

()

Verticillium dahliae
Meloidogyne javanica

*

(/ / : // :)

+

()

$(p \leq /)$

+

+

%

+

$(p \leq /)$

مقدمه

(Rengel *et al.*, 1994; Ogallo & Mc Clure, 1995;

Ryals *et al.*, 1996)

)

(

(Zainol *et al.*, 2003)

(Oka *et al.*, 1997) SA
 (Hammand-Kosack & SA
 Jones, 1998)
 (1995) Buffa *et al.*
 (cholera) SA
 (1997) Mandavia *et al.*
Fusarium oxysporum f.sp. *ciceri*
 (Padwick) Sen Gupta and Chattopadhyay
 (Manzanilla) (Koroneiki)
 (Bellini, 2002)
 (Tous & Ferguson, 1997)
 (Di Pietro & Roncero,
 1996)
 (1998) Valette *et al.*
Verticillium dahliae
Meloidogyne javanica (Treub) Klebahn
 Chitwood
Radopholus similis (Cobb) Thorne
V. dahliae
) *V. dahliae* (dopamine)
 (SS-4
 (SA)
 %
 PDA SA

...

:

(1992) Hilloks

PDA

(Bhat & Subbarao, 1999; Khan *et al.*, 2000)

×

×

(Hall & Ly, 1972; Devay *et al.*, 1973)

) (propagule)

×

(

()

/

)

(Khan *et al.*,

×

.2000)

(

M. javanica

(Dhingra & Sinclair, 1986; Khan *et al.*,

M. javanica

.2000)

V. dahliae

)

De Grisse

)

(

(1969)

PDA

(

(Seervers *et al.*, 1971)

M. javanica

M. javanica

Eisenbeck & Triantaphyllou (1987) Jepson

(Etebarian, 1989)

(1991)

/

/

(single egg mass)

(Rutgers)

(1973) Hussey & Barker

(Spectronic-501)

%

(Etebarian, 1989; Seervers *et al.*, 1971)

()

/

(Seervers *et al.*, 1971;

Etebarian, 1989)

%

×

/

(Lamberti

& Baines, 1969; Hussey & Barker, 1973; Sasanelli

et al., 1997)

/

(1971) Seervers *et al.*

%

%

Beckman-J2-Mc

[(g=1.127 (rpm/1000) 2]

()

M. javanica *V. dahliae*

()

/ wx	/ x	/ r	/ abcd	
/ c	/ d	/ e	/ ab	
/ d	/ f	/ h	/ a	
/ a	/ a	/ a	/ bcd	+
/ f	/ h	/ k	/ abcd	
/ b	/ c	/ d	/ cd	+
/ g	/ j	/ mn	/ abcd	
/ a	/ b	/ f	/ abc	+
/ x	/ x	/ s	/ cd	
/ r	/ p	/ kl	/ cd	
/ u	/ s	/ o	/ cd	
/ p	/ l	/ g	/ bcd	+
/ v	/ u	/ p	/ cd	
/ q	/ n	/ i	/ abcd	+
/ w	/ v	/ q	/ cd	
/ s	/ q	/ l	/ bcd	+
/ w	/ w	/ r	/ cd	
/ g	/ g	/ fg	/ abcd	
/ i	/ i	/ j	/ d	
/ e	/ d	/ b	/ d	+
/ j	/ k	/ kl	/ cd	
/ j	/ e	/ c	/ abcd	+
/ l	/ m	/ m	/ bcd	
/ h	/ h	/ h	/ cd	+
/ w	/ x	/ s	/ cd	
/ n	/ no	/ j	/ abcd	
/ o	/ o	/ k	/ cd	
/ m	/ ij	/ d	/ d	+
/ r	/ r	/ no	/ d	
/ k	/ k	/ h	/ cd	+
/ t	/ t	/ p	/ d	
/ r	/ r	/ no	/ cd	+

%

($p \leq /$)

(Dehghani *et al.*, 2001) ($p \leq /$)

() +

... :

(Bellini, 2002) ()

.(Tous & Ferguson, 1997)

()

.(Saeedizadeh *et al.*, 2003)

+

(Seah *et al.*, 1996; Mandavia *et al.*,
1997; Matern & Kneusal, 1998; Dehghani *et al.*,
2001; Gogoi *et al.*, 2001; Janda *et al.*, 2003; He &
Wolyn, 2005)

M. javanica

V. dahliae

.(Saeedizadeh *et al.*, 2003)

