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ORIGINAL ARTICLE

FIRST REPORT OF LEAF BLIGHT DISEASE CAUSED BY *RHIZOCTONIA SOLANI* KÜHN ON ORNAMENTAL PLANTS IN IRAQ

Ghassan Mahdi Daghir* and Qusai Hattab Madhi

College of Agriculture, University of Misan, Iraq.
E-mail : qusaihattab82@yahoo.com

Abstract : This study was conducted to detect the leaf blight disease caused by *Rhizoctonia solani* fungus in some nurseries in the city of Amar. Results showed that the disease is prevalent in these nurseries on Carnation (*Dianthus carphyllus*) and Night jasmine (*Cestrum noctrum*). Seven isolates were obtained and identified as from *Rhizoctonia solani*, four isolates from carnation, and three isolates from Night jasmine and these isolates were diagnosed morphologically and microscopically. The sclerotia of these fungi examined were seen clearly on the potato dextrose agar (PDA). The results showed different degrees of pathogenicity of *Rhizoctonia solani* isolates on carnation and Night jasmine, the highest severity of infection on Night jasmine with isolate M3, which was For isolation M3 18.66% with significant differences from other isolates of carnation, the highest degree of isolation (K1) 12% with significant differences from other isolates.

Key words : *Cestrum noctrum, Dianthus carphyllus*, Leaf blight, *Rhizoctonia solani*.

1. Introduction

Rhizoctonia solani is one of the most important pathogenic fungi of the plant. It causes different diseases of plants all over the world [Woodhall *et al.* (2007)]. It is known to cause various types of diseases, including blight of seedlings, damping-off, root rot, crown and seed rot and, especially when environmental conditions are appropriate for growth and infection [Mubark (2003), Yang (2015)], sexual phase *Thanatephorus cucumeris* for *R. solani* causes target spot disease [Kenneth (2011)]. *R. solani* is a soil-borne fungus and attacks many plants belonging to different plant families [Ajayi-Oyetundd and Brdley (2018)].

The fungi are dispersed in the form of sclerotia in soil and fungal hypha in plant residues and It is considered a source of primary inoculum [Anderson (1982), Ogoshi (1987)]. *R. solani* produce various types of simple and complex infection cashion that are related to the degree of pathology produced in different species from infection cashion, simple and complex relationship to the degree of pathogenesis [Yahia *et al.* (2007)]. The fungi is of the following taxonomy: Teleomorph : *Thanatephorus cucumeris* (Frank) Donk; anamorph: *Rhizoctonia solani* Kühn; Kingdom Fungi; Phylum Basidiomycota; Class Agaricomycetes; Order Cantharellales; Family Ceratobasidiaceae; genus Thanatephorus [Marleny *et al*. (2011)].

In Florida, Shew and Melton (1995) found that Rhizoctonia ornamental leaves plants are strikingly similar to disease target spot on the tobacco plant. The fungus also causes a leaf blight on plants of Rosaceae family, spots appear on the top and bottom surfaces of the leaves [Everett (1982), Huxley (1992)] as well as causing the fungus leaf blight on the plant Amaranthus (*Amaranthus tricolor*) the infection appears in the form of light white spots on the aerial parts of plant, which quickly spread and lead to loss of crop [Gireesh and Radhakrshnan (2016)]. The aim of the research was to diagnose leaf blight disease caused by *R. solani* in some nurseries and test the pathogenicity of isolates of *R. solani*.

2. Materials and Methods

The laboratory and field experiment was conducted in the laboratories and field of the Plant Protection

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Department, College of Agriculture, University of Misan in 2018.

2.1 Field Survey

The survey included five nurseries in the city of which were Amara, the nursery of Al-Tur, Al-Salam, Al-Zuhoor, Al-Hauraa and Al-Rabee, the plants were randomly selected and two plants showed signs of blight on the leaves, which were Carnation (*Carnation carphyllus*) and Night jasmine (*Cestrum noctrum*), the number of each plant in each nursery was calculated and the incidence rate was calculated according to the following law: Percentage of infection = Number of infected plants / Number of examined tested plants × 100.

Samples of infected leaves were taken and brought to the laboratory for isolation.

2.2 Isolation of Pathogenic Fungus

Isolation of fungi from samples by plant tissue method, the infected plant leaves were cut from each plant into small pieces (1 × 0.5 cm) and the surface of the leaves was sterilized with 10% chlorax solution for (3-5 minutes) and then washed with sterile distilled water and dried on filter paper Watman-No. 4, then transferred 4 pieces of leaves to a sterile petri dish of 9 cm in diameter containing the sterile media potato Dextrose Agar (PDA), with added antibiotic Chloramphenicol (250mg / L). All dishes were incubated at a temperature of (27°C) for seven days and transferred the fungi to a petri dish containing sterile PDA. Using a sterile inoculation needle, and then incubated for seven days. After the growth of colonies, fungal isolates were diagnosed based on their phenotypic and taxonomic characteristics [Watanaba (2002)].

