J. Hortl. Sci.
Vol. 13(2) : 217-220, 2018

Short Communication

Occurrence of powdery mildew disease of Gerbera in Kerala

N.M. Praveen*[1], Reshmy Vijayaraghavan[1], S. Beena[1] and S. Krishnan[2]

[1]Department of Plant Pathology, College of Horticulture, Kerala Agricultural University, Kerala, India-680 656
[2]Dept of Agricultural Statistics, College of Horticulture, Kerala Agricultural University, Kerala, India-680 656
Email: pn40785@gmail.com, drreshmydhanesh@gmail.com, reshmy.v@kau.in

ABSTRACT

A purposive sampling survey on the hilly tracts of Wayanad, Kerala revealed the existence of powdery mildew disease in gerbera crops, grown under both protected and open field condition. Among the other fungal diseases of gerbera, powdery mildew disease causes decisive damage to the ornamental cut flower crop, thereby decline in the industrial value of the crop. Symptom of the disease include as white powdery mat on the upper surface of leaf lamina that gradually turned pale yellow to brown. Powdery mildew existed in two locations of Wayanad *viz.*, Ambalavayal and Chulliyode where highest per cent disease severity (PDS) of 50.72 was observed at Chulliyode and 47.2 per cent was observed at Ambalavayal during November-December. In Ambalavayal, the disease was non-significant and no correlation existed between weather parameters and disease progress. But, in Chulliyode, correlation studies revealed that it was significant with positive correlation to relative humidity and a reverse relation existed with temperature and rainfall. The weather data clearly depicts that at a low rainfall of 96 mm and above average relative humidity of 80.27 per cent during November-December was the congenial factor influencing the disease development. But during summer, decline in relative humidity (78.37%) and rainfall (63.13 mm) caused a slight reduction in mean per cent disease severity of 49.12 per cent and 33.6 per cent at Chulliyode and Ambalavayal respectively. Morohological and cultural characters of the pathogen depicts presence of two distinct organism v*iz.*, *Golovinomyces cichoracearum* (*Erysiphe cichoracearum*) and *Podosphaera* sp. as the causative organism of the disease. *Golovinomyces cichoracearum*produced hyaline, septate mycelia with globose conidia with irregular peripheral end formed in a chain and *Podosphaera* sp. produced superficial, hyaline, coenocytic mycelium with oval or ellipsoidal, catenate conidia with dimension ranging from 22.1-30.18 x 13.36-18.08ìm formed in unbranched erect conidiophores.

Keywords: Gerbera, *Golovinomyces cichoracearum, Podosphaera* sp., per cent disease severity

INTRODUCTION

Gerbera is a perennial herb, native to tropical regions of South America, Africa and Asia belongs to Asteraceae family. It is the most popular cut flower with increasing commercial significance, these plants were grown throughout the world in a wide range of climatic conditions and are in great demand in the floral industry as cut flower as well as potted plant due to its beauty, color, long vase life and ability to rehydrate after long transportation. Fungal, bacterial and viral diseases being the major constraints that bring down the growth of the cut flower industry. Among the fungal disease, powdery mildew affects the yield and economic profitability of the cut flower cultivation. Powdery mildew disease observed mainly in the hilly tracts due to the favorable humid and temperature prevailing in those locations. Hence, the present study is focused on to study the occurrence of powdery mildew disease in Wayanad district of Kerala, its correlation with the weather parameters and also the disease causing pathogen.

A purposive sampling survey on the occurrence of powdery mildew diseases of gerbera in Wayanad district was conducted during the months of July-August, November-December and March-April to get a complete profile on the occurrence of diseases

prevailing during rainy, winter and summer season. The disease incidence and disease severity were recorded based on extent of symptoms produced by the pathogen. The severity of disease was assessed by adopting a standard score chart of 0-6 scale developed by Kumar *et al* (2012).

During sampling survey, the extent of intensity and severity were recorded for powdery mildew disease and was correlated with the weather parameters *viz.*, temperature, relative humidity (RH) and rainfall prevailing during each seasons.

