WSU Virus Research

Spring 2017 Project Status

Overview

- Key results from 2015
- 2016 Project Plan
- Key Results from 2016
- Plan for 2017
- Potential WSU Dahlia Resource Center

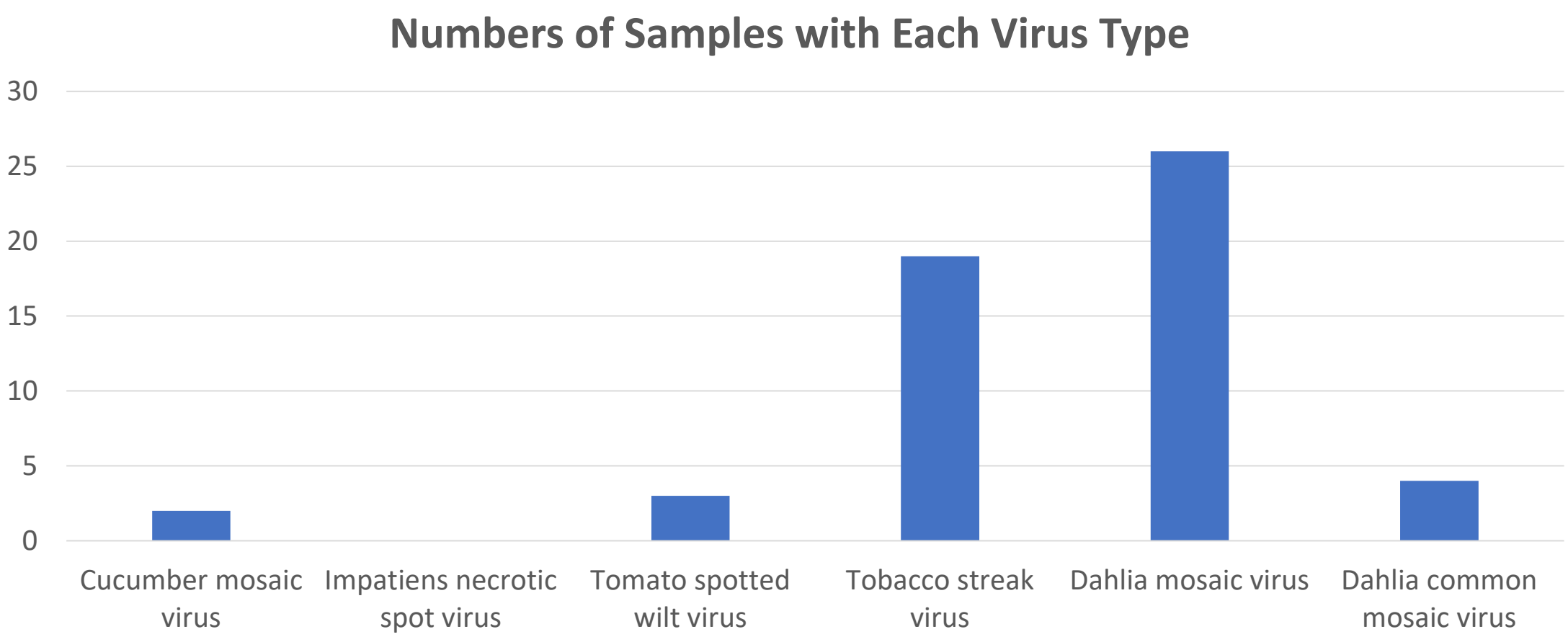
2015 Testing

- Gardens
  - Five Northeast Ohio Gardens
    - One Smaller Garden at 100%,
    - Two Larger Gardens @ About 25%,
    - Few Selected Samples from 2 Gardens
  - Samples Gathered and Evaluated by Two Individuals
    - Appearance of Foliage Rated from 1 to 10 by Two Evaluators
- Results Led to “G1” Plan for Plants Free of Virus
- Jim Chuey Donation Made It Possible

