

# PMTV: Unseen Threats to a Global Staple

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## Abstract

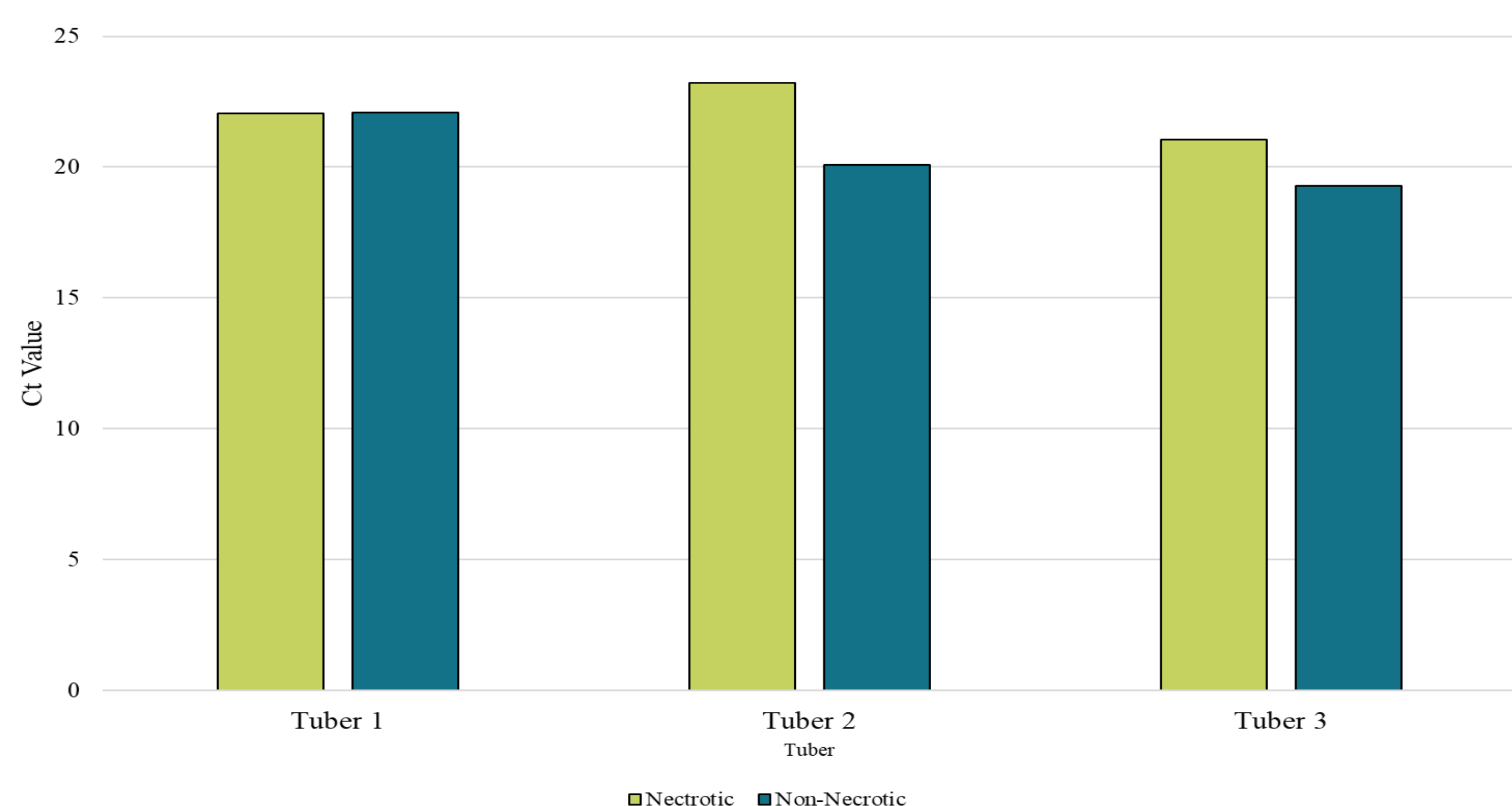
Potato Mop Top Virus (PMTV) is an emerging problem for the potato industry. This disease is characterized by internal brown streaks and/or necrotic arcs in the flesh of the tubers. PMTV can remain in fields for 18 years and spreads through seed potatoes or the movement of tools and equipment from contaminated fields. Little is known about the behavior of this virus or varieties that are immune to PMTV infection. A multi-year study has been carried out to learn more about the distribution of the virus across the tuber and examine varieties for their tolerance to PMTV.

### Distribution of PMTV

PMTV infection can and often occurs with few to no symptoms depending on environmental and other genetic factors. Laboratory testing is necessary to detect and quantify the presence of PMTV and to determine the virus load in tubers that are both symptomatic and asymptomatic. In order to determine where the virus is most concentrated in the tuber, and thus, better know where to sample from for reliable detection, different sections of infected 'Modoc' tubers were assessed. Thin slices (0.25cm) of different infected tubers were taken across the tuber length (Figure 1) and the width of the tuber and each slice was tested individually. Further, different parts of the tuber such as the skin, flesh, pith, necrotic vs healthy tissue, and the eyes were isolated and tested (Figure 2). Each subsection was tested individually for virus presence and quantity to look for differences in different parts of the tubers.



**Figure 1.** PMTV infected 'Modoc' tubers sampled by sectioning along the length of the tuber. Ct values less than 30 are positive for PMTV. Relatively no differences in viral load based on laboratory testing was detected between differing sections of the tuber.

