COLLAR ROT OF ELEPHANT FOOT YAM

Elephant foot yam (*Amorphophallus paeoniifolius* (Dennst.) Nicolson) belonging to the Araceae family is widely cultivated for its edible tubers, extensively used as a favourite vegetable by millions of people in India (Fig. 1). It is a remunerative and profitable crop and has gained much popularity due to its health benefits, high productivity, ease of cultivation, shade tolerance and steady demand. Collar rot caused by the fungus, *Sclerotium rolfsii* is the most common and devastating disease prevalent in all elephant foot yam growing areas resulting in considerable yield loss (Fig. 2). The fungus, *S. rolfsii* is capable of infecting any stage of the crop, though it is usually detected in the later part of crop growth. Apart from causing major damage in field, *S. rolfsii* is the major contributor for postharvest rot during storage of harvested corms.

Fig.1. Field view of elephant foot yam crop

Fig.2. Collar rot infected plants

Fig.3. Collar rot infected corms

Symptoms

The pathogen invades the collar region resulting in development of water-soaked lesions on the pseudostem just above the soil surface (Fig. 4). The leaves turn yellow from the tip which steadily extends to other portions causing complete chlorosis of the plant (Fig. 5). Finally, the pseudostem shrinks and the plant collapses due to rotting of the collar region (Fig. 6).

Fig. 4. Water soaked lesions on collar region

Fig. 5. Plants showing yellowing symptoms

Fig. 6. Shrinkage of pseudostem and collapse of the plant

A thick, white mycelial mat of the pathogen with globular dark brown mustard seed like structures called sclerotia can be seen all around the affected tissues (Fig. 7, 8 and 9). The pathogen is capable of causing sudden death of the plant under favourable conditions (Fig. 10).

Fig. 7. White mycelial growth at the collar region

Fig. 8. Closer view of the collar region after infection

Fig. 9. Sclerotia developed at collar region

Fig. 10. Sudden collapse of the plant

Pathogen

Sclerotium rolfsii is a soil borne fungus with a number of alternate host plants. Colonies of *S. rolfsii* are characterized by fluffy white mycelium on artificial media (Fig. 11). Mycelia produce hard, round sclerotia with 0.5 - 2 mm diameter. Sclerotia begin as small tufts of white mycelium and immature sclerotia are white (Fig. 12 and 13). The colour of sclerotia turns darker as they mature, becoming tan to dark brown (Fig.14).

Survival of the pathogen

S. rolfsii affects more than 500 species of host plants belonging to 100 families mainly legumes, crucifers and cucurbits. The sclerotia remain viable for a longer period of time in the soil. *S. rolfsii* thrives in highly aerobic environments and thus survives best near the soil surface. Repeated cultivation of elephant foot yam in the same field leads to increased incidence of the disease.

Spread of the pathogen

Sclerotia contain viable hyphae and serve as the primary inoculum source in the disease cycle. *S. rolfsii* needs warm and wet weather to propagate, hence its growth and sclerotial formation is optimal at 27-30 ºC. Warm and humid weather, poor drainage and mechanical injuries caused during intercultural operations and by insect attack are the major predisposing factors for disease incidence.

Fig. 11. Growth of *S. rolfsii* on potato dextrose agar (PDA) medium

Fig. 12. Formation of small tufts of white mycelium

Fig. 13. Immature sclerotia

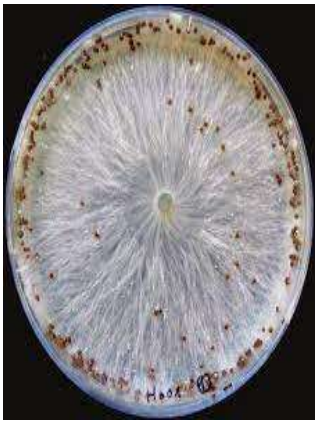

Fig. 14. Mature sclerotia

Disease management

Collar rot disease is difficult to manage, since the pathogen has a broad range of host plants and produce persistent sclerotia. Considerable research has been carried out on the management of this disease. Resistance is not found in any of the cultivated varieties. However, there are certain measures, physical and cultural, chemical, and biological control strategies, which can reduce the disease incidence and losses caused by the pathogen.

Physical and cultural measures

- Use disease free corms for planting.
- Remove infected plants from the field.
- Improve drainage in field.
- Plough deeply to bury or kill sclerotia and hyphae of the pathogen in the field.
- Mulch the plants with paddy straw or any other organic wastes.
- Rotate with non-host crops

Chemical measures

- Treat the corms three days before planting with combination fungicide, mancozeb + carbendazim at the rate of 2 g/litre (Fig. 15).
- Drench the plants immediately after intercultural operations with the above fungicide at the rate of 2 g/litre.
- Remove infected plants carefully and give an additional drenching with the fungicide to the nearby plants.

Organic management

If organic cultivation is practised, the following measures can be adopted.

Follow physical and cultural measures mentioned earlier.

- Treat the corms with *Trichoderma* enriched cowdung slurry, three days before planting. Mix *Trichoderma* in cowdung slurry at the rate of 5 g/kg corm (Fig. 16).
- Apply *Trichoderma* enriched FYM at the rate of 2.0 - 2.5 kg/pit at the time of planting.
- Apply *Trichoderma* enriched vermicompost to the collar region at the rate of 150 g/plant immediately after intercultural operations (Fig. 17).
- Remove infected plants carefully and give an additional application of *Trichoderma* enriched vermicompost to the nearby plants.

Fig. 15. Treating the corms in fungicide

Fig. 16. Treating the corms with *Trichoderma* enriched cowdung slurry

Fig. 17. Application of *Trichoderma* enriched vermicompost to the collar region

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