



**Fig a.** Spots on the sepals and calyces **Fig b.** Leaf showing isolated oval spots with brown powdery spores at the centre **Fig c.** Geniculate conidiophore **Fig d.** Conidia with echinulation. **Fig e.** Spots coalesce and leads to drying of entire leaf

**Disease:** Fairy Ring Spot of Carnation (*Dianthus caryophyllus* L.);

**Causal agent:** *Cladosporium echinulatum* (Berk.) G.A. de Vries, (1952)

**Synonyms:** *Davidiella dianthi* (C.C. Burt) Crous & U. Braun, (2003),

*Heterosporium echinulatum* (Berk.) Cooke, (1877), *Helminthosporium echinulatum* Berk., (1870)

**Classification:** K: Fungi, D: Ascomycota, C: Dothideomycetes, O: *Capnodiales*, F: *Davidiaceae*

Fairy ring spot is a fungal disease of carnation caused by *Cladosporium echinulatum*. The disease initiates in the corners of the polyhouse where cool temperature and humidity favours growth of the pathogen. The disease spreads fast to the centre of the polyhouse and causes severe devastation. The spots on the flower stalk reduces the aesthetic value of the flower.

**History:** The fungus was first reported and named by Berkeley in 1870 as *Helminthosporium echinulatum*. Later the name was changed to *Heterosporium echinulatum* by Cooke in 1877 then to *Cladosporium echinulatum* by Berkeley in 1952 which is currently in use.

**Symptomatology:** The disease initiates as small pin head necrotic lesions which later enlarge as circular to oval spots (1- 4 mm) with purple margins (Dhancholia *et al*, 2001). The centre of the spot is covered by a brown powdery mass of spores arranged in the form of dull dark bands. These typical spots were observed on the leaves, petioles, and sepals of the plant, making it unfit for aesthetic use. Sporulation is very abundant on the under side of the leaf during rainy season.

**Pathogen Biology:** The pathogen affects the plant in its conidial stage. Mycelium are septate, sub hyaline to olivaceous brown and smooth walled. Conidiophores are septate, nodulose and geniculate bearing yellowish brown, echinulated conidia which are straight or slightly curved, oblong to obtuse in shape, sometimes soleiform with 1- 4 septations measuring 15-65 x 10-17  $\mu\text{m}$  (Bensch *et al* 2012). The pathogen was also reported to produce black irregularly shaped spherical perithecia with a short stout beak in it's sexual stage *Davidiella dianthi* (Burt, 1936)

**Epidemiology:** The disease intensity is severe during periods of high rainfall and humidity. Low temperature favours disease spread and during continuous days of sunshine the disease intensity decreases.

**Geographical distribution:** The disease has been reported in Africa, India, Japan, Europe, Brazil, Venezuela (Dowson, 1936).

**Host Range:** In addition to carnations the pathogen is known to cause disease in Sweet Williams, *Lychnis* and *Saponaria* species and other members of *Caryophyllaceae*.

**Disease Impact:** The pathogen destroyed approximately 25,000 flowers of carnation varieties "Midas", "Nelson" and "Salamanca" at Mucuchies region of Venezuela (Luis *et al*, 1997). In Tamil Nadu (India) the disease was found prevalent in Kodaikanal, Ooty and Kothagiri. The Percent Disease Index ranged from 40-60, with Gaudina red as the most susceptible variety.

**Disease Management:** Management of the disease includes both cultural and chemical practices. Weeds and alternate hosts need to be removed either by manual methods or by herbicides. Many fungicides have been tested and mancozeb and tebuconazole proved effective @ 1.5% at 5 days interval. Application of sodium bicarbonate @ 5g/l and Trichonativa (*Trichoderma virens*) @ 5ml/l is also effective (Sandoval *et al*, 2008).

**Reference:** Bensch *et al* (2012) *Studies in Mycology* 72 : 111 -114; Dhancholia (2001) *Journal of Mycology and Plant Pathology* 31: 91; Burt (1936) *Transactions of the British Mycological society* 20: 207-215; Vinodkumar Selvaraj (2013) Indian Phytopathological Society (South zone)-Abstract; Vinodkumar Selvaraj (2014) Fairy ring spot, APS featured image-fi00231

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