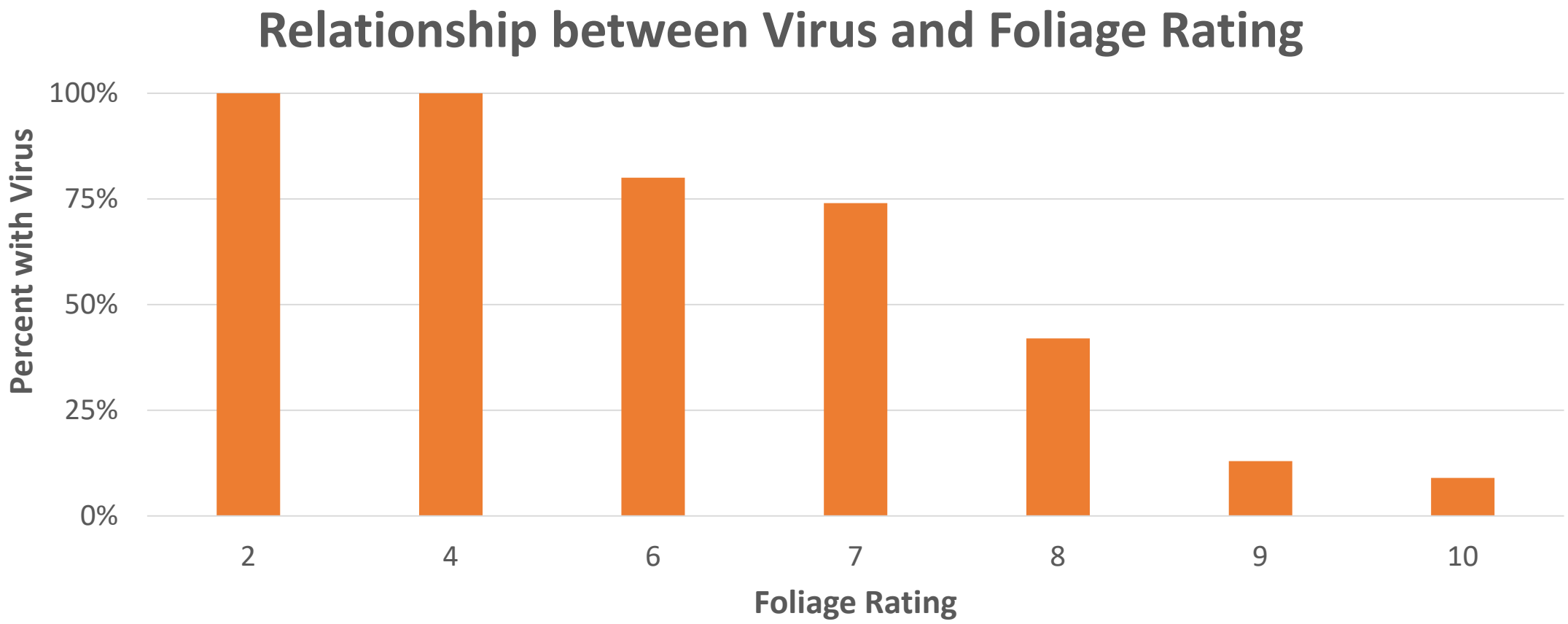
2015 Testing – Basic Results

- 186 Samples Tested; 48 Were Positive for the Viruses Tested (25.8%)
- No Impatiens Necrotic Spot Virus (INSV) Was Detected
- Only One of the Five Gardens Tested had Tobacco Streak Virus (TSV)
- Few Occurrences of Dahlia Common Mosaic Virus (DCMV); those Leaves Showed Very Poor Appearance
- Excellent Correlation Between Incidence of Virus and Poor Foliage
- No Individual Cultivars Stood Out as Free of Virus
- About 10% of Plants with Excellent Foliage Tested Positive for Virus

2015 Testing – Viruses Detected



2015 Testing – Clear Relationship to Foliage



Key Bottom Lines

- Very Few Plants Showed Foliage as Bad as Those Published with the June 2014 ADS Bulletin
- Only about One-Fourth of the Plants Had Virus
- The Appearance of the Foliage Was an Excellent Predictor of the Presence of Virus --- “If in Doubt, Throw it Out!”
- About 10% of the Plants with Very Good Foliage Tested Positive for Virus

Plan, Objectives for 2016

- Broad Spectrum of Tests from Gardens Across the USA
  - More Data
  - Opportunities for All Dahlia Growers to Test Their Gardens
  - Reasonable Costs, Compliments of the Scheetz-Chuey Foundation
- Gathering of Results by Cultivar and Location
  - Cultivars with Virus Resistance?
  - Garden or Location Affects?
- Identification of Parent Stock for Clean Tubers for 2017
  - Best Source of Clean Tubers is Virus Free Parent Plants
  - Promotion of the “G1” Concept

2016 Data

- 722 Samples Were Analyzed in 43 Batches from 40 Different Gardens across the USA; 49% were Positive for Virus
- Long Turnaround Times Made It Difficult to Use the Results to Help Make ‘Keep or Destroy’ Decisions
- Increase in the Incidence of Virus over the 2015 Results, Largely as a Result of Much Higher Incidence of Tobacco Streak Virus
- Correlation to Quality of Foliage – (NB: Many Evaluators!)
  - Samples Characterized as Clean, Questionable, or Poor Where Possible
  - Clean Foliage Samples Twice as Likely to Be Free of Virus
  - “If in Doubt, Throw it Out!”