Pathogenicity of obligate parasites causing powdery mildew diseases was proved by detaching an infected leaf containing a single colony and inoculating onto a fresh healthy leaf. The whole leaf sample was covered with plastic bag and observations were taken for symptom development. Uninoculated plants were maintained under same condition and were treated as control (Warkentin *et al.*, 1995).

Symptoms of powdery mildew on gerbera was studied under natural conditions during the survey.

A temporary mount of fungal pathogen was prepared by using a strip of transparent cellophane tape (10 cm long) which was held in between the thumb and the forefinger. The sticky side of the tape was firmly pressed onto the leaf surface of a sporulating colony. After gently removing the cellophane tape, the sticky surface carrying fungal spores and hyphae was carefully placed over drops of lactophenol cotton blue kept at the centre of a clean glass slide. The tape was gently pressed and the extended ends of the tape is held over the ends of the slide and observed under the light microscope where the characteristics of spores and sporulatingstrucutures were studied (Narayanasamy., 2011).

For further confirmation, the isolates were sent to National Center for Fungal Taxonomy (NCFT), New Delhi where the cultures were also deposited under different accession numbers.

Survey was conducted in mainly two locations of Wayanad district *viz.*, Ambalavayal and Chulliyode for assessing the incidents of powdery mildew in the district. The disease was devastating in nature with a PDI of 93.6 and 95.2 per cent in Ambalavayal and Chulliyode during November-December respectively. Per cent disease severity of the disease with the maximum of 57.4 per cent at Chulliyode and a minimum of 32.7 per cent at Ambalavayal was also found to be very high compared to other diseases observed during the survey

Powdery mildew existed in two locations *viz.*, Ambalavayal and Chulliyode of Wayanad district with more severity at Chulliyode. Mean per cent disease severity was maximum during November-December with 50.72 per cent in Chulliyode and 47.2 per cent in Ambalavayal. In Ambalavayal, the disease was non-significant and no correlation existed between weather parameters on disease progress. But, in Chulliyode, correlation studies revealed that it was significant with positive correlation to relative humidity and a reverse relation existed with temperature and rainfall. The weather data clearly depicts that at a low rainfall of 96 mm and above average relative humidity of 80.27 per cent during November-December was the congenial factor influencing the disease development. But during summer, decline in relative humidity (78.37%) and rainfall (63.13 mm) caused a slight reduction in mean per cent disease severity of 49.12 per cent and 33.6 per cent at Chulliyode and Ambalavayal, respectively.

The correlation analysis that clearly depicted the major weather factors that influenced the spread of powdery mildew were low temperature, high relative humidity and sparse but less intense rainfall. This might be the one of the reason why powdery mildew was not noticed during the monsoon season. As a testimonial to the above conclusion, Kumar *et al.* (2012) detailed weather parameters most congenial for powdery mildew which included high relative humidity (80-95%), moderate temperature (20-28^{o}C) and low light intensity or shade. Similarly, the results are in accordance with Leah *et al.* (2012), who showed that the disease exhibited positive correlation with RH and negative with temperature.

Infected samples collected during the sampling survey were used to inoculate the powdery mass onto fresh healthy leaves whereby the symptoms appeared three weeks after inoculation. The development of symptom after inoculation was very slow due to obligate nature of the pathogen. Dispersed white powdery growth was observed above the leaf lamina, thus confirmed the pathogenicity of the isolate. Similarly, Baiswar *et al.* (2010) confirmed the pathogenicity of the powdery mildew pathogen, *Podosphaera* sp. in gerbera by dusting conidia on healthy plants

Symptoms of powdery mildew were found to be as similar as that observed in other crops. Symptoms appeared as distinct white powdery mould on the upper surface of leaf lamina. These spots later enlarged to form white powdery mat which gradually turned pale yellow to brown (**Plate 1**). It was observed that immature leaves were severely affected compared to mature ones leading to complete death of the plant. The description of powdery mildew symptom was in conformity with the findings put forth by other workers (Ferronato *et al.*, 2008; and Rossman, 2009; Baiswar *et al.* 2010 and Troisi *et al.*, 2010).

