# CRITERIA FOR RANKING EVALUATIONS OF IR-4 ADVANCED STAGE BIOPESTICIDE PROPOSALS-2014

Proposal number/Title/PI: **6A, Evaluation of Biopesticide, Veratran D for Control of Spotted Wing Drosophila and Thrips in Berry Crops, Liburd**

The following criteria were established to assist the reviewers in selecting biopesticide projects for funding that: (1) are either in a more advanced stage of development (as opposed to exploratory or early stage of development) or involve expansion of the label; (2) have a high probability of being registered/marketed in a reasonable period of time; and (3) will be useful in meeting pest control needs involving minor crops (uses), including minor uses on major crops.

| Criteria | Score (0 to 10 or 20) |
|---|---|
| 1. Adequacy of investigators and facilities. | of 10 |
| 2. Experimental design, work plan and preliminary research. | of 10 |
| 3. Does experimental design allow to determine performance relative to conventional control practices and how the biopesticide might fit into IPM programs. | of 10 |
| 4. Evaluation of Budget | of 10 |
| 5. Relevance of the proposal toward the development of data for registration or label expansion of the biopesticide. | of 10 |
| 6. Evidence of Efficacy. Positive supporting data provided. | of **20** |
| 7. Probability of biopesticide being used by growers (factors such as effectiveness and economics of use rates should be considered). | of 10 |
| 8. Other control measures currently available to control target pest. | of 10 |
| 9. Probability of biopesticide being registered, time to registration, and if label expansion, time to market. | of 10 |
| TOTAL* | of 100 |

Funding Recommendation (Check appropriate line)

YES _____

NO _____

MAYBE _____

Note: Attach a comment page, should you have specific comments related to the proposal not covered in the above criteria.

* There is a possibility of 10 points per criteria (except efficacy=20) for a total of 100 points. A rating of 0 means that the proposal does not meet the criteria at all, while a rating of 10 means it is ideal.

Reviewer's Initials _____

# IR-4 BIOPESTICIDE GRANTS COVER PAGE

## 2014

| | |
|---|---|
| Proposal Number (For IR-4 Use): | Principal Investigator: Dr. Oscar Liburd |
| Proposal Title: Evaluation of Biopesticide, Veratran D for Control of Spotted Wing Drosophila and Thrips in Berry Crops | |
| Institution: University of Florida | |
| Total dollars Requested $17,332 | |

Enter each biopesticide /crop/ pest combination

| No. | Biopesticide and/or Conventional Product TRADE Name | Active Ingredient | Crop | Pest (Weeds, Diseases, Insects) |
|---|---|---|---|---|
| 1 | Veratran D | Sabadilla Alkaloids | Blueberry, Strawberry | SWD (Spotted Wing Drosophila), Thrips |
| 2 | PyGanic® | Pyrethrum | Blueberry, Strawberry | SWD (Spotted Wing Drosophila), Thrips |
| 3 | Entrust® | Spinosad | Blueberry, Strawberry | SWD (Spotted Wing Drosophila), Thrips |
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**Biopesticide Grants Contact Information Form**

| ***Proposal Title:***<br><br>Evaluation of the biopesticide, Veratran D for control of spotted wing drosophila and thrips in berry crops | **Address**<br>**Street** | **City/State** | **Zip+4** | **Phone & Fax Number** | |
|---|---|---|---|---|---|
| **Project Director (*Principal Investigator*):**<br>Dr. Oscar E. Liburd | University of Florida Entomology and Nematology, 1881 Natural Area Drive, Steinmetz Hall | Gainesville, FL | 32611-0620 | (352) 273-3918<br>(352) 392-0190 | oeliburd@ufl.edu |
| **Co-investigator**. Dr. M. Samuel-Foo | University of Florida FSHN/FETL, SW 23rd Drive | Gainesville, FL | 32611-0270 | 352-392-1978 x 406 | mfoo@ufl.edu |
| **Administrative Contact:**<br>Oliverne M. "Virni" Mattson | Entomology and Nematology, 1881 Natural Area Drive, Steinmetz Hall | Gainesville, FL | 32611-0620 | (352) 273-3901<br>(352) 392-0190 | virni@ufl.edu |
| **Financial Grant Officer:**<br>Brad S. Staats, Assistant VP for Contracts & Grants, Contract and | Division of Sponsored Programs, 123 Grinter Hall | Gainesville, FL | 32611-3001 | virni@ufl.edu | staatsb@ufl.edu |
| **Authorized Grant Official:**<br>Brian Prindle | Division of Sponsored Programs, 219 Grinter Hall | Gainesville, FL | 32611-5500 | (352) 392-1582 | ufproposals(@ufl.edu |
| **Individual Responsible for Invoicing:**<br>Nadeige King | Contracts & Grants Accounting Services, 29 Tigert Hall | Gainesville, FL | 32611-0116 | (352) 273-3485 | n.king@ufl.edu |

NOTE: THIS IS FOR INFORMATIONAL PURPOSES ONLY. THIS IS NOT MEANT TO BE SIGNED. DO NOT DELAY SUBMITTING YOUR PROPOSAL BY ATTEMPTING TO GET THIS SIGNED. THIS IS NOT MEANT AS A REPLACEMENT FOR ANY INSTITUTIONAL APPROVAL PAGES.

I. **Grant Stage** What is the grant Stage to which you are applying? Early or Advanced (Check appropriate line)

X Early – Biopesticide not yet registered and has not completed the Tier I toxicology data requirements.

X Advanced – the biopesticide is registered or at least has completed the Tier I toxicology data requirements.

If you are applying for any Advanced Stage Proposal, and the product is not currently registered with EPA, provide a list of the toxicology work that has been completed. Ask registrant or have company provide information to IR-4.

→ Changed to Advanced
MB
11/6/13

**II. Introduction** (***Limit 1 page***) Include the objective, description of the pest problem and justification.

Florida blueberry and strawberry industries are valued at 70 and 380 million USD, respectively. These industries provide an economic alternative for citrus growers whose industry has been in a state of decline due to the tree-killing disease, Huanglongbing. Blueberries and strawberries provide high economic returns for Florida growers. These crops are produced during the winter to early spring when other states cannot compete for market shares. This has resulted in the expansion of blueberry acreage by at least 30% and strawberry acreage by 18% in the past decade. Despite the lucrative aspects of producing berries in Florida and the increase in acreage, the arrival of two invasive pests, spotted wing drosophila (SWD), *Drosophila suzukii* (Matsumura) and chilli thrips, *Scirtothrips dorsalis* Hood has seriously threatened these industries. At present, management strategies for SWD and chilli thrips are still surfacing but conventional growers can cope with these pests due to the extensive research and development directed to identifying insecticides and developing resistance management and rotational sprays for these pests. Unfortunately, minimal research has been directed to finding compounds that can be used for organic pest management despite having almost 20% organic berry production in Florida. Our goal is to provide additional tools that organic growers can use to manage SWD and chilli thrips. Specifically, **our objectives are: 1) to evaluate the biopesticide, Veratran D (Sabadilla) for SWD and thrips control in berry crops and 2) to compare Veratran D efficacy with other standard organic pesticides including PyGanic® EC 5.0 (pyrethrin) and Entrust® (spinosad).** Our proposal targets two key pests, SWD and chilli thrips, which are outlined in the 2014 IR-4 priorities.

The SWD is an invasive pest of thin-skinned and stone fruit crops that is threatening Florida's blueberry and strawberry industries. This insect was first detected in the continental U.S. in California strawberries and caneberries in August 2008 and made its debut in Florida in 2009 in Hillsborough County. Currently SWD have been recorded in more than 28 counties in Florida including all major blueberry and strawberry producing areas (Liburd and Iglesias 2013). Unlike common drosophila flies that infest overripe and decaying fruits, SWD females have a serrated ovipositor used to puncture healthy, ripening fruits. Eggs are deposited just below the surface of the fruit and the larval stages develop inside rendering the fruit unmarketable**.**

Thrips are also major pests for blueberry and strawberry growers. Common species that cause economic damage in blueberries and strawberries are the Florida flower thrips, *Frankliniella bispinosa* (Morgan) and Western Florida thrips, *Frankliniella occidentalis* (Pergande). The Florida flower thrips is the key early-season pest in southern highbush blueberries (Liburd et al. 2005) and strawberries. The western Florida thrips is also a common species found in strawberries in the central parts of the state. Adults and larvae feed on the reproductive parts of the flower that result in fruit scaring, decreasing the marketability of the berries.

Another species of thrips that causes economic damage to berry crops is the invasive chilli thrips. During the 2012-2013 production season high populations of chilli thrips were recorded in strawberries during the spring and in blueberries during the peak of summer. Chilli thrips infest the developing leaves of host plants resulting in scarring and distortion of leaves (Kumar et al. 2010) and high populations of chilli thrips can substantially reduce marketable yields.

**Justification.** To date SWD and chilli thrips have been the most serious threats to Florida's blueberry and strawberry industries. Conventional growers are able to cope with these new invasive pests due to research that focus on conventional systems. However, management tools for organic growers are very limited and sometimes unavailable. We propose to evaluate the bio-pesticide, Veratran D® (Sabadilla) for SWD and thrips control. Veratran D® is a broad-spectrum biopesticide that is effective against sucking/rasping insects including avocado thrips (*Scirtothrips perseae*) and citrus thrips (*Scirtothrips citri*). Therefore, we hypothesized that Veratran D® will control the related species chilli thrips (*Scirtothrips dorsalis*), flower thrips and SWD.

## III. Experimental Plan (Please limit this section to 10 pages)

1. **Provide a numerical list of all treatments including the products (Trade names and active ingredients, rate (units), application timing, etc. A majority of the treatments must be biopesticides (see http://ir4.rutgers.edu/Biopesticides/LabelDatabase/index.cfm). If you are not sure, ask.**

   ***BB = Blueberries**
   ***SB = Strawberries**

| No. | Biopesticide Trade Name (Active Ingredient) | Rate | Application Timing | Application Method |
|---|---|---|---|---|
| 1 | Veratran D<br>(Sabadilla alkaloids) | 8 lbs/ac (low) | ***BB Trial 1.** Early spring when plants begin to flower | CO2 sprayer |
| | | | **BB Trial 2.** Inset of new growth after harvest | CO2 sprayer |
| | | | ***SB Trial 1.** Early spring | CO2 sprayer |
| 2 | Veratran D<br>(Sabadilla alkaloids) | 13 lbs/ac (medium) | **BB Trial 1.** Early spring when plants begin to flower | CO2 sprayer |
| | | | **BB Trial 2.** Inset of new growth after harvest | CO2 sprayer |
| | | | **SB Trial 1.** Early spring | CO2 sprayer |
| 3 | Veratran D<br>(Sabadilla alkaloids) | 18 lbs/ac (high) | **BB Trial 1.** Early spring when plants begin to flower | CO2 sprayer |
| | | | **BB Trial 2.** Inset of new growth after harvest | CO2 sprayer |
| | | | **SB Trial 1.** Early spring | CO2 sprayer |

| | | | | |
|---|---|---|---|---|
| | | | **BB Trial 1.** Early spring when plants begin to flower | CO2 sprayer |
| | | | **BB Trial 2.** Inset of new growth after harvest | CO2 sprayer |
| | | | **SB Trial 1.** Early spring | CO2 sprayer |
| 4 | PyGanic® EC 5.0<br>(Pyrethrum) | 20 oz/ac in 50 gal water | **BB Trial 1.** Early spring when plants begin to flower | CO2 sprayer |
| | | | **BB Trial 2.** Inset of new growth after harvest | CO2 sprayer |
| | | | **SB Trial 1.** Early spring | CO2 sprayer |
| 5 | Entrust®<br>(Spinosad) | 1.25 oz/ac in 100 gal water | **BB Trial 1.** Early spring when plants begin to flower | CO2 sprayer |
| | | | **BB Trial 2.** Inset of new growth after harvest | CO2 sprayer |
| | | | **SB Trial 1.** Early spring | CO2 sprayer |
| 6 | Water (Control) | Water only | **BB Trial 1.** Early spring when plants begin to flower | CO2 sprayer |
| | | | **BB Trial 2.** Inset of new growth after harvest | CO2 sprayer |
| | | | **SB Trial 1.** Early spring | CO2 sprayer |

Veratran D (Sabadilla Alkaloids) [MGK, Minneapolis, MN] is a biopesticide that is botanical in nature. It has broad-spectrum activity against sucking/rasping insects including thrips (see information on label about citrus thrips). Therefore, there is great potential for control of flower thrips, *Frankliniella* spp. as well as chilli thrips, *Scirtothrips dorsalis* in blueberries and strawberries. This organic pesticide also has potential to control fruit flies including SWD. Veratran D will be compared with two commercial standards; 1) PyGanic EC 5.0 (Agriculture Solutions, Strong, Maine); 2) Entrust®

(Spinosad) (Dow AgroSciences, Indianapolis, Indiana) and a water treated control.