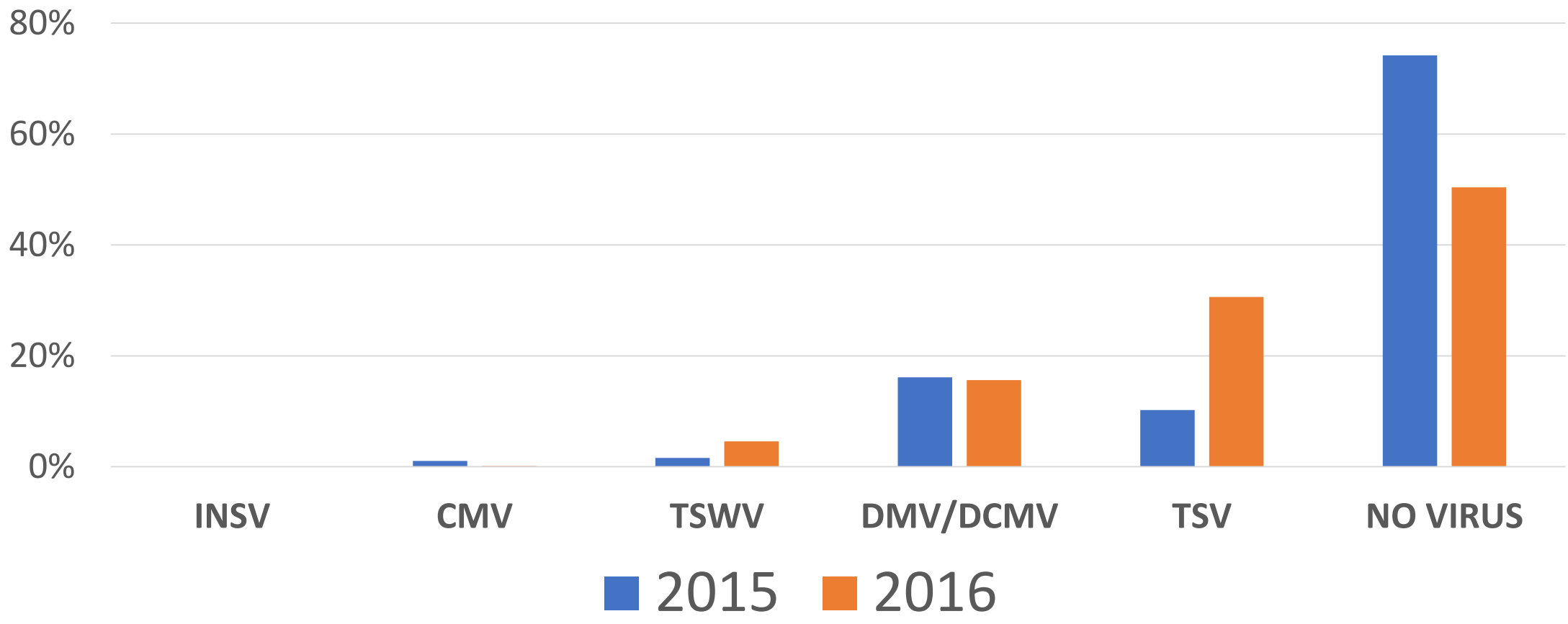
2016 Results

- Data on “G1” Samples Showed 57% Had No Virus
  - Limited Data Set, 74 Samples
  - Most G1 Plants Were Not Tested in 2016
  - Disappointing that 43% Tested Positive for Virus
- No Individual Cultivar Stood Out as Free of Virus
  - 5 Cultivars Tested 9 Times; Each Tested Positive for Virus in a Portion of the Tests
  - Largest Number of Tests without Virus was Kenora Wildfire - 6 Tests

