

***Trichoderma* spp.**
Macrophomin phaseolina

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<i>Trichoderma</i> spp.									
%66		Tv1		<i>Macrophomina phaseolina</i>					
.1		Tv1		<i>M. phaseolina</i>					
		Thk20						Tv1	
				Thk20		² 100/		1,17	
						² / 7,58			
	<i>Trichoderma</i> spp.			TV1					
	/ 1,26			/ 0,29	0,74	0,88	Thk20	Th1	Tv2
				<i>Trichoderma</i> spp.					
		Tv1		Peroxidase					
	Polyphenoloxidase						/	1,52	
3,03							Tv2		
	<i>Trichoderma</i> spp.								/
				Thk20					
				/	1,51				
				/	1,46				

***Trichoderma* Isolates Ability to Produce Cellulase Enzyme
and it's Role as Resistance Inducer to Fungus
*Macrophomina phaseolina***

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ABSTRACT

The result of this study indicated that *Trichoderma* spp. culture filtrates have antagonistic activity against *Macrophomina phaseolina* where the isolate Tv1 gave the higher antagonistic activity with 66%. in addition to that the same isolates showed higher antibiosis activity with an average of 1 according to Bell scale, with reduced pH level in culture media while the isolate Thk20 recorded the higher biomass amount of 1.17 g/100 mL with sporeulation ability 7,58 /cm². *Trichoderma* isolates showed significant differences in it's capacity to produce cellulase enzyme where the isolate TV1 produced the higher amount of enzyme 1,26 unit/g, followed by the isolates Tv2, Th1, Thk20 with 0.88, 0.28 , 0.28 unit/gm respectively. The result also showed that the ability of *Trichoderma* isolates to induce resistance in cowpea plants by raising in peroxidase activity to 1.52 unit /g f.w in Tv2 and in polyphenol oxidase activity with 3.03 in the same isolate treatment in addition to the pathogen with the isolate Thk20 recorded the higher amount of total phenols in plant 1.51 mg/g.f.w and 1.46 mg/g.f.w in the same isolate treatment in presence of the pathogen .

Keywords: *Trichoderma*, Cellulase, Peroxidase, Poly phenol oxidase, Induced resistance

Trichoderma sp.

Abiotic

Biotic

Elicitor

(Dyakov *et al.*, 2007)

Hypersensitivity

Phytoalexin

Cellulase

Trichoderma sp.

(Martinez *et al.*, 2000)

T. longibrachiatum

Peroxidase

Chitinase

.....*Trichoderma* spp.

Salicylic acid

Benzoic acid

.(Gailite *et al.*, 2005 Martinez *et al.*,2001) Ethylene

Jasmonic acid

M. phaseolina

500

M. phaseolina

Macrophomina

Random Amplification polymorphic DNA (RAPD)

.(Siddiqui and Akhtar, 2007 Ibrahim, 2006)

Trichoderma spp.

M. phaseolina

:

0,5

3-2

%1

9

Chloromphenicol

Potato dextrose agar (PDA)

(°2±) °25

. / / 100

Barnett

. 7

. (2006) Hunter

PDA

5

(°2±) °25

. / 250 Chloromphenicol

°4

1
 1,5 °121
 / 2/1 *M. phaseolina*

:
 : *Trichoderma* spp.
T. harzianum Thk20 -1
 / /
 / / *T. viride* Tv -2
 / /
T. harzianum Th1 -3
T viride Tv2 -4

Dual culture (DCT) *Trichoderma* 9 technique
 5 PDA

M. phaseolina
Trichoderma spp . 5
 5
 PDA *M. phaseolina*
 5 (1982) Bell (°2±) °25

: pH

Trichoderma spp.

pH

10

PDB

. pH meter

Trichoderma spp.

:

PDA

Trichoderma spp.

2 /

10

0,5

1

Tween 20

50

5

Magnetic stirrer

100/

Haemocytometer

:

.(Gary and Neelakntan, 1982)

:

1

:

.1:1

.*M. phaseolina*

-1

M. phaseolina

-2

-3

.()

-4

PDA

M. phaseolina

/

%5

³ / ⁶ 10× 4

.....*Trichoderma* spp.

