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PUTTING PHENOTYPIC AND GENOTYPIC TOOLS TO WORK FOR IMPROVING WALNUT ROOTSTOCKS

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Project status in 2024: Year 2 of 3

PROJECT OBJECTIVES:

1. In vitro and traditional walnut rootstock propagation that supports continuing selection and trialing of elite walnut rootstocks.

2. Intensive rootstock trialing that confirms putative superiority of new elite rootstocks for commercial walnut production.

3. Extension outreach that scientifically summarizes confirmed advantages and potential limitations of new walnut rootstocks.

4. Preparation for release of one or more rootstock clones

BACKGROUND

California walnut growers are struggling with low crop prices, and many old orchards have recently been removed. An improvement in walnut crop prices may enable growers to replant walnut orchards on superior rootstocks. This is a critical period of opportunity to provide a new generation of walnut rootstocks with superior horticultural traits and resistance to key soilborne walnut plant pests and pathogens, including lesion nematode, Phytophthora, and crown gall. Chemical approaches to managing these pathogens are costly, provide only temporary benefit, pose potential environmental and human risks, and are increasingly regulated. Genetic resistance in well-adapted rootstocks clearly offers the most economical foundation for management of all these soilborne pathogens in California walnuts.

KEY FINDINGS

- Two Juglans major selections of great interest for nematode resistance (AW10 and AW20) were propagated for use in field trials.

- We worked with commercial nurseries to propagate potted plants of new genotypes for validation of pathogen resistance and eventual use in orchard demonstration trials.

- The 2nd-generation trial in Tulare Co. was removed in Fall 2024.

- Tree growth and disease incidence data were collected from five 3rd-generation rootstock trials planted in 2022 and 2023.

- With new 3rd-generation trials maturing, 2025 harvest is expected in 5 different counties: Butte, Glenn, Colusa, Sutter, and Stanislaus

Lead PI	County / Site (Year planted)	Pathogen(s)	Experimental Selections	Harvest?
Fichtner	Tulare (2016)		K3, JM8, 11-991, JM4	No; removed in Fall 2024
Reyes	Sutter / Yuba City (2016)	CG	K3, STJM4, 29JM 8, 11-991	No
Milliron/ Wheeler-Dykes	Glenn / Butte City (2016)	NEM/replant	K3, STJM4, 29JM 8	Yes, annually
Westphal	Fresno / KARE (2018)	NEM/replant/ non-treated - fumigated	29JM2, 29JM8, 29JM11, 29JM12, JMS13, K3, STJM6	Harvest 2020 to 2024, then removal
Westphal	Colusa / Nickels (2019)	NEM/replant/ non-treated - fumigated	29JM2, 29JM8 29JM12, K3, STJM6	Yes
Reyes	Sutter / NEM2 (2022)	NEM	29JM12, AW6, AW9, 29JM11	Yes, beginning 2025
Holtz	San Joaquin (2022)	PHY	MS1-36, TB-18, TB-33, JMS13	No, survival & growth only
Duncan	Stanislaus (2022)	CG	29JM 8, AC452, AD123, AD253, TB33	Yes, beginning 2025
Jarvis-Shean	Solano / Armstrong (2022)	Inoculated with NEM, PHY, & CG	29JM 12, 29JM 8, AD624, AW22, AW6, MS1-122, STJM4, STJM 6, AX1	No, survival & growth only
Ott, Westphal	Durham, Butte (2022)	NEM/non-treated - fumigated	29JM2, 29JM12, AD123, AW6, JMS13, STJM4, TB18	Expected 2025
Jarvis-Shean	Solano / Armstrong (2023)	Inoculated with NEM, PHY, & CG	AD123, AD558, TB18, TB33, TB88	No, survival & growth only