THE EFFECT OF POTATO VIRUS X ON THE YIELD OF THE POTATO VARIETY HUDSON

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Abstract

The effect of a mild strain of PVX on the yield of the recently released potato variety Hudson was determined in split-plot experiments at three locations in New York. Two other varieties, Katahdin and Bake-King, were included for comparison. The yield data compared were total tuber yield, tuber yield $> 2 \frac{1}{4}$ in. and $> 1 \frac{7}{8}$ in. diameter and tuber number $> 2 \frac{1}{4}$ in. and $> 1 \frac{7}{8}$ in. diameter. The effect of the mild strain was not great. Hudson appeared to be more tolerant to the mild strain of PVX than the other two varieties although the variety X virus interaction was very low.

Resumen

Se determinó el efecto de un “strain” suave de PVX sobre el rendimiento de la nueva variedad de papa Hudson, utilizando el diseño parcelos divididas, en tres localidades de Nueva York. Se incluyeron las vars. Katahdin y Bake-King para comparación. Los datos de rendimiento comparados fueron: rendimiento total de tubérculos, rendimiento de tubérculos con diámetros $> 2 \frac{1}{4}$ pulg. y $> 1 \frac{7}{8}$ pulg., número de tubérculos con diámetros $> 2 \frac{1}{4}$ pulg. y $> 1 \frac{7}{8}$ pulg. El efecto del “strain” suave de PVX no fue grande. La var. Hudson parece ser más tolerante al “strain” suave, que las otras dos vars., aunque la interacción virus por variedad fue muy baja.

Introduction

Potato virus X (PVX) is regarded as one of the most important viruses of the potato (5,7,15). Its importance to the potato industry lies in the fact that the virus is widespread, mild strains of the virus can be carried in potato varieties undetected on the basis of symptoms alone, and substantial yield reductions due to the virus have been reported. Bald (1) reported yield reductions in the variety Up-to-Date of 12% and 45% due to a mild strain of PVX and the most severe naturally occurring strain mixture of PVX respectively. Bonde and Merriam (2) found PVX to reduce yield in Chippewa by 13.7%, in Sebago by 16.2%, in Katahdin by 14.9%,

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An FAO Fellowship to the senior author during the course of this study is appreciated.

Received for publication August 16, 1976.
in Kennebec by 11.2%, in Teton by 18.3%, and in Mohawk by 7.3%. Hoyman (6) found PVX to reduce vine yield in Red Pontiac by 31.54% and tuber yield by 21.85%. Lim et al. (8) reported a yield reduction in Sebago of 17.5% and Wright (16) reported significant reductions in yield in Netted Gem (Russet Burbank) and White Rose infected with PVX and PVS in British Colombia, Oregon and California but not in Washington. He also found virus-infected plants to produce significantly fewer tubers. These yield reductions due to PVX have been found to be serious enough to justify the inclusion of free potato stocks from PVX as a component of potato seed certification programs.

However, some investigations have found no yield reductions due to PVX. Clinch and McKay (3) stated that they found no significant reduction in yield due to a latent strain of PVX in Up-to-Date, rather the tendency being an increase in yield as a result of infection. McKay and Loughnane (9) found that a very mild strain of PVX did not reduce yield in Arran Banner, Majestic and President; and Murphy et al. (10) reported that yield of tubers from common PVX infected and from healthy Katahdin and Kennebec were the same. It has even been suggested that it could be advantageous to release potato varieties infected with mild strains of PVX (12).

Hoyman (6) remarked that the decrease in yield due to PVX may depend on the potato variety, the strain of PVX, and the growing conditions. Differences in these factors may account for the reports of either decrease in yield (1,2,6,15) or no effect on yield (4,9,10) with tendencies for an increase in yield (3) as a result of PVX infection. Other factors may also be involved (14,17). Hence, the relative advantages of PVX-free stocks, considering the expenses of certification, remain unresolved. The areas reviewed by de Zoeten and Fulton (17) and Shepard and Claflin (14) merit further testing to resolve this problem for the benefit of the potato industry.

This work was undertaken to determine the effect of a mild strain of PVX on the yield of the recently released variety Hudson (11). Hudson has some andigena background derived from breeding for resistance to the golden nematode, but it is not known to be resistant to PVX.

Materials and Methods

PVX-free and PVX-infected clones of three potato varieties, Hudson, Katahdin, and Bake-King, were obtained by growing tuber units in the field. The tubers used were considered to be free from PVX and other viruses and were also checked for PVX to ascertain this before inclusion in the experiments. The clones to be infected with PVX were mechanically rubbed with a mild strain of PVX from the variety Chippewa grown in Lake Placid, New York. Tubers from all clones were harvested and stored