24

.%5

	:	20
Guaiacol	:	-1
		.(Howell <i>et al.</i> , 2000)
Catechole	:	-2
		.(Shi <i>et al.</i> , 2002)
	.(Zieslin and Ben, 1993)	: -3

CRD

. %5

:

Macrophomina phaseolina (Tassi)Goid

.(Thirumalachar,1953)

:*Trichoderma* spp.

Trichoderma spp. (1)

Tv1	(1982) Bell	2 -1	<i>M.phaseolina</i>
Thk20	.2	Tv2	1
	<i>Trichoderma</i> spp.	1,66	1,33 Th1
			<i>M.phaseolina</i>

Chitinase Lipase Protease B-1.3-glucanase

(Ibraheem, 2009)

Tv1	<i>M. phaseolina</i>	<i>Trichoderma</i> spp.
	% 57	Th1 %66

Trichoderma spp.

Trichorzianinse Diketopiperazines Alamethacin Pachybasin

(Hibar *et al.*, 2007 ; Kuguk and Kivang, 2003 Stefanova *et al.*,1999)

Tv1

2,83 Thk20

2,66

.3,5 Th1

.Trichoderma spp.

:1

*)					**	
2 /	(pH)	100/ (°)	(%)			
7,58	2,83	1,17	62	1,33	Thk20	
7,5	3,50	0,69	57	1,66	Th1	
7,22	2,66	0,98	66	1,00	Tv1	
7,46	3,13	0,93	61	2,00	Tv2	

.%5

*

.(Bell *et al.*, 1982)

**

Trichoderma spp.

Trichoderma sp.

Thk20

.(Harman, 2000 Altomare *et al.*,1999)

Trichoderma Elicitors Xylanase Cellulase
 Protein resistance (PR) spp.

T.viride

Trichoderma spp.

.(Martinez *et al.*, 2001 ; Piel *et al.*, 1997)

***Trichoderma* spp.**

(2)

:Peroxidase

Trichoderma spp.

/ 1,52

Tv1

Peroxidase

/ 1,48

/ 1,47 ThK20

/ 1,47

Th1

/

Trichoderma spp. :2

/

/	*	/		
0.12 ± 0,74		0.19 ± 0,28	0.09 ± 1,005	
0.17 ± 1,51		0.14 ± 0,32	0.11 ± 1,47	ThK20
0.19 ± 1,46		0.16 ± 0,41	0.15 ± 1,17	ThK20+ <i>M.phaseolina</i>
0.09 ± 1,23		0.09 ± 0,23	0.17 ± 1,02	Th1
0.25 ± 1,11		0.05 ± 0,72	0.12 ± 1,47	Th1+ <i>M.phaseolina</i>
0.16 ± 0,83		0.21 ± 0,88	0.21 ± 1,52	Tv1
0.18 ± 1,34		0.16 ± 1,71	0.18 ± 1,48	Tv1+ <i>M.phaseolina</i>
0.19 ± 1,15		0.15 ± 1,57	0.21 ± 1,005	Tv2
0.12 ± 1,24		0.12 ± 3,03	0.15 ± 1,25	<i>T.v2+ M.phaseolina</i>
0.17 ± 0,89		0.11 ± 0,85	0.19 ± 0,96	<i>M.phaseolina</i>

.%5

*

:Polyphenoloxidase

Tv2 (2)

Tv2 / 3,03

/ 1,71 1,57 Tv1

:

Trichoderma spp. (2)

Thk20

/ 1,51

/ 1,23 Th1 / 1,51 1,46

/ Tv1

Trichoderma spp.

.0,83

	(2009) Al-Tuwaijri	(Ibraheem, 2009)
<i>Fusarium oxysporum</i>		<i>Bacillus subtilis</i> <i>T.viride</i>
		<i>Fusarium solani</i>
<i>T.atrovirdie</i>	(2005) Brunner	.
	<i>Rhizoctonia solani</i>	
	<i>T.harzianum</i>	
Trypsin Chymotrypsin		Phenylalanine ammonia lyase
<i>F.oxysporum</i>	Protease-2	
(Jayalakshmi <i>et al.</i> , 2009)		

.(Hassan *et al.* , 2007 Dyakov *et al.*, 2007 Karthikeyan *et al.* , 2006).

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