

日本国内で発生したNodulisporium melonisによるメロン根腐病(2)

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Root Rot of Melon Caused by *Nodulisporium melonis* in Japan*

2. Identification

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Abstract

Nodulisporium melonis sp. nov., the causal fungus of root rot of melon in Japan is described and illustrated. Colonies of this fungus on PDA are white and homogeneous, subhyaline, cream to pale brown in reverse. The conidiophores are erect, hyaline, simple or branched verticillately or irregularly, $45\text{--}280 \times 1.2\text{--}2.3 \mu\text{m}$, bearing single conidia or apical spore masses, 2-9 conidia per head on apical fertile portions, denticulate after detachment of conidia, often proliferated from conidia on conidiophores. Conidia are single, in short chains or aggregated, sympodulosporous, acropleurogenous, hyaline, 1-celled, obovoid, cylindrical, elliptical or irregular in shape, $2.5\text{--}13.8 \times 1.2\text{--}3.0 \mu\text{m}$ ($5.9 \times 2.5 \mu\text{m}$) with basal frill or cylindrical appendix, $3.0\text{--}10.0 \times 0.4\text{--}1.0 \mu\text{m}$.

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Key words : *Nodulisporium melonis*, morphology, temperature responses, taxonomy.

INTRODUCTION

The occurrence of a new disease of melon with brown-rotted and corky roots in Japan, was first reported in 1976^{11,12)}, and redescribed in 1995 in the previous report by Sato *et al.*¹³⁾, but the causal fungus *Nodulisporium* sp. has not been reported in detail.

Although this *Nodulisporium* was already described and illustrated by one of us, T. Watanabe in 1993¹⁵⁾ and 1994¹⁶⁾, it is redescribed as *N. melonis* sp. nov. in this report.

This is one of two papers¹³⁾ with the same title, concerned with identification of the causal fungus of root rot of melon in Japan.

MATERIALS AND METHODS

The fungus grows slowly on various media including commercial potato dextrose agar (PDA) (Nissui Chem. Co., Tokyo, Japan), V-8 juice agar and water agar.

Temperature responses of the representative isolates N-1, and N-8 of *Nodulisporium* used in the previous report¹¹⁾ were tested by measuring the diameter of colonies on PDA 7 days after inoculation at 12 temperatures from 4-37°C. Inocula consisted of 4-mm-diam. mycelial agar discs removed using an aseptic cork borer

from the edge of 7-day-old cultures on PDA at 25°C. Measurement of colony diameters represents an average of six replicates in two experiments.

RESULTS

Nodulisporium melonis T. Watanabe & M. Sato
sp. nov. (Figs. 1-6)

Coloniae in agar decocto tuberosum post 7 dies ad 28°C 31-34 mm diam. attingentes, albae, reverso subhyalinae vel pallide luteobrunneae. Mycelium superficiale vel immersum, ex hyphis ramosis, septatis, hyalinis, $1.2\text{--}5.0 \mu\text{m}$ crassis compositum. Conidiophora micronematosae vel semi-micronematosae, hyalinae, laeviae, erectae, simplicia vel irregulariter vel subverticillato romosa, $(45\text{--})103\text{--}140\text{--}(280) \mu\text{m}$ longa, $1.2\text{--}2.3 \mu\text{m}$ lato ad basium, $0.7\text{--}1.8 \mu\text{m}$ ad apicem, raro proliferationes efformantia. Cellulae conidiogenae holoblasticae, terminales, laterales, vel sympodiales. Conidia holoblastica, acropleurogena, solitaria vel 2-9 aggregata in massis, hyalina, laevia, obclavata, elliptica, lacrimiformia vel cylindrica, aseptata, eguttulata vel guttulata, $(2.5\text{--})4.2\text{--}11.5\text{--}(13.8) \times 1.2\text{--}3 \mu\text{m}$, saepe basales frill vel appendices ferentia; appendices cylindricas $3\text{--}10.0 \times 0.4\text{--}1.0 \mu\text{m}$.

Holotypus: N-1 (=TW 75-355, FFPRI 425439)

* Part of this work was conducted at the National Institute of Agricultural Sciences (presently National Institute of Agro-Environmental Sciences), Tsukuba, Japan by T. Watanabe.

