The Effect of Fytomax N on the Growth of Some Phytopathogenic Fungi under Laboratory Conditions

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Abstract

This study aims to the effect of Fytomax N (Azadirachtin 1% plus Neem oil) on some phytopathogenic fungi at various concentrations of 0, 0.5, 1, 1.5 and 2ml/Litre. Results show that Fytomax N inhibits the growth of the following pathogenic fungi: *Fusarium oxysporum*, f.sp *lycopersici*, *f. solani, Rhizoctonia solani* and *Alternaria alternata* where the average percentage of inhibition at a concentration of 1ml/Litre was 48.89%, 54.67%, 64.11% and 63.00% respectively.

Introduction

Plants can be affected by many pathogenic fungi that infect them with various diseases of varying severity depending on the fungus species and the part of the plant that has been affected. Diseases caused by *Alternaria* sp. are considered to be the most common within plant species; this genus affects vegetable crops and ornamental plants in addition to some fruit trees such as citrus and apple trees leading to mainly blotches, blight and the death of some of the seedlings. Some of their species such as *A. alternata* are characterised by production of specific toxins called AM- Toxin (Agrios, 2005); this fungus is considered to be the main cause of blotches on Palm tree leaves in Iraq (Fayad & Mania, 2008), it also leads to blotches on tomato leaves (Matrood, 2010). In addition, *Rhizoctonia solani* is one of the main fungi causing seeds rot and the death of seedlings prior to, and post, sprouting (Schwartz & Gent, 2007) in addition to causing roots rot and crown, and ulceration of stems (Mahmoud et al, 2007). It is considered to be the main cause of death of tomato seedlings in desert farms in Basra Province where the average of infection by it was in the range of 10-25% in 2004 (Al-Refai, 2004). Fusarium wilt on tomatoes caused by the fungus *Fusarium oxysporum* f.sp *lycopresici* is considered to be the most significant disease in that crop especially crops planted in sandy soil in warm climates (Agrios, 2005) .This fungus causes great losses in tomato crops in Iraq whether they are planted outdoors or in greenhouses; the loss may be as high as 50% when replanting of the same crop occurs for several years in the

same soil or when more sensitive varieties are planted (Al-Athoory, 2002). In the light of growing realisation of the dangers resulting from the use of chemical pesticides especially from the environmental pollution aspect and the emergence of resistant strains to insecticides, the efforts of research and scientific institutions have been directed towards finding alternatives to chemicals. Material extracted from plants e.g. Fytomax N, known as biorationals, is seen as one of the promising solutions. The Neem tree, *Azadirachta indica* A. Juss, is from the Meliaceae Family; it is considered to have the most uses and to be the most widely used tree as it has many prospects; it contains many useful by-products as well as its wood such as the leaves, bark, flowers, fruit, seeds, resin and oil where these products have various anti-bacterial and other biological effects (Girish & Shankara, 2008). Kanwal et al (2011) showed that two of the anti-bacterial compounds: Genistein 7-O-Glucoside and epi-catechin extracted from the Neem plant leaves, have (at a concentration of 1000ppm) inhibited the growth of five fungal species which are *A. alternate*, *Aspergillus fumigates*, *Aspergillus niger*, *Macrophomia phaseolina* and *Penicillum citrii*; the percentage inhibition ranged between 83-99% and 82-95% respectively.

The study objective is to evaluate the efficacy of Fytomax N in inhibiting the growth of a different species of plant pathogenic fungi under laboratory conditions.

1. Materials and methodology:

The laboratory experiments were undertaken in the Department of Plant Protection, Agricultural College at the University of Basra; the research ran over the period of 2011-2012.

1.1 Laboratory Research:

1.1.1 Isolation, identification and testing of pathogenicity of plant pathogenic fungi

Fusarium oxysporum f.sp l*ycopersici* was isolated from the roots of the base of the stems of tomato plants where some signs of Fusarium wilt appeared, in addition the fungi *F. solani* and *Rhizoctonia solani* were isolated from the roots of tomatoes where rot in the root and base of stems was seen, while the fungus *Alternaria alternata* was isolated from the leaves of tomato plants that showed signs of blotches. The plants were taken to the laboratory and the bases of stems and roots were washed with tap water to get rid of earth and other dirt; these were cut into small pieces the size of 0.5-1cm, and then disinfected with Sodium Hypochlorite (NaOCl) at a concentration of 10% of the trade product for 2-3 minutes and then washed in sterile water to remove any traces of the disinfectant; they were then placed onto filter paper to allow them to dry. Following that, four small pieces were moved to a Petri dish containing PDA (Potato Dextros Agar) and to which the antibacterial Chloramphenicol was added at 250mg/Litre with an average

of three dishes. The dishes were placed in an incubator at a temperature of 27°C ± 1 and left there for four days. The isolated fungi were then taken and identified according to the characteristics described by Booth, 1971 and Domsch in 1980.

