Fusarium oxysporum MT0062によるナス科作物の全身的な抵抗性の誘導

誌名	日本植物病理學會報 = Annals of the Phytopathological Society of Japan
ISSN	00319473
著者名	山口,健一 貴田,まゆみ 有田,政信 高橋,正昌
発行元	日本植物病理學會
巻/号	58巻1号
掲載ページ	p. 16-22
発行年月	1992年1月

農林水産省 農林水産技術会議事務局筑波産学連携支援センター
Tsukuba Business-Academia Cooperation Support Center, Agriculture, Forestry and Fisheries Research Council Secretariat

日植病報 58：16-22 (1992)
Ann. Phytopath. Soc. Japan 58：16-22 (1992)

Induction of Systemic Resistance by *Fusarium oxysporum* MT0062 in Solanaceous Crops

Kenichi YAMAGUCHI*, Mayumi KIDA*, Masanobu ARITA*,† and Masayoshi TAKAHASHI*

Abstract

Fusarium species isolated from the root-tissue of tomato were screened for biocontrol activity to Fusarium wilt of tomato caused by *F. oxysporum* f. sp. *lycopersici* race J1 by using the root-dipping method. Some isolates of *Fusarium* species induced suppressiveness to Fusarium wilt in tomato. The most effective isolate, MT0062, was identified *F. oxysporum*. The isolate reduced also the wilt incidence in tomato caused by *Verticillium dahliae*. Furthermore, it had protective effect on Fusarium and Verticillium wilts in eggplant, but little effect in radish and strawberry. *F. oxysporum* MT0062 was frequently re-isolated from the hypocotyl of tomato and eggplant, but it was hardly re-isolated from radish or strawberry. There was no apparent antagonism between *F. oxysporum* MT0062 and the pathogens *in vitro*. Tomato seedlings pre-treated with *F. oxysporum* MT0062 at the part of underground reduced the development of late blight, following the inoculation of *Phytophthora infestance* onto aerial parts of the plant in which *F. oxysporum* MT0062 was not detected. These results suggested that *F. oxysporum* MT0062 could be successful in infecting to solanaceous crops such as tomato and eggplant, but did not cause any symptoms, and induced a non-specific resistance systemically.

(Received April 23, 1991)

Key words: *Fusarium oxysporum*, Solanaceae, induced resistance, cross protection, Fusarium wilt, Verticillium wilt.

INTRODUCTION

Protection of plant disease by pre-inoculation with avirulent or hypovirulent strains is known as 'Induced Resistance' or 'Cross-Protection'. This phenomenon was first described in virus disease[17] and it has developed into the practical use against some virus diseases, for example tobacco mosaic virus (TMV) and citrus tristeza virus (CTV) in Japan[18]. In bacterial diseases, there were several reports of protection related to antagonism[11], but very few reports of this type of protection, except for the case in which avirulent *Pseudomonas solanacearum* showed protective effect on bacterial wilt of tobacco[3]. The 'Induced Resistance' phenomenon has been well demonstrated in both foliar[13,14] and soilborne[4] fungal diseases. Several workers[20,23,24] have investigated the practical use of this protective phenomenon, especially in soilborne diseases that can not be controlled by chemicals exclusively.

On vascular diseases such as Fusarium wilt, several fungi were reported[7,22] to show protective effects, but most of them were formae speciales of *F. oxysporum*[5,9,26] that were pathogenic to the other plant. Also non-pathogenic *F. oxysporum* had protective effect on Fusarium wilt of carnation[6], cucumber[21] and sweet potato[19].

* Life Science Research Center, Mitsui Toatsu Chemicals Inc., 1144 Togo, Mobara-shi, Chiba 297, Japan 三井東圧化学 ㈱ ライフサイエンス研究所
† Present address: Tokyo Kasei University, 1-18-1 Kaga, Itabashi-ku, Tokyo 173, Japan 現在：東京家政大学

The present work was attempted to isolate the available *Fusarium* species from tomato to control vascular diseases in solanaceous crops and determine the characteristics of this type of protection. Portions of this work have been previously published[27,28].

