SLVRC Pathology Program

Newsletter (July 2022)

Research updates And Acknowledgments

The pathology field trials are moving toward the end of the season according to the plan with no incidences. Treatments and data collection are being performed for all trials as planned. We will start vine kill our trials mid of August and harvest by the end of the month.

The three spore traps run by the Pathology Program are being monitored and the spores trapped are being identified using our molecular tools. For weekly progress report, please visit the CPAC website.

The Pathology Program is working with the CPAC to develop and submit research proposals to external federal funding agencies. This will help to secure necessary funds to conduct research projects on diseases of concern to the potato industry at the SLV and the export of fresh potato market to Mexico.

I thank all growers and consultants who invited me to visit their fields and share experiences on potato diseases.

Potato News:

➢ Spore traps updates:

Spores of *Altenaria solani* (early blight), *Alternaria alternata* (brown spot), *Botrytis cinerea* (grey mold), *Sclerotinia sclerotiorum* (white mold) have been detected using qPCR in our three spore traps. After an increase in the abundance of these spores starting from early June, the incidence was close to zero at the first week of July. The level is still low since then. *Phytophthora infestans* (late blight) has not been detected.
For weekly progress report, please visit the CPAC website.

➢ Hail injuries

On June 26, we had a mild hailstorm in the SLVRC farm that resulted in minor inuries to growing potato plants. Damaged plants in the pathology trials exhibited broken stems and pierced leaves. One interesting observation was that potato plants with mosaic symptoms, due to PVY infection, suffered more damage, probably due to the brittleness of the virus infected foliage.
The photo below shows two potato plants of Reveille Russet showing different hail damage levels. The plant on the left was PVY positive while on the right was PVY-negative

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Featured disease: Blackleg and soft rot
(Co-authored by Dr. Janak Raj Joshi)

Colorado State University Extension

Causal agent:

Potato soft rot and blackleg disease is caused by bacteria belong to two genera, *Pectobacterium* and *Dickeya*. ***Pectobacterium atrospeticum* is the major cause of blackleg and soft rot in the San Luis Valley**.

Epidemiology:

Pectobacterium and *Dickeya* **can remain latent in lenticels of potato tubers** without any symptoms, hence, cannot be detected visually. Even when healthy seed tuber is used, **the infection with *Pectobacterium* and *Dickeya* may occur in the field through contaminated irrigation water, insects, nematodes, and aerosols**. *Pectobacterium* and *Dickeya* can infect potato plants via roots, and invertebrates that cause wounds to the roots are likely increase disease incidence. *P. atrosepticum* causes blackleg and sot rot and at cool temperature (64-72^{o}F). This bacterium infect limited hosts beside potato, including, Helianthus annuus (Common sunflower), Solanum melongena (Eggplant), and Zantedeschia aethiopica (Calla lily).

Significance:

This group of bacteria was responsible for outbreak of the disease in 2014/2015 in the northeastern and northcentral region of United States resulting in yield and crop losses estimated around $40 million. Besides yield losses, blackleg may result in seed lot rejection, further adding to the loss.

Symptoms:

Plants with blackleg become stunted with inward rolling of the top leaves. Infected plants look yellow and become wilted as growth progresses.
Not all stems on plants grown from infected mother tuber show symptoms.
The foliage symptoms accompanied by blackening and decaying of stems under and above ground.
Decayed tissue become slimy in wet weather.
Symptoms of tuber soft rot begins on tuber surface as soft, wet, rotted, black or cream-colored tissue decay progressing inwards. Tissue decay is usually accompanied by foul odor which results from secondary infections in the mushed tissue.

Prevention:

With no effective control measures for the disease, growers rely on prevention measurements including:

- **Planting healthy seed tubers**
- **Growing potato in well drained soils and avoid over irrigation**; low oxygen content of wet soils promote the disease
- Good sanitation with farm equipment
- Avoid injuries to tuber at harvest and promote wound healing by storing harvested tubers at 45-49^{o}F for at least two week with good ventilation and humidity of 95%

Potato Calico:

Calico is a potato disease (symptoms) caused by an RNA virus called alfalfa mosaic virus (AMV).
AMV has a wide natural host range, including alfalfa and potato, two common crops of the San Luis Valley.
AMV causes bright yellow blotching or mottling on leaves (calico).
The virus is transmitted via infected seed tubers, and by many aphid species in a non-persistent manner, by which few probes are sufficient for the aphids to acquire and transmit the virus with a very short incubation periods (seconds to minutes).
In the SLV, aphid transmit the virus to potato field from alfalfa crops. AMV is not considered important to potato production. **However, certain strains of AMV can cause tuber necrosis in some potato cultivars such as Innovator, Shepody and Yukon Gold** as was reported in California and Canada.

For further information please refer to: Potato Tuber Necrosis Induced by Alfalfa Mosaic Virus Depends on Potato Cultivar Rather Than on Virus Strain. Plant Disease 2020 104:340-347

Yukon Gold (AMV-positive by ELISA)

Mesa Russet (AMV-positive by ELISA)

Russet Norkotah 8 (AMV-positive by ELISA)

Reveille Russet (AMV-positive by ELISA)

Potato Coiled Sprout Disorder:

Potato coiled sprouts affect the emergence of potato plants and is featured by stem bending, coiling, swelling and in some cases split sprouts below soil level. Coiled sprout disorder delays emergence, hence, reduces yield, and affected plants produce more stems due to stem splitting, which leads to increased number of small tubers.

This disorder is associated with many factors, including deep planting, low temperature soil, soil compaction, and planting seed tubers with long sprouts. It is also believed that the feeding of stubby root nematodes, that transmit tobacco rattle virus (TRV), on the growing sprouts may irritate them and cause them to swell and bend.

Photos below was taken from a field with missing hills/delayed emergence. We noticed that seed tubers of affected plants were deep planted in compact soil. **Both, mother tubers and coiled sprouts were negative to tobacco rattle virus**.

(Thanks to Tommy Biel for inviting me to this field and for the useful discussion)

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