

## Occurrence of Narcissus Smoulder Caused by *Botrytis narcissicola* in Korea

Sung Kee Hong<sup>1\*</sup>, Wan Gyu Kim<sup>1</sup>, Weon Dae Cho<sup>2</sup> and Hong Gi Kim<sup>3</sup>

<sup>1</sup>Plant Pathology Division, National Institute of Agricultural Science and Technology (NIAST), Rural Development Administration (RDA), Suwon 441-707, Korea

<sup>2</sup>Applied Microbiology Division, NIAST, RDA, Suwon 441-707, Korea

<sup>3</sup>Division of Applied Biology, College of Agriculture and Life Science, Chungnam National University, Daejeon 305-764, Korea  
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Leaf blight and bulb rot symptoms were observed on narcissus plants grown in Yongin, Cheongwon and Namhae areas in Korea during disease survey from 1999 to 2002. A total of 15 isolates of *Botrytis* sp. were obtained from the infected plant parts of narcissus. All the isolates were identified as *Botrytis narcissicola* based on their morphological and cultural characteristics. Three isolates of *B. narcissicola* were tested for their pathogenicity to leaves and bulbs of narcissus by artificial inoculation. All the isolates induced leaf blight and bulb rot symptoms on the plants of narcissus by artificial inoculation. The symptoms induced by artificial inoculation were similar to those observed in the fields. This is the first report of narcissus smoulder caused by *B. narcissicola* in Korea.

**KEYWORDS:** *Botrytis narcissicola*, Narcissus, Smoulder

Narcissus (*Narcissus tazetta* L. var. *chinensis* Roem.) native to the shore of the Mediterranean is distributed in Europe, north Africa, China and Korea. The plant belongs to Amallidaceae as one of bulbous flowers. Bulbs of narcissus varieties grown in Korea have been imported from other countries including Netherlands. The bulbs are usually grown in greenhouses for production of flowers and offspring bulbs. In other countries, a number of narcissus diseases such as smoulder, fire, white mould and leaf scorch have been reported as major fungal diseases leading losses of bulb and flower yields (Moore, 1979). In Korea, viral diseases caused by Narcissus mosaic virus and Tobacco rattle virus was recorded in narcissus (Cho and Shin, 2004), but other diseases have not been studied in detail.

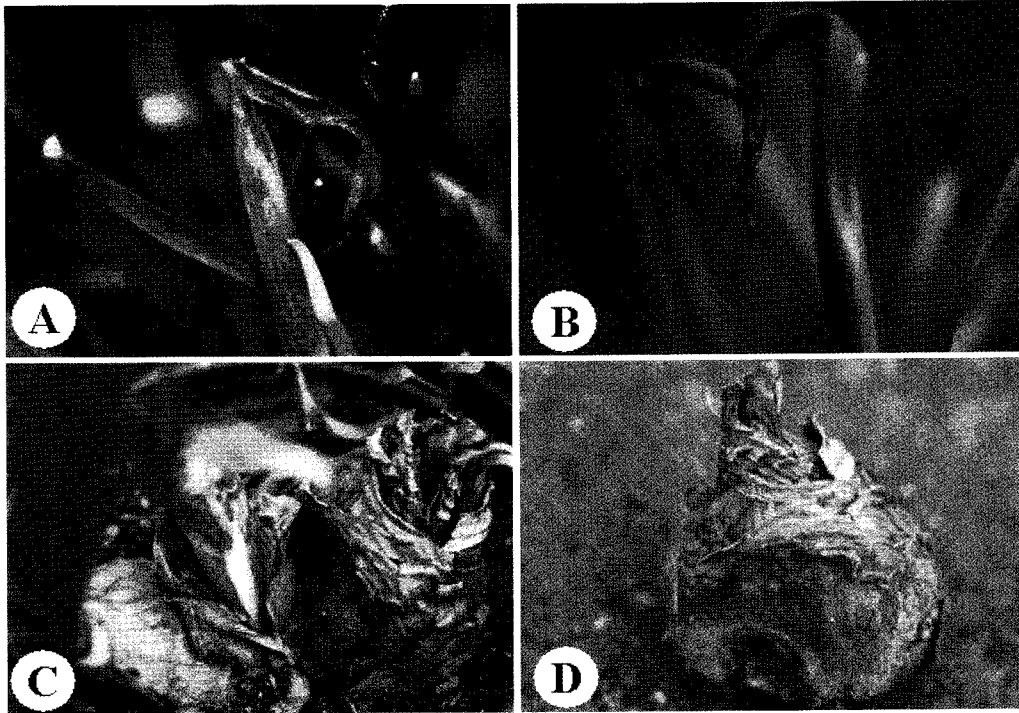
Symptoms caused by *Botrytis* sp. were sometimes observed on leaves and bulbs of narcissus in some fields of Yongin, Cheongwon and Namhae areas in Korea during disease survey from 1999 to 2002. Incidence of the disease ranged from 1 to 2% in 3 of 7 fields surveyed. Initial symptoms appeared as blight with halo on the leaf tips and progressed to lower portion of the leaves (Fig. 1A). Conidial masses were produced on the lesions, and the diseased leaves curled later (Fig. 1B). Symptoms produced on the bulbs appeared as light brown to dark brown discoloration with gray conidial masses (Fig. 1C). Later, sclerotia formed in rotted tissues of the infected bulbs (Fig. 1D). The infected bulbs were stunted with thin and yellow leaflets and did not produce shoots.

