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A virus survey of seed potato generation 4 and 5 crops, 2018

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EXECUTIVE SUMMARY

A virus survey of seed potato generation 4 and 5 crops, 2018

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A survey of seed, fresh and process potato crops in 2014 (Fletcher 2014) determined changes in the patterns of virus incidence compared to past surveys. *Potato virus S* (PVS) was the most widespread virus detected in 90% of crops, *Potato virus M* (PVM) and *Potato virus A* (PVA) were present in around one third of crops and *Potato virus Y* (strain PVY^{N}) present in 17% of crops. High incidences of these viruses, especially in some seed crops, were of concern to Potatoes New Zealand who felt further exploration of the problem was required. Of concern was the detection in this survey of a recombinant isolate of $PVY^{N:O}$ not previously found in New Zealand. In 2018, with the cooperation of growers and merchants, 43 seed generation 4 and 5 potato crops were surveyed from Canterbury, Manawatu and Auckland during January – March 2018.

The objectives were:

- To estimate the ranges of incidence of the potato viruses X, Y, S M, A and *Potato leafroll virus* (PLRV) within potato seed Generations 4, 5 and 6 compared to previous surveys
- To measure the relative proportions of potato virus Y strains Y^{N}, Y^{C} and Y^{O} within the seed crop population
- To determine the presence of any new recombinant strains of PVY in seed crops
- Where crops with low virus incidence are detected, key crop and seed management practices will be explored by consultation and discussion with those growers
- To make recommendations to improve virus health in seed crop production.

Incidences of all viruses were up from the last survey (Fletcher 2014). Some increases were marginal, such as PVX and PVY. PVY^{N} appears to be under a consistent level of control, likely because of high insecticide use to control tomato potato psyllid. (TPP). It is unfortunate that we were not able to determine if $PVY^{N:O}$ was still present in seed crops so further work on this will need to be done in the future. PVS continues to be widespread and at high incidence in over 50% of crops with, mechanical transmission is likely the primary cause of spread. It worth noting that 25% of crops did have PVS incidences below 10% and this is an indication that some growers are making a serious effort and having some success in minimising PVS incidence in their seed lines. PVM was more widespread, with more crops affected and at higher incidences. PVA, while only at low levels is more widespread, again possibly contained by insecticides and by the resistance of many cultivars. PLRV incidence increased after trending down in past surveys (Fletcher 1996;:2012; 2014). It is likely (as has happened in the past) that late aphid flights may have transmitted some PLRV to regrowth in seed crops.

Key points arising from discussions and communications concerning seed production were:

- Nuclear seed production — pre G1 mini tubers were produced under hygienic protected conditions well isolated from subsequent generations
- Seed storage —strict isolation and segregation of seed tubers from other potato generations while in cool stores
- Isolation of subsequent generations — the cleanest early generations were multiplied on land not previously used for potato production. Some seed crops were isolated from other potato production areas
- Whole seed preference — whole seed tubers planted to avoid unnecessary cutting thus reducing the risk of mechanical damage and virus transmission
- Seed cutting — if seed was cut strict sanitation of cutters with suitable disinfectants was undertaken. Attempts are being made to reduce or eliminate seed cutting
- Planting — sanitation between early generations. Some growers were using cleaned equipment to plant early generations to help maintain virus health
- Intensive insecticide spray programmes — planting with a tuber or in furrow treatment then spraying 7–10 days in order to further protect crops from both aphids and tomato potato psyllid. Careful use of differing mode of action chemicals every second or third spray. Chemicals were usually ground applied
- Early spray off — post certification early herbicide spray off with insecticide, monitoring for regrowth or missed plants then further follow up spray off .

Ideally earliest generation crops, especially generation 1 (G1) and generation 2 (G2) should be fully isolated from subsequent generations. Hygienic management of these crops sets the scene for what will follow. Separate storage of early generations also helps maintain high health. The move toward whole seed planting of varieties that are currently cut is commendable in that it removes one important aspect of seed damage.

Further areas to explore to sustain crop health are the use of barrier crops between generations, e.g. cereal strips laid down to slow and disrupt aphid/psyllid movement between plantings and to further expand glasshouse grown nuclear, G1 and G2 seed production in order to contract the seed production period from 5–6 generation down to 4 to 5.

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1 INTRODUCTION

A survey of seed, fresh and process potato crops in 2014 determined changes in the patterns of virus incidence compared to past surveys. *Potato virus S* (PVS) was the most widespread virus detected in 90% of crops and *Potato virus M* (PVM) and *Potato virus A* (PVA) were present in around one third of crops and *Potato virus Y* (strain PVY^{N}) present in 17% of crops. High incidences of these viruses, especially in some seed crops, were of concern to Potatoes New Zealand who felt further exploration of the problem was required. Of concern was the detection in this survey of a recombinant isolate of $PVY^{N:O}$, not previously found in New Zealand. In 2018, with the cooperation of growers and merchants, 43 seed potato crops were surveyed from Canterbury, Manawatu and Auckland during January – March.

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- To measure the relative proportions of potato virus Y strains Y^{N}, Y^{C} and Y^{O} within the seed crop population
- To determine of the presence any new recombinant strains of PVY ($Y^{N:O}$) in seed crops
- Where crops with low virus incidence are detected, key crop and seed management practices will be explored by consultation and discussion with those growers
- To make recommendations to improve virus health in seed crop production.

2 METHODS

2.1 Virus survey

With the cooperation of growers and merchants, 43 seed crops were surveyed from Auckland, Canterbury and Manawatu during January – March 2018. The survey focussed on seed generations 4 to 6. Based on the method used in past surveys in each crop (Fletcher 1993; Fletcher et al. 1996), 100-leaf samples were randomly collected by the seed merchants or their representatives, usually in a 'W' pattern, cool stored and sent to Plant & Food Research, Lincoln. Serological assays were completed on each field sample for potato viruses X, Y, S, M, A and PLRV using samples grouped in 10. Any positive PVY groups were further tested serologically using monoclonal antibodies (MAbs) to PVY^N and a combination antibody to strains PVY^O and Y^C, by host inoculation to *Nicotiana tabacum* and molecular analysis (Ministry for Primary Industries, Auckland) to further confirm the strains of PVY. Virus incidence was estimated using tables (Fletcher 1996) derived using the formula of Gibbs and Gower (1962). Unlike the previous survey no differentiation of PVS strains was undertaken in this survey.

2.2 Low virus incidence crop practices

Merchants and seed growers were approached for further details on key practices undertaken to maintain good virus health.