MATERIALS AND METHODS

Isolation of Fusarium species. Tomato (*Lycopersicon esculentum* Mill.) cv. Ponderosa was seeded and grown in a natural field soil (alluvial soil, Chigasaki-shi) under greenhouse condition. Two to 3 months after seeding, main roots of healthy tomato seedlings were removed, washed free of soil and the surface was sterilized in 0.5% sodium hypochlorite for 10 min. Surface-sterilized roots were homogenized with sterile distilled water and plated on the Fusarium-selective medium[12]. Resultant colonies were transferred to potato dextrose agar. Single spore cultures were prepared for the respective isolate before screening.

Initial screening. Isolates of *Fusarium* species were screened for biocontrol activity to Fusarium wilt of tomato caused by *Fusarium oxysporum* Schlechtendahl f. sp. *lycopersici* (Saccardo) Snyder et Hansen race J1 by using the root-dipping method. Seeds of tomato cv. Ponderosa were planted in a plastic flat containing steamed soil. Three-week-old seedlings were carefully removed and the root-system was washed free of nursery soil and dipped in the bud cell suspension of the respective isolate of *Fusarium* species for 30 min. The bud cell was prepared by growing for 7 days on potato dextrose liquid medium in 500 ml Erlenmeyer flask on a reciprocal shaker (25°C, 120 rpm). The contents of the flask were filtered through threefold gauzes to remove mycelia, and the resulting bud cells were washed by centrifugation and re-suspended in distilled water. The concentration of the bud cell suspension was adjusted approximately 10^6 bud cells/ml. The root-system of the non pre-inoculated control plants was dipped in distilled water instead of the bud cell suspension. The tomato seedlings pre-inoculated with the test *Fusarium* species were planted in 10-cm-diameter pots containing steamed soil. The following day, the seedlings were inoculated with *F. oxysporum* f. sp. *lycopercisi* race J1 prepared in the same manner as the test fungi. After re-planting, the pots were incubated in a growth chamber with 12 hr of light (10,000 lux) and 12 hr of darkness at 28°C. Ten seedlings were examined for each treatment. The symptom of Fuarium wilt was assessed a month after inoculation. The index of symptom-expression was recorded as follows: a healthy plant was given the value of 0, a wilt of lower leaves showing was given the value of 1, a wilt of middle leaves showing was given the value of 2, a wilt of upper leaves showing was given the value of 4, a dead plant was given the value of 5. Disease severity of each treatment was calculated as below.

$$\text{Disease Severity} = \frac{\text{Sum of Index Value}}{\text{Number of Plants} \times 5} \times 100$$

Biocontrol activity. Seedlings of 1-2 fully expanded true leaf stage of tomato cv. Ponderosa, eggplant cv. Senryo No. 2, cucumber cv. Shimoshirazu-jihai, radish cv. Wakagoma and strawberry cv. Hoko-wase were planted in steamed soil pre-inoculated with bud cells of the test fungi at a concentration of 10^5 bud cells/g of dried soil. Control plants without pre-inoculation were also grown in steamed soil without the test fungi. Three weeks after pre-inoculation, the seedlings removed from the nursery soil were transplanted to an artificially infested soil with the respective pathogen, *F. oxysporum* f. sp. *lycopersici* race J1, *Verticillium dahliae* Klebahn, *F. oxysporum* Schlechtendahl f. sp. *melongenae* Matuo et Ishigami, *F. oxysporum* Schlechtendahl f. sp. *cucumerinum* Owen, *F. oxysporum* Schlechtendahl f. sp. *raphani* Kendrick et Snyder or *F. oxysporum* Schlechtendahl f. sp. *fragariae* Winks et Williams at a cocentration of 10^5 bud cells/g of dried soil. *Verticillium* species were cultured by using another medium[25]. The plants were grown in a greenhouse and assessed for disease severity as described above a month after transplanting to the infested soil.