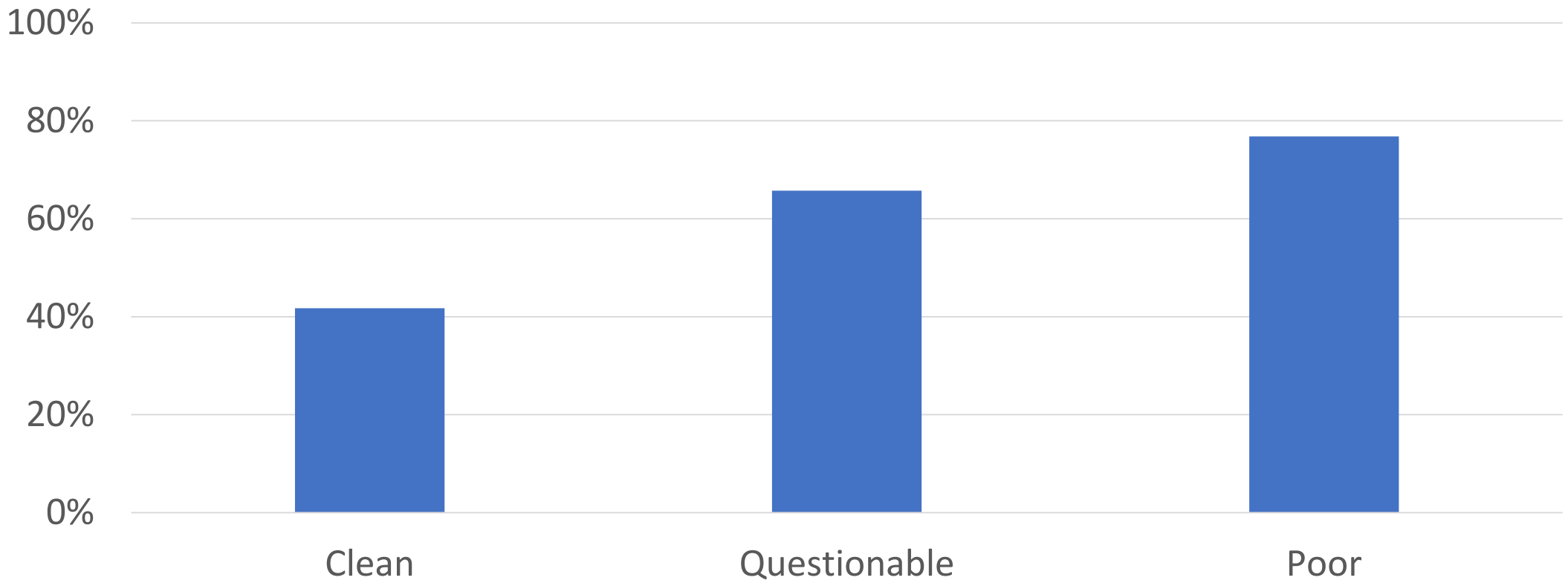
2016 Results

- No Obvious Relationship Between Percent Virus and Year of Introduction
  - Suggests that Old Cultivars Aren’t More Virus Resistant than New Ones
- One Virus (TWSV) Showed Geographical Dependence
  - Very Few Total Cases of the Virus (33)
  - None on the East Coast
- Samples Were Gathered and Sent over the Entire Season; early July to Mid-October. Incidence of Virus Did Not Change over the Season