PyGanic® is an OMRI Listed **organic** pesticide that is used extensively in commercial organic production. It contains the botanical compound pyrethrin (derived from chrysanthemum) and is broad-spectrum in nature. PyGanic® controls a number of insect pests including fruit flies and thrips.

Entrust® is a naturalyte insecticide formulated from the toxin of a bacterium, *Saccharopolyspora spinosad*. It is used extensively in commercial organic agriculture for control of lepidopteran pests including armyworms, loopers and tobacco budworm as well as thrips control.

2. **What crops or sites will this study be conducted on?**

The study will be conducted on southern highbush blueberries and strawberries. The blueberry experiment will be carried out at a certified organic grower's farm in Citrus County, Florida and the strawberry experiment will be conducted at the University of Florida, Plant Science Research and Education Unit in Citra (PSREU) on certified organic land.

3. **What experimental design will be utilized? (Such as Randomized Complete Block. Will there be a complete factorial arrangement of treatments? Also include plot size, statistical tests, etc. Please see section Treatment lists and design of biopesticide studies on page 40). Note: EPA requires an Experimental Use Permit if the total treated area is above 10 acres. It may also require destruction of a food crop if there is no existing tolerance. Please document the existence of an EUP if applicable.**

**Blueberry Trials.** A randomized complete block design will be used with 6 treatments including a control (untreated plot) and 4 replicates. The experiment will be carried out at a certified organic grower's farm in Citrus County, Florida. Individual blueberry plot size will be 10 bushes spaced ~5 ft apart. There will be 2 bushes (~10 ft) serving as a buffer zone between plots to prevent interference with spray drift. Two experiments will be established in blueberries. Southern highbush blueberries experience high infestations of flower thrips in early spring when plants begin to flower therefore experiment 1 (BB1) will begin as thrips populations reach their threshold. Spotted wing drosophila targets the developing fruit; therefore, a two-week break will occur 1 month following the start of experiment 1 then two subsequent applications will be made to determine SWD infestation (4 total applications). Experiment 2 (BB2) will begin after blueberries are harvested when there is a lot of new growth and Chilli thrips usually invade plants to feed on the young growth (2 applications).

**Strawberry Trial.** A randomized complete block design will be used with 6 treatments including a control (untreated plot) and 4 replicates. The experiment will be conducted at the University of Florida, Plant Science Research and Education Unit in Citra (PSREU) on certified organic land. Similarly, individual strawberry plots will be 20 X 20 feet with a 10 feet buffer zone between plots. Strawberry plants will be grown from plugs on raised beds using standard organic production techniques. There will be one experiment established in strawberry (SB1). The experiment will begin in early spring as plants

experience varied populations of flower thrips. In some cases Chilli thrips usually invade younger leaves during this time. In Florida, the fruiting period for strawberries spans between December and April and flowers are present continuously. Therefore, monitoring for thrips and SWD will occur simultaneously in strawberries (2 applications)

The treatment designs for all trials will be comparing the efficacy of a 'new' product Veratran D to two standard organic pesticides, PyGanic® and Entrust®, for the control of multiple thrips species and the spotted wing drosophila. Experiments will begin as thrips populations reach their threshold of 2 per flower (Arevalo 2006). A threshold has not been established for SWD so the presence of one SWD will initiate applications. Treatments will be applied at the above listed rates beginning in early spring in blueberries (BB1), during the onset of new growth after harvest of blueberries (BB2), and in the early spring in strawberries (SB1). Applications will be made 4 times during BB1, and twice during BB2 and SB1 10-14 days apart. Compounds will be applied with $CO_2$ sprayer early in the morning before pollinators are active. Spray volume will be equivalent to standard commercial practice of 50-100 gal per acre.

**Sampling for thrips and spotted wing drosophila**

**Flower thrips.** White sticky cards/traps and flower collection will be used to assess flower thrips in blueberries. Sticky traps will be hung within the canopy of bushes at the beginning of flowering in blueberries (Liburd et al. 2008). One sticky trap (Great Lakes IPM Vestaburg, MI) will be used per treatment. Sticky cards will be left in the field for 72 hrs once a week and a new card will be replaced weekly until 3 weeks after the final treatment application. Each week cards will be collected and taken back to the University of Florida, Small Fruit and Vegetable IPM Laboratory (SFVIPM) in Gainesville, FL to be assessed with the help of a stereomicroscope for thrips. A representative sample of thrips from the sticky cards will be collected in vials and cleaned with histoclear (Great Lakes IPM, Vestaburg MI). These thrips will be slide-mounted identified to species using keys (Arevalo et al. 2005).

Flower samples will be collected weekly from blueberry bushes and strawberry plants at the beginning of flowering period. In blueberries 5 flower clusters will be collected from each experimental plot (each cluster has 5-8 individual flowers). For strawberries, 30 flowers will be randomly collected weekly from each experimental plot. Ten flowers from blueberries and 10 from strawberries will be placed in 50-ml centrifuge tubes containing 25 ml of 70% ethanol. Vials will be brought back to the SFVIPM laboratory for processing. Flower thrips will be sampled using the shake-and-rinse method developed by Arevalo and Liburd (2007) for use in blueberries. Because strawberry flowers are much more open than blueberry flowers, only one shake and rinse will be required. Flower thrips will be identified to species and sexed with the aid of a compound microscope. The number of males and females of each species will be recorded.

**Chilli thrips.** Leaf and sticky cards samples will be used to evaluate Chilli thrips in blueberries and

strawberries. Leaf samples will be collected weekly starting one month after harvesting in blueberries and one month after planting in strawberries. Twenty new growth leaves will be collected per plot randomly each week in blueberries. Similarly, in strawberries 20 trifoliate leaves will be collected randomly each week from each treatment plot. Leaves will be placed in gallon sized re-sealable plastic bags and taken back to the University of Florida SFVIPM in Gainesville, FL. Each leaf will be examined under a dissecting microscope and the number of chilli thrips counted and recorded.

Sticky cards will be left in the field for 72 hrs once a week and a new card will be replaced weekly until 3 weeks after the final treatment application. Each week cards will be collected and taken back to the University of Florida, Small Fruit and Vegetable IPM Laboratory (SFVIPM) in Gainesville, FL to be assessed with the help of a stereomicroscope for thrips.

**Spotted wing drosophila** Trapping and fruit samples will be used to assess spotted wing drosophila (SWD) population during blueberry trial 1 and strawberry trial 1. One trap will be placed in each treatment once the first blueberry or strawberry begins to ripen. The SWD traps will be cup shaped traps (Price et al. 2012) made with 0.95-L clear plastic cups with lids (Solo®, Urbana, IL) with 4 to 7-mm holes along the sides of the containers serving as adult fly entrances. Traps will be baited with 150 ml of a yeast sugar mixture. Traps will be placed in shaded areas of the blueberry or the strawberry canopy. Each week, the contents of each trap will be emptied into another container and replaced with fresh bait. The containers will be brought back to the University of Florida SFVIPM laboratory for processing. The contents of the containers will be examined under a dissecting microscope and the number of SWD males and females will be counted and recorded. Fruit samples will be collected weekly by randomly selecting ~50 berries from each treatment plot. Twenty berries will be dissected and eggs and larvae counted using a dissecting microscope and the remaining 30 will be incubated at room temperature over mesh wire to allow maggots to exit the fruit.

4. **How many locations (field or greenhouse)? How many replications?**

   Two field locations with four replications at each location.

5. **Describe how this proposal is designed to provide information on how it fits into an integrated pest management program. (Note: We favor proposals that determine the utility of biopesticides as early season treatments or in rotation with conventional products, rather than only a direct comparison of conventional products versus Biopesticides). Please see section: Treatment lists and design of biopesticide studies begin on page 40. Keep in mind that the data need to be sufficient to determine the value of the biopesticide product to the pest control program.**

The objective of this proposal is to evaluate the effectiveness of the biopesticide Veratran D for control of SWD and thrips. The University of Florida small fruit team has teamed up with other

researchers around the country to identify tools than can be used for managing the invasive SWD and thrips in small fruits, including monitoring strategies, chemical, biological, and cultural control techniques. However, little effort has been made in the management of these pests in organic systems, leaving organic growers with few alternatives for control. Spinosad (Entrust) is the most commonly recommended organic control option for thrips and SWD. Pyrethrum performance has been variable. Flower thrips as well as chilli thrips have already shown some resistance to spinosad. Due to its short life cycle, SWD will likely show resistance in the near future. Our goal is to identify additional tools, Veratran D that can be used in a rotation program with Spinosad and other effective products in order to prevent resistance and extend the life. In addition, the organic products we are evaluating will fit well in an IPM program due to their minimal effects on non-targets and beneficials.

6. **Data collection – (Describe what data will be collected such as crop yields, crop quality, etc. If visual efficacy evaluations will be collected, describe the rating scale used and the evaluation timings).**

This proposal evaluates the efficacy of a new biopesticide compared with traditional organic pesticides on populations of thrips and SWD in blueberry and strawberry. Infestation rates of thrips after application of biopesticide treatments will be collected via white sticky cards and flower samples. Adult SWD infestation will be collected using a trap-and-lure system and immature SWD will be assessed using fruit dissection and larval emergence. Climate data will also be collected using the Florida Automated Weather Network (FAWN).

7. **Describe the pests to be controlled, the degree to which they are a problem in your state or region and the frequency that they occur (season long problem, every year, every few years).**

The proposed pests to be controlled are the spotted wing drosophila *Drosophila suzukii* (Diptera: Drosophilidae), and key thrips species, Florida flower thrips *Frankliniella bispinosa* (Morgan), Western Florida thrips *Frankliniella occidentalis* (Pergande), and chilli thrips *Scirtothrips dorsalis* Hood.

Spotted wing drosophila is a newly invasive pest species of thin-skinned and stone fruits. The serrated ovipositor of the female fly allows her to puncture the skin of a healthy host fruit and lay her eggs just beneath the skin surface. Spotted wing drosophila is therefore a major pest of concern during the entire fruiting period of host crops. In Florida, the crops of most concern are blueberry, strawberry, and blackberry. Spotted wing drosophila has been present in damaging numbers every year since its first detection in Hillsborough County, FL in 2008. Losses in blueberries in 2012 were estimated at 10-15% or 7.8 - 11.7 mil USD whereas losses have yet to be reported in strawberries or the growing blackberry industry (eFly 2012).

Thrips are also major pests for blueberry and strawberry growers. The Florida flower thrips is the key early-season pest in southern highbush blueberries (Liburd et al. 2005) and strawberries. The western Florida thrips is also a common species found in strawberries in the central parts of the state. Adults and larvae feed on the reproductive parts of the flower that result in fruit scaring, decreasing the

marketability of the berries. In addition, high population of thrips can negatively affect berry yield and profits.

Another species of thrips that has causes economic damage to berry crops is the invasive Chilli thrips. During the 2012-2013 production season high populations of Chilli thrips were recorded in strawberries during the spring and in blueberries during the peak of summer. Chilli thrips infest the developing leaves of host plants resulting in scarring and distortion of leaves, and discoloration of buds, flowers, and young fruits (Kumar et al. 2010). High populations of Chilli thrips can substantially reduce yields during the current year for strawberries and subsequent years in blueberries.

8. **Will the crop be inoculated with the target pest or otherwise be brought into the test system to ensure that it will be available for evaluation? If not, describe the frequency of occurrence.**

Both proposed experimental locations have had a strong, annual presence of SWD, Florida flower thrips, western Florida thrips, and chilli thrips. Therefore, neither of the locations will require inoculation of the pest species.