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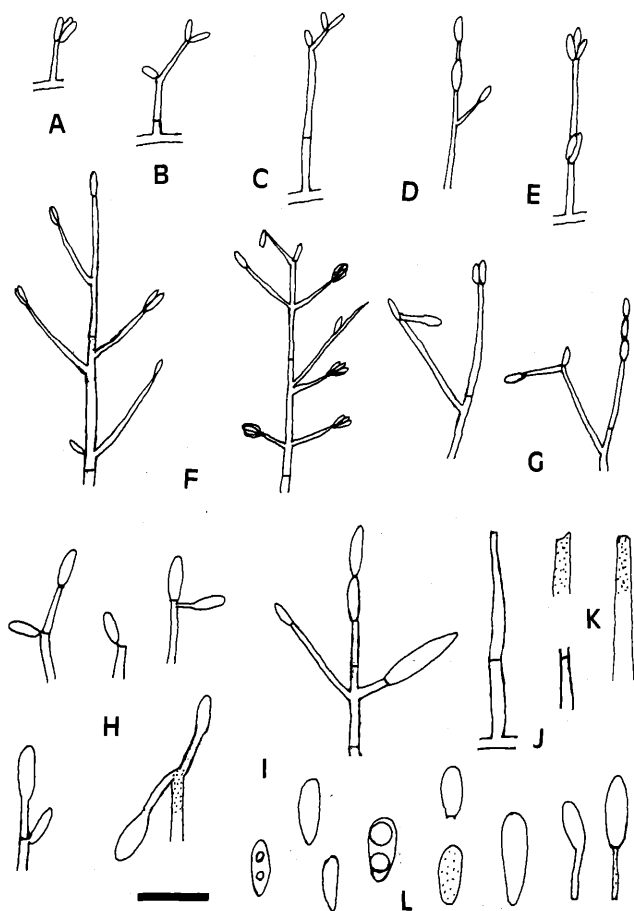


Fig. 1. *Nodulisporium melonis*. A. Simple conidiophore bearing apical spore head. B, C. Sympodial development of conidiophore bearing apical and lateral conidia. D. Branched conidiophores and development of a new conidium by proliferation. E. New conidial mass developed from apical conidia on simple conidiophores by proliferation. F. Sympodially developed conidiophores with terminal single conidium or conidial mass. G. Part of branched conidiophores bearing single or 2-3 conidia solitary, in twines or in a chain. H, I. Apical fertile portions of conidiophores with conidial development. J, K. Simple conidiophore (J), and apical parts of conidiophores (J, K). L. Conidia. Scale bar: A-G = 40 μm ; H-J = 15 μm ; K, L = 10 μm .

Colonies white on PDA, 31-34 mm diam. after 7 days at 25°C, reverse subhyaline, cream to pale brown. Mycelium superficial or immersed, composed of rather slender hyaline, septate, branched, occasionally rough hyphae, 1.2-5.0 μm wide. Conidiophores micronematous or semimicronematous, erect, hyaline, simple or branched irregularly or subverticillately, (45-)103-140(-280) μm long, 1.2-2.3 μm wide basally, 0.7-1.8 μm wide apically, bearing single conidia or apical spore masses containing usually 2-9 conidia per head. Conidiogenous cells holoblastic, apical, lateral, and sympodial occasionally proliferated, rough or denticulate in apical fertile portion after conidium

detachment. Conidia single, in short chains or aggregated, sympodulosporous, acropleurogenous, hyaline, obovoid, cylindrical, elliptical, eggulate or occasionally biguttulate, (2.5)4.2-11.5 (13.8) $\times$ 1.2-3.0 μm (5.9 $\times$ 2.5 μm), occasionally apiculate or with basal frill or cylindrical appendix, 3.0-10.0 $\times$ 0.4-1.0 μm .

When young, this fungus appears to be *Acremonium* species, because of its simple conidiophores (Fig. 1A), but they are branched often irregularly or subverticillately (Figs. 1F, 3, 5, 6). Therefore, it does not belong to the genus *Acremonium* with simple conidiophores and phialosporous conidia in apical spore heads although the causal fungus of melon decline in Spain was identified as *Acremonium* sp.³⁾ Spain fungus is similar to our fungus in colony characteristics, and conidiophore and conidial morphology and their dimensions.

