



# Colorado Flower Growers Association

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## Resistant Carnation Varieties May Carry Bacterial Wilt

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The rapid and wide dissemination of bacterial wilt by carnation cuttings was brought to the attention of florists by Creager in 1942 (Florist's Review #2348) shortly after the disease was first described in Washington by Jones (Phytopathology #34). Jones noted that cuttings taken from plants prior to the appearance of the disease were responsible for transmitting the bacteria. But no mention was made that certain carnation varieties may serve as carriers of the disease.

Concurrent with work on carnation carriers of *Fusarium* (Colorado Flower Growers Bull. #41) it became apparent that a similar situation may develop with bacterial wilt. Two serious outbreaks of bacterial wilt in Denver greenhouses in 1951 called attention to observations by other plant pathologists that disease carriers do occur in other crops such as potatoes and cucumbers.

In one greenhouse a one-year-old bench of William Sim carnations served as a mother block for propagation. In another greenhouse a two-year old bench of the Skyline variety served as a mother block. The mother plants appeared healthy and vigorous, and had had a good production record. Despite the employment of

all known practices of good sanitation, 79 per cent of the William Sim and all the Skyline cuttings died with bacterial wilt. A recheck of the mother plants one month later, in July, showed no indication of wilt, but random isolations made from the plants always yielded the causal bacteria.

Because of the potential hazard of bacterial wilt arising from the intensive cutting-improvement and production program in the area, it seemed advisable to determine whether some carnation varieties may serve as carriers of the bacteria, and to investigate the reactions of certain commonly-grown carnation varieties to the disease.

Cuttings of White Sim, Durango, Arapahoe, Skyline, and Miller's Yellow carnations were obtained from mother plants which previously had been found free of any disease by standard indexing procedures. Two hundred cuttings of each of these five varieties were rooted in pasteurized sand and transplanted to pasteurized soil with pH 6.6 48 hours after steaming. At the time of transplanting the roots of 100 of the cuttings of each variety were dipped into a broth suspension of the bacteria; the remaining

cuttings served as checks. After 5 weeks all plants were pinched to favor the development of more breaks which might be likely to indicate wilt symptoms. The plants were grown at temperatures averaging 70° F days, 60° F nights. After 6 months all plants were examined for wilt symptoms and internal discoloration, and isolations were made from each plant to determine the presence of the pathogen.

The results shown in Table 1 indicated that no symptoms of the disease were evident in any of the Durango plants, and that the organism could not be isolated from any of the plants. From all indications it seemed apparent that the Durango variety was immune to the culture of the wilt bacteria used in this investigation.

Table 1. Reaction of five carnation varieties to inoculation with bacterial wilt (*Pseudomonas caryophylli*) <sup>1/</sup>

Variety	No. wilted	No. vascular discoloration	No. + isolations	Resistance <sup>2/</sup>
Durango	0	0	0	I
White Sim	6	19	89	MRC
Skyline	6	28	100	MRC
Arapahoe	50	100	100	S
Miller's Yellow	70	100	100	S

<sup>1/</sup> 100 plants of each variety inoculated.

<sup>2/</sup> I, immune; MRC, moderately resistant carrier; S, susceptible.

Six plants each of White Sim and Skyline carnations wilted. Of the former variety 19 plants had vascular discoloration at the root crown, and 28 plants of Skyline showed evidence of vascular infection. All isolations from the Skyline plants yielded the pathogen, whereas 89 of the White Sim plants contained the organism. The indications were that both varieties were moderately resistant to the disease, and that both varieties may serve as efficient carriers.

Half of the Arapahoe plants wilted by the end of the test, but all were discolored internally. All isolations were positive. Because of the internal discoloration the variety could not be considered very resistant to the disease; but because of the failure of half of the plants to wilt during the period of the test, there was some indication of slight resistance. With close examination of the plants at the time of taking cuttings, however, the Arapahoe carnation could not be considered a true carrier of the disease.

Of the Miller's Yellow plants in this test 70 per cent completely succumbed to the disease, while the remaining 30 were not as vigorous as the check plants. All of them had internal discoloration and yielded the causal bacteria upon isolation. This variety was rated as completely susceptible to bacterial wilt, with no tendency to serve as a carrier. None of the check plants of any variety showed any evidence of bacterial wilt, and all isolations were negative.

It was obvious from this investigation that some carnation varieties may serve as carriers of bacterial wilt. Their ability to carry the bacteria without showing any symptoms of the disease may, in part, be dependent on their inherent resistance to the disease. It is suggested, therefore, that varieties known to be resistant to the disease or to serve as carriers of the disease, be isolated in cutting benches in order to prevent their passing the bacteria on to more susceptible varieties. Until such time that a suitable control of the disease is found, it is also recommended that all known carrier plants be eliminated.

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