



# Dynamics of Potato Virus Y Infection Pressure and Strain Composition in The San Luis Valley, Colorado

Mohamad Chikh-Ali

Colorado State University, San Luis Valley Research Center; [Mohamad.Chikh-Ali@colostate.edu](mailto:Mohamad.Chikh-Ali@colostate.edu)

## BACKGROUND

- The San Luis Valley, Colorado, is the second-largest fresh potato growing region in the United States, which accounts for about 95% of the total potato production in Colorado
- Potato virus Y (PVY) is the leading cause of seed potato rejection in the San Luis Valley

## OBJECTIVES:

- Monitor the dynamics of PVY infection in the San Luis Valley using bait tobacco plants
- Identify PVY strains circulating in the San Luis Valley

## MATERIALS AND METHODS:

- Tobacco plants were used as baits to trap PVY infection under field growing conditions
- Weekly sets of tobacco plants were exposed to natural field infection by aphids throughout the growing season (Fig. 1)
- Tobacco sets were tested by ELISA and IC-RT-PCR to detect and identify PVY strains

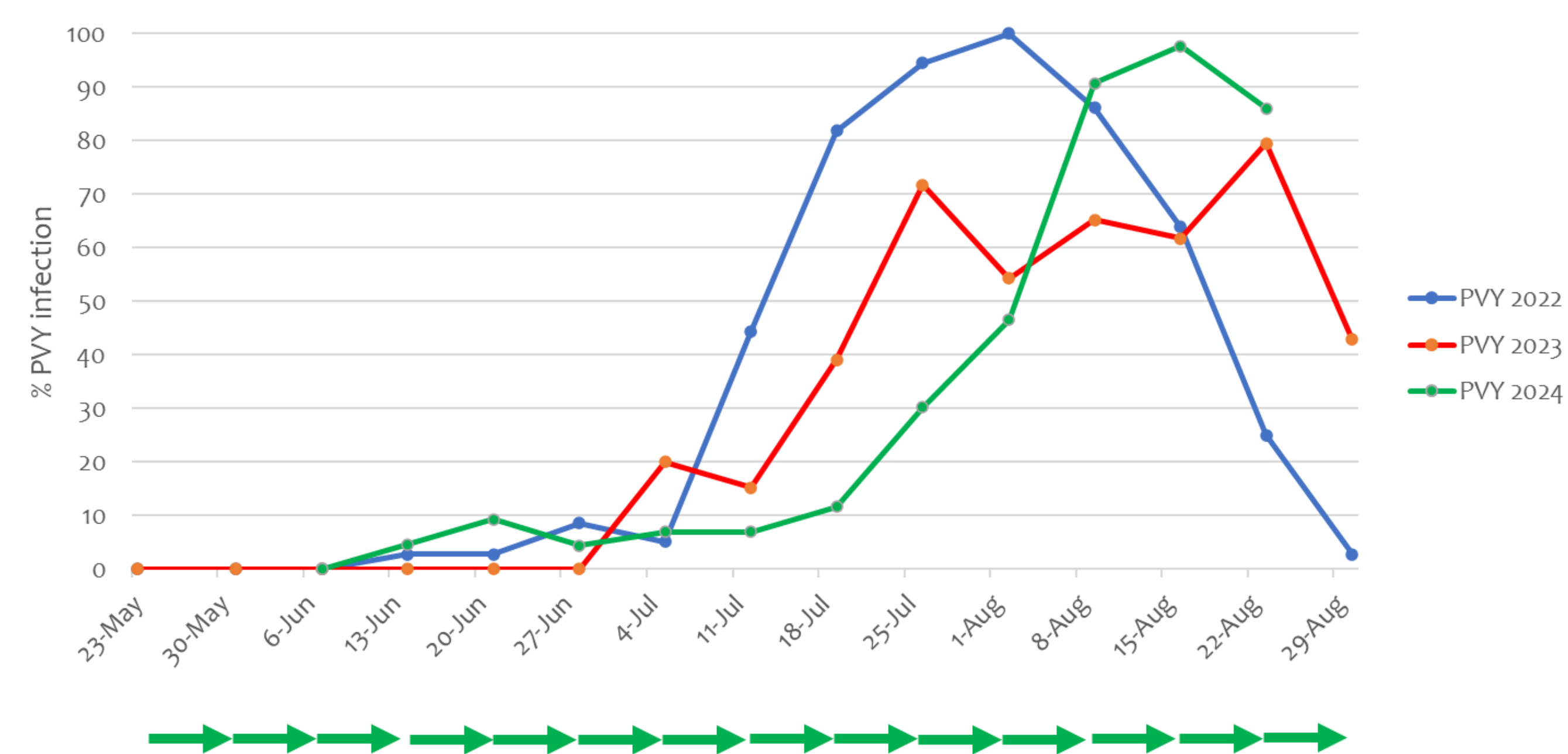


Fig. 2. The dynamics of PVY infection pressures over the growing seasons of 2022, 2023, and 2024. The Y-Axis represents the percent of PVY