LEAF BLIGHT OF TARO

Taro (*Colocasia esculenta* (L.) Schott) is an important tropical tuber crop widely cultivated in different states of India. Taro leaf blight (TLB), caused by the oomycete *Phytophthora colocasiae* Raciborski, is the most destructive disease of taro. E.J. Butler and G.S. Kulkarni reported this disease for the first time in India in 1913. It has been observed at various places in India causing 25-50 percent yield loss. The disease is more prevalent in northern and eastern parts of India, where the crop is widely cultivated. Both *eddoe* and *dasheen* types of taro are equally susceptible to TLB disease. Though *P. colocasiae* is mainly a foliar pathogen, it also affects the petioles and cormels of taro (Fig.1).

Fig.1. *P. colocasiae* infection on taro leaves, petiole and cormels

Symptoms

Small, water soaked light brown spots appear on the leaf surface. The spots enlarge rapidly, increase in size and number, coalesce and lead to complete destruction of leaf lamina (Fig. 2). During the dry season, expansion of lesions slows down and the colour of lesions may change from light brown to brown surrounded by dark brown margins.

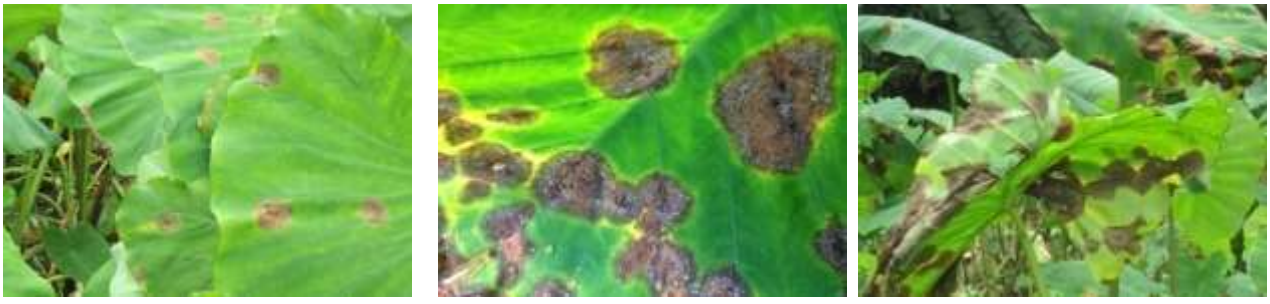

Fig. 2 . Various stages of foliar infection

Bright orange or reddish brown exudates, oozing from the affected portionis another common symptom and they become hard globules later (Fig. 3). The centre of the lesions become papery, disintegrate, blown out and produces a ‘shot-hole’ appearance in some varieties and during dry weather. When there is high relative humidity, whitish ring formed by mass accumulation of sporangia is seen around the edge of the lesions (Fig. 4). In susceptible varieties, the lesion increase in size and number rapidly (Fig. 5). Whereas in tolerant ones, lesions are restricted with a yellow halo surrounding them (Fig. 6). Lesions develop on petioles of susceptible varieties and the brown exudates are seen oozing out from the petiole and the petiole infection causes the plants to collapse (Fig. 7). Infected corm tissue is brown, firm, and rotting develops rapidly after harvest.

In fields where the previous crop had TLB incidence, the infection starts on the lower leaves which touch the ground (Fig. 8). Practice of mulching can delay the incidence by avoiding contact between leaves and ground.

