

Clean Stock Offense

ADS Clubs

March 4, 2023

Prof. Hanu Pappu and the ADS Virus Team:

Ron Miner, Brad Freeman, Nick Weber, Jerry Moreno, Linda
Taylor

Virus Research Overview

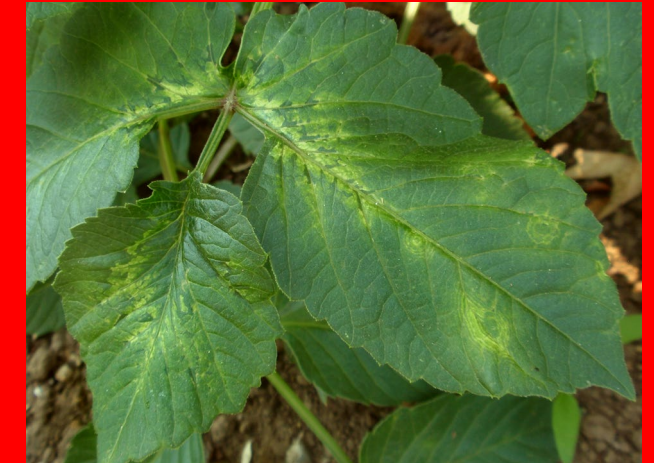
- Washington State University (WSU) from the outset
 - Mid-90's R&D supported by Evie Gullikson, then ADS via Bill McClaren
 - Important Transition with Professor Pappu in 2002: All dahlias do not have virus!
 - Carl F. and James J. Chuey Endowed Chair in 2017
- Scheetz-Chuey Charitable Foundation
 - Donations to create WSU Endowed Chair for dahlia R&D in perpetuity
 - Ongoing financial support for virus testing at WSU

Key Field Virus Observations ('15 – '21)

- Clear relationship between quality of foliage and the presence of virus: “If in doubt, throw it out!”
- DMV and DCMV “disappeared” after 2016. Hindsight: It evolved!
- Virus can be present in asymptomatic plants
- Failure to disinfect tools after working on a plant with virus will spread that virus to the next plant(s)
 - “Clean Between!”

Key Field Virus Observations ('15 – '21)

- Seedlings are free of (RNA!) viruses – including those from parents with virus
- Seven Years of Observations on TSV, INSV, TSWV, and CMV: Different RNA Viruses Behave Differently!
 - TSV persists through winter storage
 - INSV tends not to persist through winter storage
 - TSWV can spread rapidly within a garden
 - CMV is seldom detected