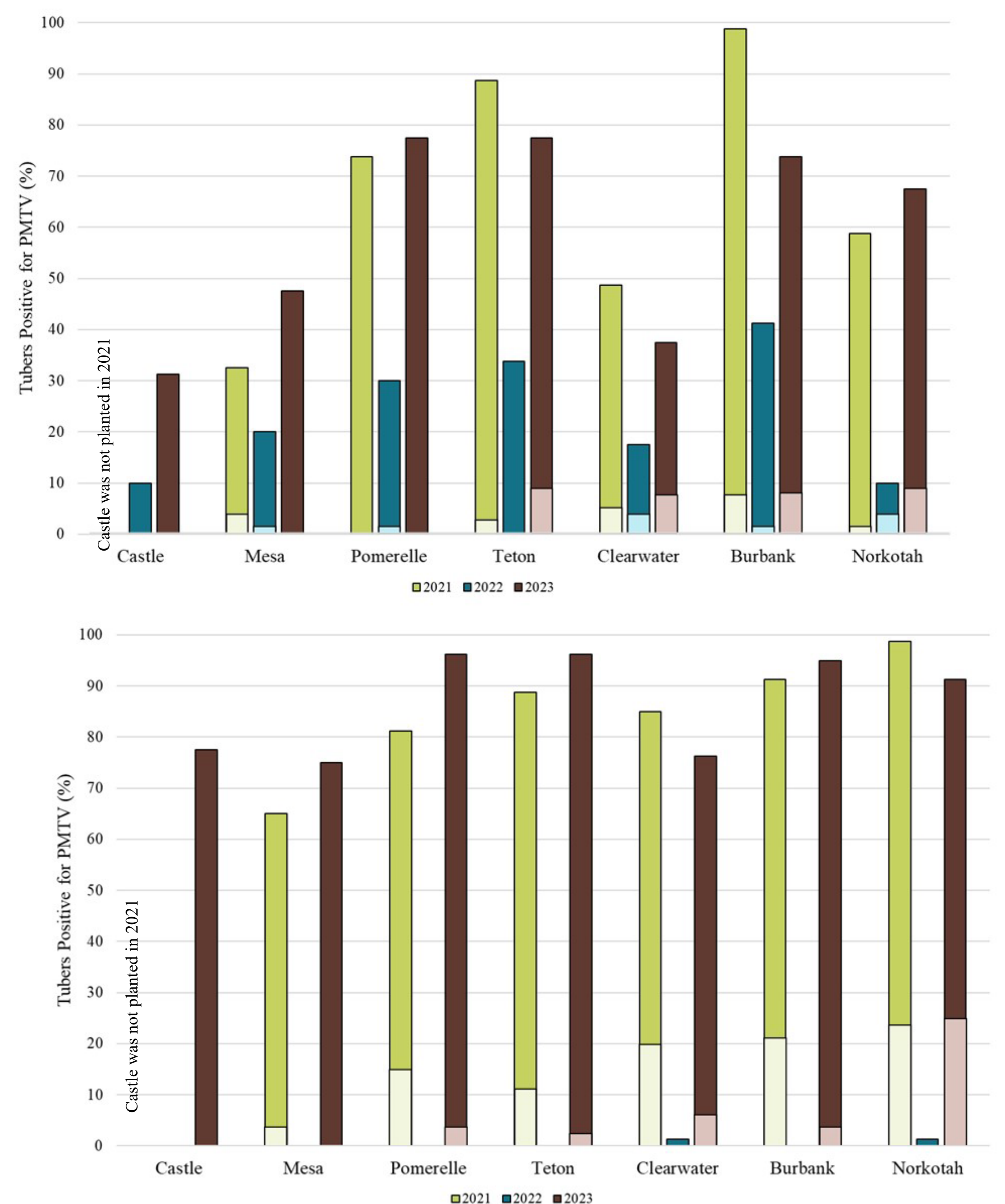


**Figure 2.** PMTV virus amount from necrotic and non-necrotic sections of Modoc tubers was quantified through laboratory testing. No significant differences between the two tissue types was observed.

From this study, there were very little observed differences in PMTV viral concentration across the tuber from the length and width sub sectioning (Figure 1), and its different parts such as eyes, skin, flesh, pith, necrotic tissue and non necrotic tissue (Figure 2). This study shows that at high PMTV infection rates, the virus appears to be evenly distributed in all parts of the tuber and effective sampling and detection can be obtained from any part of the tuber.

### Testing Varieties Response to PMTV

Very little is known about PMTV resistance in different potato varieties and so far, no known resistance has been identified. It's been presumed that 'Castle' may have resistance due to lack of symptoms in the tubers when planted in infected fields. To assess resistance, seven readily available potato varieties were planted in PMTV infected fields in SE Idaho. From 2021 to 2023, 80 tubers were sampled from each variety and assessed for PMTV using visual symptoms and a laboratory assay to detect virus quantity.



**Figure 3.** Percent of Tubers that were positive for PMTV from seven different varieties planted in two locations in SE Idaho from 2021 to 2023. Lighter sections within the bars indicates number of positive tubers that showed PMTV symptoms.

'Castle', 'Mesa' and 'Clearwater' showed consistently lower PMTV infection over three years in both locations when compared to the other varieties tested. Though none of the seven tested varieties showed complete resistance to PMTV, 'Castle' and 'Mesa' both showed considerable tolerance and few to no symptoms compared to the other varieties. Although 'Castle' and 'Mesa' tubers can still be infected with PMTV, their lack of visual symptoms could make them a good option for planting in fields with known PMTV infestation.

