Botrytis leaf blight (BLB), caused by *B. squamosa*, is an important foliar disease of onion (*Allium cepa* L.) in temperate regions around the world. BLB is endemic to onion-growing regions, including eastern Canada, New York, and Michigan, and BLB epidemics can occur when moist conditions persist. Unchecked, BLB epidemics drastically reduce marketable yields by stunting plant growth and bulb development.

Crop rotation is not usually practiced in large-scale onion production due to limited acreage of suitable soil. BLB progresses rapidly once established; therefore, fungicides are used as preventative, with sprays applied when weather conditions favoring the pathogen are predicted. In the northeastern United States and southeastern Canada, fungicidal sprays are applied 6 to 14 times per season. The development of fungicide-resistant strains of *B. squamosa* is becoming a major concern because of the lack of crop rotation, coupled with the high level of fungicide use. Incidents of strains resistant to commonly used fungicides have been detected. Overuse of fungicides likely encourages the development of more fungicide-resistant strains.

Current integrated pest management (IPM) strategies focus on reducing sources of primary inoculum and using predictive modeling systems forecasting epidemics to maximize the efficacy of the fungicide sprays. BLB-resistant onion varieties, in conjunction with current IPM strategies and predictive models, could aid in reducing the use of fungicide sprays and, therefore, reduce the risk of *B. squamosa* strains developing resistance to fungicides. Previous research has identified strong resistance to BLB in *A. roylei*. However, current onion cultivars are susceptible to BLB.

Onion lines resistant to BLB were produced by backcrossing the *Bs1* BLB resistance of *Allium roylei* Stearn into cultivated onion two and three times with selection for bulb quality and resistance during each cycle. Partial or complete resistance to pathogens can lead to a reduction in pesticide use, which is desirable because of the increased socio-environmental pressure against pesticides and the need to decrease the chance of strains of *B. squamosa* resistant to fungicides from developing. However, several important issues must be considered before a new resistance can be used in commercial hybrids: the relative disease control provided by plants homozygous vs. heterozygous for the resistance as transferred to the cultivated crop, whether variability in the pathogen includes isolates that can overcome the resistance, and whether the resistance gene, as transferred to the crop, is linked to genes negatively impacting horticultural performance of the lines/hybrids. Each of these issues are examined in a new article published in the January–February 2015 issue of *Crop Science*.

Homozygous BLB-resistant onions tested in inoculated growth chamber screens with five distinct *Botrytis squamosa* isolates and in naturally infested regional field trials showed significantly lower BLB symptoms than susceptible commercial hybrid controls. F1 hybrids heterozygous for the *Bs1* gene showed levels of BLB symptoms between those of the homozygous-resistant and susceptible controls. In most field trials, hybrids heterozygous for *Bs1* had similar levels of BLB control as their parental homozygous BLB-resistant lines, indicating that either homozygous or homozygous BLB-resistant hybrids could be used commercially for BLB control. There were no differences in the degree of pathogenicity across the five distinct *B. squamosa* isolates nor among the naturally occurring pathogens present at the six different field locations used. No obvious association was noted between presence of the *Bs1* resistance gene and unfavorable characteristics such as reduced bulb size or yield.

The results of this study indicate that the incorporation of BLB resistance via the *Bs1* gene into commercial varieties could reduce the use of fungicides and decrease yield loss caused by BLB. The BLB-resistant onion lines have been released under a material transfer agreement to seed companies to facilitate creation of BLB-resistant commercial onion hybrids.