Plate 1. Powdery mildew symptom

Morphological characterisation of the isolates revealed the existence of two distinct pathogens *viz.*,*Erysiphe* sp. and *Podosphaera* sp. Light microscopy revealed the presence of hyaline, septate mycelia, globose oidia with irregular peripheral end formed in chains where the characters were similar to that of *Erysiphe* sp. Troisi *et al* (2010) from Italy while studying etiology of powdery mildew in gerbera reported *Erysiphe cichoracearum* as the causative agent. *Podosphaera* sp. produced superficial, hyaline, coenocytic mycelium with oval or ellipsoidal, catenate conidia with dimension ranging from 22.21-30.18µm x 13.36-18.08µm formed in unbranched erect conidiophores where these characters are in conformity with those reported by Baiswar *et al.* (2010) where they detailed the morphological characters *Podosphaera* sp. in *Gerbera jamesonii* from India (**Plate 2 and Plate 3**). Based on the host and morphological characteristics, the powdery mildew pathogens were identified as *Golovinomyces cichoracearum* (previously known as *Erysiphe cichoracearum*) and *Podosphaera* species.

Plate 2. Conidia of *Golovinomyces cichoracearum*

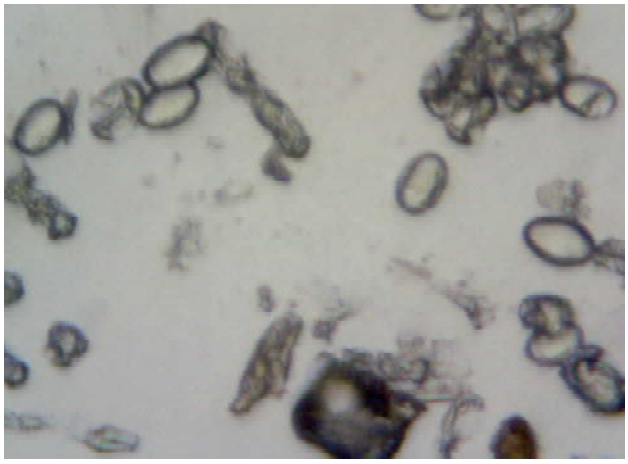

Plate 3. Conidia of *Podosphaera* sp.

REFERENCES

Baiswar, P., Chandra, S., Kumar, R. and Ngachan, S. V. 2010. First report of anamorphic *Podosphaera* on *Gerbera jamesonii* in India. *Plant Pathol.* 59: 802.

Farr, D. F. and Rossman, A. Y. 2009. *Phytophthoracryptogea*. Fungal Databases, Systematic Botany and Mycology Laboratory, ARS, USDA. [Online]. Available: http:// nt.arsgrin.gov/fungal databases/ [15 January 2016].

Ferronato, M. L., Neto, L., and Tomaz, R. 2008. Gerbera diseases in the state of Parana, *Scientia Agraria* **9**(4): 481-489.

Kumar, S., Tomar, K. S., and Shakywar, R. C. 2012. Response of gerbera varieties against powdery mildew diseases under polyhouse condition. *Hort. Flora. Res. Spectrum* 1: 286-288.

Leah L. Granke, L. L., Layla, E. Crawford, E., and Mary, K., and Hausbeck, M. K. 2012. Factors affecting airborne concentrations of *Podosphaera xanthii* conidia and severity of gerbera powdery mildew. *Hortscience* **47**(8): 1068–1072.

Narayansamy, P. 2011. *Microbial plant pathogen-detection and diagnosis: fungal pathogens*. Springer, Netherland, 291p.

Troisi, M., Bertetti, D., Garibaldi, A., and Gullino, M. L. 2010. First report of powdery mildew caused by *Golovinomyces cichoracearum* on gerbera (*Gerbera jamesonii*) in Italy. *Plant Dis.* **94**(1): 130.

Warkentin, T. D., Rashid, K. Y., and Zimmer, R. C. 1995. Effectiveness of detached leaf assay for determination of the reaction of pea plants to powdery mildew. *Can. J. Plant Pathol.* 17: 87-89.

(*MS Received 10 October 2017, Revised 16 November 2018, Accepted 04 December 2018*)