Otherwise, aerial parts of the 3-week-old seedlings of tomato grown in the pre-inoculated soil with the test fungi were sprayed with suspension of *Phytophthora infestance* (Montagne) de Bary. The concentration of inoculum was approximately 10^5 zoospores/ml. The inoculated plants were kept in a moist chamber at 17°C and assessed for disease severity 7 days after inoculation.

Re-isolation Fourteen, 21, 28, 35, 42 and 49 days after inoculation with the test fungi, approximately 5-mm-thick segments of stem of tomato, eggplant, cucumber, radish or strawberry seedlings were surface-sterilized in 0.5% sodium hypochlorite for 3 min and placed on a 1.5% agar plate containing chloramphenicol at a concentration of 200 ppm. One week after incubation, presence of the test fungus in each segment was determined by observation of the plate. The colony was then transferred to potato dextrose agar and zymograms of non-specific esterase were used to confirm the test fungi[16].

Test for antagonism. Antagonism between the test fungi and the pathogens was examined by using the dual culture method. Mycelial agar-disc of the test fungi and the pathogens, *F. oxysporum* f. sp. *lycopersici* race J1, *F. oxysporum* f. sp. *melongenae* or *V. dahliae* were placed on potato dextrose agar plate and incubated at 25°C for 7 days. Antagonism was determined by observation of inhibition zone on the plate.

Test for pathogenicity. Pathogenicity of the test fungi to the plants was examined by using the root-dipping method. The test fungi were grown on potato dextrose agar at 25°C for 2 weeks and produced conidia were used in the test for pathogenicity. The root-system of tomato cv. Ponderosa and eggplant cv. Senryo No. 2 in the seedling stage of 3-week-old was dipped in the conidial suspension (10^6 conidia/ml) for 30 min and then planted in 10-cm-diameter pots containing steamed soil. As the inoculated control, tomato seedling inoculated with *F. oxysporum* f. sp. *lycopersici* race J1 and eggplant seedlings inoculated with *F. oxysporum* f. sp. *melongenae* were examined. Ten seedlings of each plant inoculated with the test fungi were incubated in a growth chamber. A month after inoculation, the seedlings were checked for some symptoms as compared with the inoculated control and non inoculated control plants.

RESULTS

Effect of pre-inoculation with the test fungi on the development of Fusarium wilt and re-isolation from tomato

More than 300 isolates of *Fusarium* species were isolated and tested for their ability to reduce the incidence of Fusarium wilt in tomato. In all experiments, severe wilt symptom in the plants inoculated only with the pathogen appeard within a month after inoculation. About 80 isolates of *Fusarum* species had some of protective effects, and tomato seedlings pre-inoculated with *F. oxysporum* MT0029 and MT0062 showed little symptom at a month after inoculation with *F. oxysporum* f. sp. *lycopersici* race J1.

Table 1. Effect of pre-inoculation with *F. oxysporum* MT0029 and MT0062 on the development of Fusarium wilt in tomato[a)]

Pre-inoculation	Days after inoculation			
	21	28	35	42
None	95 A	100 A	100 A	100 A
MT0029	0 B	17 B	81 B	95 A
MT0062	0 B	0 C	1 C	4 B

a) Values represent disease severity based on 15 plants/treatment. Within columns, means with same letter are not significantly different according to Duncan's multiple range test ($P=0.01$).

Table 2. Re-isolation frequencies of *F. oxysporum* MT0029 and MT0062 from the middle part of hypocotyl in tomato[a)]

Test fungus	Days after inoculation					
	14	21	28	35	42	49
None	0	0	0	7	0	7
MT0029	100	93	60	33	13	7
MT0062	100	100	93	100	93	80

a) Values represent percentage of plants from which the test fungus was isolated. Data is based on 15 plants/treatment.