In addition, the conidia of our fungus arise as blown out ends at the fertile apex of conidiophores (Figs. 1H, 7), and they are holoblastic, but rarely somewhat phialosporous. However, detached conidia (Figs. 1L, 4) possess occasionally basal frill or part of conidiophores at one end (Fig. 1L), and after their detachment, scars of fertile apices are conspicuously rough (Figs. 1I, 1K, 7) or denticulate, but conidiophore apices rarely appear to be phialide-like. New conidia are often formed by proliferation from apical or lateral conidium on conidiophores with or without extended conidiophores (Figs. 1B-D, 1E). Therefore, conidia are rarely formed in a short chain (Figs. 1G, 1I).

The fungus grew within 7-34°C but almost did not grow at or below 7 and at or above 34°C. The optimum temperature is 25°C (Fig. 8).

HABITAT. From roots of melon, Toyoda-chou, Shizuoka, Japan.

MATERIAL EXAMINED. JAPAN. Shizuoka, Asaba-chou, culture from melon roots, 16 May, 1975, M. Sato, N-1 (=TW 75-355, FFPRI 425439, MAFF; HOLOTYPE); Toyoda-chou, Shizuoka, culture from melon roots, 23 July, 1975, N-8 (=TW 75-356, FFPRI 425440, MAFF; PARATYPE) deposited in the Herbarium, Forestry and Forest Products Research Institute (FFPRI) and National Institute of Biological Resources, Ministry of Agriculture, Forestry and Fisheries (MAFF) at Tsukuba, Japan.

DISCUSSION

Based on the sympodial development of conidiophores with rough or denticulate apical fertile portions, and conidia occasionally with basal frill or cylindrical appendage, this fungus resembles species of the genera *Nodulisporium* Preuss, *Hansfordia* Hughes, *Geniculosporium* Chesters & Greenhalgh, *Calcarisporium* Preuss, amongst others^{1,2,4,5,7-9)}. Many of the teleomorph of these fungi are or believed to be *Daldinia* Ces. & de Not., *Hypoxylon* Bull. ex Fr., *Xylaria* Hill ex Schrenk or