2.3 Pathogenicity test of *Rhizoctonia solani*

The pathogenicity of *R. solani* isolates was independently tested *in vitro* using method of Phong *et al*. (2014) with a slight modification a little modified. 15 leaves of each plant were taken and isolated individually and were put on filter paper in Petri dishes then were put in each dish one leaf of plants and contaminated with a disk of 0.5 cm of fungus on the surface of the leaves. The filter papers were then moistened with sterile distilled water and only 0.5 cm infertile leaves as a comparative treatment. The dishes were incubated in a laboratory atmosphere at a temperature ranging from 27 to 30°C for 10 days and the area of the affected paper was measured post inoculation after pollination using a scale according to that provides a rate [Gauhl *et al*. (1996)] : 0 = No symptoms; 1 = -0.5% of the limbus with symptoms; 2 = 0.6 to 5% of the limbus with symptoms; 3 = 6 to 15% of the limbus with symptoms; 4 = 16 to 30% of the limbus with symptoms; 5 = 31 to 50% of the limbus with symptoms; 6 = 51 to 80% of the limbus with symptoms; 7: 81 to 100% of the limbus with symptoms. Then calculate the severity index (I.S.) of disease using

$$IS = (\Sigma nb/(N - 1) \times T) \times 100$$

where, n = Number of leaves for each Degree of the scale.

b = Degree of the scale.

N = Number of the degrees used in the scale.

T = Total number of the scored leaves.

2.4 Field Experiment

Three seedlings of the Night jasmine plants and three Carnation seedlings were brought in the same age and did not show any symptoms. One dish was taken for each *Rhizoctonia solani* isolate, the contents of a 9 cm diameter dish of each *R. solani* isolate were added to 90 ml sterile distilled water, then mixed using the electric mixer for 1-2 minutes, then spray the mixture (fungi) using a small sprinkler at 90 ml / plant. leaving a treatment compared to spraying it with sterile distilled water only. And the plants were left to grow. After two weeks the leaves of each plant were checked to see the symptoms of infection.

2.5 Statistical Analysis

Laboratory experiments were carried out according to the complete random design (C.R.D.), then significant differences between the means were compared by testing the least significant difference (L.S.D) at a protection level of 0.01.

3. Results and Discussion

3.1 Field Survey

The results of the field survey, which included the nursery of Al-Tur, Al-Salam, Al-Zuhoor, Al-Hauraa and Al-Rabee (Table 1) showed that the leaf blight disease is spread on some plants in these nurseries and characterized by the symptoms of infection in the form of blisters and spots on the leaves light brown color of different sizes (0.5-2 cm) oval or irregular at first then

Fig. 1 : Infection of leaf blight caused by *R. solani* in nurseries. **A**. Night jasmine, **B**. Carnation.

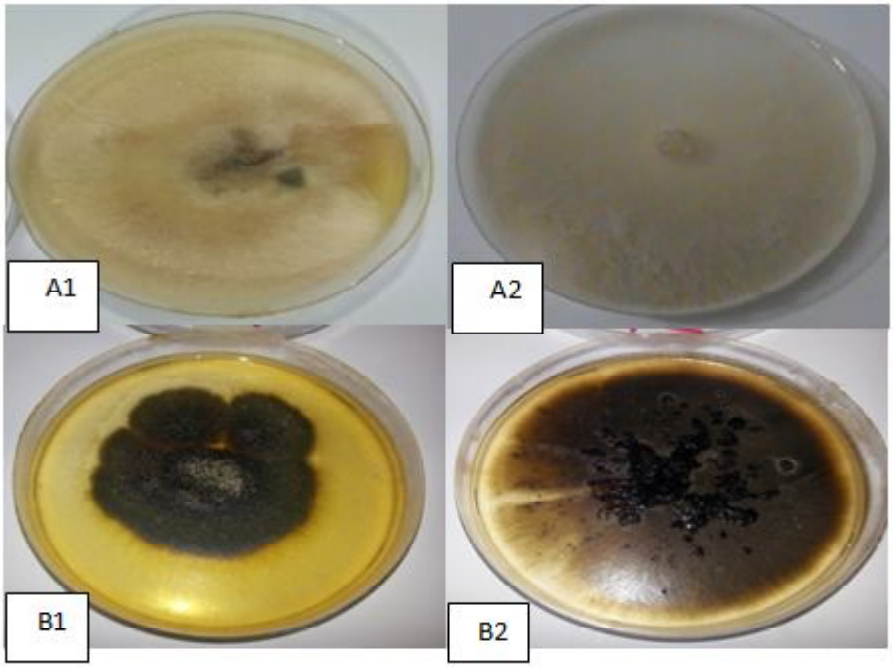

Fig. 2 : (A1,2) Colonies of *R. solani* on PDA, (B1, 2) sclerotia on PDA.

Table 1 : Percentage of infection of *R. solani*.

Nurseries	Infection %	
	Night jasmine	Carnation
Al-Tur	10.2	23.3
Al-Salam	15.1	20.1
Al-Hauraa	0	0
Al-Zuhoor	14.2	13.3
Al-Rabee	0	16.6
$LSD_{0.01}$	4.01	7.08

expand gradually and then combine with each other to form large gray to brown with dark brown edges and then dry these leaves and die (Fig. 1, Table 1) . *R. solani* may occur due to its preference for warm, humid weather for infection and growth events; such conditions are available in nurseries [Cubeta and Vilgaiys (1997)].

