Differences in mosaic disease virus profiles between three potato cultivars

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As a result of an enzyme-linked immunosorbent assay (ELISA) survey in Prince Edward Island. major differences were found in the virus profiles of mosaic-diseased Shepody, Red Pontiac, and Green Mountain potato cultivars. Potato viruses Y, (PVY) and X, (PVX) were associated with mosaic disease in all three cultivars, but to differing degrees; PVY was present in **89%** of the samples of Shepody showing severe mosaic but was present in only **59%** and **32%** respectively, OF those samples of Red Pontiac and Green Mountain. Potato virus A (PVA), however, was only found in the Green Mountain cultivar.

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A la suite d'un inventaire de plusieurs cultivars de pommes de terre dans L'Ile du Prince Edward en utilisant le test d'immunoadsorbant lib a un enzyme (ELISA), on a découvert des differences majeures dans les profits des virus associbs à la mosaïque chez les cultivars Shepody, Red Pontiac et Green Mountain. Les virus Y (PVY) et X (PVX) de la pomme de terre sont associés avec la mosaïque chez les trois cultivars, mais 2l des degrés diffbrents. On retrouve le PVY dans **89%** des bchantillons de Shepody montrant des symptômes sévères de mosaïque mais dans seulement **59%** et **32%** des bchantillons de Red Pontiac et de Green Mountain. Toutefois, le virus A de la pomme de terre (PVA) n'est présent que chez le cultivar Green Mountain.

In a recent study (2) of the association of mosaic-inducing viruses with the potato (*Solanum tuberosum*) cultivar Russet Burbank in Prince Edward Island, it was found that potato virus X (PVX) was the virus most frequently associated with plants showing mild mosaic, while mixed infections of potato virus A (PVA) and PVX accounted for the majority of plants showing severe mosaic. As previously discussed (2), knowledge of which viruses are the cause of mosaic symptoms in a particular cultivar is essential for selecting appropriate control measures and in applying serological assays for seed potato certification.

Of the other commercial potato cultivars produced in Prince Edward Island, the three with the highest susceptibility to mosaic are Shepody, Red Pontiac and Green Mountain. As the prevalence of the different mosaic-inducing viruses in a particular cultivar and region will vary according to complex ecological factors including cultivar susceptibility (1), this study was undertaken to determine the principal causes of mosaic in each of these cultivars.

Leaf samples were collected from six fields of Shepody, five of Red Pontiac and five of Green Mountain. Both mosaic-affected and symptomless samples were taken from each field and the severity of the symptoms were categorized as before (2). The enzyme-linked immunosorbent assay (ELISA) methods used to identify the presence of potato virus Y (PVY), PVA and PVX in leaf samples were also the same as previously reported (2).

The results, shown in Table 1, indicate major differences in virus profiles between the three cultivars. While PVX, PVY and PVA were all associated with mosaic disease in Green Mountain, only PVX and PVY were detected in Red Pontiac and Shepody. This would suggest a high degree of resistance to PVA in these latter two cultivars as it is known that they are not immune (unpublished data of the author).

PVY was found to be the major cause of mosaic in Shepody as it was associated with 89% of all the samples showing severe mosaic and with 71% of all the mild mosaic samples. For Red Pontiac, PVX appeared to be a more significant cause of mosaic as PVY was only detected in 59% of the samples showing severe mosaic. In the case of Green Mountain where both PVA and PVY were detected, PVA was detected in 42% of the samples showing severe symptoms while PVY was detected in 29%; PVX in single infection accounted for 34% of these samples. In plants showing mild symptoms, PVX in single infection accounted for 46% of the samples, while PVA and PVY were present in 30% and 26% of these samples, respectively.

The number of symptomless samples of Shepody, Red Pontiac and Green Mountain were 71, 12 and 56, respectively and levels of PVX were **63%.** 50% and 88%. This level of occurrence of presumably symptomless strains of PVX is similar to the 69% level reported for Russet Burbank (2). PVY was also found in 2% of the Shepody and Green Mountain samples, probably reflecting recent current season spread.

In conclusion. this study clearly demonstrates the effect of cultivar on the prevalence of the different mosaic-inducing viruses. In some cultivars (e.g. Green Mountain and Russet Burbank), PVA plays a significant role as a cause of mosaic, while in others (e.g. Red Pontiac and Shepody) it does not.

The relative importance of either PVX or PVY as causes of mosaic was found to vary considerably. This study does, however, reinforce the importance of PVX as a cause of mosaic and suggests that efforts to control this often latent virus will be helpful in reducing the occurrence of mosaic disease.

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Table 1. Potato viruses X, A, and Y detected by ELISA in mosaic-diseased (severe and mild) samples of the Shepody, Red Pontiac and Green Mountain cultivars.

Virus Combinations	Shepody		Red Pontiac		Green Mountain	
	Severe Mosaic	Mild Mosaic	Severe Mosaic	Mild Mosaic	Severe Mosaic	Mild Mosaic
PVX alone	13	32	22	16	16	51
PVA alone	0	0	0	0	2	3
PVY alone	85	25	17	2	2	0
PVA + PVX	0	0	0	0	38	28
PVY + PVX	204	54	15	4	17	27
PVA + PVY	0	0	0	0	0	0
PVA + PVY + PVX	0	0	0	0	7	2
Total	302	111	54	22	82	111

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