RESPONSE OF SUGAR BEET RECOMBINANT INBRED LINES TO POST-HARVEST ROT FUNGI

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Sugar beet (*Beta vulgaris*) is commonly stored in outdoor piles prior to processing for food and animal feed. During this storage period the crop is subject to multiple post-harvest rots. Resistance to three post harvest rots was identified in two sugar beet germplasm in the 1970s, but there has been little work done on host resistance to post-harvest storage pathogens in recent years. In recent survey work in Michigan, several fungi known to cause post harvest rot were found. The results varied from previous surveys in the area as little *Phoma* was isolated from beets out of storage piles. The most commonly isolated pathogens were *Botrytis cinerea* and *Penicillium* species, followed by *Fusarium* species. Recombinant inbred lines (RILs) of sugar beet have recently been developed in Michigan, and these were screened for susceptibility to biotic post-harvest deterioration.

Methods: Screening was done using a method adapted from Gaskill (1952). Beets were sliced into at least 2 cm thick slices with 4 cm or larger diameter. Slices were placed on moist paper towels in covered metal pans. Hyphal plugs (6 mm diameter) from cultures grown on potato dextrose agar (PDA) 5-10 days (5 days for *Rhizopus* and *Botrytis*, 7 days for most other fungi except 10 days for *Fusarium semitectum*) were cut and placed, hyphal side down, near the center of each slice. Controls had a plug of sterile PDA placed on the beet slice. Three replicate beets from each RIL were inoculated. Boxes were incubated at 22 C. After 24 hours, plugs were removed. The diameter of rotted tissue was measured with a ruler and the beet sections were sliced through the inoculation site and the depth of rotted tissue measured with the same ruler. Reisolation was done from a subset of samples to confirm presence of the pathogen by cutting tissue from the edge of the lesion, surface disinifesting for 60 sec. in 10% bleach, and plating on PDA.

Results: Significant differences ($P < 0.05$) were found in this population for responses to four pathogens: *Botrytis cinerea*, *Fusarium graminearum*, *Penicillium claviforme*, and *Rhizopus stolonifer*. No significant differences were found for responses to *Phoma betae* or *F. semitectum*. The response in several RILs varied depending upon the length of time in storage. A poor correlation between reduced damage by different pathogenic genera suggests independent genetic control of susceptibility (R^2 0.03-0.07). There is the potential to develop materials that may be less damaged by post harvest rot pathogens for the North Central US growing region, as well as gaining a better understanding of the interaction between fungal storage rot pathogens and host genotype.

Figure 1. Example of storage rot response of sugar beet by red beet (MSR) recombinant inbred lines. Each row represents an individual RIL. Each column is a different treatment. From the left, these are: media control, *Botrytis cinerea* and *Rhizopus stolonifer*. Beets were stored from October, 2012 until February, 2012 at 4C. Shown are beets kept at 28 C for 7 days following inoculation.


PDA
Botrytis
680
654
751
711
660