A total of 15 monoconidial isolates were obtained from

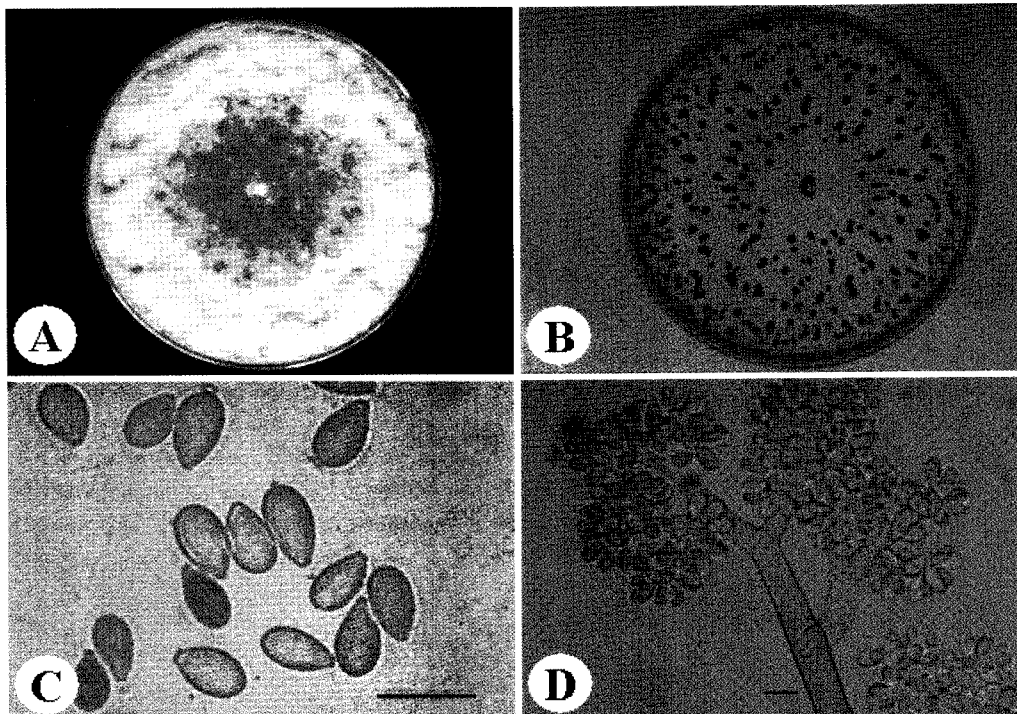
the lesions of leaves and bulbs. All the isolates were identified as *Botrytis narcissicola* Kleb. (Table 1) based on their morphological and cultural characteristics according to the descriptions of previous workers (Ellis, 1971; Williams and Spooner, 1991). Colonies on potato dextrose agar (PDA) consisted of effuse, pale yellow, and somewhat cottony mycelium (Fig. 2A). Sclerotia which were evenly distributed on the medium were black, small, spherical to broadly ellipsoidal or irregular and 1.0~1.2 × 1.5~2.0 mm in size (Fig. 2B). Conidia were subglobose to ellipsoidal, unicellular, pale brown, smooth and measured 7.5~13.8 × 5.0~10.0 μm (Fig. 2C). Conidiophores were erect and usually 0.8~1.3 mm high. Stipes were slender, cylindrical, pale brown below, paler near apices, 11.0~24.0 μm wide. Conidiogenous cells were inflated at apices producing conidia on sterigma (Fig. 2D). Conidia and conidiophores of *B. narcissicola* were similar to those of plurivorous *Botrytis cinerea* Pers. that has been reported in association with smoulder. The former produces small sclerotia less than 2.0 mm, which were distributed evenly on PDA. However, the latter is known to produce much larger sclerotia more than 2 mm and to distribute in annular patterns on PDA (Ellis, 1971; O'Neill and Mansfield, 1982). *B. narcissicola* also was easily distinguishable from *Botrytis polyblastis* Dowson known as a causal fungus of narcissus fire in which conidia are spherical and 30~50 μm in size (Arx, 1987).