9. **What is the proposed start date and completion date? Also describe this in chronological order in the context of the experimental plan.**

| Activity (BB1, BB2, SB1) | Members | Dates (Week of) |
|---|---|---|
| **BB1 & SB1.** Set up white sticky card traps for thrips and plastic cup traps for SWD. | Undergrad assistant | February 3 |
| **BB1 & SB1.** First spray application. Begin weekly sticky card collection for thrips. Begin collecting weekly flower samples for thrips. | Post Doc | February 10 |
| **BB1 & SB1.** Second spray application. | Post Doc | February 20-24 |
| **BB1 & SB1.** Break through to fruiting period. | | March 10-24 |
| | | |

| | | |
|---|---|---|
| **BB1 & SB1.** Set up cup traps for adult SWD. | Undergrad Assistant | March 17 |
| **BB1 & SB1.** Third spray application. Begin collecting berried for SWD larvae. | Post Doc | March 24 |
| **BB1 & SB1.** Fourth spray application. | Post Doc | April 4-7 |
| **BB1 & SB1.** Final Weekly samples (cards, flowers, traps) | Post Doc / Undergrad Assistant | April 21 |
| **BB1 & SB1.** Process samples and data analysis. | Post Doc | April-June |
| **BB2.** Prune blueberries | Biological Scientist/staff | June 2 |
| **BB2.** Set up white sticky card traps for thrips. | Undergrad Assistant | June 30 |
| **BB2.** First spray application. Begin weekly sticky card and leaf sample collection for thrips. | Post Doc | July 7 |
| **BB2.** Second spray application. | Post Doc | July 21 |
| **BB2.** Final Weekly samples (cards, flowers, traps) | Post Doc/ Undergrad Assistant | August 4 |
| **BB2.** Process samples and data analysis. | Post Doc | August-October |
| Slides mount specimens from | | October 2014 |

| | | |
|---|---|---|
| thrips species. | Undergrad Assistant | |
| Preparation of publications and meetings with Florida blueberry and strawberry growers. | Post Doc | November-December 2014 |
| Preparation of final report | Post Doc/ Principal Investigator | December 2014 |

10. **Describe the test facilities where these studies will be conducted.**

The blueberry experiments will be carried out at a certified organic grower's farm in Citrus County, Florida and the strawberry experiment will be conducted at the University of Florida, Plant Science Research and Education Unit in Citra (PSREU) on certified organic land. All samples will be processed at the University of Florida, Small Fruit and Vegetable IPM (SFVIPM) lab in Gainesville, FL.

11. **Budget: Provide an itemized budget, with categories such as labor, supplies, travel, etc. Provide a grand total. Note: Overhead costs are not permitted. Funding is only awarded on a per year basis, if this is a multiple year proposal, divide the budget for each year. Also include a list of support from the registrant and/or other sources. Provide information on other sources of monetary support and in-kind contributions from growers (land, plant material, etc.).**

| **BIOPESTICIDE PROJECT BUDGET** | | | |
|---|---|---|---|
| **<u>Project Period:</u>** From: January 2014 | | To: December 2014 | |
| | | Funds Requested ($) | Matching Funds ($) |
| Totals ($) | | | |
| | | | |
| **A. Senior/Key person** | | $0 | $0 |
| **B. Other personnel /Post Doc** | | $11,000 | $0 |
| **B. Other personnel Undergrad Assist** | | $2,500 | $0 |

| | | | |
|---|---|---|---|
| Total Number | 2 | | |
| **C. Fringe benefits** | | $792 | $0 |
| **C. Fringe benefits** | | $40 | $0 |
| **Total Salary, Wages and Fringe Benefits** | | $14,332 | $0 |
| | | | |
| **D. Equipment** | | **NOT ALLOWED** | $0 |
| | | | |
| **E. Travel** | | | |
| 1. Domestic | | $1,000 | $0 |
| 2. Foreign | | **NOT ALLOWED** | $0 |
| | | | |
| **F. Participant Support Costs** | | $0 | $0 |
| 1. Travel | | $0 | $0 |
| 2. Other | | $0 | $0 |
| | | | |
| **G. All Other Direct Costs** | | | |
| 1. Materials and Supplies | | $1,000 | $0 |
| 2. Publication Costs | | $0 | $0 |
| 3. Consultant Services | | $0 | $0 |
| 4. Computer Services | | $0 | $0 |
| 5. Subawards/Consortium/Contractual Costs | | $0 | $0 |
| 6. Equipment or Facility Rental/User Fees | | $1,000 | $0 |
| 7. Alterations and Renovations | | $0 | $0 |
| 8. Other 1 | | $0 | $0 |

| | | | |
|---|---|---|---|
| 9. Other 2 | | $0 | $0 |
| 10. Other 3 | | $0 | $0 |
| **Total Direct Costs** | | **$17,332** | **$0** |

**Budget Narrative (Total amount requested $17, 332.00)**

**Personnel ($13,5.00):** 1 FTE Post-doctoral research associate at $44,000 per year will be required for three months to carry out the efficacy work. The post-doc will cordinate the experiments in blueberries and strawberries and oversee the implentation of experiments and data collection. An undergrad student (OPS) working 20 hrs per week at the rate of $10 per hour will be hired to assist in project activities.

**Fringe Benefits ($832.00):** Post-doc fringe benefits are $792 calculated at 7.2% and fringes for the undergraduate student are $40 calculated at 1.6% for the time hired.

**Travel ($1000.00)**: The funds will be used for gas and vehicle maintence to travel to the field sites. One expriment will be conducted at the University Research and Experiment station located in Orange County (Citra) and a second one at an organic manageed blueberry field in Citrus County.

**Materials and Supplies ($1000.00):** These funds will be used to purchase supplies including SWD trap materials including 1-qt containers with lids, twist-ties, yeast sugar bait ingredients and field collection containers for sending the samples to the laboratory (baiting agent), white sticky cards for monitoring thrips and lab supplies: SWD diet, yeast, rearing containers-plastic SOLO cups, petridishes, preservation kits; incubation trays.

**Facility Rental ($1,000.00):** This will be paid to the University Research and Experiment station for land use, plant maintenance including irrigation, fertilization and disease and weed management.

**IMPORTANT**** On a separate sheet provide the following information: Project title, PI name and one paragraph statement of work

Identify each budget item individually - provide cost and a written description and/or purpose for the cost.

For rentals and fees: identify type of rental or fee and provide rental rate & purpose for the cost Any contractual work will require a separate budget and statement of work including rate and purpose

The Other category **MAY NOT** include construction or indirect overhead. These costs are not permitted, under any circumstances, under this grant. [1]Indicate in a footnote if the matching funds are monetary or in kind and their source

Please enter all values to the nearest hundred dollars.

**Project Title:** Evaluation of Biopesticide, Veratran D for Control of Spotted Wing Drosophila and Thrips in Berry Crops

**PI:** Dr. Oscar Liburd

**Statement of Work:** Florida blueberry and strawberry industries are valued at 70 and 380 million USD, respectively. Despite the lucrative aspects of producing berries in Florida and the increase in acreage, the arrival of two invasive pests, spotted wing drosophila (SWD), *Drosophila suzukii* (Matsumura) and chilli thrips, *Scirtothrips dorsalis* Hood has seriously threatened these industries. At present, management strategies for SWD and chilli thrips are still surfacing but conventional growers are able to cope with these pests due to the extensive research and development directed to identifying insecticides and developing resistance management and rotational sprays for these pests. Our goal is to provide additional tools that organic growers can use to manage SWD and chilli thrips. Our objectives are: 1) to evaluate the biopesticide, Veratran D® (Sabadilla) for spotted wing drosophila and thrips control and 2) to compare Veratran D® efficacy with other standard organic pesticides that the growers are using including PyGanic® EC 5.0 and Entrust®. Our proposal targets two key pests, spotted wing drosophila and chilli thrips. Field trials will be conducted in a commercial organic blueberry field in Citrus County, FL and in organic strawberry fields at the UF Plant Science Research and Education Unit (PSREU) in Citra, FL. Experiments will be in randomized complete blocks design with 6 treatments and 4 replicates. Plants will be sprayed at recommended rates. White sticky traps and flower samples will be used to sample for flower thrips, white sticky cards and leaf samples for chilli thrips, and plastic cup traps baited with yeast sugar mixture and berry dissection will be used for SWD sampling.

12. **Describe why this product is needed and why growers are likely to use this product. (Also list alternative conventional and alternative biopesticide treatments)**
**Note: See appendix for attachment of information.**

Approximately 15-20% of the berries produced in Florida are produced using USDA organic standards. Pest management tools for organic growers are very limited and sometimes unavailable. Furthermore, currently available organic compounds for control of thrips and spotted wing drosophila show variable results [PyGanic® (pyrethrin)] or the pests are showing resistance [Entrust® (spinosad)]. Veratran D is an alternative biopesticide that is botanical in nature. It has broad-spectrum activity against sucking/rasping insects including thrips and has potential to control fruit flies including spotted wing drosophila. By comparing the efficacy of Veratran D® with standard products currently being used for SWD and thrips control, growers will have more options for rotation and pest resistance management.

**Appendix 1**

**PCR Forms.** Please fill out the attached Project Clearance Request Form for each biopesticide/crop combination involved in your proposal. (Not needed for Demonstration Stage Proposals).

**XXX Registrant Questionnaire (Will be sent directly to IR-4 by registrant)**

**Please fill out the first page of this form for each crop/biopesticide combination and send to the registrant.**

**Registrant please return to IR-4 Project Headquarters, Michael Braverman, Biopesticide and Organic Support Program Manager, 500 College Road East; Suite 201 W; Princeton, NJ 08540-6635, Tel: (732) 932-9575 ext. 4610, Fax: (609) 514-2612, braverman@aesop.rutgers.edu**

Principal Investigator: _ Oscar E. Liburd

Address: Entomology and Nematology Department
1881 Natural Area Dr., Steinmetz Hall
Gainesville, FL 32611

Telephone: (352) 273-3918

Proposal Title: Evaluation of the biopesticide, Veratran D, for control of spotted wing drosophila and thrips in berry crops

Registrant name and address: _____
_____
_____

_____

Product Name: _____ Active Ingredient: _____

Trade Name: _____

**The following section is to be completed by the Biopesticide <u>Registrant</u>. The PCR form is to be completed by the researcher for Early and Advanced Stage Proposals (Due Oct. 21, 2013 )**

**1)** Is this product EPA registered through BPPD? Yes_____ No_____

Is this use covered by your current label? Yes_____ No_____

If this product is not yet registered with EPA, describe where you are at in collecting the toxicology data or Stage of the registration process. If this project was previously funded, describe how the registration status has changed since last year.

Is label and toxicology work currently limiting product only to non-food uses?

**2)** Assuming the efficacy data are favorable, what is the likelihood that this use will be added to your label?

**3)** Considering the use rate(s), what is considered to be the farm-level cost for the treatment in $/acre?

**4)** How would you rank the importance of the proposed use compared to other potential uses?

**5)** If you are only considered a potential registrant (do not currently own rights to the product), rank your degree of interest in this product.

**6)** Were you involved or consulted in the development of the treatments or proposal?

**7)** What financial support are you planning on providing, if any?

_____ _____

Name of Registrant representative Date

_____

Title

**Other comments – Please attach a letter of support for this project by October 21, 2013**

| FOR OFFICE USE ONLY | |
|---|---|
| Date: | |
| Cat: | PR#: |

**IR-4 Minor Use Biopesticide (*Required Fields) Project Clearance Request (PCR) Form**

**1.** ***Requestor:** Oscar E. Liburd Affiliation: University of Florida
***Address:** Entomology and Nematology, 1881 Natural Area Drive, Steinmetz Hall
***City:** Gainesville *State/Territory: FL *Zip: 32611
***Telephone:** ( 352 ) 273-3918 FAX: (352 ) 392-0190
***E-mail address:** oeliburd@ufl.edu

**2.** ***Pest Control Product (Active Ingredient {a.i.}): Sabadilla alkaloids**
***Trade Name/Formulation:** Veratran D® WP
Registrant (manufacturer): MGK, Minneapolis, MN
Method of Production (Fermentation, in vivo, extraction from plants):

**3.** ***Commodity (one crop or crop group per form):** Southern Highbush Blueberry (interspecific hybrids of *V. darrowii*, *V. virgatum*, *and V. corymbosum*)

***Use Site (e.g., field, greenhouse, post-harvest):** Field
Parts Consumed: fruits Animal Feed By-Products: Yes No X
Planting Season: Dec-Feb Season: Feb-May
State/Territory Acreage: >4000 ac (2010)
% National Production: 8% (2011) Average Field Size: ~10 ac

**4.** **Insect/Disease/Weed:** Spotted wing drosophila [*Drosophila suzukii* (Matsumura)] and chilli thrips (*Scirtothrips dorsalis* Hood)
Damage caused by pest: SWD: scars upon oviposition and larvae-infested fruit, chilli thrips: leaf scarring resulting in reduction of yields

**5.** ***Why is this use needed?:** Organic growers have minimal effective control products available for the control of these two newly invasive species.

