

SEED SELECTION, HANDLING AND PLANTING FACTORS AFFECTING BLACKLEG AND YIELD

by

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The bacterial organism Erwinia carotovora is a major cause of diseases in all stages of potato production from planting through storage. It causes seed-piece decay, pre- and post-emergence blackleg, stem soft rot and soft rot of tubers during storage. As scientists, we understand the disease cycle, that there is a low and a high temperature strain, that it has enzymes that decay potatoes, that the ocean can act as a reservoir, and that storms and irrigation can spread the bacteria. We also know that stem cutting and pathogen-free programs can eliminate the bacteria from seed lots but that they become recontaminated. The bacteria recontaminate seed lots in the lenticels and remain latent (not causing disease) until the proper conditions for disease occur: a wound, moisture and proper temperature. We know all these things but what we are really interested in is control and management of blackleg.

We have looked at recontamination of *Erwinia* free seed lots over time and have observed that some seed lots become recontaminated in only 2-3 years, whereas, others may not be for 7-8 years. The number of bacteria/lenticel remains relatively constant, but the percentage of tubers infected with *Erwinia* increases. This led us to theorize that grower practices may influence the amount of *Erwinia* caused diseases that appear in a field.

This paper reports on the early results of a long term study we are doing to determine if there are practices a grower can do to control, or at least minimize, *Erwinia* diseases.

We have conducted field experiments for the past three years to determine the effect that grower controlled factors have on the incidence of the *Erwinia*-caused diseases seed-piece decay, pre- and post-emergence blackleg, and the subsequent yield loss due to these diseases. The study was done using Norgold Russet grown under dryland conditions. The factors studied were seed bruising, tuber temperature at cutting, soil temperature at planting and low, medium and high amounts of latent tuber infection.

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Bruising of the seed before cutting significantly increased seed-piece decay and pre-emergence blackleg but not post-emergence blackleg. The results indicate that tuber temperature at cutting (cold or warm) did not significantly affect any of the diseases. There was a strong interaction between seed temperature and bruising. Cold bruised seed resulted in more seed decay than warm bruised seed.

High levels of latent tuber infection (>50%) and soil temperatures of <50F and >55F significantly increased all diseases. Seed-piece decay caused yield reductions of 0.8%, pre-emergence blackleg 1.4%, and post-emergence blackleg 6.2% respectively for each 1.0% incidence of disease. Growers can partially control blackleg and subsequent yield losses by purchasing seed lots with <50% latent tuber infection by *Erwinia carotovora*, planting in soil with temperatures between 50-55F, and avoiding bruising during handling and cutting of seed. It is hoped that this kind of information, generated for several potato varieties can be used for development of a predictive model for disease and yield loss prediction.