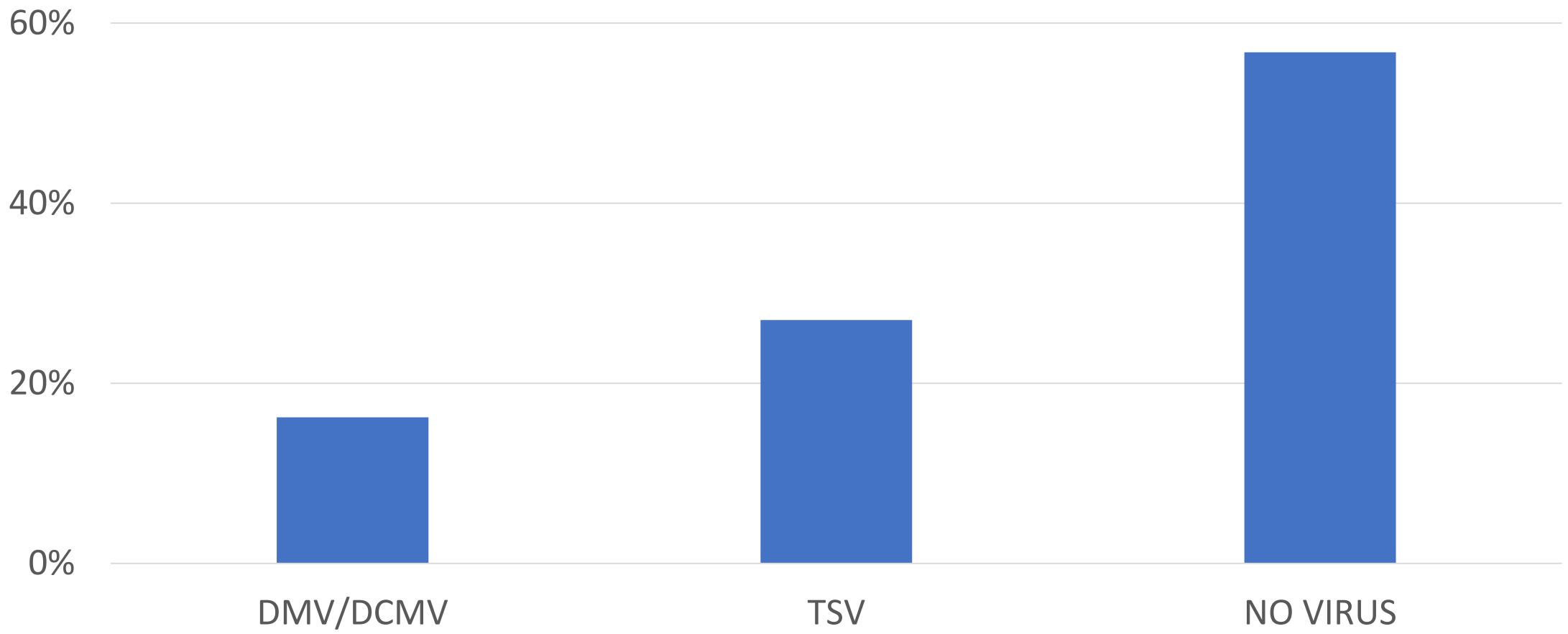
Viruses Detected in 2015 vs. 2016



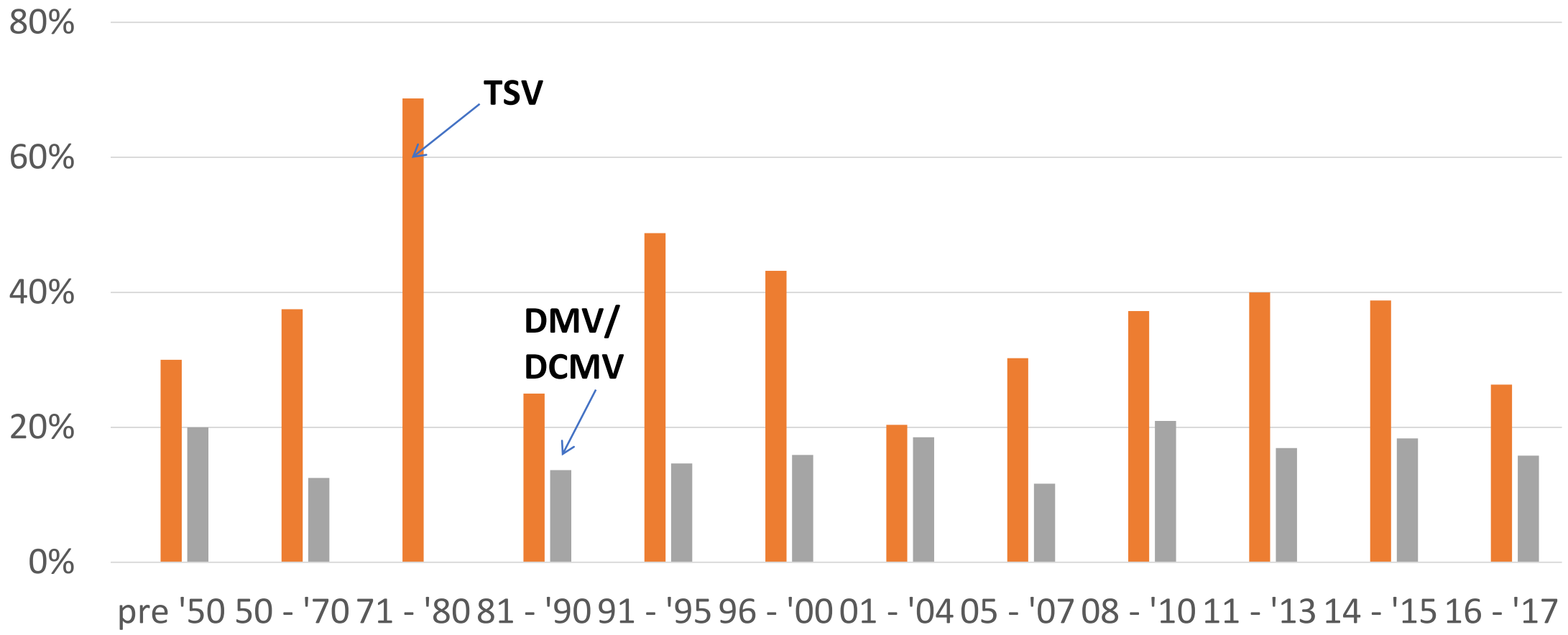
Percentage of Virus vs. Quality of the Foliage in 2016 Tests



