Cornell University

Viruses in Apple: What can we do?

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Viruses in Apple

- What viruses?
- How do viruses spread?
- What are effective management options?

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Viruses in Apple in New York

Virus name	Acronym
Apple chlorotic leaf spot virus	ACLSV
Apple stem grooving virus	ASGV
Apple stem pitting virus	ASPV
Apple mosaic virus	ApMV
Tomato ringspot virus	ToRSV
Tobacco ringspot virus	TRSV

Apple chlorotic leaf spot virus - ACLSV

B.C. Ministry of Agriculture and Lands

Howell W.E. & Eastwell K.C., WSU

Apple stem pitting virus - ASPV

Yanase H., Japan

Wilcox, W.F., Cornell

ASPV + ACLSV

Red Delicious/G.935

Breth D.I. & Liz Tee, CCE

ASPV + ACLSV

Red Delicious/G.935

Breth D.I., CCE


Apple green crinkle disease
ASPV + ACLSV + ASGV on Granny Smith
Eastwell,K. WSU


Gala/M.9
Apple mosaic virus - ApMV

Tomato ringspot virus – ToRSV

Red Delicious on MM. 106

Ogrodnick, J., Cornell

Tobacco ringspot virus- TRSV

Halbrendt J. M., PSU

Viruses in Apple

- What viruses?
- How do viruses spread?
- What are optimal management strategies?

Transmission of *ACLSV, ASGV, ASPV and ApMV*

- No known insect vector
- No seed transmission
- Budding, grafting & top working

Transmission of ToRSV and TRSV

- Dagger nematodes

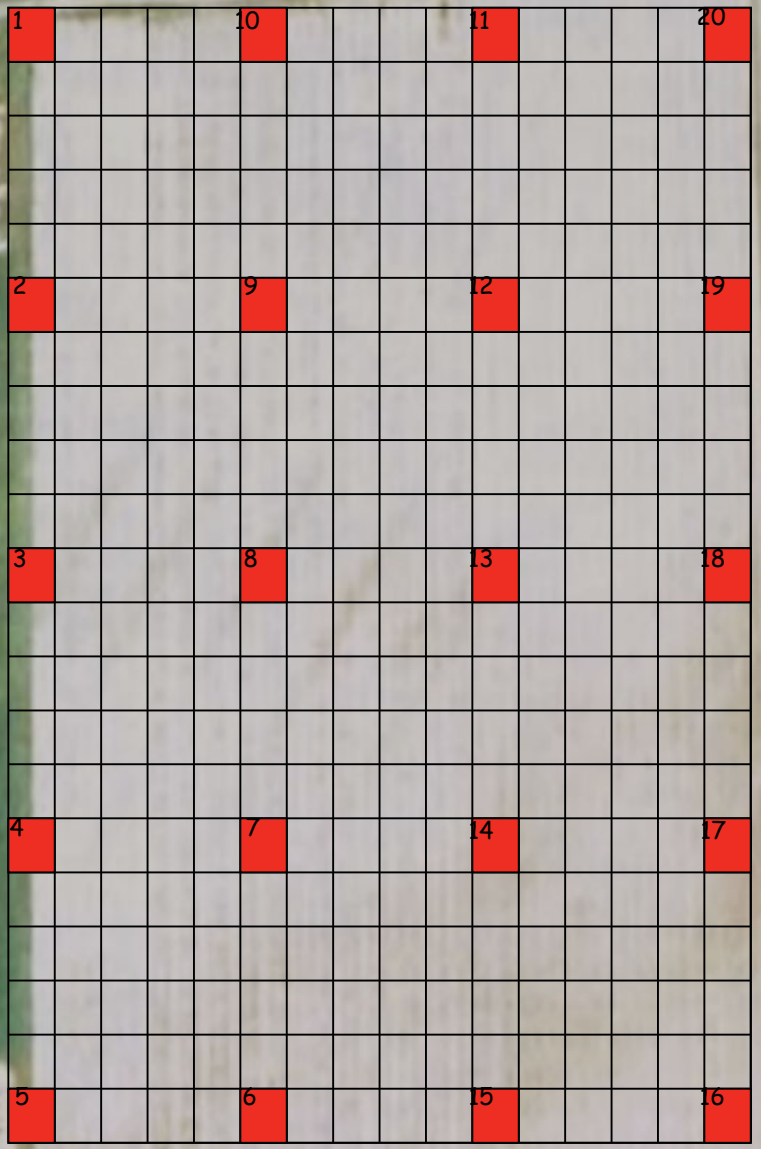

Xiphinema americanum
Abawi G., Cornell

Transmission of ToRSV and TRSV

- Dagger nematodes
- No seed transmission
- Budding, grafting and top working
- Weeds: Chickweed, dandelion, plantain

