Final Report: Investigation of weeds as an *Impatiens Necrotic Spot Virus* (INSV) reservoir in the Arizona lettuce growing region

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In March 2021, the tospovirus Impatiens necrotic spot virus (INSV) was first identified in lettuce fields in the Yuma growing region. Disease incidence was less than 1% in most fields and did not significantly affect yield. INSV is a new disease for iceberg lettuce growers in Arizona and how the virus was introduced into Yuma County in 2021 has not been identified.

A survey of potential weed hosts took place over the summer of 2021 to determine if the virus was persistent in the environment during the summer when no lettuce is planted. This survey is primarily focused near a field in Tacna, Arizona that had a higher-than-average disease incidence at harvest in 2021. Several common weed species found in the survey fields were positive for INSV, but by mid-June, all weed samples were negative for INSV. This suggests that INSV was not persistent in the environment and a new introduction of INSV to the region is necessary for the disease to occur. This project continued the weed survey to determine when INSV is detected in the weed population during the desert lettuce growing season and what weed species are important hosts.

The recently completed project included the following objectives:

Objective One: Screen 3000 weeds to determine if INSV is present prior to lettuce planting in the fall of 2021.

Objective Two: Monitor INSV in weed and lettuce through the growing season in concert with lettuce thrips monitoring.

Objective Three: Outline insect and weed management recommendations based on the results of the testing and provide those results to growers through outreach.

Results

The total number of 5206 samples from over 130 locations in the Yuma growing region were collected between 9/22/2021 and 5/24/2022. The number of samples collected each month fluctuated; a large number of samples were collected during September and October as originally proposed, with fewer samples collected as the season progressed (Table 1). Most samples collected were weeds representing fifty-three plant species, a subset of lettuce samples was tested to confirm disease presence at sample sites. In November 2021, INSV was first identified from lettuce in the field as part of this project and INSV was first detected in weeds January 13, 2022, from goosefoot collected in Tacna. The positivity rate of samples was low (Table 2), 32 total samples were positive for INSV representing seven weed species. Positivity rates varied between weed species (Table 3).