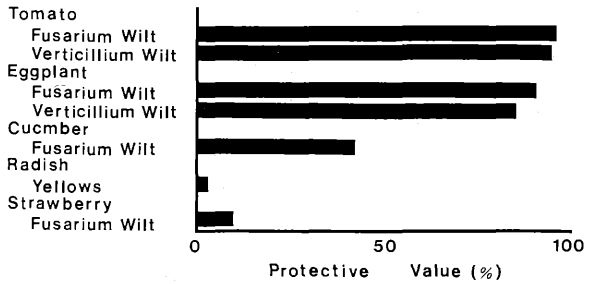

Fig. 1. Effect of *F. oxysporum* MT0062 on several vascular diseases.

$$\text{Protective value (\%)} = \left(1 - \frac{\text{Disease severity of the plants pre-inoculated with MT0062}}{\text{Disease severity of the plants inoculated only with the pathogen}}\right) \times 100.$$

Disease severity was assessed a month after transplanting to the infested soil. Data is based on 15 plants/treatment.

Table 3. Re-isolation frequencies of *F.oxysporum* MT0062 from the middle part of hypocotyl in several plants[a)]

Test plant	Days after inoculation				
	14	21	28	35	41
Tomato	100	100	93	87	73
Eggplant	100	100	100	80	66
Cucumber	87	73	47	13	0
Radish	7	0	0	0	0
Strawberry	7	13	7	0	0

a) Values represent percentage of plants from which *F. oxysporum* MT0062 was isolated. Data is based on 15 plants/treatment.

F. oxysporum MT0062 which was the most effective isolate was identified *Fusarium oxysporum* under microscopic study[15)]. It showed protective effect for more than 6 weeks after inoculation. The other effective isolate, MT0029 also identified *F. oxysporum*, could delay the onset of symptom as compared with the plants inoculated only with the pathogen, but the effect almost disappeared within 5 weeks after inoculation (Table 1).

The frequency of re-isolation was significantly different between *F. oxysporum* MT0062 and MT0029. *F. oxysporum* MT0062 was re-isolated from almost all segments of the middle part of hypocotyl during the experiment. In half number of plants, on the other hand, *F. oxysporum* MT0029 was disappearing at a month after inoculation (Table 2).

Effect of F. oxysporum MT0062 on several diseases

Effect of *F. oxysporum* MT0062 on Fusarium and Verticillium wilts in tomato, eggplant, cucumber, radish and strawberry is shown in Fig. 1. In all experiments, the plants inoculated only with the pathogen showed severe wilt symptom with disease severity being more than 80 at a month after inoculation. *F. oxysporum* MT0062 isolated from the root-tissue of tomato induced suppressiveness not only to Fusarium wilt but also to Verticillium wilt in tomato. Furthermore, it had protective effects on Fusarium and Verticillium wilts in eggplant. *F. oxysporum* MT0062, however, had less effect on Fusarium wilt in cucumber than in tomato. Meanwhile, little effect was showed in radish or strawberry (Fig. 1).

F. oxysporum MT0062 was frequently re-isolated from segments of the middle part of hypocotyl of tomato and eggplant. However, it was hardly re-isolated from radish or strawberry (Table 3).

Effect of F. oxysporum MT0062 on late blight in tomato

Although all tomato seedlings pre-inoculated with *F. oxysporum* MT0062 at the part of underground following the inoculation of *Phytophthora infestance* onto aerial parts of the plant showed the symptom

Table 4. Effect of *F. oxysporum* MT0062 on the development of late blight in tomato[a)]

Pre-inoculation	Diseased plant (%)	Disease severity[b)]
None	100	100
MT0062	100	43

a) Data is based on 15 plants/treatment.
b) Significant difference was confirmed by paired *t*-test ($P=0.01$).

Table 5. Distribution of *F. oxysporum* MT0062 in tomato seedling[a)]

Part of plant	Days after inoculation				
	14	21	28	35	42
Internode					
First	0	0	0	0	0
Epicotyl					
Upper	0	0	0	0	0
Middle	0	0	0	0	0
Lower	0	0	0	0	0
Hypocotyl					
Upper	7	20	13	0	7
Middle	100	100	93	87	73
Lower	100	100	100	93	80

a) Values represent percentage of plants from which *F. oxysporum* MT0062 was isolated. Data is based on 15 plants/treatment.

of late blight, they developed less symptom than the seedlings inoculated only with the pathogen (Table 4).