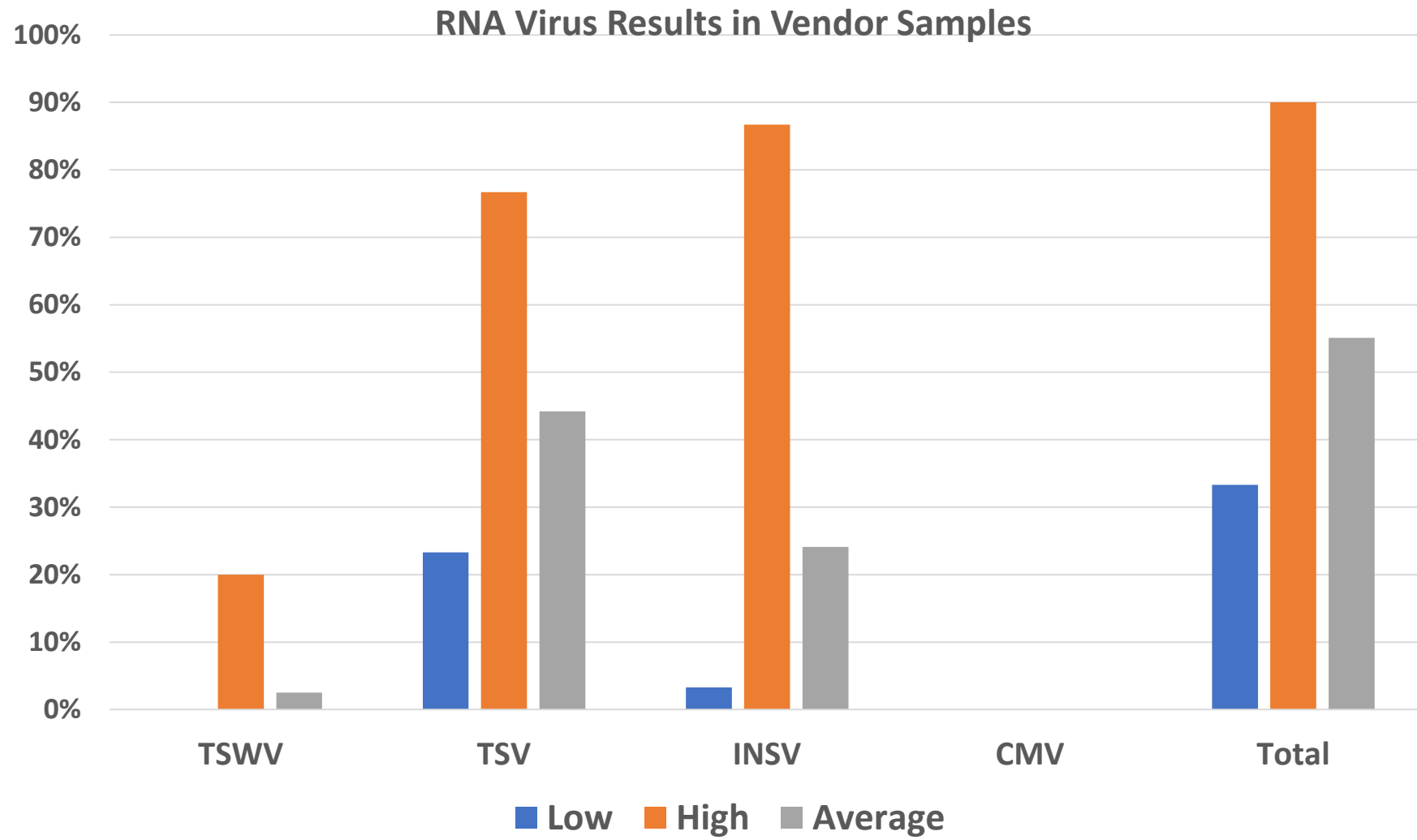
More pictures by Linda Taylor at: <https://www.flickr.com/photos/141837887@N08/albums>

Prescription for an RNA Clean Garden

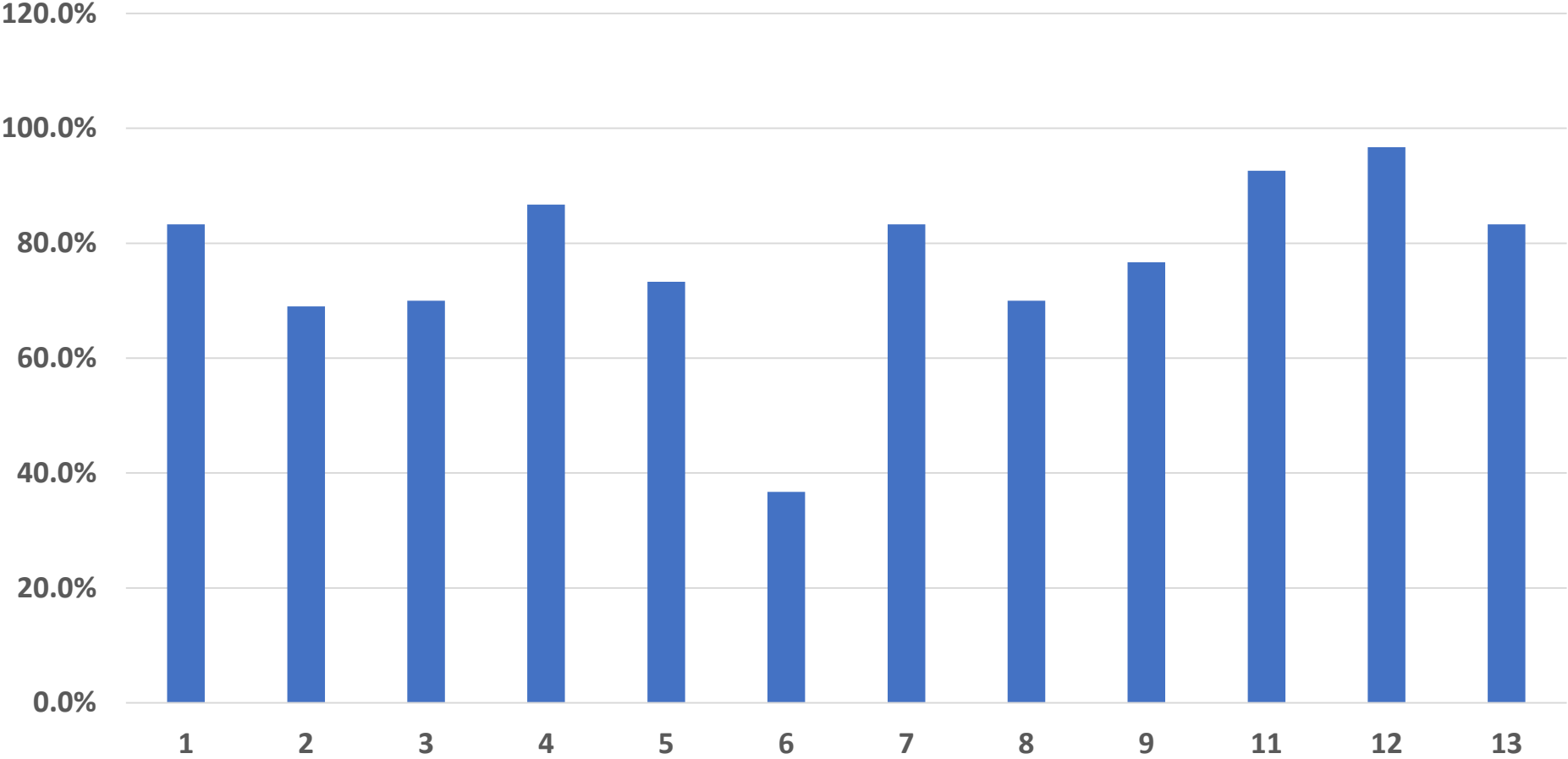
- If in Doubt, Throw It Out!
 - Check Linda Taylor's FLICKR pictures
 - Check UNC Youtube video for nutritional affects on foliage
- Clean Between!
 - 10% Bleach solution or 4 tsps. Dawn in 5c water or Virkon S
 - Remember: a clean-looking plant may just be asymptomatic
- Start with Clean Stock!
 - Best plants in your garden
 - Your Club's Clean Stock Offense!
- Isolate New Stock