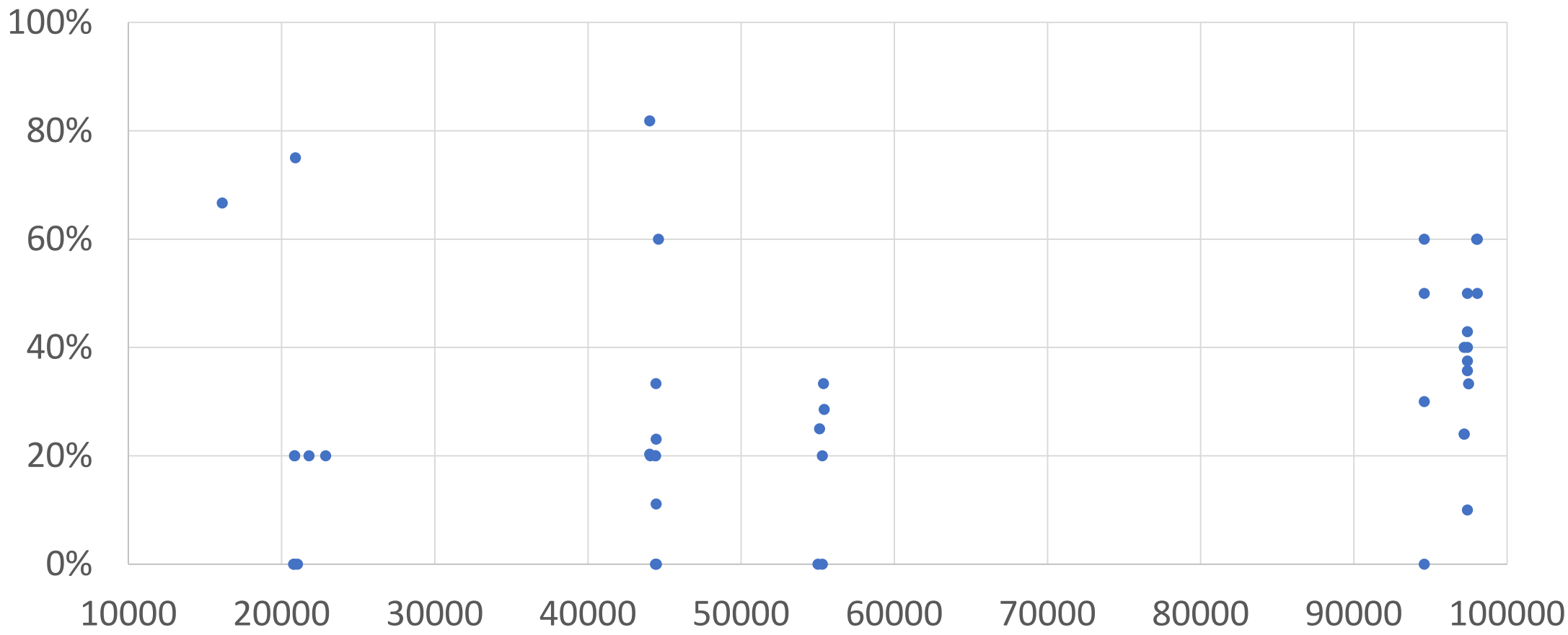
“G1” Tuber Results in 2016



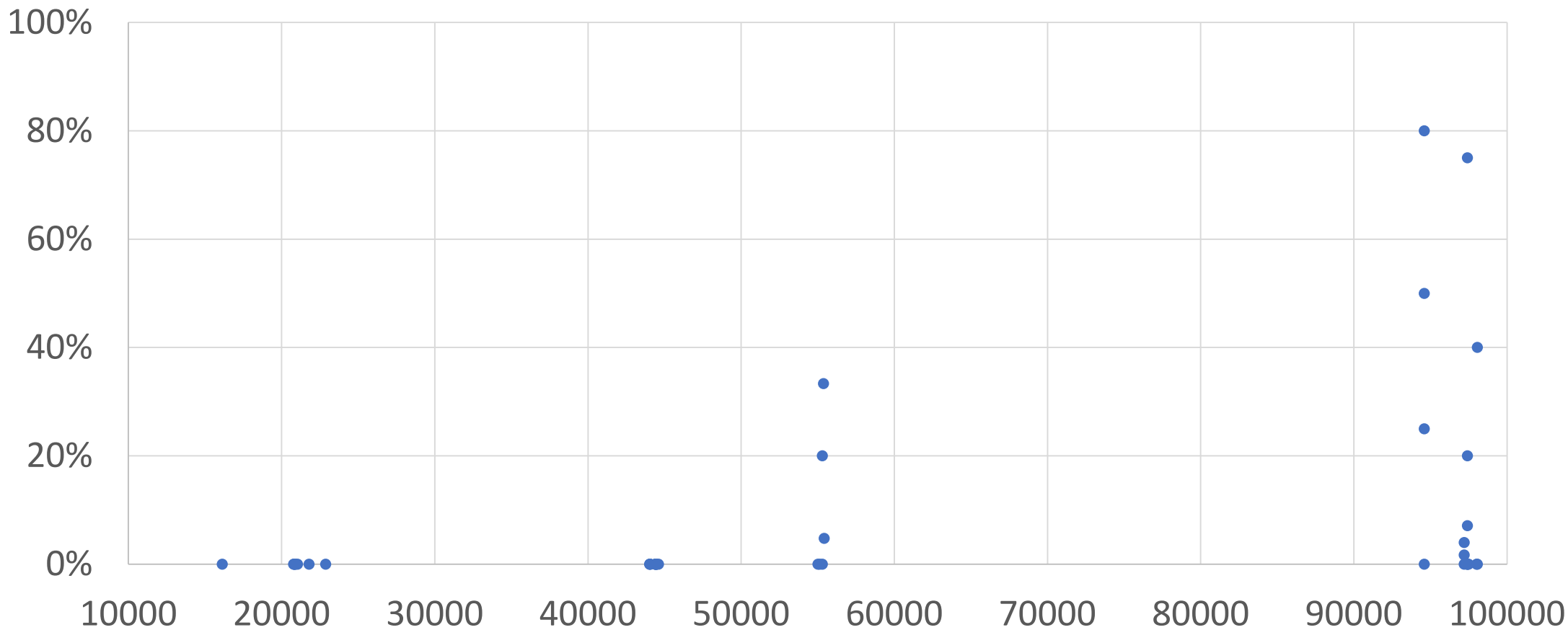
Percentage of Samples with Virus vs. Date of Cultivar Introduction



