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Mycoflora of *Viola wittrockiana* Games seeds

DANUTA PIĘTA, IRENA KIECANA

Department of Phytopathology and Technology of Plant Protection, Faculty of Horticulture, Agricultural University, Akademicka 15; 20-934 Lublin, Poland

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Abstract

Thirty seed speciments of *Viola wittrockiana* harvested in the years 1985-1987 were investigated. As a result of mycological analysis, 1808 fungi isolates belonging to 19 species were obtained. Most frequently isolated species was *Alternaria alternata* whose isolates made 26 % of isolations of all the fungi. Among the fungi isolated particularly from undisinfected seeds the species from the *Penicillium* kind were dominant. Pathogenic fungi like *Botrytis cinerea* and *Fusarium culmorum* were also isolated from the investigated seeds.

INTRODUCTION

Viola wittrockiana is a biennial ornamental plant belonging to the *Violaceae* family. In home and foreing literature there are very few remarks on the diseases occurring on the vegetative organs of *V. wittrockiana* (Czyżewski, 1975; Pirone, 1978; Boudier, 1987; Ono, 1987). The available phytopathological literature provided only one information concerning the infection of flowers of the investigated plant by *Botrytis cinerea* (Pirone, 1978). There are on reports, however, dealing with fungi populating the *V. wittrockiana* seeds. Such investigations are expedient as they inform us, among others, about a theat to plants in the conditions of their cultivation, caused by mycophytopathogens.

MATERIAL AND METHODS

Seed specimens of *V. wittrockiana* came from the harvest of 1985-1987 and the mycological analysis was carried out in February the following year. They represented the seeds which were passed to the home market by the Regional Horticultural

Seed Production and Nursery Center in Ożarów Mazowiecki. The examination material included 30 seed specimens. Fifty undersinfected and fifty surface – – disinfected seeds were analysed from each sample (0,5 min. in 50 % C_2H_5OH and 0,5 min. in 0,1 % $HgCl_2$). The fungi were isolated by mineral substrate application in Petri dishes according to Ł a c i c o w a (1970). Ten seeds were set on the Petri dishes on the solidified agar nutrient. The stored seeds were kept for ten days in the temperature of 20-22°C. In order to assign the fungi, monographs and keys were used during the investigation of bean plants (P i ę t a, 1981).

RESULTS

As a results of the mycological analysis of disinfected seeds, 558 fungi isolates belonging to 17 species and unsporulating mycelium were obtained, while the surface undisinfected seeds gave 1250 isolates from 19 species and unsporulating mycelium (tab. 1, 2). The specific composition of the fungi was similar both from disinfected and undesinfected seeds. Most frequently isolated fungus from the analysed seeds was *Alternaria alternata* and its isolates made 26 % of isolations of all the fungi.

Table 1

Fungi isolated from disinfected seeds of *Viola wittrockiana*

Species	Number of isolates from seeds						Total number of isolates
	germinated			ungerminated			
	1985	1986	1987	1985	1986	1987	
Alternaria alternata (Fr.) Keissler	0	2	3	3	88	6	102
Aspergillus ochraceus Wilhelm	0	0	0	2	0	0	2
Aspergillus niger von Tiegh.	0	0	0	1	0	0	1
Botrytis cinerea Pers.	0	0	0	8	0	11	19
Cladosporium cladosporioides Fres.	0	0	0	0	50	0	50
Cladosporium herbarum Link. ex Fr.	0	0	0	1	0	0	1
Fusarium avenaceum (Fr.) Sacc.	0	0	0	0	0	4	4
Fusarium culmorum (W. G. Sm.) Sacc.	0	0	0	11	2	0	13
Fusarium equiseti (Corda) Sacc.	0	0	1	0	0	1	2
Fusarium semitectum Berk. et Rav.	0	0	0	37	0	0	37
Penicillium cyclopium West.	0	1	0	2	46	2	51
Penicillium martensii Biourge	0	0	0	16	0	0	16
Penicilium meleagrinum Biourge	0	5	0	0	59	0	64
Penicillium nigricans (Bainier) Thom	0	0	0	2	0	0	2
Penicillium paxilli Bainier	0	1	0	0	92	0	93
Scopulariopsis brevicaulis (Sacc.) Bainier	4	0	0	0	0	0	4
Trichothecium roseum Link	1	1	0	10	22	0	34
Unsporulating mycelium	0	1	4	17	37	4	63
Total	5	11	8	110	396	28	558

In the case of disinfected seeds, such pathogenic fungi as *Botrytis cinerea* (19 isolates) and *Fusarium culmorum* (13 isolates) were isolates. These species were isolated only from ungerminating seeds. From the disinfected seeds there were numerous isolations of saprophitic fungi representing the species from the *Aspergillus*, *Cladosporium* and *Penicillum* kinds. The greatest quantities of cultures of saprophytic fungi (405 isolates) were obtained from the seeds collected in 1986 (tab. 1). These fungi were isolated mainly from ungerminating seeds.

The dominant phytopathogen isolated from undisinfected seeds was *Botrytis cinerea* as its isolates made 25 % of isolations of all the fungi. Moreover, *Fusarium culmorum* (13 isolates) was obtained from pathogenic fungi (tab. 2). Undisinfected seeds often yielded saprophitic fungi which constituted 73 % of isolations of all the fungi – 24 % of which were the species from the *Penicillum* kind. Out of six species of the *Penicillium* kind, *P. cyclopium*, *P. martensii* and *P. paxilli* were isolated in greatest amount. The above – mentioned species, both pathogenic and saprophytic originated mainly from ungerminating seeds (tab. 2).

