

Dominant Resistance to Rust in Red Clover

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The investigation reported in this paper (No. 73-11-76) is in connection with a project of the Kentucky Agricultural Experiment Station and is published with approval of the Director.

ABSTRACT

A red clover plant resistant to rust was selected in 1965 from a population of Lakeland seedlings inoculated with uredospores of an isolate of *Uromyces trifolii* var. *fallens* from red clover. In F₁ populations from crosses between the resistant plant (KyCL75) and several susceptible clones, resistant and susceptible plants occurred in approximately equal numbers, indicating that resistance is dominant and that clone KyCL75 is heterozygous.

Phytopathology 64:758-759.

Additional key words: immune, Lakeland, Pennscott.

Rust on red clover (*Trifolium pratense* L), caused by *Uromyces trifolii* var. *fallens* Arth., is distributed widely in the eastern United States (4). In Kentucky, rust is especially common in the fall, but it can be prevalent during the summer (5).

Sherwood tested 169 plants from 34 cultivars and found that 14 were resistant to all rust isolates with which they were inoculated (4). Among the resistant plants were selections from the cultivars, 'Pennscott' and 'Wisconsin Anthracnose Resistant', presumably a predecessor of 'Lakeland'. The genetic basis for resistance was not determined.

The purpose of this paper is to report data that indicate that resistance in a selected clone of red clover (KyCL75) is dominant and that clone KyCL75 is heterozygous. An abstract has been published (1). Recently similar studies in Wisconsin have been reported in abstract form (2).

Rust was established on detached red clover leaves from mass inoculum from a mixture of field-infected leaves of red clover. The fungus was maintained on 15-20 detached leaves floating on water or 2% sucrose and on detached leaves with petioles immersed in water or sucrose solution. The leaves were taken from a mixture of plants of several red clover clones.

Inoculations were made by dusting spores directly from sori onto young seedlings growing in small pots in soil or in Jiffy Mix (equal parts of vermiculite and peat moss with fertilizer) in incubators or growth chambers at 20 C or 24 C with light about 3,000 lux from a mixture of fluorescent and incandescent light with photoperiods of 8-12 h.

Hybrids and selfed progeny were obtained by hand pollination in a greenhouse. Selfed progeny was developed from seed formed on tripped florets on detached heads (3).

Rust reaction was recorded 12-14 days after inoculation. Leaves could be classified clearly and easily as susceptible with numerous pustules or resistant with no pustules.

Three resistant plants were identified in a population of 100 plants of cultivar Lakeland and eight in a population of 100 plants in cultivar Pennscott. There were no resistant plants in a population of 100 inoculated plants of the cultivar Kenland, and none in 150 plants of cultivar Orbit.

A rust-resistant seedling of Lakeland was selected in 1965, cloned, and given the accession designation KyCL75. Rust has not been observed on this clone in the

TABLE 1. Reaction of red clover populations inoculated with *Uromyces trifolii* var. *fallens*

Populations	Number of plants		χ^2	P
	rusted	symptomless		
Resistant \times susceptible (expected 1:1)				
KyCL75 \times KyC15	60	44	2.46	.20 to .30
KyCL75 \times W24	108	115	0.20	.90 to .95
KyCL75 \times KyC101	121	138	1.12	.50 to .70
KyCL75 \times KyC102	99	56	11.93	<.01
KyCL75 \times N1-17-1-32	25	31	0.64	.70 to .80
Resistant inbreds (expected 1:3)				
KyCL75 ₁	0	8	2.66	.20 to .30
KyCP29 ₁	14	54	0.71	.70
KyCP52 ₁	19	26	7.12	.02 to .05
Susceptible \times susceptible (expected 1:0)				
KyC6 \times KyC40-1	125	0	0.00	.99
KyC15 \times W24	178	0	0.00	.99
KyC36 \times KyC101	149	0	0.00	.99
KyC36 \times KyC102	103	0	0.00	.99
KyC71-8 \times KyC101	193	0	0.00	.99
KyC101 \times KyC102	38	0	0.00	.99
KyC102 \times KyC71-8	75	0	0.00	.99

laboratory, or in the field in central Kentucky.

Clone KyCL75 was resistant to at least five isolates from clover in central Kentucky, four of them recovered from field plants in different years. Also, plants of the clone have been observed for 4 yr in the field in central Kentucky; rust has not been present on them at times when adjacent plants were rusted heavily. Accordingly, it appears that the resistance in KyCL75 is more than a reaction to an odd or unusual race of the fungus.

In F₁ populations from crosses between KyCL75 and susceptible clones, resistant and susceptible plants occurred in approximately equal numbers. All plants in F₁ populations from crosses between susceptible clones were susceptible (Table 1). These results suggest that resistance in KyCL75 to the field isolate of the fungus used is dominant and that KyCL75 is heterozygous.

Plants from selfing KyCL75 have been difficult to obtain. Only a few inbreds of this clone have been tested. Inbreds of two other resistant clones, KyCP29 and

KyCP52, selected from Pennscott, have been inoculated. Results appear to be consistent with the hypothesis that resistance is dominant (Table 1).

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