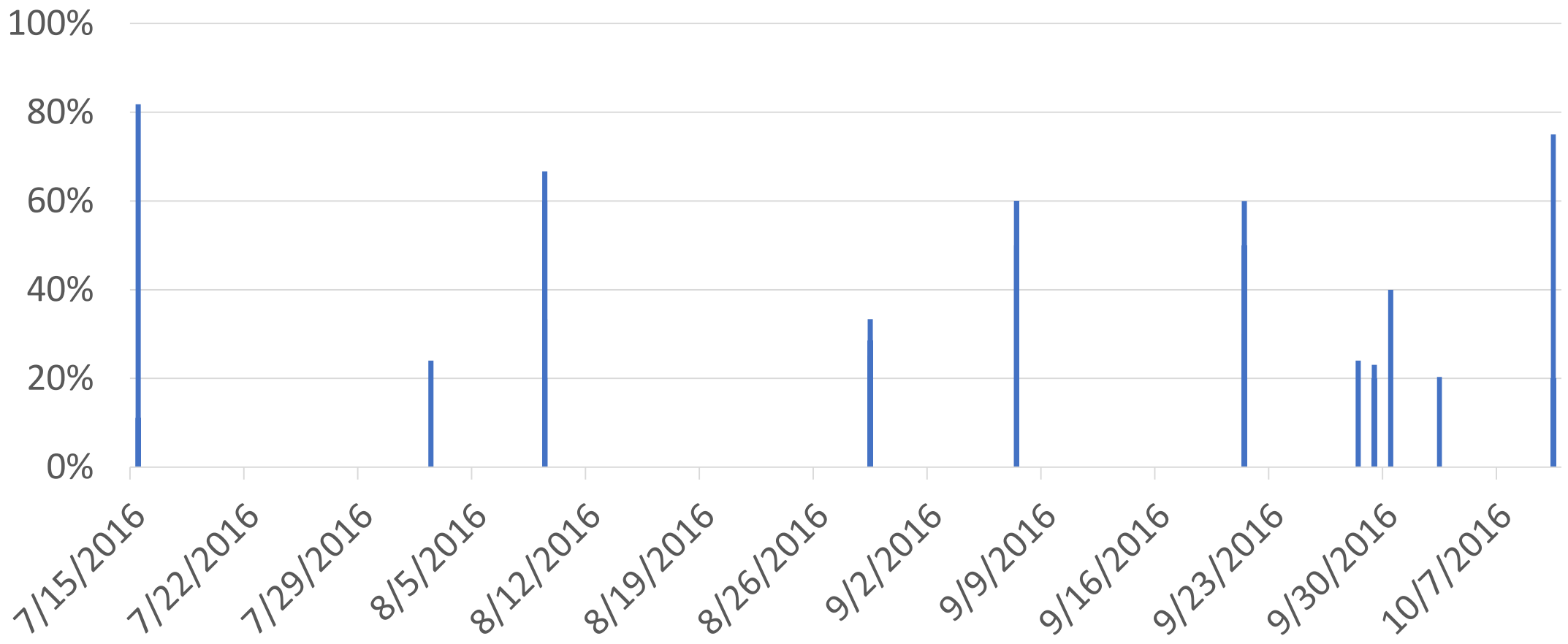
Tobacco Streak Virus vs. Garden Zip Code



Tomato Spotted Wilt Virus vs. Garden Zip Code



Tobacco Streak Virus vs. Test Date



Conclusions

- Chlorosis (Yellowing) of the Veins and/or a Mottled Yellow Pattern on Dahlia Foliage Are Clear Indications of the Presence of Virus. If in Doubt, Throw it Out!
- Dahlias with Clean, Healthy Foliage Are Significantly less Likely to Have Virus than Plants with Chlorosis of the Leaf Veins.
- A Substantial Portion of Plants with Clean Foliage also Test Positive for Virus. 2015: 10 to 20%. 2016: About 43%.
- Few Plants Exhibited Tobacco Streak Virus in 2015; Almost One-Third of the Plants Exhibited Tobacco Streak Virus in 2016.