Surveys of apple orchards

Quadrat sampling strategy with a stratified regular distribution



Surveys of apple orchards

Orchard	N	Single	Multiple
1	32	29	1
2	16	5	0
3	12	9	0
4	80	26	29
5	80	18	0
6	294	76	28
7	9	0	3
Total	542	169 (31%)	67 (12%)

Surveys of apple budsticks

Orchard	N	Single	Multiple
1	58	20	3
2	855	529	23
3	495	216	81
Total	1,408	765 (54%)	107 (8%)

Distribution of Viruses

ASPV	ACLSV	ASGV	ApMV	ToRSV	TRSV	ASPV+ACLSV	ASPV+ACLSV+ASGV
846	50	6	2	7	3	143	9
44%	3%	0.3%	0.1%	0.4%	0.2%	7%	0.5%

N= 1,950

Viruses in Apple

- Who are the culprits?
- How are the culprits disseminated?
- What are effective management options?

Management Strategies

- Carefully select new trees
- Carefully select new planting sites
- Eliminate and manage weeds
- Rogue infected trees if growth and productivity as unsatisfactory
- Carefully select scion buds for top working

Management Strategies

- Be proactive, don't introduce a new disease problem close to your trees

- Scout for virus symptoms:
  - Foliar discoloration or deformity
  - Change in growth habit or maturity timeline
  - Stem pitting or union necrosis
  - Fruit deformation
  - Lack of vigor or decline
  - Inability to cope with other stressors


High quality apples …
Healthy orchards …
Healthy trees!


We are all in it together ...

Acknowledgements

- Debbie Breth
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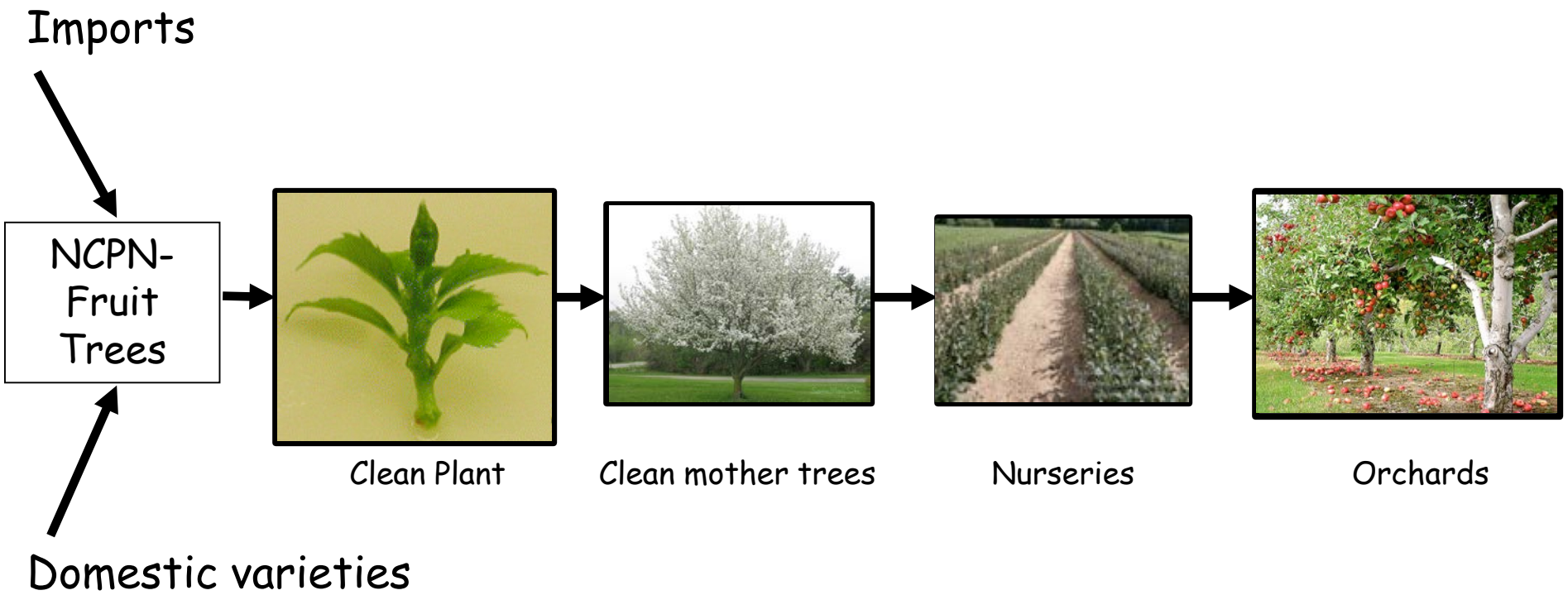
- Cummins Nursery
- Rosemary Cox