**6.** ***Proposed Label Instructions**
***Rate per Application (lbs a.i. per acre or 1000 linear ft):** 13 lbs/ac
Type of sprayers that may be used (e.g., fixed wing, ground boom sprayer, chemigation, air blast, ULV, granular spreader): CO2 sprayer

Range of Spray Volume (if applicable): 100 gal water

Maximum Acreage Treated per Day: _____

*Crop Stage during Application(s): 1) flowering and fruiting, 2) new growth

*Maximum no. of applications: as needed Minimum interval between applications: 10-14 d

Maximum lbs active ingredient per acre per year/season: _____ *PHI: when dry

7. ***Availability of Supporting Data[1]:** *Phytotoxicity(P) __ *Efficacy(E) ___ *Yield(Y)___

[1]Supporting data may be required before a residue study will be initiated.

8. ***Submitted By (print name): Oscar E. Liburd**

*Signature: *Oscar Liburd* *Date: 10-29-2013

**Send this completed form to:**

IR-4 Project Headquarters, 500 College Road East; Suite 201 W; Princeton, NJ 08540-6635; Telephone (732)932-9575 ext. 4610 (Michael Braverman) FAX (609) 514-2612 or e-mail: braverman@aesop.rutgers.edu

| FOR OFFICE USE ONLY | |
|---|---|
| Date: | |
| Cat: | PR#: |

**IR-4 Minor Use Biopesticide (*Required Fields) Project Clearance Request (PCR) Form**

**1.** ***Requestor:** Oscar E. Liburd Affiliation: University of Florida
***Address:** Entomology and Nematology, 1881 Natural Area Drive, Steinmetz Hall
***City:** Gainesville *State/Territory: FL *Zip: 32611
***Telephone:** ( 352 ) 273-3918 FAX: (352 )392-0190
***E-mail address:** oeliburd@ufl.edu

**2.** ***Pest Control Product (Active Ingredient {a.i.}): Sabadilla alkaloids**
***Trade Name/Formulation:** Veratran D® WP
Registrant (manufacturer): MGK, Minneapolis, MN
Method of Production (Fermentation, in vivo, extraction from plants):

**3.** ***Commodity (one crop or crop group per form):** Strawberry (*Fragaria sp.*)
***Use Site** (e.g., field, greenhouse, post-harvest): Field
Parts Consumed: fruits Animal Feed By-Products: Yes No X
Planting Season: Oct-Nov Harvest Season: Dec-May
State/Territory Acreage: 8900 ac (2012)
% National Production: 10-15% (2007) Average Field Size: 40 ac

**4.** **Insect/Disease/Weed:** Spotted wing drosophila [*Drosophila suzukii* (Matsumura)] and chilli thrips (*Scirtothrips dorsalis* Hood)
Damage caused by pest: SWD: scars upon oviposition and larvae-infested fruit, chilli thrips: leaf scarring resulting in reduction of yields

**5.** ***Why is this use needed?:** Organic growers have minimal effective control products available for the control of these two newly invasive species.

**6.** ***Proposed Label Instructions**
***Rate per Application** (lbs a.i. per acre or 1000 linear ft): 13 lbs/ac
Type of sprayers that may be used (e.g., fixed wing, ground boom sprayer, chemigation, air blast, ULV, granular spreader): CO2 sprayer

Range of Spray Volume (if applicable): 100 gal water

Maximum Acreage Treated per Day: _____

*Crop Stage during Application(s): flowering and fruiting

*Maximum no. of applications: as needed

Minimum interval between. applications: 10-14 d

Maximum lbs active ingredient per acre per year/season: _____ *PHI: when dry

7. ***Availability of Supporting Data[1]:** *Phytotoxicity(P) _ *Efficacy(E) ___ *Yield(Y)___

[1]Supporting data may be required before a residue study will be initiated.

8. ***Submitted By (print name): Oscar E. Liburd**

*Signature: *Oscar Liburd* *Date: 10-29-2013

**Send this completed form to:**

IR-4 Project Headquarters, 500 College Road East; Suite 201 W; Princeton, NJ 08540-6635; Telephone (732)932-9575 ext. 4610 (Michael Braverman) FAX (609) 514-2612 or e-mail: braverman@aesop.rutgers.edu

## Appendix 2

**Labels –** Supply the label or the proposed label of the biopesticide(s) to be evaluated.
**(Note:** Labels of conventional products are not needed.).

**PRECAUTIONARY STATEMENTS**
Hazards to Humans and Domestic Animals

**CAUTION**

Harmful if absorbed through skin. Avoid contact with eyes, skin, or clothing.

**PERSONAL PROTECTIVE EQUIPMENT (PPE):**
Mixers, loaders, applicators, flaggers and other handlers must wear: Long-sleeved shirt and long pants, shoes and socks, and chemical-resistant gloves when mixing/loading to support aerial applications. See engineering controls for additional requirements. Some materials that are chemical-resistant to this product are made of any water proof material. If you want more options, follow the instructions for category A on an EPA chemical-resistance category selection chart. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.
Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them.

**ENGINEERING CONTROLS:**
Pilots must use an enclosed cockpit that meets requirements listed in the WPS for agricultural pesticides [40 CFR 170.240(d)(6)].

**USER SAFETY RECOMMDENDATIONS:**
Users should wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
Users should remove clothes/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
Users should remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

**ENVIRONMENTAL HAZARDS**
This pesticide is toxic to aquatic invertebrates. Do not apply directly to water or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment wash water or rinsate.

**DIRECTIONS FOR USE**
It is a violation of Federal Law to use this product in a manner inconsistent with the labeling. Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation. Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application.

**GENERAL PRECAUTIONS AND RESTRICTIONS**
**SPRAY DRIFT MANAGEMENT**
Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment and weather-related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions.
A variety of factors including weather conditions (e.g., wind direction, wind speed, temperature, and relative humidity) and method of application (e.g., ground, aerial, airblast, chemigation) can influence pesticide drift. The applicator and grower must evaluate all factors and make appropriate adjustments when applying this product.

**TEMPERATURE INVERSIONS:**
If applying at wind speeds less than 3 mph, the applicator must determine if a) conditions of temperature inversion exist, or b) stable atmospheric conditions exist at or below nozzle height. Do not make applications into areas of temperature inversions or stable atmospheric conditions.

# VERATRAN D®

An Insecticide for citrus thrips and other thrips species

| | |
|---|---|
| Active Ingredient | |
| Sabadilla Alkaloids | 00.20% |
| Other Ingredients | 99.80% |

KEEP OUT OF REACH OF CHILDREN

**CAUTION**

FIRST AID
IF SWALLOWED - Induce vomiting by placing a finger at the back of the throat. Call physician immediately.
IF INHALED - Remove to fresh air.
IF IN EYES - Flush eyes with plenty of water.
IF ON SKIN OR CLOTHING - Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice. Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact 1-888-740-8712 for emergency medical treatment information.



Manufactured by:

MGK

8810 Tenth Avenue North
Minneapolis, MN 55427
EPA Est. No. 1021-MN-2 EPA Reg. No. 1021-2600

NET CONTENTS 50 pounds

**DIRECTIONS FOR USE** (continued)

**WIND SPEED:**
Do not apply at wind speeds greater than 15 mph at the application site. Apply only as medium or coarser spray (ASAE standard 572) or a volume mean diameter of 300 microns or greater for spinning atomizer nozzles.

**AIR BLAST EQUIPMENT:**
To minimize spray loss over the tops of trees in orchard applications, sprays must be directed into the crop canopy. Outward bound pointing nozzles should be turned off at row ends and when spraying outer row.

**AERIAL EQUIPMENT:**
RELEASE HEIGHT:
Release spray at the lowest height consistent with efficacy and flight safety. Do not release spray at a height greater than 10 feet above the ground or top of orchard crop canopy.
BOOM LENGTH:
The boom length must not exceed 75% of the wingspan or 90% of the rotor blade diameter.
SWATH ADJUSTMENT:
When applications are made with a cross-wind the swath will be displaced downwind. The applicator must compensate for this displacement at the downwind edge of the application area by adjusting the path of the aircraft upwind. Leave at least one swath unsprayed at the downwind edge of the treated field. Do not make applications into temperature inversions.

**AGRICULTURAL USE REQUIREMENTS**
Use this product only in accordance with its labeling and with the Worker Protection standard 40 CFR part 170. This standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), notification to workers, and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard. Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours. PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is: coveralls, shoes plus socks, chemical-resistant gloves made of any waterproof material.

**CROP INFORMATION**
VERATRAN D is a specially formulated wettable power for the control of thrips.
**AIR APPLICATION** - Use 10 to 15 lb. per acre in 10 to 40 gallons of water. Fly every row. Screen size should be 20 mesh or larger.
**GROUND APPLICATION** - Use 10 to 15 lb. per acre in 20 to 100 gallons of water. If 200 gallons of spray solution are applied per acre increase dosage to 20 lb. per acre. Screen size should be 20 mesh or larger.
**AVOCADOS** - To protect fruit and foliage against thrips feeding damage, treat when early instars are present and damage is anticipated. Control will be most effective on those thrips species inhabiting the peripheral foliage. Reapply as needed, usually at a 10-14 day interval. Do not apply at time of harvest.
**CITRUS** - To control citrus thrips and to protect fruit, treat when early instars are present. Reapply as needed, usually at a 10-14 day interval. Do not apply at time of harvest.
**MANGOS** - To control citrus thrips, spray entire tree to protect newly formed growth and to reduce the thrips population on the tree. Treat when early instars are present and damage is anticipated. Reapply as needed. Usually at a 10-14 day interval. Do not apply at time of harvest.

## STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

**PESTICIDE STORAGE**
Store only in cool, dry, locked and ventilated room. Protect from moisture, open flames or heat.

**PESTICIDE DISPOSAL**
Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

**CONTAINER DISPOSAL**
Nonrefillable container. Do not reuse or refill this container. Completely empty bag into application equipment. Then offer for recycling if available or dispose of empty bag in a sanitary landfill or by incineration or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

## NOTICE

Our recommendations for use of this product are based upon tests believed to be reliable. The use of this product being beyond the control of the manufacturer, no guarantee expressed or implied, is made as to the effects of such or the results to be obtained if not used in accordance with directions and established safe practice. To the extent consistent with applicable law, the Buyer must assume all responsibility, including injury, or damage, resulting from its misuse as such, or in combination with other materials.
For information on this product (including health concerns, medical emergencies, or other pesticide incidents), call the International Poison Center at 1-888-740-8712.

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Page 1 of 1

**Appendix 3**

**Supporting preliminary data** (Attach tables, graphs of the current data that coincide with the proposed use. Please include complete efficacy reports and do not only list literature citations. If appropriate, attach the full copy of actual literature. **Summarize the significance of the efficacy data.** In order to compare your proposed list of treatments to the data make sure the products are identified in the same way or if the names of the products are different, provide a key to all the names so that they can be compared directly. Do not assume the reviewers know which code names or active ingredients match with a given trade name. Avoid color graphs or any low quality graphics that do not copy well in black and white copies. **Note: Proposals without supporting data are less likely to be funded**.

## Preliminary Efficacy Data for Chilli thrips

Efficacy data for organic compounds for control of chilli thrips in unavailable in Florida due to the new and invasive nature of this pest. However, Veratran D® has been approved for use against avocado and citrus thrips, both in the same genus *Scirtothrips* as chilli thrips (*Scirtothrips dorsalis*), in California. Therefore, we have included preliminary efficacy data of Veratran D® on citrus thrips on tango oranges by MGK in California 2013.

**Materials and methods:** Trials were conducted in a commercial tango orange orchard in Coachella, CA. Design was a randomized complete block design with 3 treatments and 4 replicates. Treatments were Delegate® (commercial standard), Veratran D®, and a water control, all applied at the manufacturer's recommended rates. Four leaves per tree were collected pre-treatment, 24-h post-treatment, and 7-d post-treatment to sample for citrus thrips. Adult and immature numbers were combined in the analysis.

**Results:** Results showed significant reduction in mean number of citrus thrips per tree 24 h post-treatment (Fig. 1). Both Delegate® and Veratran D® reduced thrips populations significantly more than the control 24-h post-treatment and 7 d post-treatment. The mean thrips per tree remained below the economic threshold level of 3 thrips/leaf 7-d post-treatment (http://www.authorstream.com/Presentation/Ankitgadhiya72-1392411-chilli-thrips-by-ankit-gadhiya/).

