Plant Archives Vol. 19 No. 1, 2019 pp. 1089-1092 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

EVALUATION OF SOME PLANT EXTRACTS USING TO REDUCE PATHOGENICITY OF FUNGUS (*RHIZOCTONIA SOLANI*)

Malik H.Karem*, Mohmad Khalel Ibrahim and Nabeel Abdalla Al-Kaeath

Department of Plant Protection, College of Agriculture, AL-Muthanna University, Iraq.

Abstract

The antifungal effect of three plants extracts *viz.*, *Tamarix mannifera*, *Ceratophyllum demersum* and *Alhagi camelorum w*ere evaluated against *Rhizoctonia solani*. This study conducted in vitro. Aerial part, leaf and whole plant were used to prepared extract. Plant materials were mixed with distilled water at 10:90 (w/v) and placed in blender, mixed for 15 min then extracts were filtered. Two experiments conducted for antifungal activity of the plant extracts, first to determine plant antifungal activity for three plants *T.mannifera*, *C. demersum* and *A. camelorum*, all plants extracts showed inhibition for mycelial growth (61, 57, 83) respectively, then the most potent plant extract was selected from the in vitro test (Experiment l) and prepared 5 concentrations 0% distilled water as control treatment 5%, 10%, 15% and 20% of plant extract (*A. camelorum*). The effective concentration inhibiting the growth of mycelium formation of the pathogen by the plant extract of *Alhagi camelorum* was at 20% concentration.

Key words : Plant Extracts, *Rhizoctonia solani*, *Alhagi camelorum, Tamarix mannifera, Ceratophyllum demersum.*

Introduction

Rhizoctonia solani is the most important soil borne fungal pathogen, which develop in both cultivated and non-cultivated soils, causing the symptoms of web blight disease to wide range of crop plants. *Rhizoctonia* induced diseases can occur on all parts and at all growth stages of the peanut.This cost farmers a huge amount of money in terms of reduced productivity and cost of control. Evidently, there is a need to increase the yield and improve the seed health and quality of the crop by controlling seed-borne fungal pathogens. Among the control practices used, seed treatment is one of the effective technique to eliminate seed-borne inocula which prove the 'arsenal' of plant pathology in now equipped with most sophisticated ammunitions. Treatments of seed should be done as a routine practice as it is a cheap insurance against possible disasters at a later stage (Bilgrami and Dube 1976). *Asolani*, *B. cinerea* and *R. solani* are important plant diseases that causes significantly yield losses in our countryand in the world. *A.solani* is very common diseases on tomatoes which are known early blight (Yazici *et al.,* 2011). Some of *R. solani* isolates were genetically close to some previously recorded isolates in Iraq, indicating that the importation of some agricultural products such as Iranian potato can be as a source of the entry and spread of many dangerous pathogens, such as the fungus R. solani that identified with genetically different isolates, which may be more dangerous and devastating for economic crops (Aqeel *et al.,* 2018).Botanicals are now emerging as safer and more compatible approach to control phytopathogens (Kumbhar *et al*., 2000). Higher plants are known to posses fungi toxicity against spore germination and mycelial growth of phytopathogenic fungi (Varma and Dubey, 1999). The plant world is a rich store house of natural chemicals that could be exploited for use as pesticides (Satish *et al.,* 2008). Chemical fungicides are commonly used successful-ly for control of *Rhizoctonia* root-rot of pea (Khan *et al*., 1998). However, their field application may not always be desirable. The persistent, injudicious use of chemicals was discouraged owing to their toxic effects on non-tar-get organisms, the undesirable changes they inflict upon the environment (Arcury and Quandt 2003) and due to the development of resistant strains of pathogens against various chemical fungicides (Deising *et al*., 2008). Keeping in view the drawback of chemical

Author for correspondence : E-mail : Malik.hasan@mu.edu.iq

control of plant diseas-es, the use of plant extracts in the control of plant diseases is gaining importance. Various plant products like plant extracts, essential oils, gum, resins… etc. were shown to exert biological activity *in vitro* and *in vivo* and are used as bio-fungicidal compounds (Pawar and Thaker 2006; El-Mougy and Alhabeb 2009; Fawzi *et al*., 2009).Hence, in the present study three plant extracts and 4 concentrations of *Alhagi camelorum* extracts were tested in vitro against *Rhizoctonia solani*, which can be exploited in the plant disease management.

Material and Methods

Fungi Cultures and Plant Materials

The plant pathogenic fungi used in the research were isolated from rhizosphere region of okra roots, field of agriculture collage andmaintenanceon Petri dishes (90 mm) containing 20 ml of PDA and incubated at 25±2ºC for 7 days, these fungi cultures were used in study, The isolated fungus (*Rhizoctonia solani*) was identified on the basis of morphological characters as previously described Domasch *et al.* 1980.Plant species were collected from some place of Samawahstate, Iraq year of 2017 (Table 1). The plant parts were washed with tab water and then distilled water, air-dried at room temperature for 20 days in dark conditions. The dried plant parts were milled to a fine powder in a mill. Then keep in Refrigerator at 4^0C until used.

