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Respiratory losses in sugar beets as a function of storage temperature, field nitrogen application, sprouting incidence and handling severity.

The trend toward warmer temperatures in Michigan has lead to an increased risk of excessive temperatures in field piles of sugarbeets. In the 2004-2005 season, the Michigan industry is estimated to have lost approximately $25,000,000 to pile breakdown following an unusually warm winter and spring. Determination of optimal storage strategies requires knowing the effects of the major factors influencing respiratory activity. From 2005 to 2009, we evaluated the impact of storage temperature, nitrogen applied during the growing season, and handling severity on respiration after one and four months holding. In addition, the contribution of sprouts formed during storage to respiratory activity was estimated by harvesting sprouts and measuring their respiratory activity relative to the root. Field nitrogen application between 0 and 160 lb/acre did not influence respiratory activity. Commercial machine harvesting increased respiratory activity between 10 and 25% relative to hand-harvested controls and the impact of machine harvesting increased with storage duration. Beets collected after dropping into full, half-full and empty trailers all experienced enhanced respiration, with the greater respiratory activity induced by the most damaging treatment. The data collected will be used to model respiratory activity and pile temperature profiles for field-stored sugarbeets in Michigan.