As the disease progresses, the spots merge and form reddish-orange and rusty pustules. The pustules may have yellow margins and can turn darker at later stages. The leaves may die because of the infection and in severe cases, the plants collapse.

Management

- Removal of collateral hosts and infected plants.
- Use of moderately resistant cultivars viz. BTM NDL 4, TNBr 012, DHBT 11-8 D , GPUBT 3, GPUBT 6 and DHBT 11-5.
- Seed treatment with Arka microbial consortia @ 10 g/kg seed with one foliar spray of Propiconazole 25% EC or Tebuconazole 25.9% EC @ 1 ml/l of water at 35-40 days after sowing is effective for the management of rust in browntop millet.
- Sprays of Mancozeb @ 2.5 g per l. of water immediately after initiation of symptoms can reduce the disease incidence.

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