F. oxysporum MT0062 was re-isolated from segments of the middle part of hypocotyl of tomato. However, it was hardly re-isolated from the upper parts of hypocotyl, not from any parts of epicotyl or internode which are infection courts of *P. infestance* (Table 5).

Antagonism of F. oxysporum MT0062

Antagonism between *F. oxysporum* MT0062 and the pathogens was tested *in vitro*. No visual evidence of inhibition zone on the dual culture plates was observed between *F. oxysporum* MT0062 and the respective pathogen, *F. oxysporum* f. sp. *lycopersici* race J1, *F. oxysporum* f. sp. *melongenae* or *V. dahliae*. As a result, there was no antagonism between *F. oxysporum* MT0062 and these pathogens.

Pathogenicity of F. oxysporum MT0062

The tomato and eggplant seedlings inoculated with *F. oxysporum* MT0062 did not show any symptoms and grew like the plants without the fungus. As a result, *F. oxysporum* MT0062 was determined to be non-pathogenic to tomato and eggplant.

DISCUSSION

In solanaceous crops such as tomato, protection of Fusarium wilt by pre-inoculation of formae speciales of *Fusarium oxysporum* had been well studied[5,9,26]. Recently, non-pathogenic *F. oxysporum* that had protective effect on Verticillium wilt of tomato was isolated from healthy root-tissue of tomato[1]. Non-pathogenic *Fusarium* species were reported to be found in plants commonly[2] and these fungi were effective against vascular diseases[4]. In the present work, MT0062 identified *F. oxysporum* was obtained from root-tissue of tomato. It was the most effective isolate in reducing the wilt incidence of tomato caused by *F. oxysporum* f. sp. *lycopersici* race J1. *F. oxysporum* MT0062 reduced also the wilt incidence of tomato caused by *Verticillium dahliae*. Futhermore, it had protective effect on Fusarium and Verticillium wilts in eggplant. It was shown that this protective phenomenon was not the response of only one specific pathogen or plant. In laboratory test, there was no apparent antagonism between

F. oxysporum MT0062 and the respective pathogen *in vitro*. *F. oxysporum* MT0062 was concluded to induce resistance of some of plants belonging to *Solanacea*.

The seedlings of tomato pre-inoculated with *F. oxysporum* MT0062 reduced the development of late blight, following the inoculation of *Phytophthora infestance* onto aerial parts of the plant in which *F. oxysporum* MT0062 was not detected. The protection by *F. oxysporum* MT0062 was concluded to be systemic. *F. oxysporum* were reported to induce a resistance sistemically in cucumber[10] and sweet potato[20]. The present work was analogous to their reports.

The other isolate, MT0029 also identified *F. oxysporum*, had protective effect on Fusarium wilt of tomato. However, it was effective only in delaying symptom-expression. There was also significant difference between *F. oxysporum* MT0062 and MT0029 in frequency of re-isolation from tomato seedling. *F. oxysporum* MT0062 which could survive longer in tomato had more protective effect than *F. oxysporum* MT0029 which could survive shorter. And *F. oxysporum* MT0062 was frequently re-isolated from the hypocotyl of tomato and eggplant in which *F. oxysporum* MT0062 had protective effect. It was, however, hardly re-isolated from radish or strawberry in which *F. oxysporum* MT0062 had little effect. The magnitude of protection appeared to be corresponding to the degree of compatibility.

These results suggested that *F. oxysporum* MT0062 was capable of invading into the root-tissue of solanaceous crops such as tomato and eggplant, could be successful in infecting, but do not cause any symptoms. It is likely that *F. oxysporum* MT0062 stimulate some protective response in the plant as a result of infection. Homma *et al.*[8] indicated that the changes of some enzyme-histochemical reactions of the xylem-tissue of tomato after inoculation of *Fusarium* species. A further biochemical analysis is needed to discuss the mechanism of 'Induced Resistance' phenomenon by *F. oxysporum* MT0062. And the possibilities of *F. oxysporum* MT0062 as a bio-control agent will be investigated in the following report.