infected tobacco plants, and the X-Axis represents the exposure week of tobacco bait plants to field conditions. Green arrows represent the week of exposure to field infection.

## Strain Composition

- PVY has a relatively low PVY strain diversity with only three PVY strains, PVY<sup>O</sup>, PVY<sup>N-Wi</sup>, and PVY<sup>NTN</sup>, while the ratio of mixed infection with two or more strains was relatively high (Fig. 3)
- PVY strains were detected throughout PVY infection periods regardless the strain type (Fig. 4)

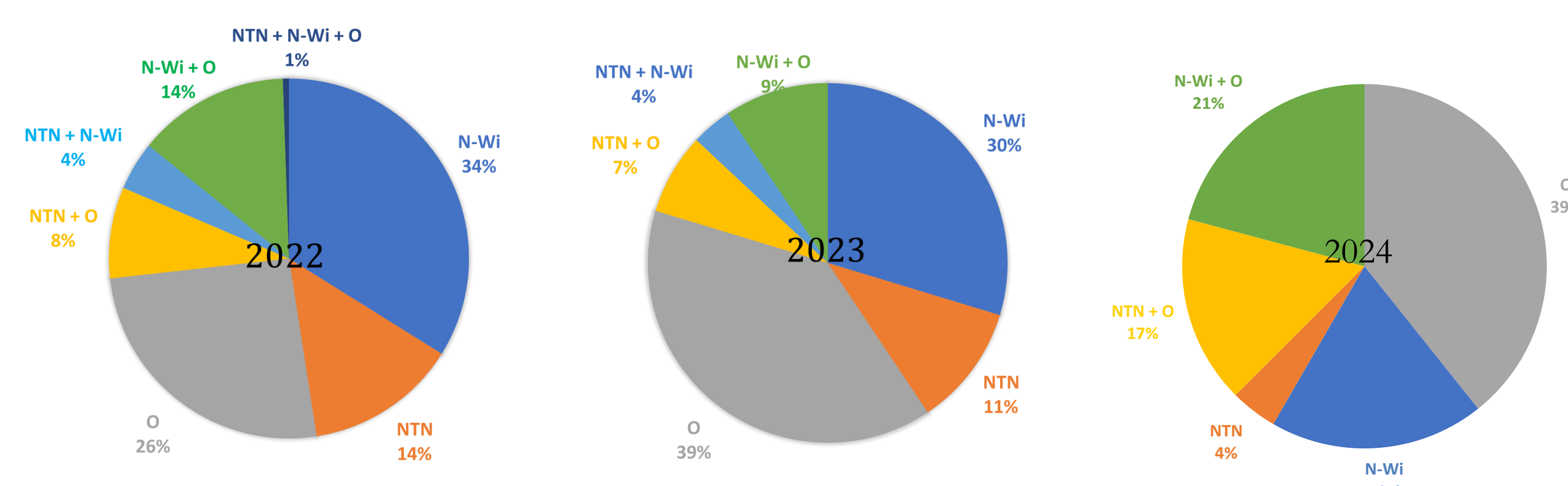
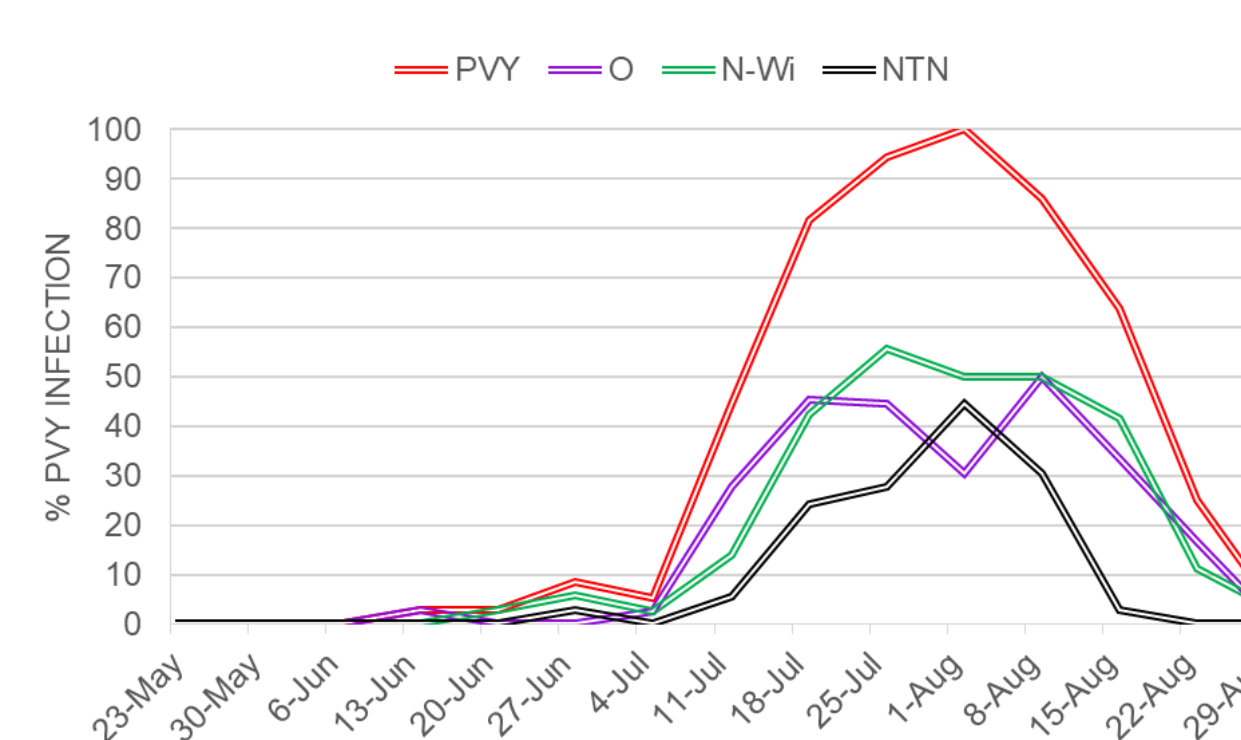