Results from 2022

- Two basic projects sponsored through Scheetz-Chuey Foundation
 - Free vendor tests, 30 max samples
 - Half-price ADS Club tests, 30 max, 30 more available at \$10 each
- DMV/DCMV (a DNA virus) was rediscovered
 - Evolved and (very!) common
 - Integrated in the plant genome? Need more experience and more research!
- Vendor Results for the RNA viruses
 - 33% to 90% of samples positive for one or more RNA virus – one exception
 - Earnest interest in improvement among participants
- Vendor Results for DMV, the DNA virus
 - 70% to 97% of samples positive for DMV – one exception



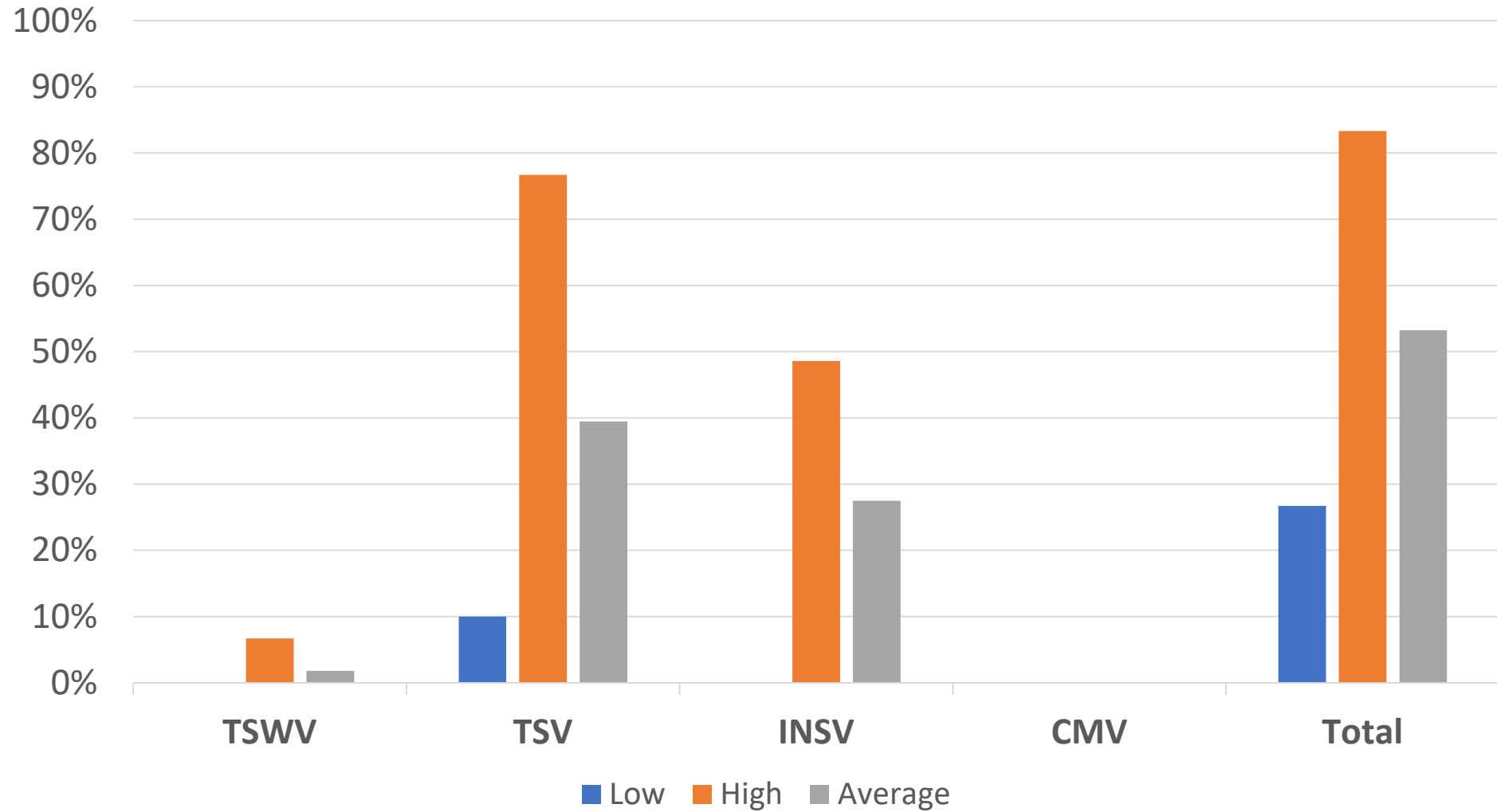
DMV Results in Vendor Samples



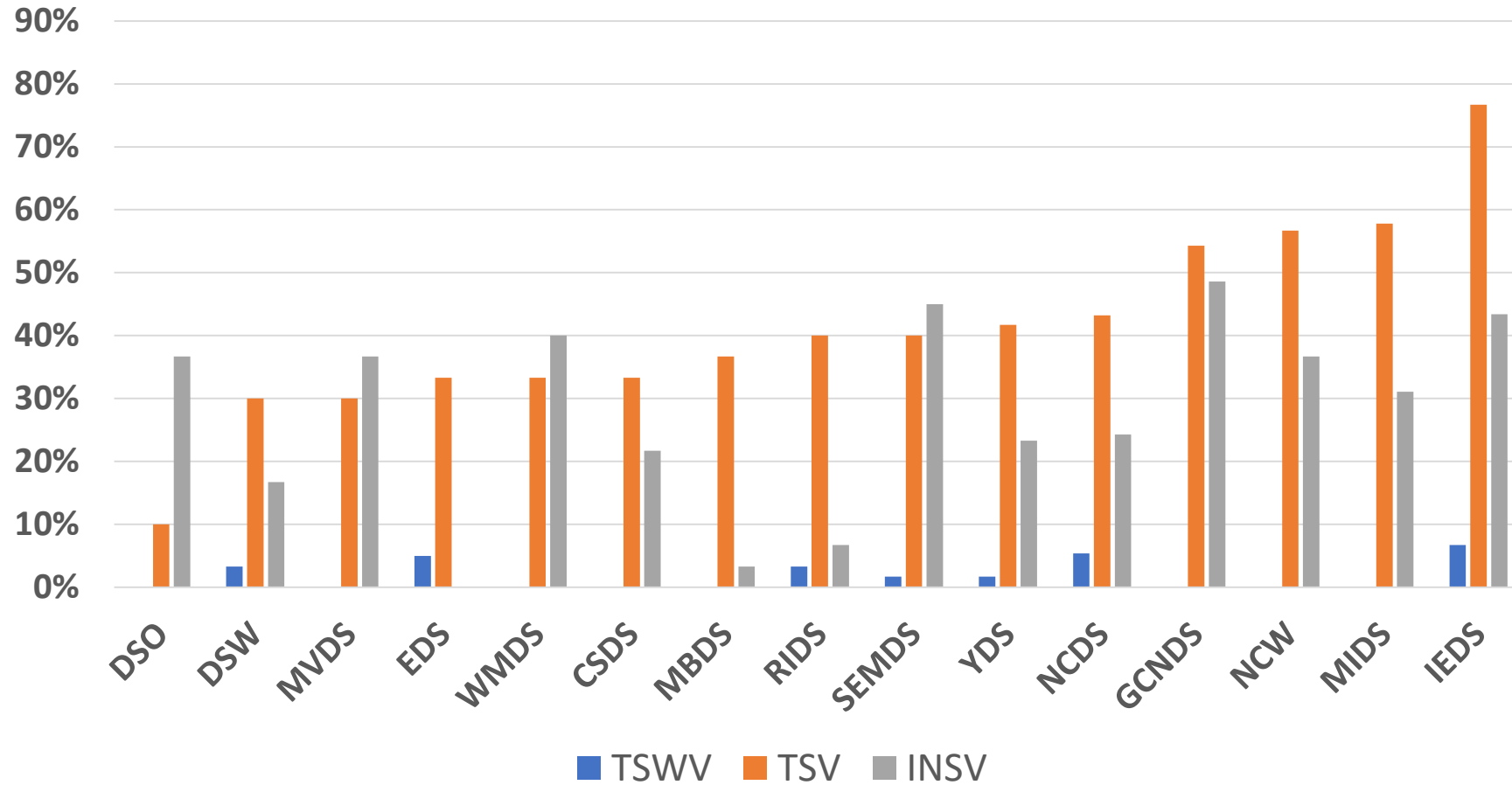
Results from 2022, ADS Clubs

- RNA Results for 15 Clubs
 - 37% to 83% of samples positive for one or more RNA virus
 - Wide range in individual virus results, particularly INSV
- DMV Results
 - 60% to 100% of samples positive for DMV