Preparation of plant materials

Powdery plant materials were mixed with distils water at 10:90 (w/v) and was placed in blender, mixed for 15 min;the extracts were filtered through thin cheesecloth. Next, final extract was separated from the plant materials by centrifuging at 5000 rpm for 15 min. The supernatant was transferred to the new tubes and filtered by using a Whatman No.1. To get stock of 100% concentration, then placed in bottles and storage at $4c^0$(Harborne 1984).

Antifungal activity of the plant extracts

Experiment l

One ml of plants extract and 9 ml of media PDA were poured into 9 cm diameter Petri dishes and shaking appropriately to mix well. Another set of untreated PDA with I ml distilled water plates was used as control. For each treatment, 3 replicates (plates) were used. All plates were inoculated individually with 1 cm^2 of the tested fungal cultures, and then incubated in the dark at 25±2°C, until the control plates reached full growth.

Experiment ll

The most potent plant extract (*Alhagi camelorum* Fisch) was selected from the *in vitro* test (Experiment l) and prepared 5 concentrations 0% distilled water as control treatment 5%, 10%, 15% and 20% concentrations of plant extract. And reuse same procedure of previous experiment I, one ml of plant extract and 9 ml of media PDA were poured into Petri dishes and shaking appropriately. Another set of untreated PDA with I ml distilled water plates was used as control. For each treatment, 3 replicates were used.then incubated at 25±2°C, until the control plates reached full growth. Per cent inhibition of mycelial growth was calculated by the following formula, Montealegre *et al.* 2003.

$$Inhibition\ percent = \frac{C-T}{C} \times 100$$

Whereas,

C = Diameter of fungus colony (mm) in control plate

T = Diameter of fungus colony (mm) in treated plate

Statistical Analysis

Data collected from the experiments were analyzed for test of significance and compared the treatment means following Completely Randomized Design (CRD) by using Duncan's Multiple Range Test at 5% level of probability.

Result and Discussion

All plant extracts used in this study showed a better inhibitory effect over the untreated control and reduced the growth of *R. solani* (Table 2). The tested plants had the ability to control *R. solani* which showed 82% inhibition of *R. solani* by *Alhagi camelorum* extract; followed by *Tamarix mannifera* extract (61%). whereas the lowest inhibitions were recorded for the extracts of *Ceratophyllum demersum* (57%). Shejpal *et al.,* (2009) tested forty four plant extracts for their efficacy as antifungal botanicals against sheath blight of rice caused by *R. solani*. And found that clove extract of garlic (*Allium sativum* L.) exhibited strong fungi toxicity even at low concentration of (100 ppm).The fungicidalproperty of *Piper betel* might be due to the presence of hydrochavicol in the extracts as reported by Ali *et al.,* (2010).

Radial growth of *Rhizoctonia solani* decreased

Table 1 : List of plant species.

Scientific name	Family	Part used	Place of collection
Alhagi camelorum Fisch.	Leguminoseae	Aerial parts	Warkaa, Samawah
Tamarix mannifera E	Tamaricaceae	Leaf	Majed, Samawah
Ceratophyllum demersum	Ceratophyllaceae	Whole plant	Rumaitha,Samawah

Table 2 : Mycelial growth of *Rhizoctonia solani* against plant extracts.

Treatment	Plant extract	Inhibition
T_1	Control	0
T_2	*Ceratophyllum demersum*	57
T_3	*Alhagi camelorum*	83
T_4	*Tamarix mannifera*	61

Table 3 : Mycelial growth of *Rhizoctonia solani* against plant extract of *Alhagi camelorum.*

Treatment	Concentration/%	Inhibition
T_1	0	0
T_2	5	33
T_3	10	47
T_4	15	74
T_5	20	77

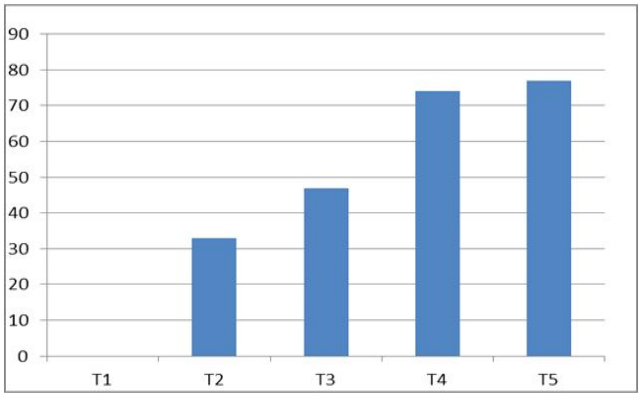

Fig. 1 : Mycelial growth of *Rhizoctonia solani* against some concentrations of plant extract (*Alhagi camelorum*)

significantly with in-creasing the concentration of *Alhagi camelthorn* extracts. High growth inhibition was observed at concentrations of 20% and 15% respectively (77%74%). Followed by concentration of 10% recorded 47%. Whereas minimum inhibition recorded at 5% 0f *A. camelthorn* extracts (Table 3). The results obtained in this experiment are close with the findings of Srinivas *et al.,* (2013) studied phytotoxic effect of thirteen plant extracts and reported highest growth inhibition of fungus by garlic at (10%) concentration. The findings are in consonance with there of Dutta *et al.,* (2004), who reported that 10% concentration of crude *Allium sativum* extract exhibited total inhibition of sclerotial production and 20% concentration showed excellent mycelial inhibition of *Rhizoctonia solani* causing sheath blight of rice. It was further noticed from the results of present study that *Allium cepa* also inhibited the test pathogen significantly but was less fungicidal as compared to *Allium sativum*.