Fig. 3. Composition of PVY strains in the San Luis Valley over the 2022, 2023 and 2024 growing seasons

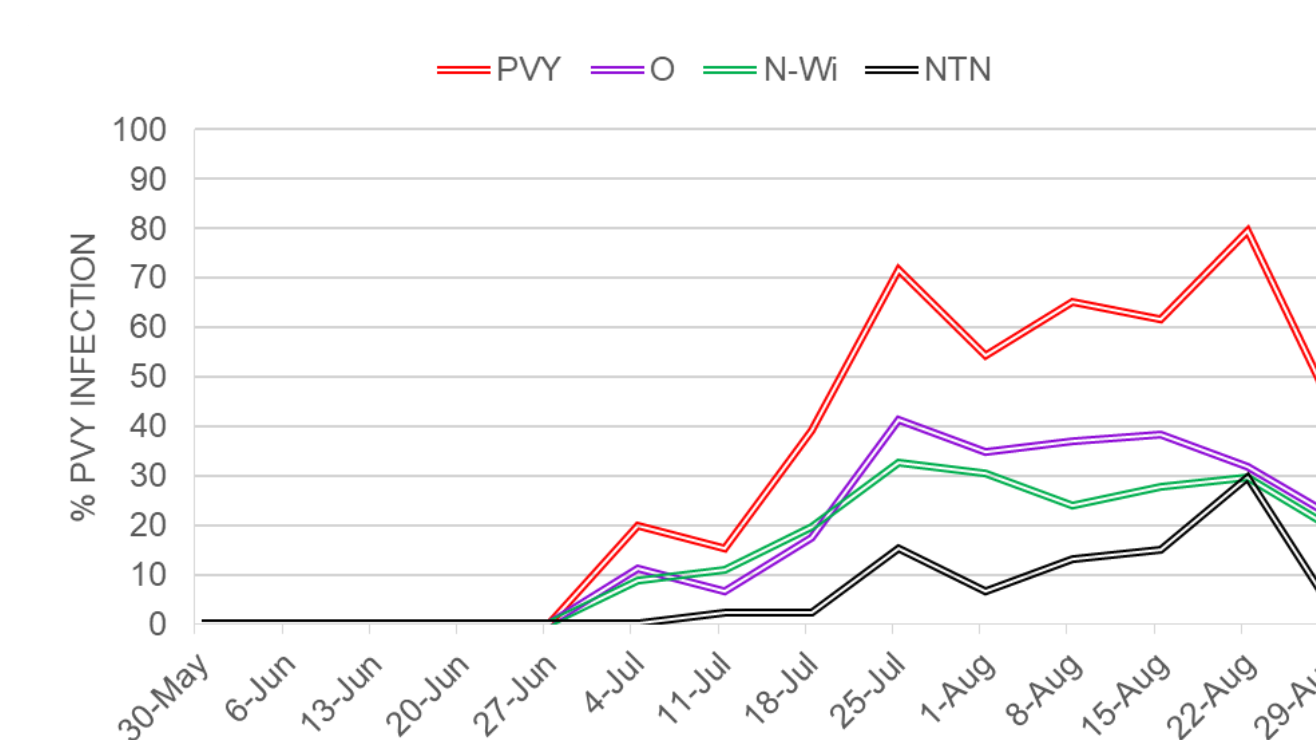
## RECOMMENDATIONS

- The application crop oil and insecticides should focus on July and August due to the high PVY infection pressure during these months in the San Luis Valley
- Early planting and vine-kill is recommended to avoid high PVY infection pressure late in the season