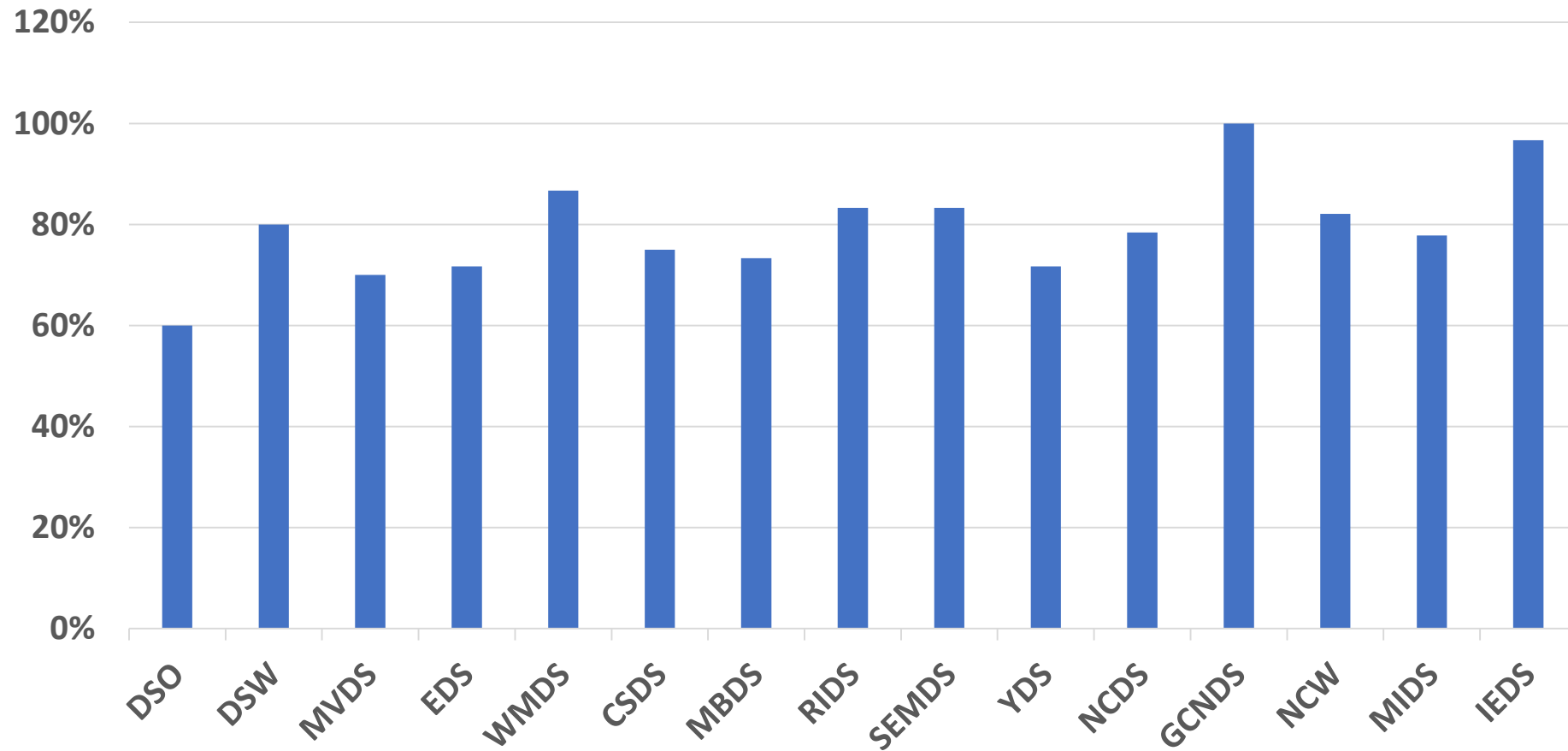
RNA Virus Results in Club Samples



Percent RNA Viruses in Club Samples



Percent DMV in Club Samples



Disposition of Tested Plants

- Propagate Clean Stock Enthusiastically!
 - Confirm plant was properly handled in '22, after testing
 - Take great care with tools during propagation
- Positive Plants with Questionable Foliage – Dispose Immediately
- Positive Plants with Excellent Foliage:
 - If TSV or TSWV, dispose immediately
 - If INSV or DMV, save for '23 and monitor closely for symptoms
- Monitor plants from INSV-, DMV-positive plants
 - Dispose of any that develop symptoms
 - Track and report fraction of DMV removed
 - Submit leaves from 3 different cultivars with a DMV-positive parent

Results from 2022, ADS Virus Team

- Similar DMV levels to clubs
- Persistence of DMV:
 - Each of 3 descendants of a DMV-positive plant in 2016 were positive for DMV in '22 in Ohio garden
 - Lost almost all other DMV plants in '16/'17
 - Each of 11 descendants of 3 DMV-positive plants in 2016 were positive for DMV in '22 in Oregon garden
- Six Species dahlias: Zero RNA viruses; but 5 of 6 positive for DMV
- Examples where tubers or cuttings from the same parent plant produced different DMV results

Results from 2022, ADS Virus Team

- Majority (~3/4) of DMV-Positive Plants are Asymptomatic
- Preliminary Indication that DMV may be Cultivar-Dependent
 - Club Question: Only 4 clean plants out of 30, isn't it interesting that two are the same cultivar – from two different gardens?
 - 1334 DMV Tests from over 30 gardens
 - 434 Tests on 434 Different Cultivars
 - 900 Tests were on 271 Cultivars
 - 95 Cultivars had Mixed DMV Results
 - 176 Cultivars were either 100% +ve or 100% -ve for DMV
 - 10 Cultivars where 6 to 10 samples were all DMV-Positive (Integrated??)
 - No Similar examples of DMV-Resistant Cultivars!

DMV-Positive Foliage



Courtesy of
Linda Taylor

Summary

- The Prescription for a Dahlia Garden Basically Free from Problematic RNA Virus is Known
- Dahlia Mosaic Virus Spoiled our Best-laid Plans for a Lot of Clean Stock
- DMV – more questions than answers
 - Evolved, was lost, and rediscovered in 2022
 - Early experience was severe on some cultivars
 - Integrated and harmless? Active and inactive virus particles? Evolving further?
 - DMV-Susceptible Cultivars?
 - Research ongoing at WSU to Understand the Nature and Behavior of DMV
- The Scheetz-Chuey Charitable Foundation to Support the ADS Club Clean Stock Offense Project again in 2023