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Periwinkle Anthracnose (*Colletotrichum capsici*) in Madhya Pradesh, India: A Survey

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Periwinkle or *Catharanthus roseus* (G. Don syn: *Vinca rosea* L.) exists as an influential curative plant in the Apocynaceae family that holds an extreme level of alkaloids. This plant is found in abundance in India. Although this plant is affected by many diseases, among them all, Anthracnose or dieback caused by *Colletotrichum capsici* is such a severe disease that kills the whole plant. Field surveys were carried out in the current study to determine the percentage of the disease's incidence. For the surveys, fifteen locations in five districts of Madhya Pradesh were selected in 2017-18 and 2018-19. During the survey, the plants showing symptoms of the disease were collected and brought to a laboratory to determine the involvement of the pathogen in the disease. The range of disease intensity during the 2018 and 2019 surveys was 20.2 to 34.5 percent. From 18.1% to 33.5%, respectively. No area remained free of Anthracnose disease in any of the locations surveyed. In all areas, the stems and tender twigs were the most affected.

Key words: Anthracnose**,** *Colletotrichum capsici*, Percent disease index (PDI), periwinkle.

INTRODUCTION

Periwinkle or *Catharanthus roseus* (G. Don syn: *Vinca rosea* L.) belongs to the family Apocynaceae and is native to West Indies. It is a tropical perennial herb, about 1 m height, leaves obclavate, entire, opposite, deep greenish, shiny, rounded, or obtuse apex, propagated by seeds. Periwinkle grows to 80 cm. to 1m. high and its flowers bloom throughout the year with pink, purple and white flowers. This plant grows in a sub-tropical area with a height of about 1 meter. Its leaves are two to2.5 cm long and 1.0-3.5 cm wide, oval to oblong, glossy green, arranged in the opposite pair with the short petiole and pale midrib (Gajalakshmi *et al.*, 2013). This plant has economic as well as medicinal value as it contains some high-level alkaloids such as vincristine, vinblastine, and ajmaline. More than 65 high-level alkaloids have been isolated so far from this plant. In these alkaloids, most of these are found in the roots (Jaleel *et al.,* 2006).Presence of two new alkaloids (NEU 1-7 and NEU 17) in the roots and leaves of the periwinkle have been reported (Sreevalli *et al*, 2004). The plant is also very useful in pharma-ceutical industries (Edeoga and Eriata 2001).

The plant suffers from a number of diseases like wilt (*Fusarium* sp.), leaf spot (*Rhizoctonia* sp.), and anthracnose or dieback caused by *Colletotrichum capsici / C. gloeosporiodes* (Syd.) Butler and Bisby. Out of these, anthracnose is the most severe disease as it kills the whole plant. As the name indicates the disease causes necrosis of tender twigs from the tip backward. The affected twigs are water-soaked to brown, becoming grayish, white, or straw-colored in the advanced stage of the disease. A large number of black dots were found scattered all over the necrotic surface of the affected twigs. It occurs in epidemic form for this reason. During the rainy season, the disease was particularly virulent.

MATERAILS AND METHODS

Gwalior, Bhind, Morena, Shivpuri and Datia districts were surveyed for anthracnose. During September and October 2018 and 2019, a systematic survey

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was undertaken. In the Gird zone, fifteen localities (3 each from Gwalior, Bhind, Morena, Shivpuri and Datia districts) were randomly selected to examine the severity of anthracnose. Anthracnose signs were observed on plants in five randomly selected locations in a field, and the severity of the disease was documented.

Percent disease is calculated based on the number of diseased plants and the total number of plants. The frequency was estimated.Periwinkle plants displaying the typical anthracnose symptoms were gathered from the investigated region and placed in properly labeled transparent plastic bags and transported to the laboratory for isolation of pathogen.

The proforma that follows is based on the average incidence in each location.