To prove pathogenicity of the fungus to the host plants, isolates B99110, B0039 and B0227 were tested. Conidial suspension ( $3 \times 10^5/ml$ ) of each isolate and 5mm mycelial disks from PDA cultures were used as inocula. Leaves and bulb scales of narcissus were placed in plastic boxes,

\*Corresponding author <E-mail: sukiahong@rda.go.kr>



**Fig. 1.** Symptoms of smoulder on leaves and bulbs of narcissus. A and B, leaf blight with conidial masses; C and D, diseased bulbs covered with conidial masses.



**Fig. 2.** Cultural and morphological features of *Botrytis narcissicola* isolated from narcissus. A, a 14-day-old colony on PDA; B, sclerotia produced on PDA; C, conidia (scale bar = 14  $\mu\text{m}$ ); D, conidiophores bearing conidia (scale bar = 13  $\mu\text{m}$ ).

and then a drop of the conidial suspension and the mycelial disks (5 mm in diameter) were placed on the surface of the leaves and bulb scales. The plastic boxes were placed in an incubator at  $21 \pm 1^\circ\text{C}$  for 5 days. Symptoms

were not produced on the leaves inoculated with conidial suspensions except that weak lesions were produced on a few leaves. Yellowish brown lesions restricted to inoculated sites were produced on the bulbs inoculated with

**Table 1.** Morphological and cultural characteristics of *Botrytis narcissicola* isolated from diseased narcissus plants

Structure	<i>Botrytis narcissicola</i>		<i>Botrytis cinerea</i>
	Present isolates	Williams & Spooner (1991)	Ellis (1971)
Conidiophore			
Color	Pale brown	– <sup>a</sup>	Brown to pale brown
Length (mm)	0.8~1.3	–	> 2
Width (μm)	11.0~24.0	–	16~30
Conidium			
Color	Pale brown	Pale brown	Pale brown
Shape	Subglobose to ellipsoidal	Obovoid	Ellipsoidal or obovoid
Surface	Smooth	Smooth	Smooth
Size (μm)	7.5~13.8 × 5.0~10.0	8~18 × 7~12	6~18 × 4~11
Sclerotium on PDA			
Color	Black	Black	Black
Shape	Spherical or irregular	Spherical to ellipsoidal	Variable
Size (mm)	1.0~1.2 × 1.5~2.0	0.75~1.5 × 1.0~2.0	Variable
Colony on PDA	White to pale yellow	Whitish to grayish brown	Grey or grayish brown

<sup>a</sup>–: not described.

conidial suspensions. Water soaked and dark brown lesions were produced rapidly on the leaves and bulbs inoculated with mycelial disks. It was reported that conidial suspension in distilled water failed to infect narcissus plants but mycelial or conidial suspension supplemented with nutrients such as pollen successfully induced lesions (O'Neill and Mansfield, 1982). The present study first reveals that *B. narcissicola* causes smoulder of narcissus in Korea.

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