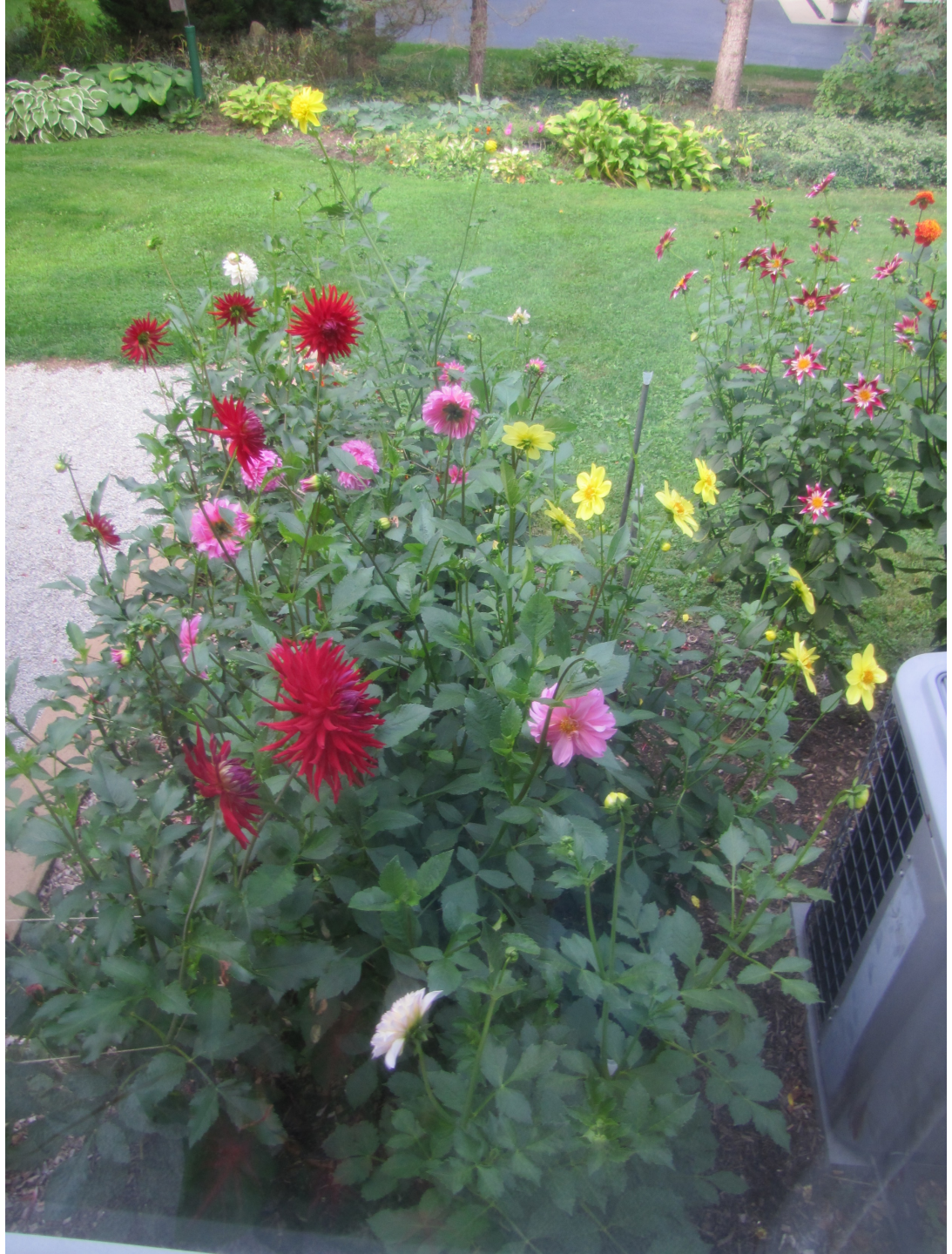
Future Work

- Additional Support from Jim Chuey and the Scheetz-Chuey Foundation plus Ongoing Support and Cooperation from Professor Pappu and WSU are Bases for 2017
- Continue the Same Testing Program for 2017
  - Analyses of Sets of 30 Samples for $10 Each
  - Open to All
  - Similar Tracking of Results
  - Benefits
    - Broader Base of Data
    - Additional Information on Individual Cultivars
    - Opportunities for Individual Garden Tests, with more G1 Tubers Identified

Future Work

- Free Testing of 2016 G1 Tubers on 2017 Plants
  - 2016 Program Participants, Virus-free Plants Yield G1 Tubers
  - Plants from G1 Tubers Are Tested for Virus for Free in 2017
    - Carefully Tracked and Grown
    - Clean Plants Only; i.e., If in Doubt, Throw it Out
- Selected Tests within the Virus Team
  - Promising Resistant Cultivars, Young and Old
  - ‘Interesting’ Plants with Virus in 2016
    - Location within Plants, Timing through Season
    - Transfer to G1 Plants
  - Differentiation among the Viruses

Virus Transfer
Experiment
in the
“AC” Garden
3 Rows
13 Plants



	2015 HISTORY						JULY 2016 RESULT							OCTOBER 2016 RESULT					
3.4	M 1			1.5	S 3		3.4	M 1			1.5	S 3		3.4	M 1			1.5	S 3
	DMV				DMV			DMV				TSV			TSV				TSV
		2.4	S 1						2.4	S 1						2.4	S 1		
			NONE							TSV							TSV		
3.3	M 2			1.4	S 3		3.3	M 2			1.4	S 3		3.3	M 2			1.4	S 3
	DMV				DMV			DMV				TSV			TSV				TSV
		2.3	S 1						2.3	S 1						2.3	S 1		
			NONE							TSV							TSV		
3.2	M 3			1.3	S 3		3.2	M 3			1.3	S 3		3.2	M 3			1.3	S 3
	DCMV				DMV			DIED				TXV			NO TEST				DMV
		2.2	S 2						2.2	S 2						2.2	S 2		
			NONE							NONE							NONE		
3.1	M 3			1.2	M 1		3.1	M 3			1.2	M 1		3.1	M 3			1.2	M 1
	DCMV				DMV			DIED				TSV			NO TEST				DMV
		2.1	S 2						2.1	S 2						2.1	S 2		
			NONE							DIED							NO TEST		
				1.1	M 1						1.1	M 1						1.1	M 1
					DMV							NO TEST							TSV/DMV

Future Work

- Other Areas of Effort
  - Genome Sequencing
  - Resistance and Tolerance and Maturity
  - Meristem and Tissue Culture
  - Seedlings

Dahlia Technology/Resource Center at WSU

- Ongoing Discussions with Prof. Pappu, WSU, and Jim Chuey
- Possible Functions
  - Coordination, Management of Virus Reduction Efforts
  - Communication of Items of Interest to Dahlia Growers
    - Pest Controls and Organic Growing
    - Soils and Soil Management
    - Fertility
  - Communication, Coordination, Prioritization of R&D where Current Technology Isn't Sufficient
  - Education and Outreach
    - Webinars
    - Print and Electronic Media
    - Workshops