

## Survey of postharvest disease in Michigan potato storages, 2020

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Potatoes are stored after harvest to meet year-round market demands. However postharvest losses caused by shrinkage and disease can result in significant economic loss. Approximately 22.3 million cwt (11%) was lost in the 2019/20 storage season between September and June, with an estimated value of \$219.4 million (USDA-NASS 2020). This project was performed to quantify disease incidence and severity in tubers at harvest and after a commercial storage period. Information on prevalent diseases and their impact on potato tubers postharvest will be used to develop management strategies. Diseases of concern include bacterial soft rot (*Pectobacterium* spp. and *Dickeya* spp.), Fusarium dry rot (*Fusarium* spp.), leak (*Pythium ultimum*), and late blight (*Phytophthora infestans*).

### Materials and Methods

In 2019, approximately 50 tubers were obtained from 12 potato fields in six Michigan counties. At-harvest assessment was performed October to November 2019 ( $N = 679$  tubers) and post-storage assessment was performed July to October 2020 ( $N = 676$  tubers). At-harvest samples were held at 39°F until processed immediately after harvest (at-harvest samples). Postharvest samples were placed in the Michigan Potato Industry Commission Potato Demonstration Storage Facility in standard storage conditions at 48°F from harvest (September to October 2019) until processing (July to September 2020) and observed at four time points for disease progression and weight loss. During assessment, tubers were weighed and destructively sampled. Tubers were cut and examined externally and internally for abiotic damage as well as signs and symptoms of disease. Putative pathogens were identified based on defining morphological characteristics including colony appearance, hyphae, presence of reproductive structures, and pigmentation.

### Results and Conclusions

At-harvest survey results found symptoms and signs of disease in 95% assessed tubers ( $N = 682$ ) with blemish diseases including scab (*Streptomyces* spp.), black dot (*Colletotrichum coccodes*), black scurf (*Rhizoctonia solani*), and silver scurf (*Helminthosporium solani*) most prevalent. Rot diseases including bacterial soft rot (*Pectobacterium* and *Dickeya* spp.), Fusarium dry rot (*Fusarium* spp.), and leak (*Pythium* spp.) were also present. Putative pathogens were recovered from 84% of at-harvest sampled tubers and include the following genera: *Fusarium*, *Rhizoctonia*, *Pythium*, *Alternaria*, *Pectobacterium*, *Dickeya*, *Colletotrichum*, *Streptomyces*, *Geotrichum*, *Phytophthora*.

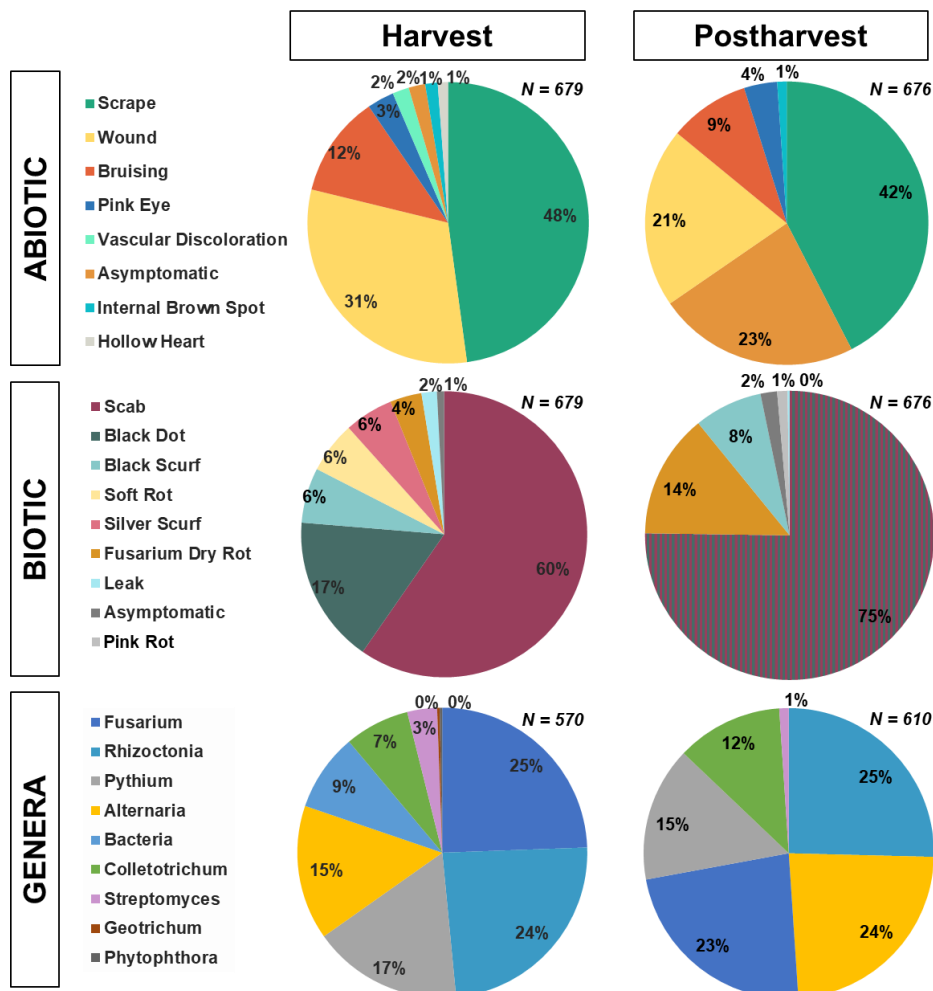
Post-storage sampling identified symptoms and signs of disease in 99% assessed tubers ( $N = 673$ ). Blemish diseases including scab, black dot, black scurf, and silver scurf were detected on 79% of tubers; rot diseases were also detected including Fusarium dry rot (7%), and leak (<1%). Putative pathogens were recovered from 90% post-storage sampled tubers (Table 1).

Correlations between abiotic and biotic damage will be calculated to identify damage that increases susceptibility to disease. At-harvest and post-storage data will be analyzed to monitor disease development in storage. During 2020-2021 storage season, the efficacy of Sanidate, a peroxyacetic acid based fungicide, will be investigated in management of Fusarium dry rot, leak, pink rot, and bacterial soft rot. Newly commercialized and advanced potato chip processing lines will be assessed for postharvest disease resistance to these four diseases as well.

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**Table 1.** Frequencies (%) of pathogens recovered from 2018 and 2019 samples

Pathogen Genera	2018		2019	
			At-Harvest	Post-Harvest
<i>Number of tubers</i>	<i>N</i> = 368		<i>N</i> = 570	<i>N</i> = 610
<i>Fusarium</i>	29.8		24.4	23.0
<i>Pectobacterium</i>	24.6		-	-
<i>Rhizoctonia</i>	19.3		24.0	25.0
<i>Pythium</i>	5.3		16.7	15.0
<i>Phytophthora</i>	5.3		-	-
<i>Geotrichum</i>	3.5		-	-
<i>Colletotrichum</i>	3.5		7.2	12.0
<i>Dickeya</i>	3.5		-	-
<i>Streptomyces</i>	3.5		-	1.0
<i>Alternaria</i>	1.8		15.0	24.0



**Figure 1 (left).** Relative frequencies (%) of biotic damage and physiological disorders, biotic signs and symptoms of disease, and known pathogenic genera isolated from tubers during at-harvest and postharvest destructive sampling (*N* = total number of tubers evaluated, or organisms isolated). Vertical fill lines represent observed blemish diseases, excluding black scurf, in postharvest samples.