

Management of Potato Viruses and Vectors

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We have recently discovered that mixed-viral infections of heterologous viruses such as *Potato virus Y* (Potyviridae: *Potyvirus*) (PVY) and *Potato leafroll virus* (Luteoviridae: *Polerovirus*) (PLRV) are a regular occurrence in Idaho's potato cropping systems. These two viruses are the most important virus pathogens of potato and are transmitted most efficiently by the green peach aphid (*Myzus persicae* Sulzer) (GPA) and the potato aphid, *Macrosiphum euphorbiae* (Thomas). An increased number of plant samples from Idaho's potato fields over the last two years has serologically tested positive for both PVY and PLRV via double antibody sandwich enzyme linked immunosorbent assay (DAS-ELISA) and exhibited more severe symptoms than singly-infected plants (PVY or PLRV).

Several authors have extensively studied the mixed infection phenomenon but to the best of my knowledge none has examined the effect of such infections on vector biology and preference. We used a set of laboratory studies to assess the effect of mixed-viral (PVY-PLRV) infection on the fecundity and preference of the two most efficient PVY and PLRV vectors, the green peach aphid and the potato aphid. Adult aphids were clip-caged (1 adult per cage) to leaflets of PVY, PLRV, PVY-PLRV-infected and non-infected potato plants. The number of nymphs produced in all four treatments was recorded after 96 h. Preference of winged and wingless green peach aphid and potato aphid was determined with the use of settling bioassays. Our recent studies have demonstrated the green peach aphid and the potato aphid fecundity was significantly higher on mixed-infected plants than on singly-infected plants or non-infected plants. Both winged and wingless green peach aphid and potato aphid preferentially settled on PVY-PLRV infected plants than on singly-infected plants (PVY or PLRV) or non-infected plants. These results suggest that mixed viral infections could influence the epidemiology of potato viruses in the crop, with implications for disease management. Increased detection of mixed-infected plants in Idaho's potato systems indicates that the current management plants are inadequate and requires changes in management approaches. Increased sampling and identification of viruses should be advocated before choosing an appropriate aphicide; this could be more useful and economical. This research will allow a more complete understanding of the interaction between viruses, and vectors, and aid in development of much needed and improved virus management plan.

Publications:

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