ARDP

Activities Associated with Apple Certification



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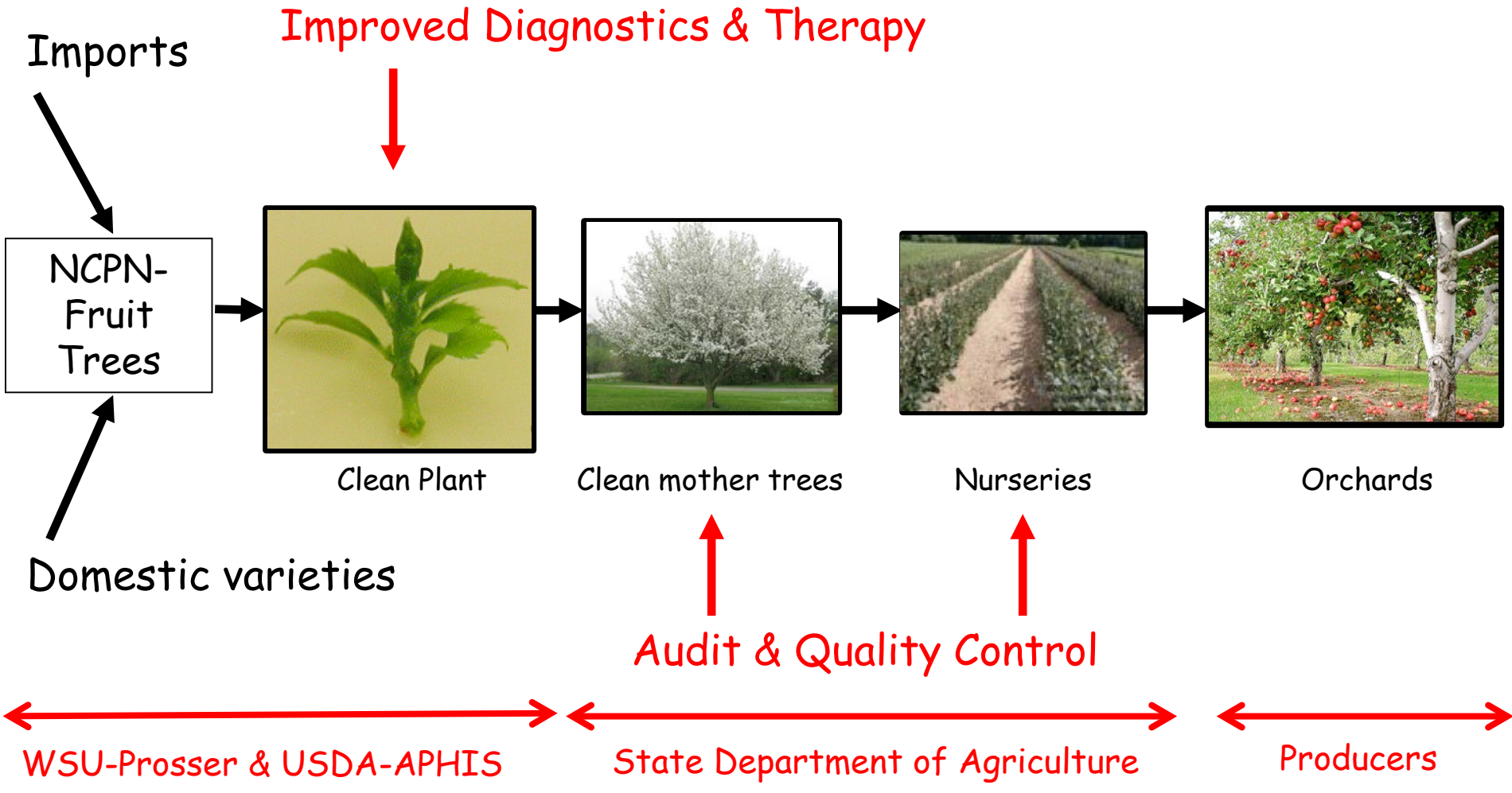