**Summary**: Veratran D® is equally effective as the commercial standard Delegate® against citrus thrips *Scirtothrips citri*. Citrus thrips are in the same genus as chilli thrips *Scirtothrips dorsalis* therefore Veratran D® has a high potential to be an effective control option for blueberry and strawberry growers.

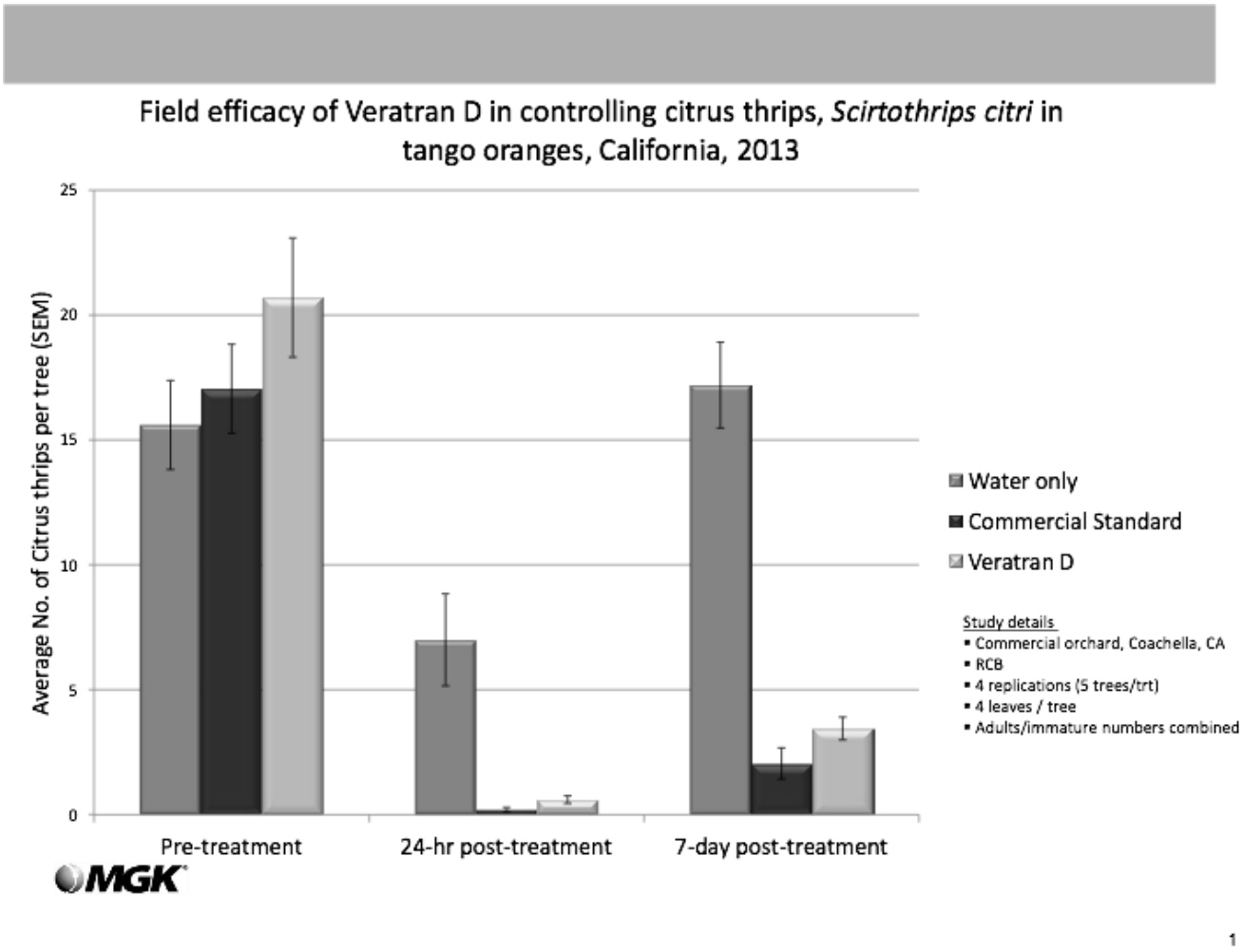


Figure 1: Efficacy of Veratran D® on citrus thrips.

**Preliminary Efficacy Data**
**for spotted wing drosophila**

This purpose of the study was to test the efficacy of biopesticides PyGanic® and No Fly® (two rates) on spotted wing drosophila (SWD) *[Drosophila suzukii* Matsumura], a new invasive pest that is threatening Florida's blueberry and strawberry industries. Female SWD has a serrated ovipositor that is used to deposit eggs in ripening fruits. It is important that effective compounds be able to kill the females before she can lay her eggs.

**Materials and Methods:** Adult flies were obtained from a laboratory colony that is being maintained at the Small Fruit and Vegetable IPM Laboratory at 23$^{o}$C, 65 ± 2% RH and 16:8 day and night photoperiod. All the flies used for the experiment were 5-7 days old after hatching. Southern high blueberries were harvested from the field that had never been sprayed before. Before the start of the experiment berries collected from the field were tested for presence of SWD maggots.

PyGanic® (pyrethrin, Key Industries, LTD., Aukland, NZ) and No Fly(R)® WP (entomopathogenic fungus, Natural Industries, Houston, TX) was applied according to the manufacturer's recommended rate mixed with water equivalent to 50 gal (189 L) per acre. Insecticides were used within 1 h of mixing and deionized water was used as the control. Berries were submerged into the solution for 30 s and allowed to air dry for 4-5 h before introducing flies. Insecticide-treated berries were placed in 1-L clear plastic containers with lids that had insect proofing net for aeration. Berries were placed such that they were not rolling over to knock each other. Sugar solution in a 5 ml Eppendorf fitted with a dental's wick was placed in the container as a source of food for the flies. In each container 10 adults (5 males and 5 females) were introduced into each bioassay chamber and placed on the laboratory bench for 24 h under 16:8 day and night photoperiod. Temperature in the laboratory is ~ 22$^{o}$C and RH around 50%. Each treatment was replicated 10 times. The first five replicates were assessed only one time at 24 h while other 5 replicate were assessed at 24 h and 48 h after it was determined that 24 h may not have been sufficient.

**Results:** Approximately 20% of the SWD flies introduced were killed after 24 h of exposure to PyGanic- treated berries, which was not significantly different than the untreated control (13.8%, Fig. 2). NoFly® at both the high and low rate killed fewer SWD than the control, 6.1 and 1.3% respectively. These results are extremely low compared to non-organic compounds available such as Mustang® and Cyazypyr® that show death rates up to 87% after 24 h (Nyoike and Liburd unpublished). A repeat of this experiment counting the number of dead flies at 24 and 48 h shows that just 5.1% flies were killed within the two days period of exposure to PyGanic® and 2.1% with NoFly (Fig. 3). Neither PyGanic nor No Fly (high and low) killed female flies before they could oviposit into the fruits. The number of larvae found per berry after 24 h in the PyGanic, NoFly low and high treatments (1.7, 1.4, and 1.1, respectively) were not significantly different than the control (0.9, Fig. 4). Similarly in the repeat experiment, the larvae found per berry after 48 h in the PyGanic (3.6) and No Fly low (2.1) treatments were not significantly different than the control (3.7, Fig. 5). When the experiment was repeated without No Fly at the low rate, 3.1 larvae were found per berry in the No Fly high rate treatment and 3.6 in the

PyGanic-treated berries. In addition, the number of adult flies that hatched out of berries treated with PyGanic, NoFly at low and high rates after 14 - 20 days of incubation (31.2, 25, 24.8, respectively) were not different than the control (17.2, Fig. 6).

**Summary:** It is clear that the organic compounds available for the control of SWD are far inferior than those available to conventional growers. Organic growers are in desperate need of effective compounds that will target SWD adults that cause devastating losses to berry crops and the organic berry industry.

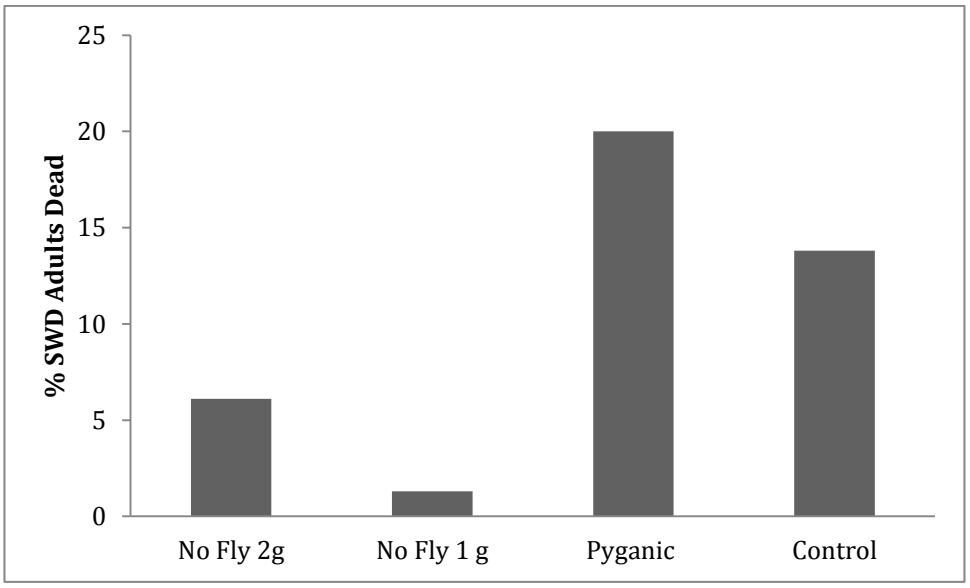


Figure 2: Percent number of dead SWD counted after 24 h exposure to insecticide treated blueberries

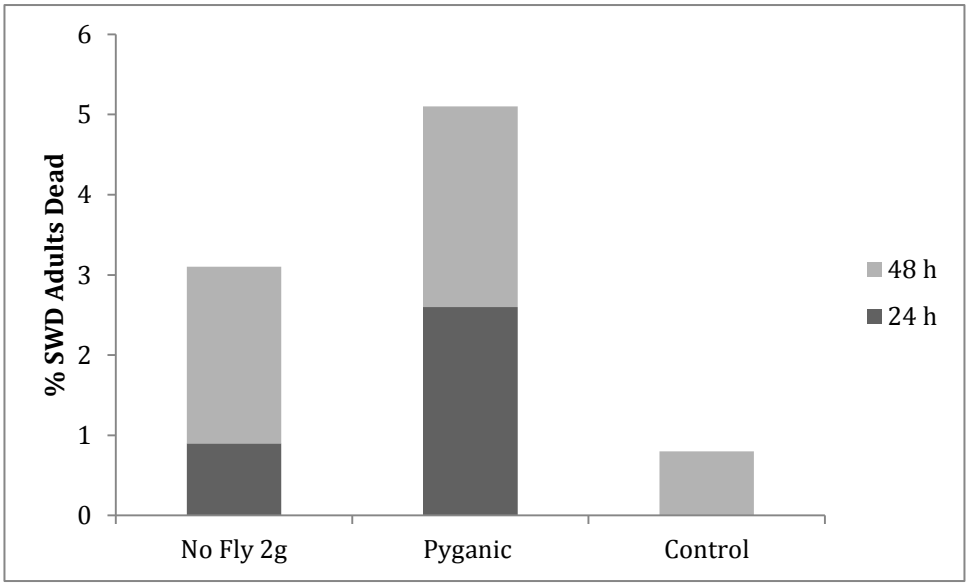


Figure 3: Percent number of dead SWD counted after 24 and 48 h exposure to insecticide treated blueberries