Fig.3. Reddish brown exudates oozing from the spots

Fig. 4. Whitish ring of sporangia around the edges of lesions

Fig.5 . Lesions on susceptible variety

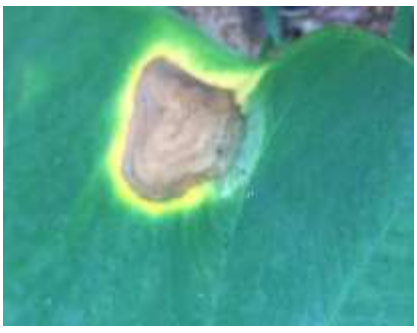

Fig.6. Lesion on resistant variety

Fig.7. Leaves collapsing after petiole infection

Fig.8. Lower leaves touching soil showing TLB incidence

Pathogen

P. colocasiae is a phytopathogenic oomycete, the colony colour of the pathogen on media is whitish or dull white with slightly fluffy and rosette in growth pattern (Fig. 6). The sporangia are formed at the ends of short, unbranched or sparingly branched sporangiophores. The sporangia are elongated, lemon- or pear-shaped and are usually separated from sporangiophores by rain (Fig. 7). Sporangia germinate directly or indirectly depending on the weather conditions. In the case of indirect germination (20-21°C),as many as 12 reniform, biflagellate zoospores are released, which are converted to cysts and germinate after 30 minutes (Fig. 8). The abundant production of sporangia, zoospores and cysts make *P. colocasiae* a devastating pathogen.

Fig. 6. Growth of *P. colocasiae* on carrot agar medium

Fig.7 . Sporangia of *P. colocasiae*

Fig.8. Sporangia of *P. colocasiae* releasing zoospores

Survival of the pathogen

The pathogen survives in cormels, in alternate hosts, wild taro plants as well as in soil as oospores and chlamydospores (Fig. 9). The cormels when stored as seed material for next crop get infected and this is a major cause of recurrence of the disease.

Fig.9. Wild taro plants infected with *P.colocasiae*

Spread of the pathogen

Taro leaf blight incidence is more in places with high relative humidity and frequent rainfall, whereas warmer areas with less rainfall and relative humidity are comparatively free from the disease. Sporangia get detached from sporangiophores and are spread by rain splash and wind-blown rain. Sporangia germinate on leaves and petioles or are washed into the soil where they can infect taro corms. When the temperature and relative humidity are optimum for 6-8 hours for three consecutive days with light rain or dew in the morning, the disease spreads fast and the entire field gets infected. Due to waxy cuticle of the leaves, many sporangia and zoospores are washed into the soil or splashed onto petioles. Due to favourable wet climate of the tropics, taro grows throughout the year and ensures a continuous supply of host plants. Cormels and other plant parts left in the field after harvest can also act as inoculum sources for newly planted taro. The pathogen spreads to long distances through infected planting material.

Disease management

Tolerant varieties

Cultivation of resistant varieties offers the most economic, reliable and best long-term solution to managing taro leaf blight.

- Use TLB tolerant varieties, Muktakeshi, Bhu Sree and Bhu Kripa (Fig. 10).

Fig.10. TLB tolerant varieties, Muktakeshi, Bhu Sree and Bhu Kripa

Cultural practices

The cultural and physical control methods have limitations considering the rapid spread of the disease. Early disease management focused on reduction of inoculum and humidity significantly reduce the crop loss. To attain this, following practices are needed.

- Use disease - free cormels for planting
- Remove infected leaves and other plant parts from the field
- Crop rotation and intercropping with non-host crops like okra
- Mulch with paddy straw or any other ground mulch (Fig. 11 and 12).
- Alter the planting time in such a way that the critical stage of plant growth and optimum climatic conditions for disease development do not coincide with each other.

Fig. 11. Taro plants with plastic mulch

Fig. 12. Taro plants with paddy straw mulch

Chemical measures

Spray any of the following fungicides as prophylactic/protective measure at 45 days after planting and again at 15 days intervals when significant disease incidence is observed.

- Metalaxyl-mancozeb, 0.1%
- Mancozeb, 0.2%
- Potassium phosphonate, 3ml/l

Organic management

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

- Use resistant varieties
- Follow cultural measures mentioned earlier.
- Treat the cormels with 10 per cent vermiwash before planting, apply vermicompost at the rate of 100 g/plant before planting and spray as well as drench with 10 per cent vermiwash before monsoon and at 15 days intervals during rainy season.
- Treat the cormels with *Trichoderma* enriched cowdung slurry. Mix *Trichoderma* in the cowdung slurry at the rate of 5 g/kg of cormel. Apply *Trichoderma* enriched vermicompost at the rate of 100 g/plant at the time of planting and once again during intercultural operation.

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