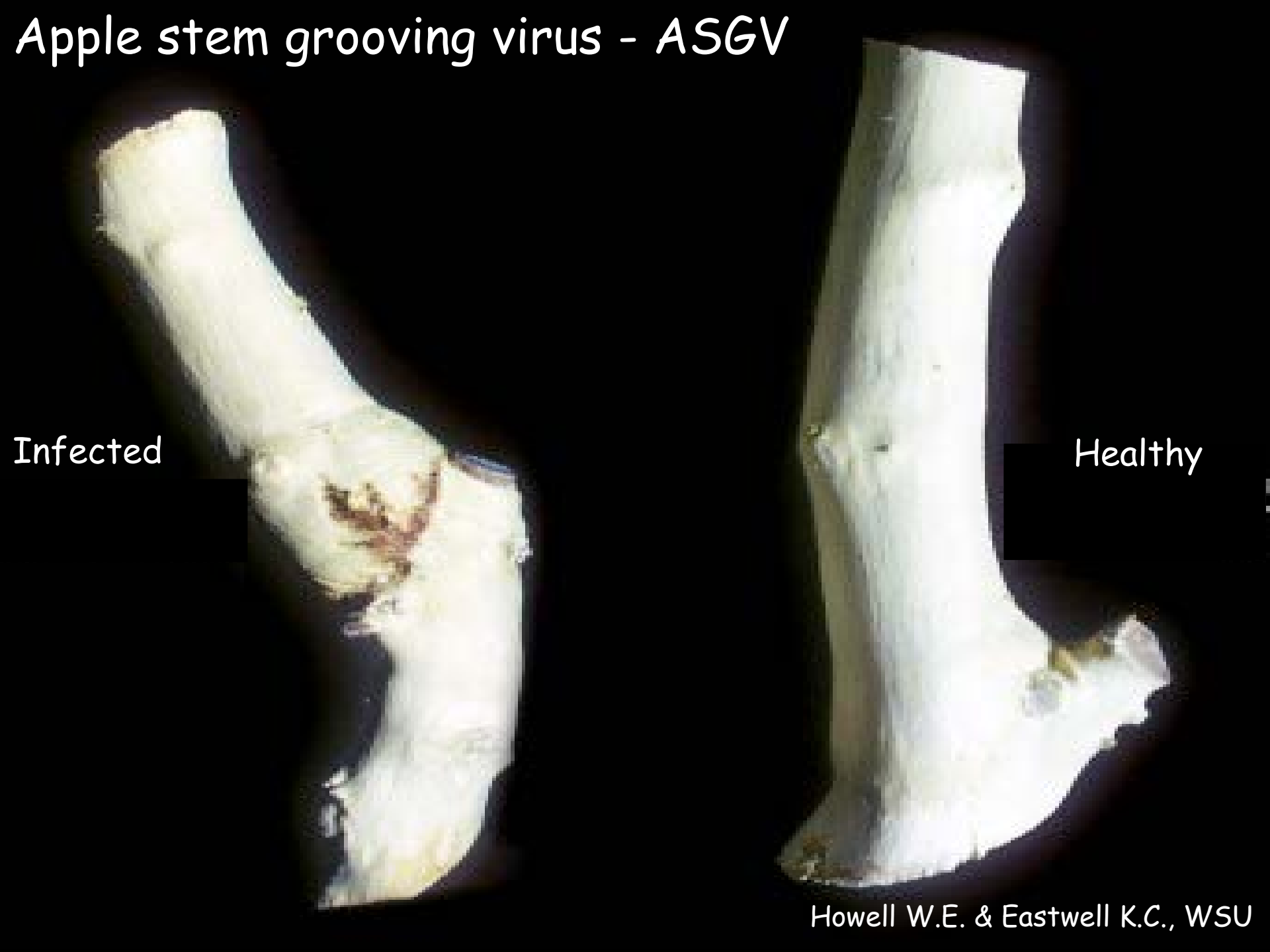


Apple stem grooving virus - ASGV



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