Literature cited

1. Amemiya, Y., Koike, M. and Hirano, K. (1989). Suppression of Verticillium wilt in tomato by non-pathogenic isolates of *Fusarium oxysporum*. Soil Micro. 33 : 27-34.
2. Armstrong, G.M. and Armstrong, J.K. (1948). Nonsusceptible hosts as carriers of wilt fusaria. Phytopathology 38 : 808-826.
3. Averre, C.W. and Kelman, A. (1964). Severity of bacterial wilt as influenced by ratio of virulent cells of *Pseudomonas solanacearum* in inoculum. Phytopathology 54 : 779-783.
4. Davis, D. (1967). Cross-protection in Fusarium wilt diseases. Phytopathology 57 : 311-314.
5. Davis, D. (1968). Partial control of Fusarium wilt in tomato by formae of *Fusarium oxysporum*. Phytopathology 58 : 121-122.
6. Garibaldi, A., Brunatti, F. and Gullino, M.L. (1986). Suppression of Fusarium wilt of carnation by competitive non pathogenic strains of Fusaria. Med. Fac. Landbouww. Rijksuniv. Gent. 51 : 633-637.
7. Gessler, C. and Kuć, J. (1982). Induction of resistance to Fusarium wilt in cucumber by root and foliar pathogens. Phytopathology 72 : 1439-1441.
8. Homma, Y., Ishii, M. and Ohata, K. (1978). Behaviour of tomato Fusarium wilt pathogen and wilt-suppressive prior-inoculants in xylem tissues of tomato plants and some enzyme-histochemical changes of infected tissues. Bull. Shikoku Agric. Exp. Stn. 31 : 71-85.
9. Homma, Y. and Ohata, K. (1977). Suppression of *Fusarium* wilt symptoms in tomato by prior-inoculation of other formae of *F. oxysporum* and *F. solani*. Bull. Shikoku Agric. Exp. Stn. 30 : 103-114.
10. Ishiba, C., Tani, T. and Murata, M. (1981). Protection of watermelon and muskmelon against *Colletotrichum lagenarium* by *Colletotrichum lagenarium*. Phytopathology 67 : 1285-1289.
11. Kerr, A. (1988). Biological control of bacterial pathogens. *In* 5th International Congress of Plant Pathology Abstracts of Papers, Kyoto. pp. 18.
12. Komada, H. and Ogawa, K. (1980). Estimation of *Fusarium* species. *In* Fusarium Disease of Cultivated Plants (Matsuo, T. *et al. eds.*). Zenkoku Noson Kyoiku Kyokai Publishing Co. Ltd., Tokyo. pp. 201-228 (in Japanese).
13. Kuć, J. and Richmond, S. (1977). Aspects of the protection of cucumber against *Colletotrichum lagenarium* by *Colletotrichum lagenarium*. Phytopathology 67 : 533-536.
14. Littlefield, L.J. (1969). Flax rust resistance induced by prior inoculation with an avirulent race of

