

AES/CE MAR 84Workgroup/Department:

University of California  
Division of Agricultural Sciences

## PROJECT PLAN/RESEARCH GRANT PROPOSAL

Project Year 2009

Anticipated Duration of Project: 2 years

Project Leader: Michael McKenry

Location: UC Riverside Nematology

Cooperating Personnel: Joe Grant, San Joaquin Co Farm Advisor and others.

Project Title: A new post-plant nematicide with potential for walnut

Keywords: *P. vulnus*, Movento, spirotetramat

Commodity(s) walnut

Relevant AES/CE Project No. 3188H

### **Problem and its Significance:**

The task of finding a post-plant nematicide suitable for walnut soils has been formidable; particularly when limited to relatively short half-life products delivered deep within soil. The first foliar-applied nematicide, Vydate, was identified in 1971 by John Radewald at UCR. Its performance was quickly found to be inadequate and most would suggest that was because only ~5% of the ai was actually getting to the roots. Prior to 1971 nematologists had repeatedly noted that a foliar-applied nematicide should be a top research priority.

Since 2000 this PI has screened 35 potential nematicidal agents of all types for the California Table Grape Commission. In 2006 we began our first treatments involving a new product that we called BY expt. It is a foliar-applied insect growth regulator that when applied with surfactant can enter the leaf cuticle and rather quickly metabolize to a nematicidal enol derivative. This metabolized form is quite soluble and moves via the phloem throughout the plant, including its roots. More specifically, it concentrates in juvenile plant tissues wherever they occur, particularly root tips. Liquids within phloem can travel a distance of one meter in one hour. We believe the metabolite of Movento is reaching grape roots within several days after treatment. With grapes we have now achieved 50% population reductions for periods as long as three months, if properly applied. All nematodes contain an abundance of lipids and the mechanism of action for Movento's metabolite is the disruption of lipid synthesis. This product is working on all nematode species and genera but some nematodes (eg dagger nematode) show the negative impact in 18 days while other species (eg ring nematode and root lesion nematode) do not show the negative impact for 50 days, even though nematodes were impacted within 18 days.

In 2006 we were achieving 10 to 20% population reductions for one month using 20 ounces/acre Movento. In 2007 we shifted to earlier timings and 4 applications at 6.25 ounces/acre, still

achieving only 10 to 20% population reductions. In 2008 we shifted to 4 ounces/acre one time in early spring versus 4 ounces applied 3 times at 18 day intervals. It was in summer 2008 that we learned the importance of not irrigating within 2 weeks after an application. It was also in that year that we achieved 3 months of 50% nematode control following a single application. In one case we achieved 70% control and in a few other cases achieved only 20% control. Much more must be learned to properly use of Movento as a nematicide because there appear to be mechanisms that can nullify its performance.

In large field trials with grape and citrus we achieved yield responses with 10% yield improvement during the first year of application. In 2008 we broadened our search to own-rooted Serr and Serr on NCB. The nematode impact was apparent with substantial variability but *P. vulnus* can be impacted to the level of 50% for at least a month. However, these drip-irrigated trees were receiving irrigation throughout our application periods.

We have initiated several Movento treatments beginning fall 2008 using 7 ounces (~\$60/acre) within a volume of spray that is appropriate to tree size. Our intent is to spray in spring and fall with no subsequent irrigations for 2 weeks. This should provide 6 months of 50% nematode relief per year. Movento is not currently registered for **nematode** control on any crop but is registered on many crops, including walnut against various insects with a top label rate of 21 ounces per year. The first publication on Movento as a nematicide has not yet been written.

### **Objectives:**

- 1) Field evaluate the performance of 7 oz Movento against various nematodes in commercial orchards having paradox, english or black walnut roots when applied in spring (April 15 to April 25) or fall (November).
- 2) Determine the soil depth that root lesion nematode can be impacted with Movento. This will be quantified per gram of root and per volume of soil with samples collected monthly.
- 3) Adjust timing and treatment rates as needed where performance is inadequate.
- 4) Collect yield data from mature trees and trunk girths from younger trees. Our preferred yield data comes during two-year field trials.

### **Plans and Procedures:**

Foliar applications to walnut trees necessitate rather large field trials. One approach we have already tested is for the sprayer to traverse between two rows a distance of six trees > shut off the nozzles for 6 trees > resume treatments to the next six trees. We then collect soil and root samples from trees in the middle of each of these treated zones. For fall treatments to 25 yr-old walnut trees at Kearney Ag Center we have applied 7 oz/ac Movento with 300 gpa water. The volume of water will be less (150 gpa) for early springtime treatments. For younger trees the volume of water will be reduced but the 7oz./acre rate will remain the same until we identify better treatment rates. Younger trees will be sprayed by hand to avoid drip between trees.

Soil and roots will be collected at appropriate depths from five treated and five non-treated trees every 30 days for a period of 6 months from each experimental site. Shovels provide the best tools for gathering walnut roots and soil but in settings where depth of nematicide delivery is important the use of a backhoe pit can be essential as the side-walls are explored for root tips.

Treatments for each objective will be replicated at least 5 times. All nematode counts will be log-transformed and subjected to ANOVA. Results are usually best presented as nematode counts from the treated zone compared to that in the non-treated.

We have identified that spray treatments with another systemic product (Admire, NatureCur or fosthiazate) several weeks ahead of Movento can nullify the nematicidal value of Movento. We are also aware that different leaf types may take up Movento with different efficiencies. Our current spreaders are Dynamic or various Penetrator products. An improved understanding of these variables is essential but that type of study will mostly be carried out with funding from the chemical manufacturer. Our goal with this proposal is to identify the best procedures for obtaining nematode control in walnut orchards on various rootstocks. We will solicit settings where there is grower interest and the grower already has adequate spray equipment plus backhoe availability. We will also continue our studies with grapevines that may provide better leads to improved efficacy compared to walnut trees.

**BUDGET REQUEST**

**2009-10 Budget Year**

Funding Source: Walnut Marketing Board

Salaries and Benefits \_\_\_\_\_

Postdocs/RA's \_\_\_\_\_

SRA's \$6,500 \$6,500

Lab/Field Assistance \_\_\_\_\_

Subtotal Sub 2 \$6,500

Employee benefits Sub 6 \$3,500

TOTAL \$10,000

Supplies and Expenses Sub 3 paid by mfg.

Equipment Sub 4 supplied by grower

Travel Sub 5 paid by mfg.

TOTAL \$10,000

Department account number \_\_\_\_\_



Date 11/25/08

Originator's Signature

COOPERATIVE EXTENSION

County Director \_\_\_\_\_ Date \_\_\_\_\_

Program Director \_\_\_\_\_ Date \_\_\_\_\_

AGRICULTURAL EXPERIMENT  
 STATION

Department Chair \_\_\_\_\_ Date \_\_\_\_\_

LIAISON OFFICER

\_\_\_\_\_ Date \_\_\_\_\_