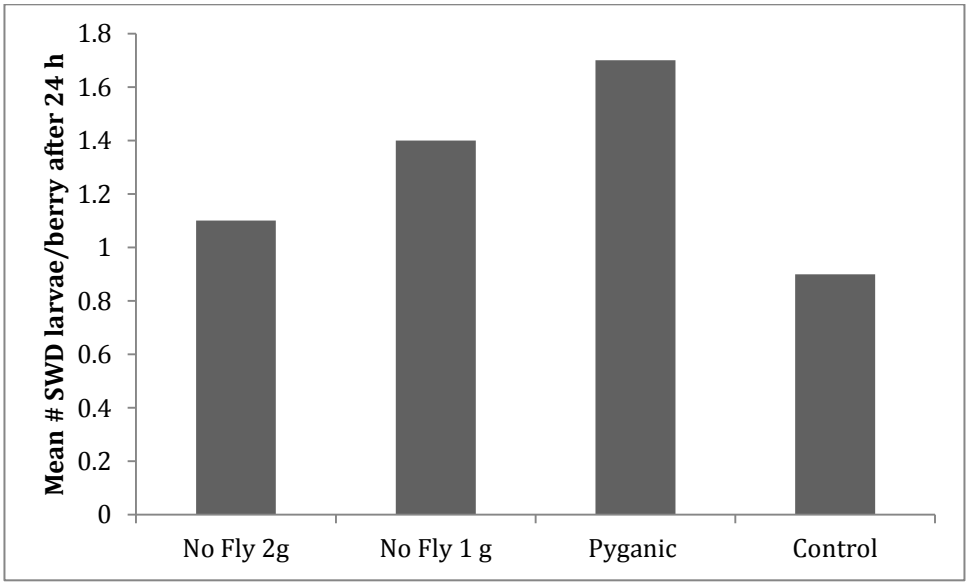


Figure 4: Mean number of SWD larvae per berry after 24 h exposure to insecticide treated blueberries

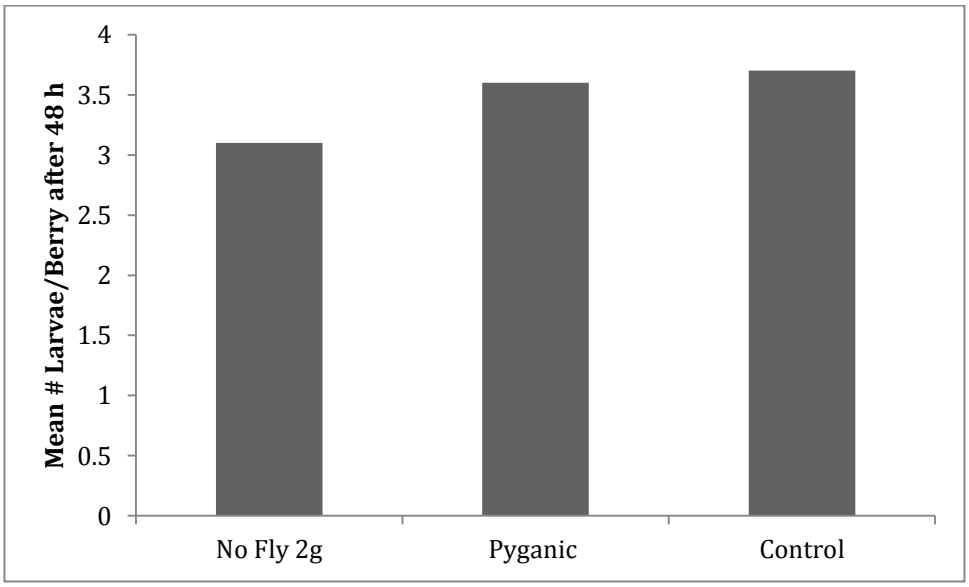


Figure 5: Mean number of SWD larvae per berry after 48 h exposure to insecticide treated blueberries

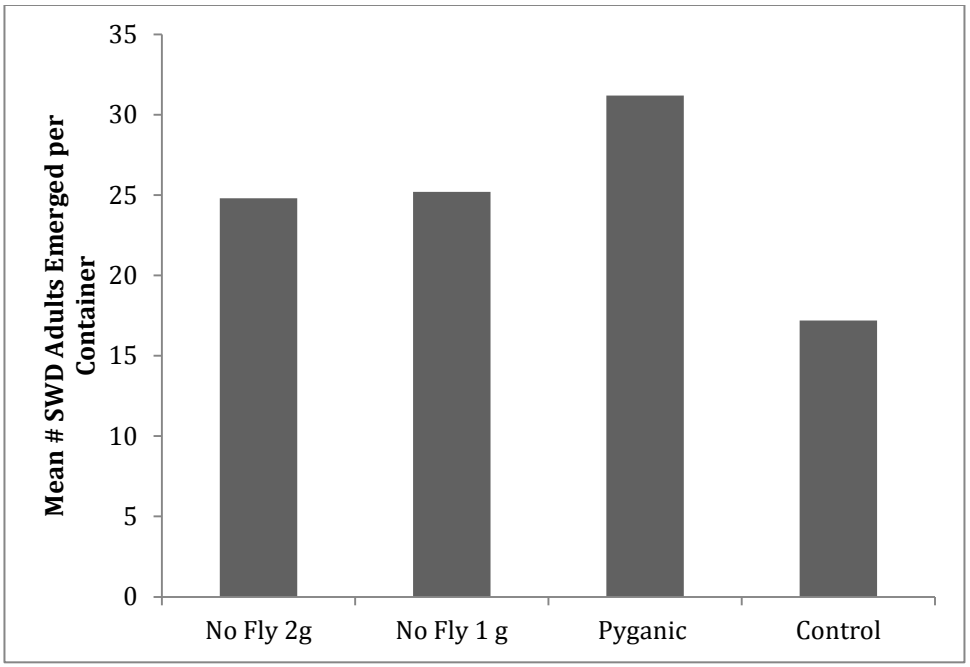


Figure 6: Mean number of SWD adults counted per container with insecticide treated berries. Each container had approximately 21 berries

**Appendix 4**

Attach resume for Principal Investigator and Co-PI's. Please limit the size of resumes to **3 pages**. Please do not submit an exhaustive list of publications. Only those showing experience with the crop and pest in the proposal and any experience with biopesticides.

Oscar E. Liburd

**Professor & Extension Specialist**

Department of Entomology and Nematology, University of Florida, Gainesville, 32611

Phone: (352) 273-3918 (office), (352) 273-3926 (Lab), Fax: (352) 392-0190

oeliburd@ufl.edu

(60% Research, 25% Extension, 15% Teaching)

**EDUCATION**

Ph.D. 1997. Entomology, University of Rhode Island, Kingston, Rhode Island, USA

M.S. 1993. Entomology, Florida A & M University, Tallahassee, Florida, USA

B.S. 1991. Entomology, Florida A & M University, Tallahassee, Florida, USA

**PROFESSIONAL EXPERIENCE**

| | |
|---|---|
| 2011- Present | Professor, Entomology and Nematology Dept., University of Florida, Gainesville, FL. USA. |
| 2005-2011 | Associate Professor, Entomology and Nematology Dept., University of Florida, Gainesville, FL. USA. |
| 2001-2005 | Assistant Professor, Entomology and Nematology Dept., University of Florida, Gainesville, FL. USA. |
| 1999-2001 | Assistant Professor, Department of Entomology, Michigan State University, East Lansing, MI. USA. |
| 1998-1999 | Post-Doctoral Research Fellow, Department of Entomology, Michigan State University, East Lansing, MI. USA. |

**Appointment:** 60% Research, 25% Extension 15% Teaching

**PROGRAM OVERVIEW**

*Program Leader*: Small Fruits and Vegetable IPM Laboratory, University of Florida, Gainesville, FL. The laboratory is developing environmentally sound insect pest management programs in fruit and vegetable systems for Florida and southeastern US. Applied and basic research is performed in organic and conventional systems including blueberries, strawberries grapes, blackberries, cucurbits and cole crops. Areas of expertise include management of thrips, midges, mites, whiteflies, aphids, scale insects, flea beetles, mealybugs, lepidopteran pests and fruit flies. Dissemination of research-based information to state and county extension faculty, commodity groups, growers, various levels of government, and private-industries occurs through innovative educational programs comprised of grower meetings, workshops, in-service training sessions, newsletters, and via the internet. The laboratory also develops and updates educational materials, and pest management recommendations targeting growers, agribusiness, and crop consultants. My international research and extension activities are focused on pesticide safety,

resistance management and implementation of bio-rational strategies in Africa and the Caribbean region.

**HONORS AND AWARDS**

2013 **Distinguished Achievement Award in Horticultural Entomology.** Southeastern Branch, Entomological Society of America. Baton Rouge, LA.

2008 **Excellence in Integrated Pest Management (IPM)**. Southeastern Branch, Entomological Society of America

2008 **Entomologist of the Year:** Annual meeting of the Florida Entomological Society, July 13-16. Jupiter, Florida

2008 **Jim App Team Extension Award:** University of Florida, IFAS Extension, Gainesville, FL

**PUBLICATIONS**

**Research refereed journals**

Nyoike, T. W., and **O. E. Liburd**. 2013. Effect of *Tetranychus urticae* Koch (Acari: Tetranychidae) on marketable yields of field-grown strawberries in north-central Florida. Journal of Economic Entomology. 106:1757-1766.

Brennan, S. A., **O. E. Liburd**, J. E. Eger, and E. M. Rhodes. 2013. Species composition, monitoring, and feeding injury of stink bugs (Heteroptera: Pentatomidae) in blackberry. Journal of Economic Entomology. 106:912-923.

Roubos C. R. and **O. E. Liburd**. 2013. Parasitism of *Dasineura oxycoccana* (Diptera: Cecidomyiidae) in North-central Florida. Environmental Entomology 42: 424-429.

Sampson, J. B., C. R. Roubos., S. J. Stringer, D. Marshall, and **O. E. Liburd**. 2013. Biology and efficacy of *Aprostocetus* (Eulophidae: Hymenoptera) as a parasitoid of the blueberry gall midge complex: *Dasineura oxycoccana* and *Prodiplosis vaccinii* (Diptera: Cecidomyiidae). Journal of Economic Entomology. 106: 73-79.

Johnson, D. T., C. R. Roubos, T. W. Nyoike, L. L. Stelinski, and **O. E. Liburd**. 2013.Lures, mating disruption and mass trapping of grape root borer. Acta Horticulture (ISHS) 1001:129-137.

Kostarides J. L. and **O. E. Liburd**. 2013. Visual and olfactory stimuli affecting the response of *Rhagoletis cingulata* (Loew) and *R. fausta* (Osten Sacken) (Dipteria: Tephritidae). PK. Entomologist in press.

Nyoike, T. W., T. Mekete, R. McSorley, E. Weibezahl-Kakarigi, **O. E. Liburd**. 2012. Confirmation of *Meloidogyne hapla* on strawberry in Florida using molecular and morphological techniques. Nematropica. 42: 253- 259.

Mcneill, C. A. **O. E. Liburd**, C. A. Chase. 2012. Effect of cover crops on aphids, whiteflies and their associated natural enemies in organic squash. Journal of Sustainable Agriculture. 36:382-403.

Garima, K, D. R. Seal, P. A. Stansly **O. E. Liburd** and V. Kumar. 2012. Abundance of *Frankliniella schultzei* (Thysanoptera: Thripidae) in flowers on major vegetable crops of south Florida.

Florida Entomologist 95: 468-475.

Francis, A. W., K. K. Moses, A. L. Roda, **O. E. Liburd** and P. Polar. 2012. The passionvine mealybug, *Planococcus minor* (Maskell) (Hemiptera: Pseudococcidae), and its natural enemies in the cocoa agroecosystem in Trinidad. Biological Control.60:290-296.

Rhodes, E. M., **O. E. Liburd**, and G. K. England. 2012. Effects of southern highbush blueberry variety and treatment threshold on flower thrips populations. Journal of Economic Entomology 105: 480-489.

Li Jian, D. R. Seal, G. L. Leibee, and **O. E. Liburd**. 2012. Seasonal abundance and spatial distribution of the leafminer, *Liriomyza trifolii* (Diptera: Agromyzidae), and its parasitoid, *Opius dissitus* (Hymenoptera: Braconidae), on bean in southern Florida. Florida Entomologist 95: 128-135.

Tertuliano, M., G. Krewer, J. E. Smith, K. Plattner, J. Clark, J. Jacobs, E. Andrews, D. Stanaland, P. Andersen, **O. E. Liburd**, E. G. Fonsah, and H. Scherm. 2012. Growing organic rabbiteye blueberries in Georgia, USA: Results of two multi-year field studies. International Journal of Fruit Science. 12: 205-215.

Rhodes, E. A., **O. E. Liburd**, and S. Grunwald. 2011. Examining the spatial distribution of flower thrips in southern highbush blueberries utilizing geostatistical methods. Environmental. Entomology 40:893-903.

Li Jian, D. R. Seal, G. L. Leibee, and **O. E. Liburd**. 2011. Diel density Patterns of leafminer, *Liriomyza trifolii* (Diptera: Agromyzidae), and two parasitoids, *Opius dissitus* (Hymenoptera: Braconidae) and *Diglyphus* spp. (Hymenoptera: Eulophidae). Proc. Fla. State Hort. Soc. 124:144-149.