Melampsora lini. Phytopathogy 59 : 1323-1328.
15. Matsuo, T. (1980). Identification of *Fusarium* species. *In* Fusarium Disease of Cultivated Plants (Matsuo, T. *et al. eds.*) Zenkoku Noson Kyoiku Kyokai Publishing Co. Ltd., Tokyo. pp. 17-59 (in Japanese).
16. Matsuyama, N. and Wakimoto, S. (1977). A comparison of the esterase and catalase zymograms of *Fusarium* species with special reference to the classification of a casual fungus of *Fusarium* leaf spot of rice. Ann. Phytopath. Soc. Japan 43 : 462-470.
17. Mckinney, H.H. (1929). Mosaic diseases in the Canary Islands, West Africa, and Gibraltar. J. Agr. Res. 39 : 557-578.
18. Motoyoshi, F. (1988). Biological control of virus disease by attenuated viruses. *In* 5th International Congress of Plant Pathology Abstracts of Papers, Kyoto. pp. 18.
19. Ogawa, K. and Komada, H. (1984). Biological control of Fusarium wilt of sweet potato by non-pathogenic *Fusarium oxysporum*. Ann. Phytopath. Soc. Japan 50 : 1-9.
20. Ogawa, K. and Komada, H. (1986). Induction of systemic resistance against Fusarium wilt of sweet potato by non-pathogenic *Fusarium oxysporum*. Ann. Phytopath. Soc. Japan 52 : 15-21.
21. Paulitz, T.C., Park, C.S. and Baker, R. (1987). Biological control of Fuarium wilt of cucumber with nonpathogenic isolates of *Fusarium oxysporum*. Can. J. Microbiol. 33 : 349-353.
22. Phillips, D.V., Leven, C. and Allison, C.C. (1967). A mechanism for the reduction of Fusarium wilt by a *Cephalosporium* species. Phytopathology 57 : 916-919.
23. Schneider, R.W. (1984). Effects of nonpathogenic strains of *Fusarium oxysporum* on celery root infection by *F. oxysporum* f. sp. *apii* and a novel use of the lineweaver-burk double reciprocal plot technique. Phytopathology 74 : 646-653.
24. Tezuka, N. and Makino, T. (1988). Biological control of Fusarium wilt of strawberry with nonpathogenic isolates of *Fusarium oxysporum*. Shokubutsu bōeki 42 : 251-254 (in Japanese).
25. Wakimoto, S. (1962). Construction of Media. *In* Laboratory Guide for Plant Pathologist (Asuyama, H. *et al. eds.*). Nippon Shokubutsu Boeki Kyokai, Tokyo. pp. 774 (in Japanese).
26. Wymore, L.A. and Baker, R. (1982). Factors affecting cross-protection in control of Fusarium wilt of tomato. Plant Dis. 66 : 908-910.
27. Yamaguchi, K. and Arita, M. (1990). Biocontrol of soilborne disease of tomato by non-pathogenic *Fusarium oxysporum* MT0062. Ann. Phytopath. Soc. Japan 56 : 404 (Abstr. in Japanese).
28. Yamaguchi, K., Arita, M. and Takahashi, M. (1988). Bio-control of soil-borne disease of tomatoes by non-pathogenic *Fusarium oxysporum* MT-0062. *In* 5th International Congress of Plant Pathology Abstracts of Papers, Kyoto. pp. 189.

和 文 摘 要

山口健一・貴田まゆみ・有田政信・高橋正昌：*Fusarium oxysporum* MT0062によるナス科作物の全身的な抵抗性の誘導

自然土壌で栽培したトマトの根から分離した *Fusarium* 属の糸状菌について，萎ちょう病に対する発病抑制作用を浸根処理法を用いて検定した。最も高い抑制効果を示した菌株は *F. oxysporum* MT0062 で，トマトに対して病原性はもたないものの，根から侵入し胚軸部の組織から 1.5 カ月以上に渡って再分離され，本菌はトマトに対する親和性が高いことが示された。*F. oxysporum* MT0062 はトマト萎ちょう病のほか，半身萎ちょう病，ナス半枯病に対する発病抑制効果が認められ，本作用は非特異的であった。*F. oxysporum* MT0062 は抑制効果が認められたナス科作物に限って胚軸部組織から高頻度で再分離されたことから，発病抑制作用と親和性との相関関係が示唆された。一方，各病原菌に対して *F. oxysporum* MT0062 は抗生作用を示さず，また，本菌を根から前処理したトマト苗の茎葉に疫病菌を噴霧接種したところ，疫病の発病が無処理と比較して軽減されたが，疫病菌の接種部位から *F. oxysporum* MT0062 は分離されず胚軸部に留まっていた。これらの結果より，*F. oxysporum* MT0062 は，親和性をもつナス科作物の根から侵入し胚軸部組織で生育することによって，植物体の抵抗性が全身的に誘導され非特異的な発病抑制作用が生じたものと推察された。