3.2 Isolation and diagnosis of *Rhizoctonia solani*

Seven isolates were diagnosed as *R. solani* (Fig. 2), four carnation isolates and three isolates of the Night jasmine. Isolates were classified by comparing phenotypic and microstructure properties on the PDA, as their colonies were brown to whitish. Fungal isolates differed in the speed of their growth. The fungal hypha of *R. solani* consists of long cells that branch out at right angles to the main hypha with little waist at their contact points. The presence of Dolipore Septum and sometimes the fungal hypha branching profusely and colorless when it is new growth turns to brown with age and then becomes thick (Fig. 3). The sclerotia were

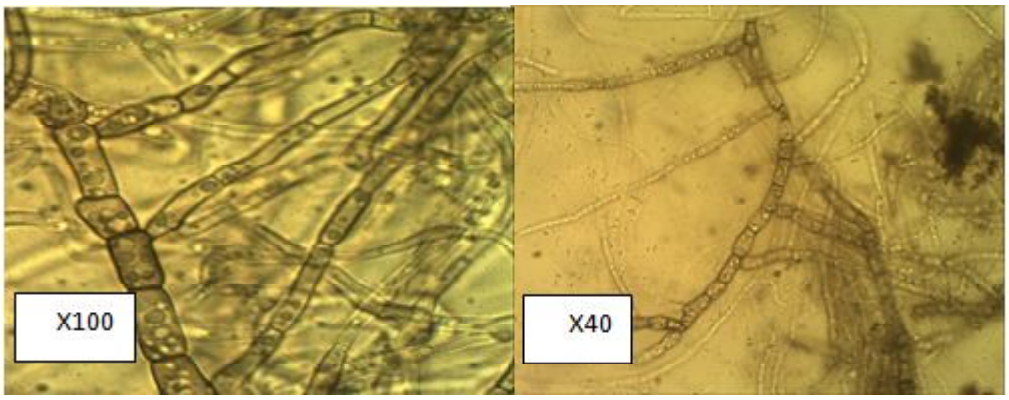

Fig. 3 : Hypha of *R. solani* branched at almost right angle with a narrow restriction near the branch area with transverse barrier.

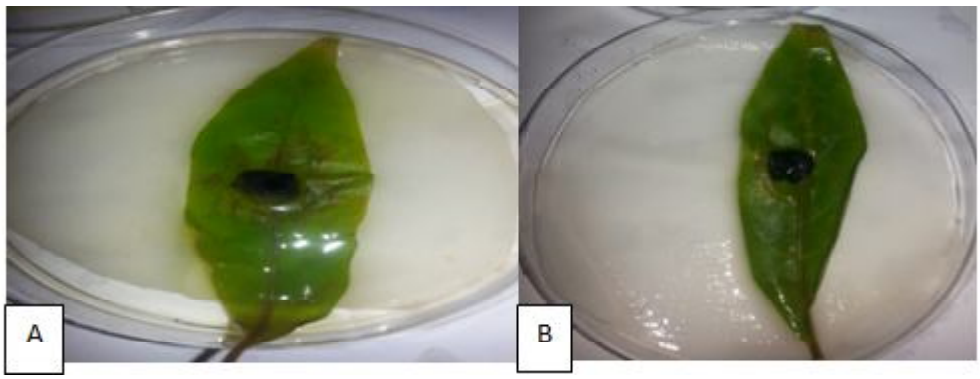

Fig. 4 : Pathogenicity of *R.solani* isolates on filter paper, **A.** Night jasmine, **B**. Carnation.

forming on PDA when the colony advanced in their growth ages, which is black, barrel-shaped squamous, is surrounded by a blackish-brown casing.

3.3 Pathogenicity test of *R.solani* fungi isolates

The results of the pathogenicity of *R. solani* isolates on carnation and Night jasmine showed different degrees of sensitivity according to isolation and plant type after 15 days of inoculation (Table 2, Fig. 4). The highest severity was recorded in Night jasmine for isolation (M3) (18.66%) and significant differences from the rest of isolates, while for carnation, the highest severity of isolates (K1) (12%) and significant differences from the rest of isolates. Several researchers revealed the variation of *R. solan*i isolates their pathogenecity [Carling *et al*. (1989)]. It is the first recording of *R. solani* fungus on these plants in Iraq.

The pathogenicity of *R. solani* fungus in the pots was weak as no disease was seen on the treated plants.This indicates that *R. solani* is a soil-born fungus and there was an infection on the leaves touching the soil in the nurseries. The disease appears at the surface of the soil when the fungal hypha is fragmented and the sclerotia germinate and infect the aerial parts of the plant. This basidial hymenium develops epiphytically on uninfected tissue and forms only during warm, humid conditions in protected areas of the supporting plant tissue. The hymenial layer is rather ephemeral, and probably dries down and weathers away within several days to weeks after spore release.

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