REFERENCES

1. Bellini, E. (2002). Miglioramento Genetico. In Arsia (Ed.,) *La Toscana Nella Storia Dell'olivo e Dell'olio*. Pp. 229-260. Florence, Italy.
2. Bhat, R. G. & Subbarao, K. V. (1999). Host range specificity in *Verticillium dahliae*. *Phytopathology*, 89, 1218-1225.
3. Buffa, R., Szwed, M., Pay, P. & Nagy, F. (1995). Cholera toxin elevates pathogen resistance and induces defense reactions in transgenic tobacco plants. *EMBO Journal*, 14, 5753-5761.
4. De Grisse, A. (1969). Redescription ou modifications de quelques techniques utilisees dans letude des nematodes phytoparasitaires. *Mededelingen Rijksfaculteit der Landbouwwetenschappen*, 34, 351-369.
5. Dehghani, A., Etebarian, H. R. & Alizadeh, A. (2001). A histological study and phenolic compounds change in resistance and sensitive cultivars of lettuce during the growth of fusarium wilt fungus. In: *Proceedings of the 14th Iranian Plant Protection Congress*, 24-27 Aug., Industrial University of Esfahan, Esfahan, Iran. p.100. (In Farsi).
6. Devay, J. E., Garber, L. L. & Butterfield, E. J. (1973). Characteristics and concentration of propagules of *Verticillium dahliae* in air-dried field soils in relation to the prevalence of Verticillium wilt in cotton. *Phytopathology*, 64, 22-29.
7. Dhingra, O. D. & Sinclair, J. B. (1986). *Basic plant pathology methods*. C.R.C Press. Inc. 355p.
8. Di Pietro, A. & Roncero, M. I. G. (1996). Endopolygalacturonase from *Fusarium oxysporum* f. sp. *lycopersici*, purification, characterization, and production during infection of tomato plants. *Phytopathology*, 86, 1324-1330.
9. Etebarian, H. R. (1989). A study of the quantitative changes in phenolic compounds in barley cultivars during the growth of *Puccinia hordei* and its relation with the cultivars resistance than barley brown rust. *Iranian Journal of Plant Pathology*, 24, 61-69. (In Farsi).
10. Funnell, D. L. & Pedersen, J. F. (2006). Reaction of sorghum lines genetically modified for reduced lignin content to infection by *Fusarium* and *Alternaria* spp. *Plant Disease*, 90(3), 331-338.
11. Gogoi, R., Singh, D. V. & Sivastava, K. D. (2001). Phenolic as a biochemical basis of resistance in wheat against karnel bunt. *Plant Pathology*, 54, 470-476.