Table 1. Weeds collected and INSV tested by month

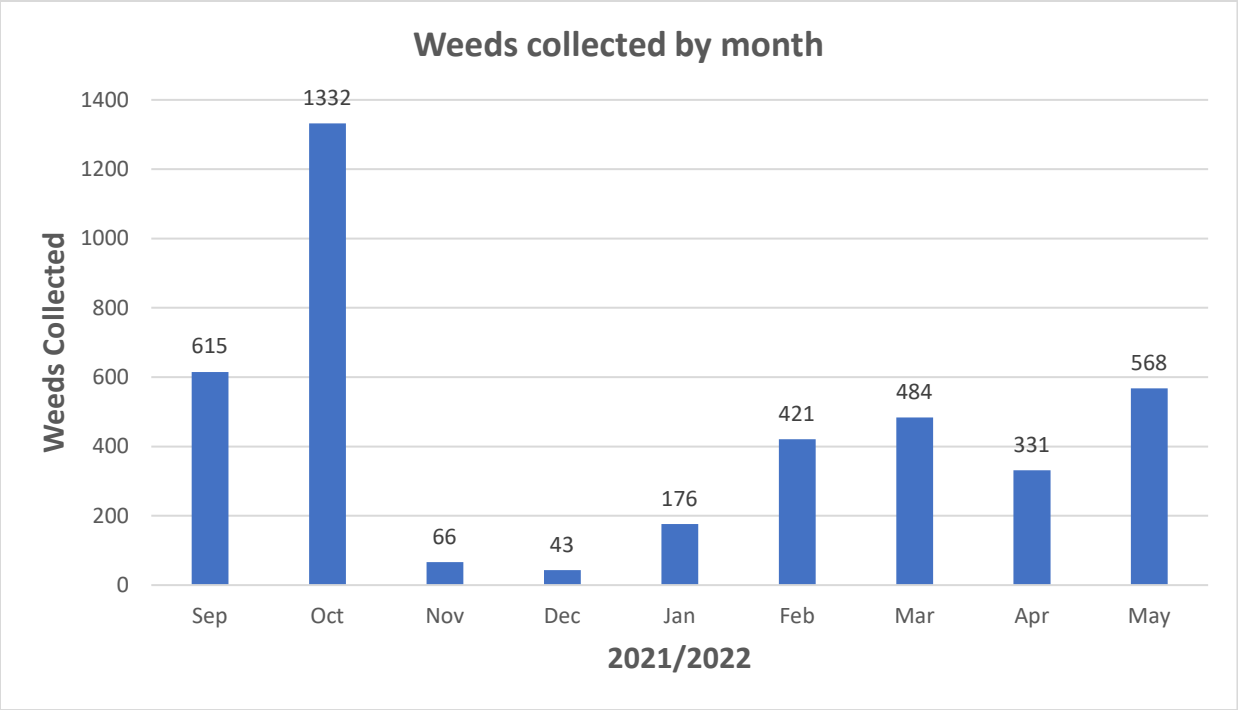


Table 2. Weed INSV positivity rate over time

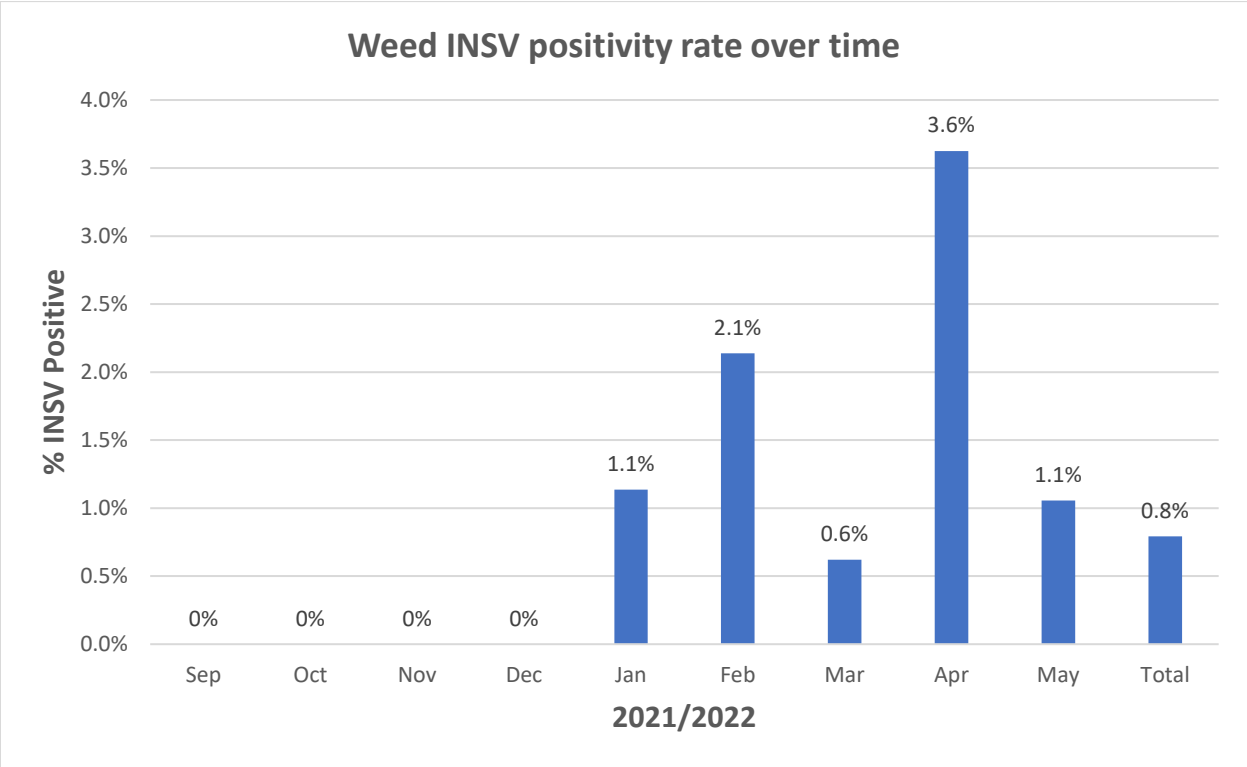
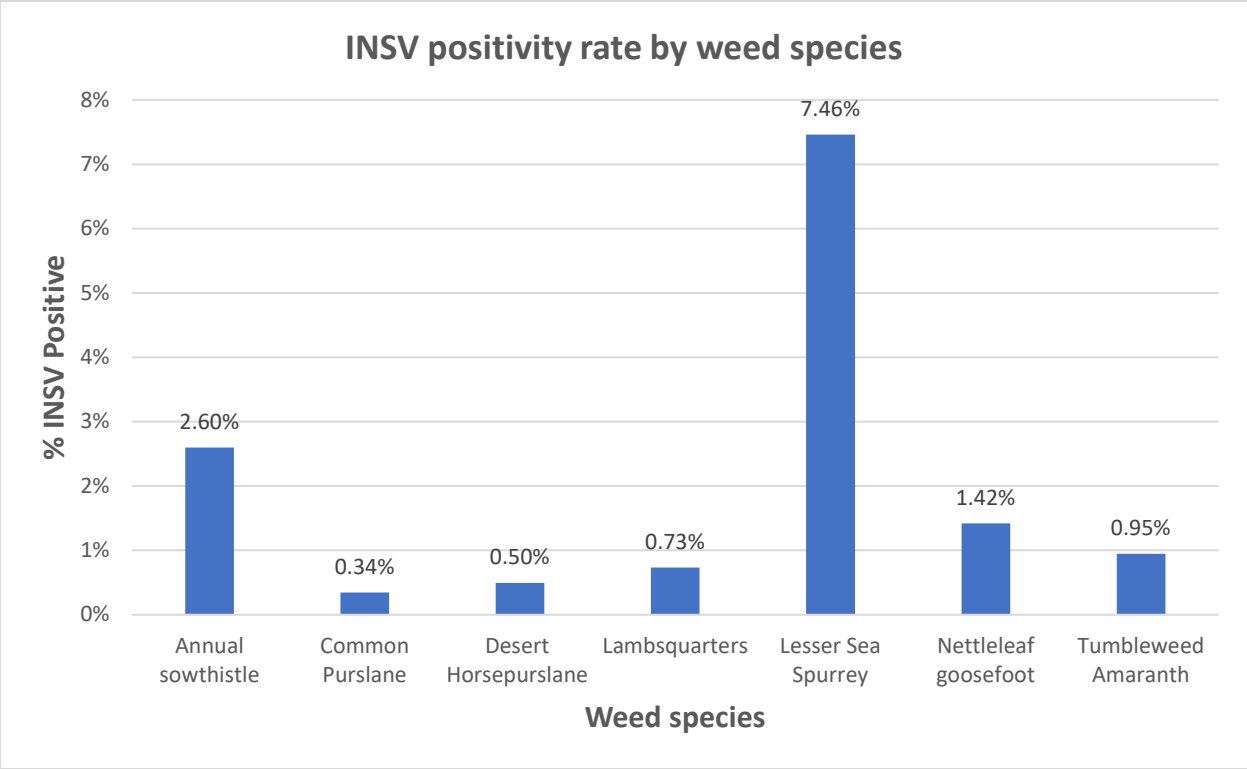


Table 3. INSV positivity rate by weed species



Discussion and next steps:

This project provides evidence that INSV was not in the resident weed population prior to the 2021-2022 lettuce growing season. INSV was likely introduced into Arizona by transplants, either by infected plants or infected thrips traveling with transplants. Weed management is important to reduce the spread of INSV during the lettuce growing season because potential INSV reservoirs will be reduced. Although INSV has not yet been detected in weeds at the start of the growing season, this may not be the case in the future, therefor, good weed management throughout the summer is important. As INSV becomes more common, the virus may survive over the summer in weeds as it does in California.

We are continuing to monitor weeds and track INSV in the Yuma growing region as part of a Specialty Crop Block Grant Program Grant.