1.1.2 Research into the effect of a biopesticide extracted from Neem in inhibiting radial growth in phytopathogenic fungi

The nutrient medium PDA was prepared and distributed into five 250ml glass flasks at an average of 250ml/ flask; the medium was sterilised in an autoclave at a temperature of 121°C and pressure of 15 psi. After the sterilisation, Fytomax N (Azadirachtin 1%+Neem Oil) was added at a concentration of 0, 0.5, 1, 1.5 and 2ml/litre each; this was mixed well with the nutrient by shaking well and then poured into sterile Petri dishes (diameter of 9cm). Once the medium solidified, the dishes were inoculated with 0.5cm diameter from the 4 day old cultures of the pathogenic fungi *F oxysporum* f.sp *lycopersici*, *F. solani*, *Rhizoctonia solani* and *Alternaria alternate*. Each procedure was repeated three times. The dishes were left in the incubator at a temperature of 25°C ±2 and the radial growth was measured once the growth of the fungus reached the edge of the culture; in the standard test we took the average of two perpendicular diameters running through the centre of the dish.

2. Results and Discussion:

2.1 The study of the effect of Fytomax N in inhibiting radial growth of pathogenic fungi in the nutrient agar

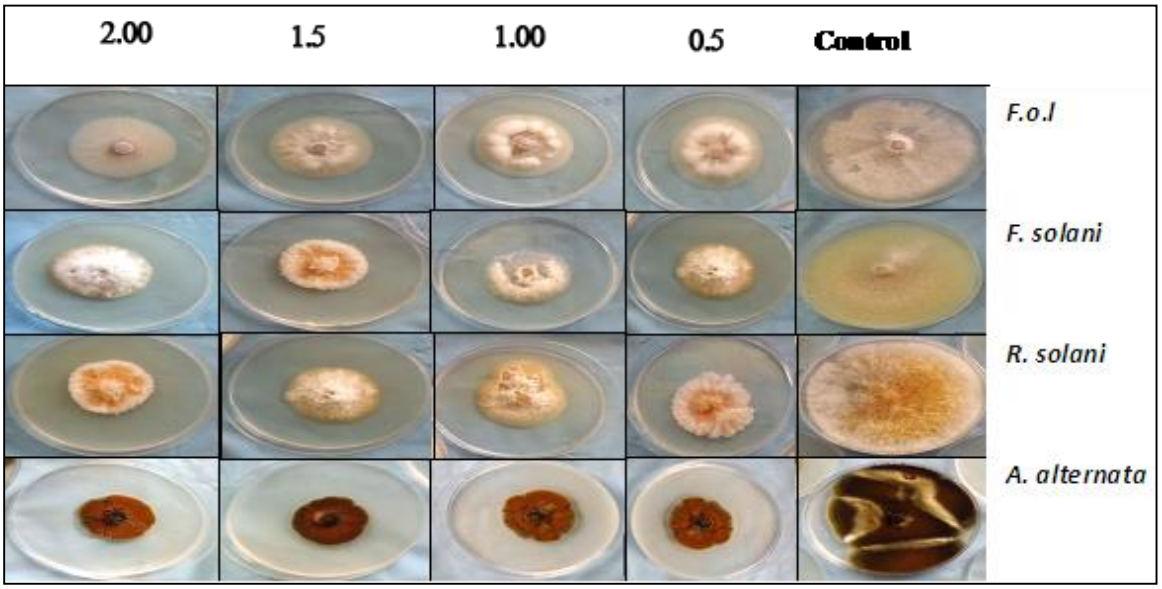
Results seen in table (1),and figure (1) show that various concentrations of the organic pesticide Fytomax N has an inhibitory effect on the growth of plant pathogenic fungi in PDA where the average growth of the fungi *F.oxysporum f.sp.lycopersci*, *F. solani*, *R. solani* and *A. alternata* and the percentage of inhibition at a concentration of 2ml/litre were 4.60cm, 48.89% and 4.08cm, 54.67% and 3.23cm, 64.11% and 3.33cm, and 63.00% respectively and in the control test 9.00cm and 0% respectively. The results of this study correlate with another study undertaken by Wang et al in 2010 on the possibility of Neem seed extract at a concentration of 100mg/ml of PDA in inhibiting the growth of colonies of *Monilinia fructicola, Penicillium expansum, Trichothecium roseum* and *Alternaria alternata* where the percentage of inhibition reached 65.7, 34.1, 66.9 and 30.7% respectively.

Table (1): Effect of Fytomax N on the growth of some plant pathogenic fungi

	A. alternata		*R. solani*		*F. solani*		*F. oxysporum*	
Concentration of Neem Biopesticide Extract	**Inhibition (%)**	**Average Growth**	**Inhibition (%)**	**Average Growth**	**Inhibition (%)**	**Average Growth**	**Inhibition (%)**	**Average Growth**
0	**0**	**9.00**	**0**	**9.00**	**0**	**9.00**	**0**	**9.00**
0.5	**55.22**	**4.03**	**55.22**	**4.03**	**50.22**	**4.48**	**44.44**	**5.00**
1	**59.67**	**3.63**	**57.78**	**3.80**	**53.56**	**4.18**	**45.22**	**4.93**
1.5	**59.89**	**3.61**	**58.33**	**3.75**	**54.11**	**4.13**	**48.89**	**4.60**
2	**63.00**	**3.33**	**64.11**	**3.23**	**54.67**	**4.08**	**48.89**	**4.60**

*Each figure represents an average of three repeats

Picture (1): The effect of various concentrations (ml/l) of Fytomax N on the growth of some plant pathogenic fungi



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