

SUSCEPTIBILITY OF STRAWBERRY VARIETIES TO RED STELE DISEASE¹

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Abstract

The susceptibility of 23 strawberry varieties and one selection to red stele disease caused by *Phytophthora fragariae* was determined under field conditions. No variety or selection was found to be immune to the disease. All plants of 'Redcoat' and 'Sparkle', two of the most commonly grown commercial varieties, were killed by this disease. 'Guardman' and 'Sunrise' exhibited more tolerance to red stele than any of the other varieties.

Introduction

In Nova Scotia the occurrence of red stele, caused by the fungus *Phytophthora fragariae* Hickman, has been sporadic in strawberry plantings. The disease was first noted in 1945 and the first general infection occurred in 1948. Red stele epidemics appear to be correlated with climatic conditions since there have been intervals of up to 4 years between reports of this disease in commercial plantings. In 1961, the authors found that several races of *P. fragariae* were present in Nova Scotia soils (unpublished results).

The most characteristic symptom of the disease is the red color of the core or stele of strawberry roots. Anderson (1) reported that no other disease or condition has been found which gives this red core symptom. Red stele is most evident from the start of growth in the spring until a week or two after harvest. Infected roots may appear healthy, except that they have a grayish cast and a rat-tail appearance, with few lateral rootlets. Some roots may have brown tips where the tissue has started to die. Often the first evidence of the disease is wilting of plants, especially in the lower areas of a planting, about the time the fruit begins to ripen. An examination of the roots of the wilting plants invariably confirms the presence of the red stele organism. After harvest most of the diseased roots are decayed, and generally there is no evidence of the disease on roots that remain alive.

In 1968, red stele was particularly severe in strawberry plantings at the Research Station, Kentville. The 1967 season was characterized by a cool, wet spring and a summer with higher than normal rainfall. These conditions apparently provided an ideal environment for the development and spread of *P. fragariae* throughout the plantings. Summer

soil temperatures at Kentville are generally within the 18-22°C optimum for growth of *P. fragariae*.

Materials and methods

Observations on varietal susceptibility were taken from strawberry plants in two fields, each of approximately 2 acres. Both fields were thoroughly infested with *P. fragariae*, infected plants having been found throughout each of them. Twelve plant plots of each variety, replicated 2 or 3 times, were set out in 1967 and allowed to form a matted row. These were rates for plant stand in May, and at harvest in July, 1968. In May, the roots of 10 plants dug at random from each plot of each variety were examined for red stele. A plant was considered to be infected if red stele was found in one or more roots.

Results and discussion

The varieties 'Guardman', 'Midway', 'Red Gauntlet', 'Sparkle', 'Talisman', and 'Templar' have been reported to be resistant to one or more races of *P. fragariae* (2, 3). Here no strawberry variety was immune to red stele (Table 1). 'Redcoat' and 'Sparkle', two of the most commonly grown commercial varieties, showed no resistance to infection by *P. fragariae* and all plants died prior to harvest. The variety 'Midway' exhibited no resistance as all plants succumbed to red stele. More plants of 'Talisman' and 'Templar' were infected with red stele than those of 'Red Gauntlet'. 'Guardman' and 'Sunrise' exhibited more tolerance to this disease than any other variety. The 'Guardman' plots did not escape infection in any replicate because adjacent plots of 'Gorella', 'Redcoat', 'Talisman' and 'Vesper' were infected or killed. Similarly, 'Sunrise' was bounded by plots of diseased 'Fulton', 'Garnet' and 'Revada'.

The breeding of resistant varieties, which has been complicated by the occurrence of races of *P. fragariae*, offers the only practical control of this disease (4). In areas where sporadic epidemics of red stele occur, commercial plantings should be of varieties which have a high degree of tolerance to red stele disease.

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Table 1. Susceptibility of strawberries to red stele, 1968

Variety	Origin	Plant stand*		Percentage of plants with infected roots, May 15
		May 15	July 8	
Acadia	CDA	ttt	ttt	100
Elista	Holland	tt	tttt	100
Fresno	California	tt	ttt	100
Fulton	New York	tt	tttt	100
Garnet	New York	ttt	tttt	100
Gorella	Holland	tt	tttt	100
Guardsman	CDA	t	t	83
Juspa	Holland	t	tttt	100
Midway	USDA	ttt	tttt	100
Raritan	New Jersey	ttt	+++†	100
Redcoat	CDA	tt	tttt	100
Red Gauntlet	Scotland	t	ttt	87
Revada	Holland	ttt	tttt	100
Senga Sengana	Germany	tt	ttt	93
Solana	California	tt	tttt	100
Sparkle	New Jersey	tt	tttt	97
Sunrise	USDA	t	t	40
Talisman	Scotland	tt	tt	97
Templar	Scotland	tt	tt	00
Tioga	California	tt	ttt	00
Veestar	Ontario	ttt	tttt	00
Vesper	New Jersey	ttt	tttt	90
Vibrant	Ontario	t	tttt	100
Alberta 57-108	CDA	t	tt	100

* + = 0- $\frac{1}{4}$ of the plants dead; ++ = $\frac{1}{4}$ - $\frac{1}{2}$; +++ = $\frac{1}{2}$ - $\frac{3}{4}$, and ++++ = more than $\frac{3}{4}$ of the plants dead.

Literature cited

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