

University of California
Division of Agricultural Sciences

Project Plan/Research Grant Proposal

Project Year 2009-1010 Anticipated Duration of the Project
 Project Leader Steve Welter Location UC Berkeley
 Cooperating Personnel Frances Cave, Bob Van Steenwyk, Carolyn Pickel, Joe Grant
 Project Title Optimizing “meso-pheromone” emitters for codling moth management in walnuts
 Keywords walnuts, codling moth, pheromone mating disruption
 Commodity(s) walnuts Relevant AES/CE Project No.

Significance:

Two new pheromone products have the potential to enter the walnut pest management market: 1) a meso-membrane emitter from Suterra and 2) a meso-chain emitter from Pacific Biocontrol.

Development of the meso emitter as a concept has been done with a variety of novel products: a) wax based blocks 2) modified Checkmate dispensers with new membranes and sizes and c) an uncut chain of Isomate ropes that all produced pheromone emission rates per acre that were roughly the equivalent of smaller point source emitters. The use of few point sources (ca. 20 per acre) challenged the prevailing dogma that many point sources were needed to provide effective codling moth control and supported the on-going experience in Lake County which has used only 1 point source (Suterra Puffer) per acre.

Studies were conducted in 2008 using 20 point sources per acre in 5 acre replicated plots across 5 orchards for a total of 11 plots. The largest contiguous areas treated with 20 dispensers per acre were 10 acres in size. Codling moth pressures varied from ca. 10 total moths for the season to >500 moths in pheromone treated plots. Grower insecticide treatments were kept consistent across the grower standard and experimental pheromone treated plots (Suterra meso emitter and Isomate chain plots). Fortunately, smaller plots sizes of 5 acres were used in 2008 as unexpected issues with sealing along the margins were found for the Suterra membrane dispensers.

Larger plots need to be used to challenge the products more aggressively before these products become widely available. The additional year of experience using smaller plots has provided the confidence to move forward both with the technology and the approach in 2009. The advantages for this approach arise from the ease of application and reduced costs given that the number of dispensers is reduced by approximately 90%. The second advantage is the passive nature of the release compared to a mechanical device such as a puffer. Despite the very low failure rates of the puffer units presently (<1%), some growers remain apprehensive about the use of mechanical devices. Finally, puffers do not appear to be a suitable approach for smaller orchards, e.g. 20 acre plots, if not part of a larger areawide project given the lack of plume overlap. Therefore, the meso-pheromone products have the potential to provide some of the advantages of fewer point source programs to smaller orchards given that at least 20 sources of the pheromone are distributed per acre throughout the orchard.

Studies in 2008 using lower total pheromone levels showed excellent suppression of codling moth flights, but did not show any additional value for damage suppression because codling moth pressures

were too low to distinguish between treatments. These studies were conducted in 3 orchards with a total of 24 5-acre blocks. In 2009, orchards will be used that have intermediate pressure levels and yet do not spray for codling moth prophylactically in hopes of providing a more direct test of the pheromone programs. Orchards that either had ca. 3% damage in 2008, organic walnut orchards, or orchards under “relaxed management” will be used in 2009.

Objectives:

1. Large block testing of meso-emitter dispenser(s) developed in 2008
2. Continued evaluation of lower levels of pheromone per acre
3. Participation in areawide mating disruption of codling moth in walnuts using puffers (no funds requested)

Plans and Procedures

Modified pheromone emitters

Larger blocks between 20-40 acres will be used as replicates depending on the orchard size. Treatments will include 1) pheromone plus standard program 2) standard program 3) pheromone only as a smaller 1-acre subunit within the pheromone plus standard program. If possible, a one acre plot that is totally untreated will be included. This approach should provide several contrasts: a) pheromone with and without insecticides and b) pheromone alone versus no control, if available.

Five larger scale studies will pair plots of 20-40 acres of the meso-pheromone product with a standard pheromone program (either Checkmate or Isomate) in orchards that had at least intermediate levels of pressure in 2007 based on codling moth counts (ca. 75 moths or greater). A five-acre pheromone standard will be included which is the commercially available pheromone product (Checkmate) at full rate. Twenty meso-pheromone dispensers will be used per acre. Growers will be asked to maintain consistent control measures across the plots so as to avoid confounding treatments that would prevent meaningful comparisons. Depending on pressure, early season prophylactic treatments will be avoided on small 1 acre plots in both treatments, if possible, to provide an estimate of damage suppression directly from the insecticides.

Damage will be evaluated by canopy counts during the growing season (500-1000 fruit per subsample in each plot) with the number of subsamples dependent on the total plot size. Final damage estimation will be taken at harvest. Codling moth pressure will also be estimated by weekly trap capture using 1x and combo lures of pear ester and pheromone from Trécé.

Testing of lower pheromone loads per acre using 20 dispensers per acre

In collaboration with funding from UC/IPM, the level of pheromone that provides adequate control using the same number of dispensers per acre (20) will be evaluated to try and determine the “break point” after which effective control is not achieved. In contrast to the UCIPM grant proposal, 2 types of pheromone dispensers will be used (the Isomate chain and the Sutterra Meso emitter). The type of dispenser is less important than the total emission rate per point source, but we can achieve a greater range of emission rates using multiple emitter types. Secondly, a common emission rate to both dispensers will be used for direct comparison of the 2 dispensing types in case our assumption of equality is violated.

Areawide Management Using Puffers – aid with grant headed by C. Pickel and J. Grant (see grant for details – no funds requested.)

BUDGET – Management of codling moth - walnuts

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Salaries	SRA II (45% time @ \$5084 / mo)	\$27,454
	Salary Subtotal	\$27,454
Benefits (21.13%)		\$5801
	Subtotal	\$33,255
Travel (Seasonal rental, mileage,...)		\$3,000
Equipment (hydraulic lift rental)		\$1000
Supplies	Miscellaneous (traps, lures, colony materials)	\$500
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	Total	\$37,755

Originator's Signature

Date

COOPERATIVE EXTENSION

County Director

Date

Program Director

Date

AGRICULTURAL EXPERIMENT
STATION

Department Chair

Date

LIAISON OFFICER

Date