Sanders W. R., **O. E. Liburd**, R. W. Mankin, W. L. Meyer, L. L. Stelinski. 2011. Applications and mechanisms of wax-based semiochemical dispenser technology for disruption of grape root borer mating. Journal of Economic Entomology 104: 939-946.

Rhodes, E. A. and **O. E. Liburd**. 2011. Flower thrips (Thysanoptera: Thripidae) dispersal from alternate hosts into southern highbush blueberry (Ericales: Ericaceae) plantings. Florida Entomologist 94:311-320.

Sanders W. R., R. W. Mankin, **O. E. Liburd**, L. L. Stelinski. 2011. Acoustic detection of arthropod infestation of grape roots: scouting for grape root borer (Lepidoptera: Sesiidae). Florida Entomologist 94: 296-302.

Hanspetersen, H. N., R. McSorley, and **O. E. Liburd**. 2010. The impact of intercropping squash with non-crop vegetation borders on the above-ground arthropod community. Florida Entomologist. 93: 590-608.

Rodriguez-Saona, C. R., S. Polavarapu, J. D. Barry, D. Polk, R. Jornsten, P.V. Oudemans and **O. E. Liburd**. 2010. Color preference, seasonality, spatial distribution and species composition of thrips (Thysanoptera: Thripidae) in northern highbush blueberries. Crop Protection. 29: 1331-1340.

Roubos, C.R., and **O. E. Liburd**. 2010. Evaluation of emergence traps for monitoring blueberry gall midge (Diptera: Cecidomyiidae) adults and within field distribution of midge infestation. Journal of Economic Entomology. 103: 1258-1267.

Michelle Samuel-Foo

**IR-4 Southern Region Field Coordinator/Associate Research Scientist**

University of Florida
Food and Environmental Toxicology Lab
SW 23rd Drive, PO Box 110720
Gainesville, FL 32611-07
mfoo@ufl.edu

**Education:**

2008 **Ph.D., Entomology**
The University of Georgia, Athens GA

2003 **M.S., Agronomy**
The University of Georgia, Athens GA

2000 **B.A., Biology (S*umma cum laude*)**
Brewton-Parker College, Mt Vernon, GA

**Professional Experience:**

2009 – Present **Associate Research Scientist (***nontenure track faculty***)/**
**IR-4 Regional Coordinator**

Department of Food Science and Human Nutrition
Food and Environmental Toxicology Lab
University of Florida, Gainesville FL

Appointment: *75% research, 15% extension, 10 % teaching*
*Program Overview and Responsibilities:*

The Southern Region IR-4 Program supports the National IR-4 mission of "facilitating registration of sustainable pest management technology for specialty crops and minor uses." We accomplish this through our three major objectives:

- **Objective 1- Food Use Program**: To obtain and maintain regulatory clearances of effective crop protection agents for high value, specialty food crops and for minor uses on major food crops with special emphasis on lower risk chemicals and uses that are compatible with Integrated Pest Management programs.
- **Objective 2 – Ornamental Horticulture Program**: To support research on crop protection products that will expand their uses on ornamental crops (nursery, floral, turf, and other non-food crop systems) to allow management of new and important pest species.
- **Objective 3 – Biopesticide Program**: To support research to enhance the development and registration of biopesticides for use in food and non-food pest management programs, and new and reduced risk pesticides for use in pest management systems through national IR-4 and the Southern region performance program (SRPP).

2001 – 2008 **Graduate Research and Teaching Assistant/Instructor**
Departments of Entomology, Biological Sciences and Crop and Soil Science
University of Georgia, Athens GA

*rief Summary of Responsibilities:* Worked as part of a multipdisclipinary research team in soybean/wheat breeding and crop improvement. Performed a variety of duties including experimental design and implementation, greenhouse assays, field trials, scouting, assessing pest damage in fields and molecular laboratory experiments . Also served as an instructor or gradaute teaching assistant for general biology laboratory practicums and entomology undergrad and graduate lecture and labs. Classes taught include Biology for majors and non majors, Integrated Pest Management, Pesticides and Transgenic Crops, Insect Natural History and Insect Pest Management.

**Teaching Experience:**

2009-2012 **University of Florida (co-lecturer)**

- ENY 3563/ENY 5566 Tropical Entomology
- HOS 5555 Tropical Fruit Production and Research
- ALS 6931 Plant Medicine Program Seminar Series
- IPM 5305 Principles of Pesticides

2004-2008 **University of Georgia (Graduate Teaching Assistant/Instructor)**

- BIOL 1107 L Principles of Biology I
- BIOL 1103 L Concepts in Biology
- ENTO 3140 Insect Natural History in Costa Rica (study abroad)
- ENTO 4250/6250 L Pesticides and Transgenic Crops
- ENTO 4740/6740 L Integrated Pest Management

ENTO 3740 L Insect Pest Management

**Publications:**

Book: **Memoirs of Black Entomologists**. Eds: E. W. Riddick, **M. Samuel-Foo**, W.W. Bryan and A.M. Simmons. Thomas Say Publication, Entomological Society of America. *Under review(Fall 2013).*

Chen, Y., R. N Story, R. A. Hinson, A. D. Owings and **M. Samuel-Foo.** Effects of plant age and cultivar on western flower thrips damage threshold in *Impatiens wallerana*. Journal of Economic Entomology *(Submitted Summer 2013)*

Marble, S., C. Gilliam, G. Wehtje and **M. Samuel-Foo**. Early Post-emergence Control of Yellow Woodsorrel (*Oaxalis stricta L*.) with Residual Herbicides. Weed Technology. (*In press).*

**Samuel-Foo, M**., J. N. All and H. R. Boerma. 2013. Evaluation of pest vulnerability of 'benning' soybean value added and insect resistant near isogenic lines. Journal of Economic Entomology. 106: 830-836.

Chong, J. H., G. S. Hodges and **M. Samuel-Foo**. 2009. First record and management of the armored scale, *Melanaspis deklei* Dietz & Davidson, in South Carolina. Journal of Agricultural and Urban Entomology. 26: 63–75.

LeRoy, B., A. Painter, H. Sheppard, L. Popiolek, **M. Samuel-Foo** and T. Andacht. 2007. Protein expression profiling of normal and neoplastic canine prostate and bladder tissue. *Veterinary and Comparative Oncology*, 5: 119-130.

Lance, J. K, J. N. All and **M. Samuel-Foo.** 2005. Evaluation of Selected Insecticides for Control of Corn earworm and Fall armyworm in Sweet Corn. *Arthropod Management Tests,* 2005 (30).

Lance, J. K, J. N. All, C.W. Warrington, **M. Samuel-Foo** and P.H. Jost. 2005. Evaluation of Selected Insecticides for Control of Bollworm (BW) and Tobacco Budworm (TBW) in Georgia on Cotton, 2004. *Arthropod Management Tests,* 2005 (30).

**Oral/Invited Presentations:**

**M.Samuel-Foo:** Overview of the IR-4 program and it's how the organization assists growers of Specialty crops in the US. *Invited Seminar.* October 2013. Dept of Horticulture, Auburn University, AL.

**M. Samuel-Foo** and W. Robles: Registration of Crop Protection Chemicals for Specialty Crops: IR-4 project in Puerto Rico. *Invited presentation*. June 2013. 49th Caribbean Food Crops Society Meeting, Trinidad and Tobago.

Braman, K. and **M. Samuel-Foo**. March 2013. Managing foliar beetles in nursery production. SEB-ESA meeting, Baton Rouge, LA.

**M. Samuel-Foo:** March 2013. Navigating the IR-4 Regulatory process: How the Program accomplishes its Mission of Securing Sustainable Pest Management Tools for Minor Crops. SEB-ESA meeting, Baton Rouge, LA.

Braman, K. and **M. Samuel- Foo**. Managing scale insects in nursery production. 2013 Georgia Entomological Society Meeting.

Almodovar, L.E, W. Robles, R. Olszack, **M. Samuel-Foo** and Nelson Vargas. November 2012. Registration revision of the herbicide Diquat (Reglone ®) for the cultivation of banana. Sociedad Puertoriquena de Ciencias Agricolas, San Juan, Puerto Rico.

**Samuel-Foo, M.** June 2012: Pesticide Registrations for Specialty Crops in the US. *Invited Seminar*, CARDI, Caribbean Agricultural Research and Development Institute, St Augustine, Trinidad

**Samuel-Foo, M.,** and M. Marshall, August 2011: Registrations of Pest Management Tools for Growers of Specialty Crops in the US. *Invited seminar*, Beijing China
**Samuel-Foo, M**., December 2010: The Critical Role of IR-4 in Specialty Crop Pest Management. Entomological Society of America Annual Meeting, San Diego, CA

**Appendix 6**

**Registrant support.** Please submit your proposal to the registrant and request the registrant or potential registrant fill out the registrant questionnaire form and submit this to IR-4. Letters of support from the registrant as well as grower or commodity groups are encouraged.

**MGK®**

October 2, 2013

Re: IR-4 Biopesticide Proposal

Oscar E. Liburd, Ph.D. Professor
Fruit and Vegetable Entomology Entomology and Nematology Department University of Florida
Gainesville, FL 32606

Dear Dr. Liburd;

I am pleased to provide this letter in support of the proposed evaluation of Veratran D a new organically compliant product with a unique mode of action under development by MGK for spotted wing drosophila (SWD) and thrips control in blueberries and strawberries under the unique crop production system of Florida.

Since its foundation in 1902, MGK has been involved in the development and commercialization of natural and environmentally responsible insect pest control products. MGK 's century old commitment towards environmental stewardship and the commercialization of effective and environmentally sound technologies in agriculture provides the backdrop for our recent efforts with the development of Veratran D. MGK is intended to bring Veratran D, a new organically compliant product to the market place to assist pest management needs of organic growers nationwide.

Thank you very much. I am looking forward to cooperating with you on this project.

Sincerely,

Robert Suranyi, Ph.D.
**MGK**
8810 Tenth Avenue North Minneapolis, MN 55412 USA

## IR-4 Biopesticide Grant Program

**General guidelines and submission of biopesticide grant request forms:**
The general guidelines that will be used to initially review a proposed biopesticide grant request are shown in Appendix I. A proposal for financial assistance from our grants program must include biopesticide grant proposal forms. Incomplete or late forms will not be considered. Blank forms are also available from the IR-4 website www.ir4.rutgers.edu/ listed under Call For Proposals.

**Submission of research proposals:**
Proposals are invited for Early Stage as well as Advanced Stage biopesticides. Potential registrants are strongly encouraged to cooperate with public institutions in proposal submission; however proposals submitted solely from a company will not be considered. Early Stage biopesticides are biopesticides for which EPA subpart M Tier I data requirements http://www.epa.gov/fedrgstr/EPA-PEST/2007/October/Day-26/p20828.htm are not completed or satisfied by appropriate waivers (Ask registrant).

Most Advance Stage Proposals involve products that are already registered with the EPA and involve label expansion such as adding a new crop or new pest to the label. Research on existing labeled uses is funded under the demonstration stage program. Grant requesters are encouraged to interact with their IR-4 Regional Field Coordinator (see page 37) and the potential registrant prior to developing and submitting a proposal. All completed proposals should be submitted to the Manager of the IR-4 Biopesticide and Organic Support Program at IR-4 Headquarters. Proposals will then be reviewed for merit by IR-4 internal and external reviewers based on the criteria shown in Appendix III (Early Stage Proposals) or Appendix IV (Advanced Stage Proposals). Late or incomplete proposals will not be considered.

**Selection of projects for funding:**
Comments from the internal and the external reviewers will be summarized and a recommendation for funding will be made by the IR-4 Biopesticide Research Grant Review Committee to the IR-4 Project Management Committee (PMC). The PMC will authorize all funding decisions. If a Section 18 or Experimental Use Permit is needed to conduct the research, the permit must be in place in time to conduct the research.

**Notification of Project Funding:**
The IR-4 Biopesticide and Organic Support Program Manager will notify the requestor of the funding decision by the IR-4 PMC, probably by February of the funding year.

**Progress reports:**
Annual progress reports are required if the research is not completed within one year or if you are requesting additional funding. Otherwise, a final report is required. All reports should be sent to the

Regional Field Coordinator and the IR-4 Biopesticide and Organic Support Program. Reports should follow a standard scientific format of an abstract, introduction, materials and methods, a statistical analysis of the data in tabular or graphic format, and discussion-conclusions. Reporting requirements are attached to the end of the grant announcements.