### Growing Season 2022



### Growing Season 2023



### Growing Season 2024

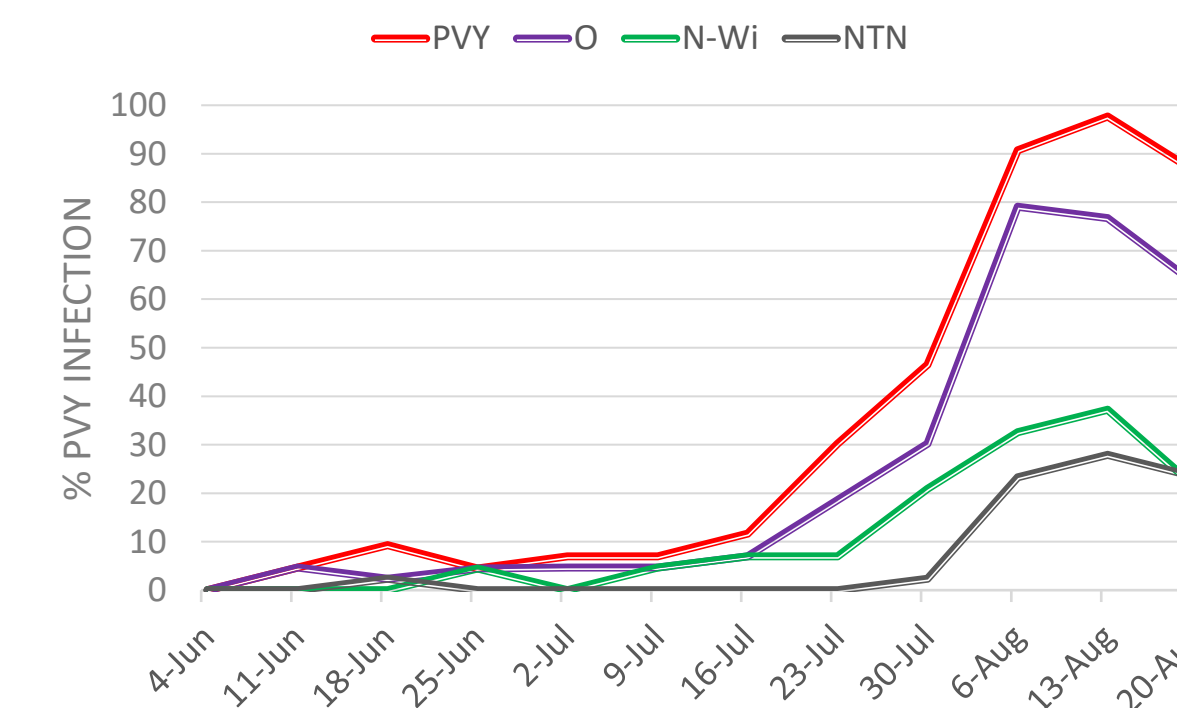


Fig. 4. The dynamics of PVY strain infection pressures over the growing seasons of 2022 and 2023. The Y-Axis represents the percent of PVY infected tobacco plants, and the X-Axis represents the exposure week of tobacco bait plants to field conditions.

Growing tobacco bait plants  
(Greenhouse: 3-4 weeks)

Exposure to field PVY infections  
(Field: 1 week)

Infection progress  
(Greenhouse: 4 weeks)

PVY detection and strain identification  
(ELISA + IC-RT-PCR)

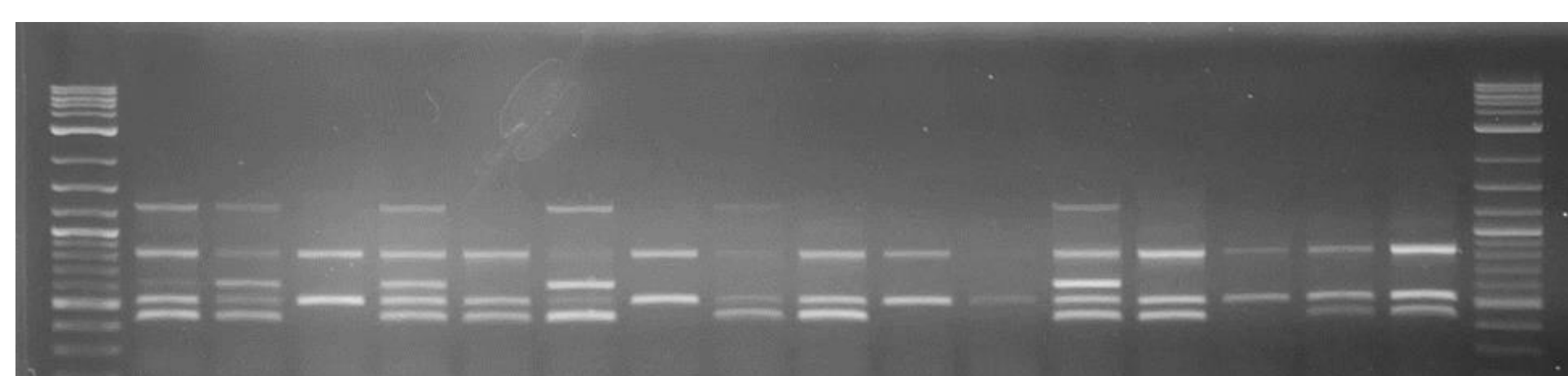


Fig. 1. Protocol used to monitor PVY dynamics and identify PVY strains in the San Luis Valley

## RESULTS & CONCLUSION:

### Dynamics of Potato Virus Y Infection Pressure

- The current research provided a novel method to monitor PVY infection pressure using tobacco bait plants (Fig. 1)
- PVY infection dynamics were slightly different over the three growing seasons, but July and August had the highest PVY infection (Fig. 2)
- The first PVY infection was detected in the second half of June which coincides with the emergence of potato crops in the valley (Fig. 2)
- PVY infection increased toward the beginning of August and then declined toward the end of the season (Fig. 2)

## ACKNOWLEDGMENTS

This work was funded by the Colorado Potato Administrative Committee; the USDA-NIFA Hatch Project grant COL00426; and the Colorado State University Agricultural Experiment Station.