Table 2

Fungi isolated from undisinfected seeds of *Viola wittrockiana*

Species	Number of isolates from seeds						Total number of isolates
	germinated			ungerminated			
	1985	1986	1987	1985	1986	1987	
Alternaria alternata (Fr.) Keissler	0	1	43	69	181	74	368
Aspergillus ochraceus Wilhelm	0	0	0	1	0	0	1
Aspergillus niger von Tiegh.	0	0	0	15	0	0	15
Botrytis cinerea Pers.	0	0	14	61	31	207	313
Cladosporium cladosporioides Fres.	0	0	4	0	11	35	50
Cladosporium herbarum Link. ex Fr.	0	0	2	3	0	2	7
Fusarium avenaceum (Fr.) Sacc.	0	0	0	2	0	3	5
Fusarium culmorum (W. G. Sm.) Sacc.	0	0	0	6	7	0	13
Fusarium semitectum Berk. et Rav.	0	0	0	26	2	0	28
Monodictis para doxa (Corda) Hughes	0	0	0	0	2	0	2
Penicillium cyclopium West.	0	0	1	21	21	25	68
Penicillium martensii Biourge	0	0	3	118	0	34	155
Penicilium meleagrinum Biourge	0	0	0	0	2	0	2
Penicillium nigricans (Bainier) Thom	0	0	0	1	0	0	1
Penicillium paxilli Bainier	0	1	0	0	67	0	68
Penicillium urticae Bainier	0	0	4	0	0	1	5
Scopulariopsis brevicaulis (Sacc.) Bainier	0	0	0	1	0	0	1
Trichothecium roseum Link	0	0	0	21	17	2	40
Ulocladium botrytis Freuss.	0	0	0	1	0	0	1
Unsporulating mycelium	0	0	10	27	44	26	107
Total	0	2	81	373	385	409	1250

DISCUSSION

Fungi most frequently isolated from *Viola wittrockiana* seeds were *Alternaria alternata* and *Botrytis cinerea*. These species grew more often from undisinfected seeds which points to a contamination of seed surface by these fungi. *Alternaria alternata*, due to its common occurrence on the organs of cultivated plants in different conditions, was regarded to be „a field fungus" populating the sowing material. Within *Alternaria alternata* fungi, however, there are strains able to produce meta-bolites harmul for plants like alternarina and teunazonic acid (G r a b a r k i e w i c z – – S z c z ę s n a J. et al., 1990). The destructive activity of the discussed species considerably descreased the vitality of seeds (G o m e s, D h i n g r a, 1983) which is evident in frequent isolation of this fungus from ungerminating seeds. *Alternaria alternata*, as well as *Botrytis cinerea* did not limit themselves to contamination of the seed surface but come into a close contact with them which was expressed in isolation of these fungi from surface – disinfected seeds. The *Botrytis cinerea* species, due to its high enzymatic activity (J a r v i s, 1977), causes to destruction of populated tissues which was evident in isolation of this species from ungerminating seeds.

The *Viola wittrockiana* seeds populated numerous species from the *Penicillium* kind. The dominant kinds among the mycoflora isolated from *Viola wittrockiana* seeds were *Penicillium cyclopium*, *P. martensii* and *P. paxilli*. Species from the *Penicillium* kind excrete metabolites harmful for seeds and are characterized by strong amylolitic, proteolytic and lipolytic properties which particularly decreases the seed vitality (according to literature quoted by Ł a c i c o w a, 1978; Ł a c i c o w a, 1989; C h e ł k o w s k i, 1985). The sowing material was rarely populated by fungi from the *Aspergillus* species. The representatives of the two mentioned fungi are regarded as the so-called „storage fungi" which have a destructive effect in the conditions of great humidity (C h r i s t e n s e n, 1972). It is recommended that excessively moist seeds should be dried before storage and kept in the conditions of small air humidity. Among the fungi isolated from the *Viola wittrockiana* seeds there is a lack of phytopathogens specialized in infecting this plant species. In the case of *Viola wittrockiana* seeds there were isolations of common phytopathogens of a polyphagic character – *Botrytis cinerea*, *Fusarium avenaceum* and *Fusarium culmorum*. The above – mentioned species were most ferquently obtained from ungerminating seeds which points to binding a close contact between these fungi and seeds, thus lowering the sowing value.

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Mikoflora nasion *Viola wittrockiana* Gams.

Streszczenie

Przedmiotem badań było 30 prób nasion Viola wittrockiana zebranych w latach 1985-1987. W wyniku analizy mikologicznej uzyskano 1808 izolatów grzybów reprezentujących 19 gatunków. Najczęściej wyosobnianym gatunkiem był *Alternaria alternata*, którego izolaty stanowiły 26 % wyosobnień wszystkich grzybów. Wśród wyizolowanych grzybów, a zwłaszcza z nasion nie odkażonych dominowały gatunki z rodzaju *Penicillium*. Z badanych nasion wyosobniano także grzyby patogeniczne, jak *Botrytis cinerea* i *Fusarium culmorum*.