12. Goli, A. H., Barzegar, M. & Sahari, M. A. (2005). Antioxidant activity and total phenolic compounds of pistachio (*Pistachia vera*) hull extracts. *Food Chemistry*, 92(3), 521-525.
13. Hall, R. & Ly, H. (1972). Development and quantitative measurement of *Verticillium dahliae*. *Canadian Journal of Botany*, 50, 2097-2102.
14. Hammand-Kosack, K. E. & Jones, D. G. J. (1998). Resistance gene-dependent plant defense responses. *The plant cell*, 8, 1773-1791.
15. He, C.Y. & Wolyn, D. J. (2005). Potential role for salicylic acid in induced resistance of asparagus roots to *Fusarium oxysporum* f.sp. *asparagi*. *Plant Pathology*, 54, 227-232.
16. Hillocks, R. J. (1992). *Cotton Diseases*. C.A.B. International, Wallingford, Uk. 415pp.
17. Hussey, R. S. & Barker, K. R. (1973). A comparison of methods of collecting inocula of *Meloidogyne* spp. including a new technique. *Plant Disease Reporter*, 57, 1025-1028.
18. Janda, T., Szalai, G., Rios-Gonzales, K., Veisa, O. & Paldi, E. (2003). Comparative study of frost tolerance and antioxidant activity in cereals. *Plant Science*, 164, 301-306.
19. Jepson, S. B. (1987). *Identification of root-knot nematodes (Meloidogyne species)*. C.A.B. International, U.K. 265pp.
20. Khan, A., Atibalentja, N. & Eastburn, D. M. (2000). Influence of inoculum density of *Verticillium dahliae* on root discoloration of horseradish. *Plant Disease*, 84, 309-315.
21. Lamberti, F. & Baines, R. C. (1969). Pathogenicity of four species of *Meloidogyne* on three varieties of olive trees. *Journal of Nematology*, 1(2), 111-116.
22. Lozovaya, V. V., Lygin, A. V., Zernova, O. V., Li, S. & Widholm, J. M. (2006). Lignin degradation by *Fusarium solani* f. sp. *glycines*. *Plant Disease*, 90(1), 77-82.
23. Mandavia, M. K., Patel, C., Maravia, G. V. & Parameswaran, M. (1997). Role of phenolic compounds in resistance of fusarium wilt in chickpea. *Indian Journal of Agricultural Biochemistry*, 10, 3-11.
24. Matern, U. & Kneusal, R. E. (1998). Phenolic compounds in plant disease resistance. *Phytoparasitica*, 16, 153-170.
25. Nicholson, R. L. & Hammerschmidt, R. (1992). Phenolic compounds and their role in disease resistance. *Annual Review Phytopathology*, 30, 369-389.
26. Eisenbeck, J. & Triantaphyllou, H. H. (1991). Root-knot nematodes: *Meloidogyne* species and races. In W.R. Nickle (Ed.). *Manual of Agricultural Nematology*. Pp. 191-274. Marcel Dekker, Inc. New York.
27. Ogallo, J. L. & Mc Clure, M. A. (1995). Induced resistance to *Meloidogyne hapla* by other *Meloidogyne* species on tomato and pyrethrum plants. *Journal of Nematology*, 27, 441-447.
28. Oka, Y., Chet, I. & Spiegel, Y. (1997). Are pathogenesis-related proteins induced by *Meloidogyne javanica* or *Heterodera avenae* invasion? *Journal of Nematology*, 29, 501-508.
29. Rahdari, P. & Khavari-Nejad, R. (2006). A study of stress effect of N,P,K on phenolic compounds content (anti oxidatives) in oats (*Avena sativa*). *Iran Agriculture Science*, 2, 32-38. (In Farsi).
30. Rengel, D., Graham, R. & Pedlar, J. (1994). Time-course of biosynthesis of phenolics and lignin in root of wheat genotypes differing in manganese efficiency and resistance to take-all fungus. *Annual Botany*, 74, 471-477.
31. Ryals, J.A., Neuenschwander, U. H., Willits, M. G., Molina, A., Steiner, H. & Hunt, M. D. (1996). Systemic acquired resistance. *Plant Cell*, 8, 1809-1819.
32. Saeedzadeh, A., Kheiri, A., Okhovvat, S. M. & Hoseininejad, A. (2003). Study on intraction between root-knot nematode, *Meloidogyne javanica*, and wilt fungus, *Verticillium dahliae*, on olive seedlings in greenhouse. *Communication Applied Biological Science*, Ghent University, 68(4a), 139-143.
33. Sahebani, N., Zad, J., Sharifi-Tehrani, A., Kheiri, A. & Mohammadi, M. (2007). A study of the quantitative changes in total phenol in root of tomato during the interaction between root-knot nematode, *Meloidogyne javanica*, and vascular wilt fungus, *Fusarium oxysporum* f.sp. *lycopersici*. *Iranian Journal of Agricultural Sciences*, 37, 745-753. (In Farsi).
34. Sari, E., Etebarian, H. R. & Aminian, H. (2007). The Effects of *Bacillus pumilus*, Isolated from Wheat Rhizosphere, on Resistance in Wheat Seedling roots against the Take-all Fungus, *Gaeumannomyces graminis* var. *tritici*. *Phytopathology*, 155, 720-727.
35. Sari, E., Etebarian, H. R. & Aminian, H. (2008). Effects of *Pseudomonas fluorescens* CHAO on the Resistance of Wheat Seedling Roots to the Take-all Fungus *Gaeumannomyces graminis* var. *tritici*. *Plant Production Science*, 11(3), 298-306.
36. Sasanelli, N., Fontanazza, G., Lamberti, F., D'Addabbo, T., Patumi, M. & Vergari, G. (1997). Reaction of olive cultivars to *Meloidogyne* species. *Nematologia Mediterranea*, 25, 183-190.
37. Seah, S., Sivasithamparam, K. & Turner, D. W. (1996). The effect of salicylic acid on resistance in wheat (*Triticum aestivum*) seedling roots against the take-all fungus, *Gaeumannomyces graminis* var. *tritici*. *Australian Journal of Botany*, 44, 499-507.
38. Seervers, P. M., Daly, J. M. & Cathedral, F. F. (1971). The role of peroxidase isoenzymes in resistance to wheat stem rust disease. *Plant Physiology*, 43, 353-360.

39. Shokouhi, E., Etebarian, H. R., Kheiri, A. & Roustaei, A. (2006). A study of the quantitative changes in phenolic compounds in melon cultivars (Garmsar and Souski) during the growth of fusarium wilt fungus, *Fusarium oxysporum* f. sp. *Melonis*, and root-knot nematode, *Meloidogyne javanica*. *Iranian Journal of Agricultural Sciences*, 36, 931-937. (In Farsi).
40. Tous, J. & Ferguson, L. (1997). La Colltura Dell'olivo in California. *Olivae*, 67, 18-26.
41. Valette, C., Andary, C., Geiger, J. P., Sarah, J. L. & Nicole, M. (1998). Histochemical and cytochemical investigations of phenols in roots of banana infected by the burrowing nematode *Radopholus similis*. *Phytopathology*, 88, 1141-1148.
42. Zainol, M. K., Abd-Hamid, A., Yusof, S. & Muse, R. (2003). Antioxidative activity and total phenolic compounds of leaf, root and petiol of four accession of *Centella asiatica* (L.) Urban. *Food Chemistry*, 81, 575-581.

