The development of oat varieties which combine resistance to crown rust and Victoria blight has emerged as a major breeding problem with this crop. Attention is focused on the problem as a result of the close association between resistance to crown rust and susceptibility to Victoria blight in varieties of Victoria origin, and the increase to epidemic proportions of races of crown rust which infect varieties of Bond origin.

In 1946, when Victoria blight was found to be widespread and destructive in Missouri, several strains, previously selected for disease resistance from a Columbia × Victoria-Richland cross, were outstanding in performance. This led to a close examination of these strains and selections from them for combined resistance to the two diseases. Their subsequent performance in the greenhouse and in the field is reported here.

**Literature Review**

The development and use of oat varieties resistant to crown rust, stem rust, and smut from the Victoria × Richland cross has been described by several investigators (12, 20, 22, 21, 14, 6). The production of these varieties was subsequently reduced by the pathogen *Helminthosporium victoriae* Meehan and Murphy, which infects Victoria and derivatives that have inherited the “Victoria type” of crown rust resistance (6, 7, 11). The complete association between the “Victoria type” of crown rust resistance and susceptibility to Victoria blight in crosses with varieties of Bond origin, has also been pointed out by Litzenberger (4). Development of varieties using Bond as a source of crown rust and smut resistance and their replacement of the Victoria-Richland varieties in commercial usage has been related by various workers (20, 14, 13, 2, 19).

Moore, Downie, and Murphy (8) reported the collection of a strain of crown rust in 1937 that infects the Bond variety. Rosen and Weetman (17) also isolated this new strain of crown rust, designated race 45, in Arkansas in 1937. It was present in the field in 1938, but developed late, causing no measurable damage. They suggest that if Bond hybrids are grown extensively in the South, race 45 might become a menace. In a later paper Rosen (15) reports that race 45 was present each year after 1937, but that 1944 was the first season in which it was found in such abundance as to constitute a hazard to the oats crop in Arkansas. Problems that would be encountered by the plant breeder, should this form of crown rust increase, are described by Murphy (10). He points out that only Marion and Colo among the commercial varieties of oats are resistant to both race 45 and Victoria blight, and discusses problems in the breeding of new superior varieties with combined resistance to the two diseases. Rosen (16) lists, as one source of combined resistance, Victoria-Richland, intermediate reaction to race 45 and resistance to Columbia, an early variety of oats originating from a “Victoria type” plant in Fulghum (18), was distributed by the Missouri Agricultural Experiment Station in 1930, and the leading spring-sown red oat in the United States (1). The Columbia × Victoria-Richland reciprocal, were made by the late B. M. King at the Missouri Agricultural Experiment Station to combine the disease resistance of Victoria with the early maturity of Columbia. The Victoria-Richland strain, C.I. 3311, was tested in crosses. Random head selections were made, and the senior author in the bulk F5 and F6 generations, which approximately 2,700 rows were grown in the field in 1941 and 1942. Selected early, 24 lines were later advanced into yield tests, and were included in the U.S.D.A. cooperative red oat nursery. After the four lines, then in the F10 generation, were distinctly superior. Three of these, 04014 (C.I. 4804), 04015 (C.I. 4617), and 04016 (C.I. 4627), were selected in the F5 from the Columbia × Victoria-Richland cross. The fourth line, 04061 (C.I. 4804), has also been selected in the F5 from the Victoria-Richland × Columbia cross.

From field observations in 1946 and greenhouse tests it was learned that these lines were each segregating for resistance to Victoria blight. Twenty-six selections from these lines, 10 from 04014, 10 from 04015, and 6 from 04016, had been made in the F6 generation and grown in rod rows in 1946. The performance of these 26 strains and the three original lines is reported in this paper. Strain 04061, from the Victoria-Richland × Columbia cross, was earlier than the others, but resistant to Victoria blight, but has been selected, so its performance is not reported.

**Greenhouse Tests for Resistance to Victoria Blight**

The Columbia × Victoria-Richland cross was tested in the greenhouse during the spring of 1947 for their reaction to Victoria blight. It was found that the leading spring-sown red oat in the United States (1), designated as one source of combined resistance, Victoria-Richland, intermediate reaction to race 45 and resistance to Columbia, an early variety of oats originating from a “Victoria type” plant in Fulghum (18), was distributed by the Missouri Agricultural Experiment Station in 1930, and the leading spring-sown red oat in the United States (1).