walnuts.org

IMPLEMENTING SOIL TREATMENT STRATEGIES FOR SUPPRESSION OF PLANT PARASITIC NEMATODES IN WALNUT

PROJECT LEADER: Andreas Westphal, Department of Nematology, UC Riverside

COLLABORATORS: Stephen Abbott, Tom Buzo, Katherine Jarvis-Shean, Z.T.Z. Maung, Rainier Medina, Mohamed T. Nouri, Daniel Rivers and Savannah Sanchez

Project status in 2024: Year 2 of 3

PROJECT OBJECTIVES:

This project has the single objective to fully assess the combinatory benefit of preplant treatment options with post-plant application patterns. Such is necessary to develop treatment recommendations with predictability and reliability.

BACKGROUND

Walnut orchards are continually damaged by plant-parasitic nematodes. Especially root lesion nematode (Pratylenchus vulnus) is a wide-spread soil-borne pests. In a survey, ca. 85% of California walnut orchards were infested with this nematode. This nematode poses a threat as soon as it is detected because even low population densities can damage walnut. Management of this nematode is crucial for the longevity and productivity of walnut orchards. Pre-plant soil treatment with the soil fumigant 1,3-dichloropropene (1,3-D), often in mixtures with chloropicrin when following walnut has often been done to remediate nematode damage. Regulation effective since January 1, 2024, prescribe higher soil moisture, deeper application or cover with totally impermeable film (TIF) to reduce the risk for off-gassing and mitigate environmental and human health risks. These guidelines make the use of 1,3-D more cumbersome, more expensive and possibly less efficacious. Promising alternative pre-plant treatments have been discovered but post-plant mitigation tools are urgently needed to safe-guard potentially lower efficacies and to suppress re-infestations.

Novel strategies for nematode suppression have been tested. The potential of chemical nematicides as preplant soil treatments including Salibro (experimental nematicide Corteva) and VelumOne (Bayer), and the fumigant Dominus were examined in walnut. The biorational method of anaerobic soil disinfestation (ASD) showed high potential but requires economically feasible application methods. The non-fumigant materials Salibro and VelumOne need comprehensive evaluation for postplant use. At the same time, nematode management programs with postplant application strategies after potential less effective preplant treatments including simplified application methods of ASD need full exploitation.

KEY FINDINGS

In 2024, the emphasis of the project was on postplant applications in five pre-plant treatment trials that had been initiated between 2018 and 2022 to evaluate the relative benefit of the new nematode management programs. Key findings of this trial series were:

- When Dominus pre-plant treatment was followed with postplant applications of Salibro, yields were consistently similar to those after Telone EC treatment.
- California registration of Dominus appears unlikely.
- Anaerobic soil disinfestation (ASD) with sudangrass 'Piper' biomass as substrate was initially efficacious against root lesion nematode when combined with postplant applications of Salibro, early yields were comparable to those in soil fumigation plots.
- Efficacy of simplified ASD with moldboard plow incorporation initially comparable to that of drench application with drip lines under tarp was more variable at longer monitoring.
- Salibro was effective as postplant material.
- Salibro received a federal label and awaits registration in California.
- Pre-plant soil treatment with Salibro plus at plant and post-plant applications protects walnut plantings had some root lesion nematode reducing potential and in fine-textured soil resulted in numerical plant growth improvements.