References

Ali, I., F.G. Khan, K.A. Suri, B.D. Gupta, N.K. Satti, P. Dutt, F. Afrin, G.N. Qazi and I.A. Khan (2010). In vitro fungal activity of Hydrochavicol isolated from *Piper betal* L. *Annals of Clinical Microbiology and Antimicrobials*, **9(7):** 2-9.

Aqeel, N. AL-Abedy, A. Fadhal Al-Fadhal, H. Malik Karem, Zeinah Al–Masoudi1 and A. Sajad AL-Mamoori (2018). Genetic variability of different isolates of Rhizoctonia solanikühn isolated from iranian imported potato tubers (*solanumtuberosum* L). *Int. J. Agricult. Stat. Sci*., **Vol. 14**, No. 2.

Arcury, T.A. and S.A. Quandt (2003). Pesticides at work and at home: exposure of migrant farmworkers. Lancet, 362 (9400), p. 2021.

Bilgrami, K.S. and H.C. Dube (1976). A Text Book of Modern Plant Pathology. Vikas Publishing House PVT, Ltd. New Delhi. pp.164.

Deising, H.B., S. Reimann and S.F. Pascholati (2008). Mechanisms and significance of fungicide resistance. *Braz. J. Microbiol*, **39 (2):** 286–295.

Domsch, K.H., W. Gams and T.H. Anderson (1980). Compendium of Soil Fungi. Academic Press, New York, USA, pp. 1156.

Dutta, S., A. Chaudhury, A.K. Chaudhury and S.K. Laha (2004). *In vitro* fungitoxicity of plant extracts against *Pyriculariaoryzae Rhizoctonia solani* incitant of blast sheath blight of rice. *Indian Phytopathology,* **57**: 344.

El-Mougy, N.S. and R.S. Alhabeb (2009). Inhibitory effects of pow-dered caraway and peppermint extracts on pea root rot under greenhouse conditions. *J. Plant Protection Res*., **49 (1):** 93–96.

Fawzi, E.M., A.A. Khalil and A.F. Afifi (2009). Antifungal effect of some plant extracts on *Alternariaalternata* and *Fusariumoxyspo-rum*. *Afr. J. Biotechnol*., **8 (11):** 2590–2597.

Harbone, G. B. (1984). Pyhtochemical methods Aguideto modern techniqius of plants analysis.2nd–ed. Chapman and hall.London, Newyork.

Khan, J., M. Khan and M. Amin (1998). Distribution and integrated management of root rot of pea in Malakand division. Pak. *J. Biol. Sci*., **1(4):** 267–270.

Kumbhar, P.P., D.H. Salnkhe, M.B. Borse, M.S. Hiwale, L.B. Nikam, R.S. Bendre, M.V. Kulkarni and P.M. Dewang (2000). Pesticidal potency of some common plant extracts. *Pestology*, **26:** 51-53.

Montealegre, J.R., R. Reyes, L.M. Perez, R. Herrera, P. Silva and X. Besoain (2003). Selection of bioantagonistic bacteria to be used in biological control of Rhizoctonia solaniinb tomato. *Enviro. Biotechnol*, **6:** 1-8.

Pawar V.C. and V.S. Thaker (2006). *In vitro* efficacy of 75 essential oils against. *Aspergillusniger*. *Mycoses*, **49(4):** 316–323.

Satish, S., M.P. Raghavendra, D.C. Mohana and K.A. Raveesha

(2008). Antifungal activity ofa known medicinal plant *Mimusopselengi* L. against grain mould. *Journal ofAgricultural technology,* **4(1):**151-165.

Shejpal, A., S. Arora and P. Kaur (2009). Evaluation of plant extracts against *Rhizoctonia solani*causing sheath blight of rice. *Ind. J. Plant Protection*, **1(1):** 25-30.

Srinivas, P., V. Ratan, A.P. Patel and M.G. Bindu (2013). In-vitro evaluation of fungicides, biocontrol agents and plant extracts against rice Sheath blight pathogen Rhizoctonia solani. *International Journal of Applied Biology and Pharmaceutical Technology*, **5(1):** 121-126.

Varma, J. and N.K. Dubey (1999). Prospectives of botanical and microbial products aspesticides of tomorrow. *Current Science,* **76:** 172-179.

Yazici, S., Y. Yanar and I. Karaman (2011). Evaluation of bacteria forbiological control of early blight disease of tomato. *Afr. J. Biotechnol*, **10:** 1573–1577.