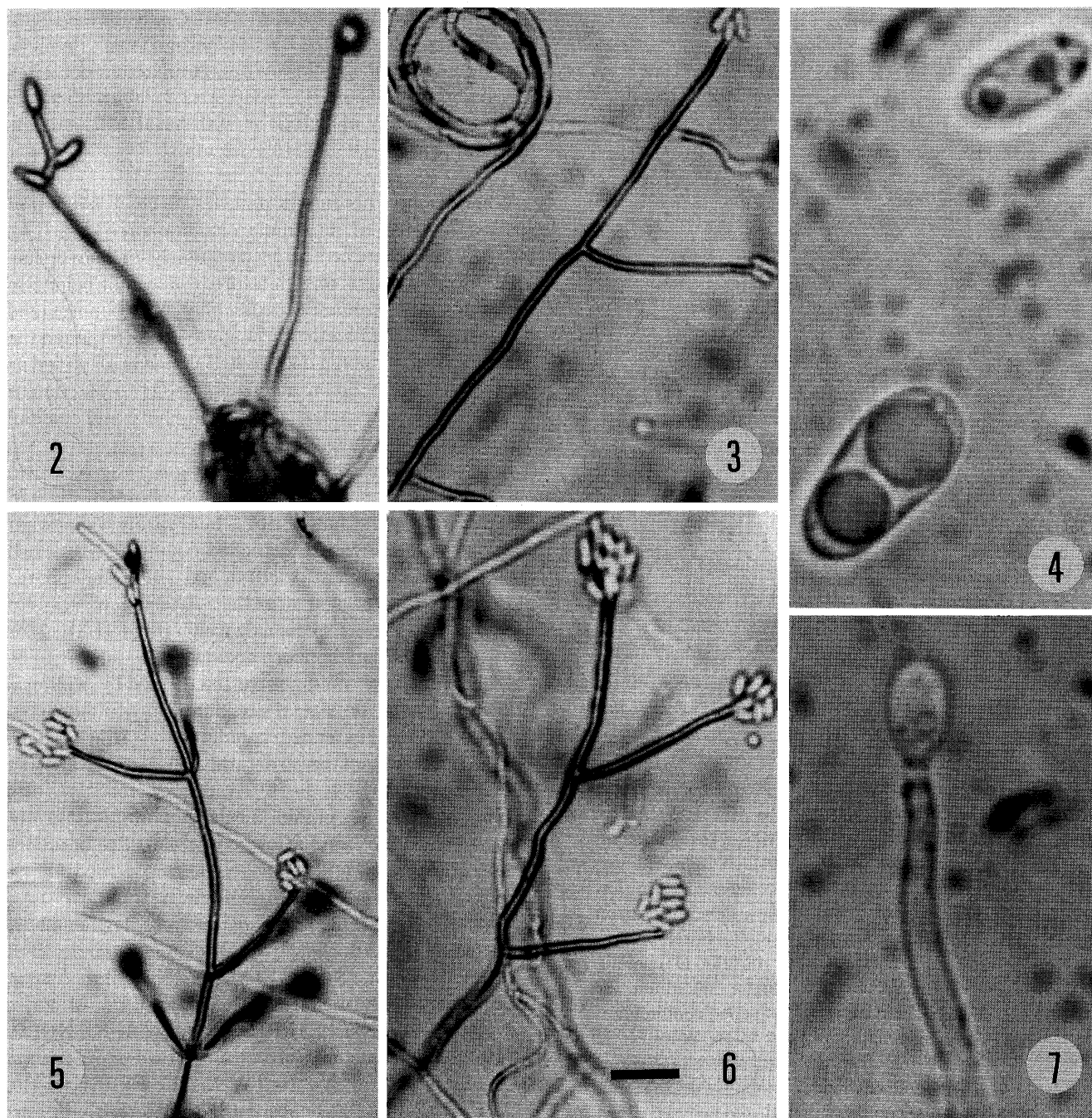


Fig. 2-7. *Nodulisporium melonis*. 2. Sympodial development of conidiophore bearing single conidia apically and laterally. 3, 5, 6. Branched conidiophores bearing apical spore masses on each branch. 4. Conidia. 5. Development of single conidia on apical fertile portion. Scale bar in Fig. 6: for Figs. 2, 3, 5, 6=15 μ m; Figs. 4, 7=2.5 μ m.

related xylariaceous genera^{1,2,4,7-10}).

According to Greenhalgh and Chesters²⁾, the four types of conidiophore in the anamorph of the Xylariaceae are roughly classified, including (1) simple, (2) nodulose, (3) intermediate between nodulose and geniculate and (4) geniculate. This fungus appears similar to *Nodulisporium* with various variations of conidiophore morphology and conidial production. Therefore, our fungus was previously identified as *Nodulisporium*. Among 14 species recognized by Hughes⁹⁾ and xylariaceous anamorphs^{2,4,7-10,14}, none of them fit with our

Nodulisporium.

To our knowledge, no fungus is close to this fungus morphologically, and it is named as new species in this study.

Literature cited

1. Barron, G.L. (1968). The Genera of Hyphomycetes from Soil, The Williams & Wilkins Co., Baltimore, Maryland.
2. Chesters, C.G.C. and Greenhalgh, G.N. (1964).

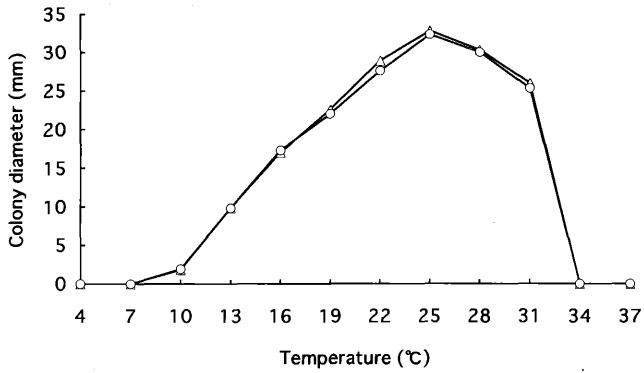


Fig. 8. Colony diam (mm) of two isolates of *Nodulisporium melonis* (triangle: Isolate N-1; circle: N-8) 7 days after inoculation on PDA dishes at 12 different temperatures.

