Stimulatory Effect of Pollen and Pistillate Parts of Some Horticultural Species upon the Germination of Botrytis cinerea Spores

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ABSTRACT

Aqueous suspensions of pollen grains of *Fragaria, Ribes, Rubus, Prunus, Malus, Hyacinthus, Iris, Narcissus*, and *Tulipa* contain substances which stimulate the germination of *Botrytis cinerea* spores. *Rubus* pollen in the germinating media caused 75% of the spores to germinate, whereas that of other species was greater than 90%. This contrasted with the 5 to 16% found in the water controls. When sections of the pistil were tested, all parts from *Tulipa* markedly stimulated germination but the stimulatory effects from stigma sections of *Prunus* sp. were either much less, or absent.

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Botrytis cinerea Pers. is responsible for serious blossom blights and harvest rots of many horticultural plants. It is particularly damaging to strawberries in Poland, especially if wet and warm conditions prevail at blossoming time. Previously, Chou & Preece (3) showed that pollen grains from strawberry stimulated spore germination. Borecka et al. (1) extended these studies to include other floral parts and found that the pistillate parts also were stimulatory while the petals and sepals were without effect. Borecka & Pieniazek (2) found that either synthetic abscisic acid (AbA) or AbA extracted from strawberry fruit would stimulate germination. In the investigations reported here, we studied the stimulatory effect of pollen from additional species and limited studies were made with the pistillate parts of some species.

We assayed the pollen from three small fruit species, *Fragaria ananassa* Hort. (strawberry), *Ribes nigrum* L. (black currant), and *Rubus idaeus* L. (red raspberry) for effects on germination of *B. cinerea* spores. We also assayed pollen from the tree fruit species, *Prunus armeniaca* L. (apricot), *P. avium* L. (sweet cherry), *P. cerasus* L. (sour cherry), *P. domestica* L. (plum), *P. persica* L. (peach) and *Malus sylvestris* Mill. (apple). Additionally, pollen from the ornamental species, *Hyacinthus orientalis* L. (hyacinth), *Iris germinca* L. (Iris), and *Narcissus pseudonarcissus* L. (daffodil) was evaluated. Our experimental technique followed that of Chou & Preece (3) wherein 30,000 pollen grains/ml of each species were mixed with 375,000 spores/ml of *B. cinerea*. Distilled water drops containing only *B. cinerea* spores served as controls in each experiment, and the percentage of germination was determined after 8 hr incubation at room temperature.

The data (Table 1) show that pollen from all tested species stimulated the germination of *B. cinerea* spores. Except for currant pollen where the germination was 75%, germination was increased to over 90%, contrasting to the 5.8 to 16.5% germination found in the water controls. Other studies were made to determine whether germ tube

TABLE 1. Stimulatory effect of pollen upon the germination of *Botrytis cinerea* spores[y]

Pollen source[z]					
Small fruits		Tree fruits		Ornamentals	
Species	Germination of spores (%)	Species	Germination of spores (%)	Species	Germination of spores (%)
Fragaria ananassa Hort.	91.5 a	*Prunus armeniaca* L.	97.5 a	*Hyacinthus orientalis* L.	93.5 a
Ribes nigrum L.	76.0 b	*P. avium* L.	96.5 a	*Iris germanica* L.	90.7 a
		P. cerasus L.	95.3 a		
Rubus idaeus L.	91.2 a	*P. domestica* L.	92.3 a	*Narcissus pseudonarcissus* L.	97.5 a
Water	5.8 c	*P. persica* L.	96.3 a	*Tulipa gesneriana* L.	97.3 a
		Malus sylvestris Mill.	92.3 a	Water	16.5 b
		Water	9.2 b		

[y] Each mean represents an average of three separate experiments and each mean within a vertical column followed by the same letter(s) are not significantly different at the 5% probability level.

[z] *Botrytis cinerea* spores added to water at concentration of 30,000/ml. Pollen grains added at concentration of 760,000/ml, and % germination determined after 8 hr.

TABLE 2. Stimulatory effects of pistillate floral parts upon the germination of *Botrytis cinerea* spores

Species	Pistillate[y] part	Germination[z] (%)
Tulipa		
gesneriana L.	stigma	79.3 a
	style	92.5 b
	ovary	83.3 b
Prunus		
avium L.	stigma	33.5 c
cerasus L.	stigma	24.8 d
domestica L.	stigma	19.8 e
Water		17.8 e

[y] Each floral part was cut into 0.5-mm sections and one section added to a drop of water containing 30,000 spores/ml.

[z] Means followed by the same letter are not significantly different at 5% probability level.

growth might be affected. In solutions containing raspberry and strawberry pollen, germ tube length of *B. cinerea* was found to average 264.0 and 232.5 μ, respectively, contrasting with 44.6 μ in water only.

Table 2 shows the effects of pistillate parts of flowers upon the germination of *B. cinerea* spores and indicates that 0.5-mm sections of the stigma, style, and ovary from tulip cause 80-90% germination when added to drops of spore suspension. Only the stigmas from *Prunus* species were tested. Those from sweet and sour cherry were stimulatory, whereas those from plum were without effect. No effect, however, was observed from uncut stigmas suggesting that endogenous substances released by injury are responsible and that these vary with the species.

Our data show that the pollen from many horticultural plants, when suspended in water, will stimulate the germination of *B. cinerea* spores and also may affect subsequent germ tube length. The presence of this stimulatory factor in aqueous suspensions of pollen very likely contributed to the heavy infection of gray mold in Polish strawberries in 1971 when excessive rainfall occurred during May and June. They also show that the pistillate parts, if wounded, could influence infection since cut sections of these flower parts of species stimulate spore germination. The identity of the stimulatory substances is unknown but those associated with the pollen are water-soluble and are not sugars (2). The stimulatory properties of AbA and its presence in pollen grains sufficient for affecting germination (2) indicate that this auxin plays a role.

LITERATURE CITED

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