Proforma

i. Location
ii. Soil type
iii. Percent Disease incidence (PDI) which was calculated as:

$$PDI = \frac{\text{Total No. of Infected Plant in Sample x 100}}{\text{Total No. of Infected Plant observed}}$$

The entire plant was regarded to be 100 for the purpose of determining the active infection, and the infected area was determined by eye for percent of disease index. The prevalence of a disease in a specific area or host group is often described as disease incidence. As a result, the purpose of this survey was to determine the pathogen percentage distribution on host plants.

RESULTS

Periwinkle, a significant medicinal plant, is severely damaged by the anthracnose disease produced by *Colletotrichum capsici*. A projected survey of periwinkle viable district was undertaken to decide the disease's predominance. Gwalior, Morena, Bhind, Shivpuri and Datia districts in 2018 and 2019 (3 locations from each district).Three villages were inspected in each district, and five fields were taken in each village.

No area remained free of anthracnose disease in any of the locations assessed. Stems and tender twigs were most impacted in all places.

As shown in Table 1, the intensity of anthracnose in the researched areas ranged from 20.2 to 34.5 percent in 2018 and 18.5 to 33.3 percent in 2019.The most intensity of anthracnose was once located in Tharet (33.3%) observed inSandalpur (33.2%), Inderghar (30.2%), Antri (30.1%), Jamdara (27.6%), Baroli (27.1%) and Pichore (26.1%) (Fig. 1).

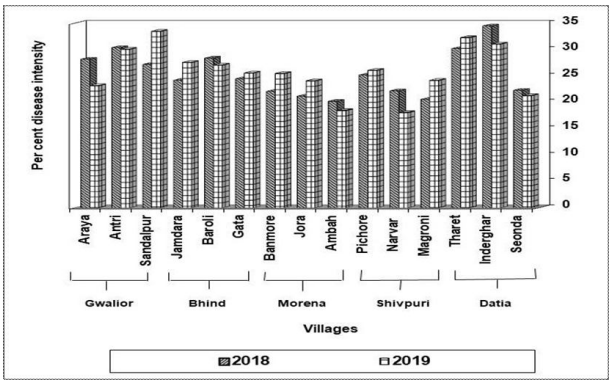

Fig.1: Village-wise incidence of anthracnose of *Catharanthus roseus*

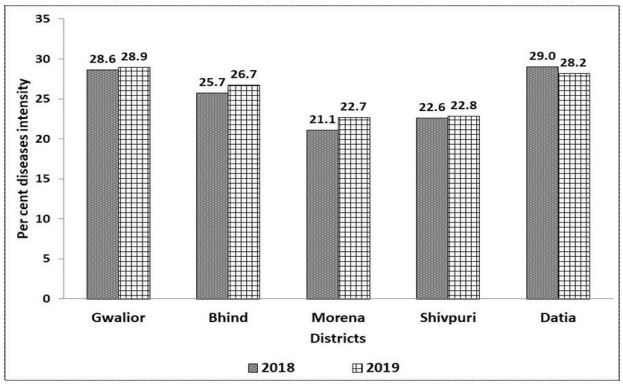

Fig.2: District-wise incidence of anthracnose of *Catharanthus roseus*

District wise minimum average intensity of anthracnose was once discovered in Morena (22.7%) followed through Shivpuri (22.8%), while the most average intensity was once located in Gwalior (28.9%) observed by way of Datia (28.2%) (Fig. 2).

Anthracnose intensity in assessed areas ranged from 18.1 to 33.5 percent in 2019, as shown in Table. Ambah (18.5%) had the lowest anthracnose disease intensity, followed by Narvar (18.6%), Seonda (21.3%), Araya (23.2%), Jora (24.3%), Magroni (24.5%), Banmore (25.5%) and Gata (25.5%). (25.6 %). Tharet (33.3 %) had the maximum anthracnose intensity, followed by Sandalpur (33.2 %), Inderghar (30.2 %), Antri (30.1 %), Jamdara (27.6%), Baroli (27.1 %) and Pichore (26.1 %) (Fig. 1).

Table 1. A summary of anthracnose disease incidence in districts of Madhya pradesh (2015 and 2016).