**Continuation Grants/Renewal Grants:**

IR-4 will commit research funds for only one year at a time. In order to receive funding beyond the first
year, the grantee must submit a new grant request for continuation of funding, a progress report on research conducted under the existing grant, justification for continued funding, and a plan of work to be carried out under the continued grant. For projects in which data are not generated until after the due date for next year's grant, it is suggested to submit the data as soon as possible for consideration by the committee. Projects that do not generate data within the grant cycle will be at a competitive disadvantage for an additional years funding. If positive efficacy data are generated later in the year, the proposal can be resubmitted for a subsequent funding cycle. Early Stage Proposals are funded on an annual basis for a maximum of 2 years and Advanced Stage Proposals are funded for a maximum of 3 years.

Decisions regarding continued support and the actual funding levels are made by the IR-4 Biopesticide Research Grant Review Committee and PMC after consideration of such factors as grantee's progress, availability of funds and likelihood of grower adoption.

Florida Strawberry Growers Association
P.O. Drawer 2550
Plant City, FL 33564-2550
Office: (813) 752-6822
Fax: (813) 752-2167

October 26, 2013

Dear Dr. Liburd,

The Florida Strawberry Growers Association (FSGA) is excited to hear of your research proposal "Evaluation of Biopesticide, Veratran D for Control of Spotted Wing Drosophila and Thrips in Berry Crops". This is very serious pest and could significantly affect strawberry production in Florida. We welcome your research to find additional tools that organic growers can use to manage SWD in berry crops. Besides Entrust and PyGanic there is hardly anything that is approve for use for organic growers. This is important with the increasing buffer zone requirements for pesticide application that is adjacent to occupied structures such as schools, daycare and other such sensitive areas of the densely populated Hillsborough County production areas. The results of your research will provide our members with the knowledge to make informed decisions.

We wish you success with your application, we anticipate great insight from your research, and we look forward to participating in your outreach activities.

Sincerely,

*Dudley Calfee*

Dudley Calfee
Chairman, Florida Strawberry Growers Association Research Board

MGK®
Insect Control Solutions

October 2, 2013

Re: IR-4 Biopesticide Proposal

Oscar E. Liburd, Ph.D.
Professor
Fruit and Vegetable Entomology
Entomology and Nematology Department
University of Florida
Gainesville, FL 32606

Dear Dr. Liburd;

I am pleased to provide this letter in support of the proposed evaluation of Veratran D a new organically compliant product with a unique mode of action under development by MGK for spotted wing drosophila (SWD) and thrips control in blueberries and strawberries under the unique crop production system of Florida.

Since its foundation in 1902, MGK has been involved in the development and commercialization of natural and environmentally responsible insect pest control products. MGK's century old commitment towards environmental stewardship and the commercialization of effective and environmentally sound technologies in agriculture provides the backdrop for our recent efforts with the development of Veratran D. MGK is intended to bring Veratran D, a new organically compliant product to the market place to assist pest management needs of organic growers nationwide.

Thank you very much. I am looking forward to cooperating with you on this project.

Sincerely,

Robert Suranyi, Ph.D.
**MGK**
8810 Tenth Avenue North
Minneapolis, MN 55412
USA

10/31 SS

Office of Research
Division of Sponsored Research
PO Box 115500 / 219 Grinter Hall
Gainesville, FL 32611-5500
Phone: (352) 392-1582
Fax: (352) 392-4400

UF UNIVERSITY of FLORIDA

**DSR—1**

Sponsored Projects
Approval Form

Principal Investigator: Oscar Liburd

Multiple PI Project: ☐ Yes ☑ No — For Multiple PI Projects one Contact PI must be identified in the signature block.

Department: Entomology and Nematology

College:

Current UPN#: (DSR Completes) 13103105

Project Title: Evaluation of Biopesticide, Veratran D for Control of SWD and Thrips in Berry Crops

Funding Agency: IR-4

If Known:

PeopleSoft Proposal #:

PeopleSoft Project #:

Type: ☑ New ☐ Renewal ☐ Continuation ☐ Supplemental ☐ Revised ☐ Change of PI ☐ Change Dept ID

Category: ☑ Research ☐ Training ☐ Extension ☐ Clinical Trial ☐ Other*

*(Fellowships, patient services, public service, conference, etc.)

UF/Dept Person to discuss Applicaton (name/phone/email):
Mattson Oliverne M
(352) 273-3892
virni@ufl.edu

Application Deadline:
☐ Postmark ☒ Receipt ☐ None
Date: December 9th

| Check all that apply: | Yes | No | Pending |
|---|---|---|---|
| *Human Subjects (IRB) | ☐ | ☑ | ☐ |
| *Animal Subjects (IACUC) | ☐ | ☑ | ☐ |
| Recombinant DNA/RNA | ☐ | ☑ | |
| Biohazards | ☐ | ☑ | |

*(If yes, attach the IRB and/or the IACUC approval letter)

Application Mailing Instructions:
Mail Original and ____ Copies to:
PI will submit grant

☐ Grants.gov
☐ Other Electronic System
☐ FedEx
☐ Other Overnight
☐ First Class Mail
☐ Fax to:
☑ Email PDF
☒ Release back to PI
☐ Internal Only (no mailing)

(FedEx Account Number)

Cost Sharing: Yes ☐ No ☑

If yes, complete the following:
Mandatory: $ _____ Attach the required cost share letter and agency guidelines
Voluntary Committed: $ _____ Attach the "Dean's Approval" Letter

(DSR Use) DSR Staff: _____ Received _____ Action _____ Date _____

**Multiple Principal Investigator Projects:** For those projects designated as a Multiple PI Project the listed PIs share the responsibility for directing and managing the project in accordance with University and Sponsor policies and procedures. The Contact PI will be responsible for relaying communications between all of the PIs, University Officials and the Sponsor.

**Principal Investigator Endorsement:** By signing below you agree to perform the work and manage the project in accordance with University and Sponsor policies and procedures.

**Investigator(s) Assurance Statement as Required by Federal Regulation:** Investigator (s), by signing this DSR-1 form, further certify that: (1) the information submitted within the application is true, complete and accurate to the best of their knowledge; (2) that any false, fictitious, or fraudulent statements or claims may subject the Investigator(s) to criminal, civil, or administrative penalties; and (3) that the Principal Investigator(s) agree to accept responsibility for the scientific conduct of the project and to provide the required progress reports and the final report if a grant is awarded as a result of the application.

**University Endorsement:** This project has been reviewed by the officials whose signatures appear below as they relate to their areas and are satisfied that all faculty involved in the project have agreed to participate and that all obligations and commitments described herein are acceptable.

**Indirect Cost Distributions:** Upon receipt of DSR's Notice of Award, Principal Investigator(s) are instructed to use the Office of Research web-based F&A Manager to declare how the indirect costs collected under the award shall be distributed. The return of indirect costs generally occurs in the Fall of each year and is based upon the indirect costs collected from grants and contracts during the preceding fiscal year (July 1 - June 30).

**Principal Investigator: Check here if Contact PI** ☑
Oscar Liburd 10-29-2013
NAME: Oscar Liburd DATE
TITLE: Professor
UFID #: 5360-3940 TELEPHONE #: (352) 273-3918
DEPARTMENT: Entomology and Nematology

**Co-Principal Investigator:**
NAME: DATE
TITLE:
UFID #: TELEPHONE #:
DEPARTMENT:

**Department Chair:**
John Capinera 10/30/2013
NAME: John Capinera DATE
DEPARTMENT: Entomology and Nematology

**Other Endorsement (Where Needed):**
NAME: DATE
TITLE:
ACADEMIC UNIT:

**College Dean:**
10/30/13
NAME: John R. Hays, Dean for Research DATE
COLLEGE: IFAS

**Vice President for Research:**
Sheree Stephens 11/06/2013
NAME: DATE
Division of Sponsored Research
Signing Official
Pre-Award Services

DSR-1.PDF ( September 3, 2009)

Please add additional signature sheets as needed.

**Registrant Questionnaire**

**Please fill out the first page of this form for each crop/biopesticide combination and send to the registrant.**

**Registrant please return to IR-4 Project Headquarters, Michael Braverman, Biopesticide and Organic Support Program Manager, 500 College Road East; Suite 201 W; Princeton, NJ 08540-6635, Tel: (732) 932-9575 ext. 4610, Fax: (609) 514-2612, braverman@aesop.rutgers.edu**

Principal Investigator: Oscar E. Liburd

Address: Entomology and Nematology Department
1881 Natural Area Dr., Steinmetz Hall
Gainesville, FL 32611

Telephone: (352) 273-3918

Proposal Title: Evaluation of the biopesticide, Veratran D, for control of spotted wing drosophila and thrips in berry crops

Registrant name and address: MGK, 8810 Tenth Avenue North, Minneapolis, MN 55427

Product Name: Veratrand D® Active Ingredient: Sabadilla Alkaloids

Trade Name: Veratrand D®

Commodity: Blueberry

**The following section is to be completed by the Biopesticide Registrant. (Due Dec. 4, 2013)**

**1)** Is this product EPA registered through BPPD? Yes____No_ **X**
Is this use covered by your current label? Yes_____No_**X**

If this product is not yet registered with EPA, describe where you are at in collecting the toxicology data or stage of the registration process. If this project was previously funded, describe how the registration status has changed since last year.

**The product is registered with the EPA but not via BPPD.**

Is label and toxicology work currently limiting product only to non-food uses? **No**

**2)** Assuming the efficacy data are favorable, what is the likelihood that this use will be added to your label? **Very high**

**3)** Considering the use rate(s), what is considered to be the farm-level cost for the treatment in $/acre? **~$55/acre**

**4)** How would you rank the importance of the proposed use compared to other potential uses?

**Very High**

**5)** If you are only considered a potential registrant (do not currently own rights to the product), rank your degree of interest in this product. **N/A**

**6)** Were you involved or consulted in the development of the treatments or proposal? **Yes**

**7)** What financial support are you planning on providing, if any? **Product and time**

Dr. Robert Suranyi

Name of Registrant representative

3 December, 2013

Date

Entomologist

Title

**Other comments – Please attach a letter of support for this project by Dec 4, 2013**

**Registrant Questionnaire**

**Please fill out the first page of this form for each crop/biopesticide combination and send to the registrant.**

**Registrant please return to IR-4 Project Headquarters, Michael Braverman, Biopesticide and Organic Support Program Manager, 500 College Road East; Suite 201 W; Princeton, NJ 08540-6635, Tel: (732) 932-9575 ext. 4610, Fax: (609) 514-2612, braverman@aesop.rutgers.edu**

Principal Investigator: Oscar E. Liburd

Address: Entomology and Nematology Department
1881 Natural Area Dr., Steinmetz Hall
Gainesville, FL 32611

Telephone: (352) 273-3918

Proposal Title: Evaluation of the biopesticide, Veratran D, for control of spotted wing drosophila and thrips in berry crops

Registrant name and address: MGK, 8810 Tenth Avenue North, Minneapolis, MN 55427

Product Name: Veratrand D® Active Ingredient: Sabadilla Alkaloids

Trade Name: Veratrand D®

Commodity: Strawberry

**The following section is to be completed by the Biopesticide Registrant. (Due Dec. 4, 2013)**

**1)** Is this product EPA registered through BPPD? Yes____No_ **X**
Is this use covered by your current label? Yes_____No_**X**

If this product is not yet registered with EPA, describe where you are at in collecting the toxicology data or stage of the registration process. If this project was previously funded, describe how the registration status has changed since last year.

**The product is registered with the EPA but not via BPPD.**

Is label and toxicology work currently limiting product only to non-food uses? **No**

**2)** Assuming the efficacy data are favorable, what is the likelihood that this use will be added to your label? **Very high**

**3)** Considering the use rate(s), what is considered to be the farm-level cost for the treatment in $/acre? **~$55/acre**

**4)** How would you rank the importance of the proposed use compared to other potential uses?

**Very High**

**5)** If you are only considered a potential registrant (do not currently own rights to the product), rank your degree of interest in this product. **N/A**

**6)** Were you involved or consulted in the development of the treatments or proposal? **Yes**

**7)** What financial support are you planning on providing, if any? **Product and time**

Dr. Robert Suranyi

Name of Registrant representative

3 December, 2013

Date

Entomologist

Title

**Other comments – Please attach a letter of support for this project by Dec 4, 2013**