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Report of Blue Mould Rot of Rhizome of Tiger Lily (*Gloriosa superb* Linn*)*

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Abstract:

Gloriosa superba is a species of flowering plant in the family Colchicaceae. It is an endangered, herbaceous, perennial plant it is also known as climbing lily, flame lily, creeping lily, glory lily, tiger claw, and fire lily. This plant contains high levels of colchicine, a toxic alkaloid. The rhizome was found with a blue mould growth at the time of post harvest storage and during planting time on the surface of rhizomes, in Sikkim, India (2013). The microscopic examination revealed that the fungus was Penicillium. The pathogenicity test also confirmed that the blue mould rot disease of rhizome was caused by Penicillium. This is the first record of Penicillium sp. on the rhizome rot of G. superb.

Key words: *Gloriosa superba* L., *Penicillium*, Colchocine, blue mould rot, Sikkim.

Introduction

Gloriosa superba is a native of tropical Africa and is found growing naturally in many countries of tropical Asia including

Bangladesh, India, Sri Lanka, Malaysia and Myanmar. It is a National Flower of Zimbabwe and state flower of Tamil Nadu, India. The plant can be propagated sexually by seed or vegetatively by dividing the rhizome. It is one of the major medicinal plants in India cultivated for its seeds which are exported to developed countries for pharmaceutical use (Chitra *et al.,* 2005). Seeds and tubers contain valuable alkaloids *viz.,* colchicine and colchicoside as the major constituents, which are used to treat gout and rheumatism. Due to the action of colchicoside on spindle fibre formation during cell division, the plant has been identified as a potential anticancerous drug. In the Indian Systems of Medicine, the tubers are used as tonic, antiperiodic, antihelmenthic and also against snake bite (Gupta *et al*., 2005). Both the fruit and the rhizome are harvested. The fruits are dried and split, and the seeds are removed and dried further. The seeds and rhizomes are sold whole, as powder, or as oil extracts.

The incidence of blue mould rot was found as a postharvest storage and planting time but more during cloudy days coupled with high humidity. Blue mold rot is a fungal disease caused by *Penicillium* spp. It is a common soil fungus that survives on dead or decaying plant debris. Lily bulbs do not have a natural protective layer and are bruised easily, which can lead to severe rot. The fungus invades the lily bulb through wounds on the bulb or decaying stem tissue. Once the fungus has invaded the bulb it grows profusely, and may sporulate on the surface of a wound appearing as a blue-green furry coating. The rot develops rapidly in storage, particularly in the high humidity. The bulbs may be soft or "mushy" to the touch, and covered with a blue-green mold fungal growth. This problem is particularly prevalent in early dug rhizome that has suffered excessive mechanical injury, insect damage; bruising, stress, etc. are seriously infected with basal rot. If the bulbs are severely damaged after lifting/harvesting or seriously infected with a bulb disease or rot and left unchecked, the disease can

become rampant and cause them to rot, therefore destroyed the rhizome (Beckerman, 2013).

Pathogenicity was determined by testing the ability of fungus to induce rot in healthy fresh rhizomes. The fungus was isolated in PDA, which is considered as the best medium for fungal culture. The fresh healthy rhizomes of 9-12 months age were obtained from the sample collection site. Rhizomes were washed in sterile distilled water and surface sterilized using 1% sodium hypochlorite and then washed in five successive changes of sterile distilled water. Holes of 1mm deep were dug in the rhizome by using 1 mm diameter sterile cork-borer; the plug was pulled out and replaced with 1 mm diameter mycelia disc from PDA and placed at the bottom of the hole on fresh rhizome. A Small portion of the rhizome plug was cut off to compensate for the thickness of the mycelial disc introduced in to the hole. The plug was carefully placed and the wounded areas were sealed with about 5 mm thick sterile agar blocks to prevent extraneous infection. The rhizomes were incubated for 15 days at room temperature (28^0C). As the rot develops further, the decayed area sunken and mycelium and fruiting bodies of the fungus appeared. These form a blue, powdery layer over the affected surface. Further, the plates were incubated at 28^0C for 3-4 days. Re-isolation from infected rhizomes on potato dextrose agar yielded a fungus which was purified by single spore technique (Belay *et al*., 2012).

On PDA medium, colonies arise after 3-4 days usually which consist of a compact white basal felt covered by a dense layer of blue coloured. A microscopic characteristic of the fungus isolates was examined using a compound microscope. The fungus was characterized by the production of conidia in long chain on repeatedly branched conidiophores resemble to brushlike head which was oval shaped. The conidiophores were septate, branched without vesicle. The isolated fungus was keyed out based on specialized taxonomic literature as shown by Raper and Thom, 1949 and was identified as *penicillium*. In

addition to colony macro and micro-morphological characteristic such as conidiophores, phialides and conidia and its elements was very significant in identification of *Penicillium* fungi. A perusal of the literature revealed that this is the first report of the incidence of *penicillium* on rhizome of *G. superb* L. in India.

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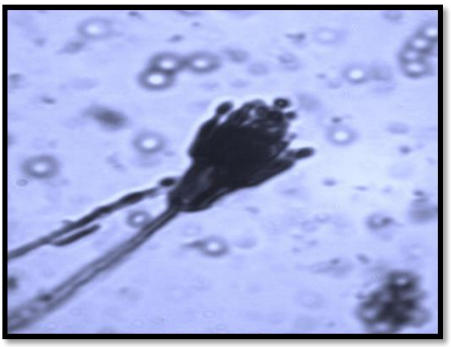

Fig: a. Microscopic view of *Penicillium* (40X).

b. Fig: Growth of *Penicillium* on rhizome of *Gloriosa superba* in field after planting.

Fig: c. Pure culture of *Penicillium* isolated from infected rhizome in PDA.

Fig: d. Healthy rhizomes