Geniculosporium serpens gen. et sp. nov., the imperfect state of *Hypoxyton serpens*. Trans. Br. Mycol. Soc. 47: 393-401.

3. García-Jiménez, J., Velázquez, M.T., Jordá, C. and Alfaro-García, A. (1994). *Acremonium* species as the causal agent of muskmelon collapse in Spain. Plant Dis. 78: 416-419.
4. Greenhalgh, G.N. and Chesters, C.G.C. (1968). Conidiophore morphology in some British members of the Xylariaceae. Trans. Br. Mycol. Soc. 51: 57-82.
5. Hawksworth, D.L., Sutton, B.C. and Ainsworth, G.C. (1983). Ainsworth & Bisby's Dictionary of the Fungi, 7th ed., Commonw. Mycol. Inst., Kew, United Kingdom.
6. Hughes, S.J. (1958). Revisiones hyphomycetum aliquot cum appendice de nominibus rejiciendis. Can. J. Bot. 36: 727-836.
7. Jong, S.C. and Rogers, J.D. (1972). Illustrations and descriptions of conidial states of some *Hypoxyton* species. Wash. Agric. Exp. Stn. Tech. Bull. 71: 1-51.
8. Rogers, J.D. (1966). Notes on the conidial state of

Hypoxyton fuscum. Mycologia 58: 459-465.

9. Rogers, J.D. and Callan, B.E. (1986). *Xylaria polymorpha* and its allies in continental United States. Mycologia 78: 391-400.
10. Samuels, G.J. and Rossman, A.Y. (1992). *Thuemenella* and *Sarawakus*. Mycologia 84: 22-40.
11. Sato, M. (1976). Root rot, a new disease of melon. Kongetsu no Nouyaku (Japan Agricultural Technology) 20: 101-104 (in Japanese).
12. Sato, M., Watanabe, T., Furuki, I. and Morita, H. (1976). Root rot (new disease) of melon caused by *Nodulisporium* sp. Ann. Phytopathol. Soc. Jpn. 42: 345-346 (Abstr. in Japanese).
13. Sato, M., Watanabe, T., Furuki, I. and Morita, H. (1995). Root rot of melon caused by *Nodulisporium melonis* in Japan. 1. Occurrence, symptoms, isolation and pathogenicity. Ann. Phytopathol. Soc. Jpn. 61: 325-329.
14. Smith, G. (1962). Some new and interesting species of micro-fungi. III. Trans. Br. Mycol. Soc. 45: 387-394.
15. Watanabe, T. (1993). Photomicrographs and Illustrations of Soil Fungi. Soft Science Publications, Tokyo, pp. 264-265 (in Japanese).
16. Watanabe, T. (1994). Pictorial Atlas of Soil and Seed Fungi, Lewis Publishers, Boca Raton, U.S.A., pp. 278-279.

和 文 摘 要

渡邊恒雄・佐藤允通：日本国内で発生した *Nodulisporium melonis* によるメロン根腐病 (2) 同定

メロン根腐病の病原糸状菌 *Nodulisporium melonis* sp. nov. の形態を記載、図示した。本菌の PDA 培養菌叢は、白色、均一で、裏面は淡褐色またはクリーム色、分生子柄は直立、無色、単純、輪生または不規則に分岐、 $45-280 \times 1.2-2.3 \mu\text{m}$ 、各分枝先端の胞子形成部位に分生胞子をシンポジロ状に 2-9 個を集合して形成、胞子離脱後は抜菌後状となる。分生胞子は無色、単胞、楕円形または不整形、 $2.5-13.8 \times 1.2-3.0 \mu\text{m}$ 、離脱胞子には棒、または分生子柄の一部 ($3.0-10.0 \times 0.4-1.0 \mu\text{m}$) が残る。