S.No.	Location	Soil Type	PDI (Percent Disease Incidence)	
			2015	2016
I.	Gwalior			
1	Araya	Sandy loam	28.2	23.5
2	Antri	Sandy loam	30.4	30.1
3	Sandalpur	Sandy loam	27.2	33.2
Mean			28.6	28.9
II.	Bhind			
1	Jamdara	Sandy loam	24.2	27.6
2	Baroli	Sandy loam	28.4	27.1
3	Gata	Sandy loam	24.5	25.6
Mean			25.7	26.7
III.	Morena			
1	Banmore	Sandy loam	22.1	25.5
2	Jora	Sandy loam	20.2	24.3
3	Ambah	Sandy loam	21.2	18.5
Mean			21.1	22.7
IV.	Shivpuri			
1	Pichore	Sandy loam	25.2	26.1
2	Narvar	Sandy loam	22.2	18.6
3	Magroni	Sandy loam	20.6	24.5
Mean			22.6	22.8
V.	Datia			
1	Tharet	Sandy loam	30.2	33.3
2	Inderghar	Sandy loam	34.5	30.2
3	Seonda	Sandy loam	22.3	21.2
Mean			29.0	28.2

The district with the lowest average intensity of anthracnose was Morena (22.7%), followed by Shivpuri (22.8%), and the district with the highest average intensity was Gwalior (28.9%), followed by Datia (28.2%) (Fig. 2).

DISCUSSION

Anthracnose of periwinkle causedby *Colletotrichum capsici* (Syd.) Butler and Bisby is one of the most common periwinkle ailments. Each year the disease appears in the region where the plant is grown and often takes on serious proportions in favorable environmental conditions.Periwinkle anthracnose is a major problem, but very few attempts have been made in the conditions of Madhya Pradesh to study the disease, and so the present investigation was conducted.A survey covering 15 locations in the Madhya Pradesh districts of Gwalior, Bhind, Morena, Shivpuri, and Datia was conducted in 2018 and 2019 to better understand the distribution and prevalence of periwinkle anthracnose.Indargarh and Tharet (Datia district) periwinkle fields had the highest prevalence in 2018 and 2019, respectively. In 2018 and 2019, the lowest frequency was recorded in Jora and Ambah (Morena district).The findings revealed that anthracnose disease was present in all of the locations with varying degrees of severity.

Mishra *et al.* (2018) did a similar survey and found that Jaunpur (54.91 %) and Mirzapur (54.91 %)

had the worst anthracnose severity (54.00 %). Prasad (2016) conducted a survey in five places in the Bulileka area to assess the percentage of incidence of chilli anthracnose. Anamika *et al.* (2014) also carried out a survey in five regions in Rewa Province to see whether chilli anthracnose was present and found that the disease severity ranged from 55.53 to 71.10 percent in field settings. The findings are similar to those reported by Yadav *et al.* (2017.) A study by Sharma *et al.* (2011) evaluated the frequency of fruit rot/ anthracnose disease caused by a *Colletotrichum* species complex in chilli and sweet pepper growing districts in Himachal Pradesh. Disease incidence ranged from 12.5 to 45.0 %.

Notwithstanding, various other *Colletotrichum* species like *C. capsici, C. gloeosporioides, C. graminicola, C. acutatum* (Machenahalli *et al.* 2014; Tanwar *et al.* 2015) and *C. atramentarium* have been found related with the illness in various geological regions.

Colletotrichum fructicola is a pathogen that has been recorded on a variety of hosts, including apple (Khodadadi *et al.* 2020), *Citrus* spp. (Huang *et al*. 2013; Peng *et al.*2012), *Pyrus* spp. (Li *et al.* 2013), *Camellia sinensis* (Liu *et al*.2014**)**, *Capsicum* sp. (Liu *et al.* 2016), *Mangifera indica* (Joa *et al.* 2016, Mo *et al.* 2018) and *Malus* sp. (Nodet *et.al*. 2019).

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