Biological Control Work Plan Fiscal Year 2019

Cooperator:	**Hawaii Department of Agriculture**	
State:	**Hawaii**	
Project Title:	**Pre-release Field Evaluation of a New Natural Enemy for Biological Control of Erythrina Gall Wasp**	
Project Coordinator:	**Juliana A. Yalemar**	
Agreement Number		
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I. BACKGROUND INFORMATION

A. Provide a brief description of the issue

The arrival of the Erythrina Gall Wasp (EGW), *Quadrastichus erythrinae* Kim, 2004 (Hymenoptera: Eulophidae), in April 2005 devastated *Erythrina* spp. (Family: Fabaceae) in the Hawaiian Islands. EGW was first found on the Island of Oahu and spread to all the other islands in a matter of months killing hundreds of *Erythrina* trees including the native wiliwili, *Erythrina sandwicensis* O.Deg. 1932.

In December 2005, a natural enemy of the EGW, *Eurytoma erythrinae* Gates & Delvare, 2008 (Hymenoptera: Eurytomidae), collected from Tanzania underwent rigorous testing to ensure its specificity to the target pest and was released in November 2008. *Eurytoma erythrinae* is an ectoparasitoid that attacks EGW by feeding on several of the immatures in large galls to complete its development. Six months after the first release, *E. erythrinae* established successfully in the pest habitat and wiliwili trees began to recover.

Although *E. erythrinae* was successful in saving the Erythrina trees, damage by EGW on flowers, seed pods, and seedlings of the endemic wiliwili persists. Galls formed by EGW on flowers and seedling are usually small and scattered but the Eurytomid parasitoid fares well only on large galls. Furthermore, the formation of seed takes approximately three months and all flower stages are susceptible up to mature seed formation. Seedlings are likewise vulnerable and easily succumb to EGW damage. Hence, the future survival of *E. sandwicensis* remains threatened.

Hawaii Department of Agriculture (HDOA) has proposed the release of a second biocontrol agent, *Aprostocetus nitens* Prinsloo & Kelly, 2009, (Hymenoptera: Eulophidae), to tackle this

dilemma. *A. nitens* is a eulophid ectoparasitoid that was collected in Africa, the native region of EGW, has completed risk assessment and is proven to be host specific to EGW. *A. nitens* can complete its development on a single EGW and survives well on small and large galls. Therefore, it can complement biocontrol by the first parasitoid. Applications for release of *A. nitens* are underway.

B. Indicate

Is this a new project? ☒ YES ☐ NO

Is this a continuation of a previously funded agreement? ☐ YES ☒ NO. If yes, have all progress reports been submitted? Explain.

II. OBJECTIVES, NEED FOR ASSISTANCE, BENEFITS EXPECTED

A. Specific Objectives of the Project (List if more than one)

1. To select release and monitoring sites for *Aprostocetus nitens* when it is approved to be released.

2. To survey, evaluate and update the status of extant natural enemy (*E. erythrinae*) and *E. sandwicensis* in the field to use as baseline comparison with the impacts of *A. nitens* after it is released.

B. Justify how the funding will facilitate the cooperator in carrying a Biological Control Project that targets a pest of concern to APHIS

Funding will allow the research staff to survey and preselect sites for release of *Aprostocetus nitens* in the event it is approved to be released. Moreover, funding will enable researchers to re-evaluate, collect and update data on the impact of previously released biocontrol agent on the pest. This data will be crucial in determining if there are beneficial impacts of multiple parasitoids on reducing EGW population on Erythrina trees.

C. Indicate the economical or environmental impact of the pest (i.e., economic losses caused by the pest, mitigation costs, cost of the invasive species)

Several species of Erythrina trees which are affected by the pest are used mainly for landscaping in Hawaii but of utmost concern is the endemic species, *E. sandwicensis*. *E. sandwicensis* is a predominant tree in Hawaii's dry forests and plays an important role in the Hawaiian culture as well. Persistent damage of EGW on its flowers, seed pods, and seedlings threatens its future survival.

D. Describe the expected benefits of conducting the activities in the work plan

Surveying and pre-selecting release sites will enable researchers to choose optimal sites for the survival and establishment of the new parasitoid, *A. nitens*. In addition, to evaluate the status of *E. sandwicensis* after the release of first biocontrol agent, this study will provide the information needed to determine the comprehensive impacts of *A. nitens* after it is released in the field.

III. RESULTS

A. What are the anticipated results and successes?

1. Selected pre-release and monitoring sites
2. Created maps of pre-release and monitoring sites
3. Updated data on pest and biocontrol agent populations and the overall health of *E. sandwicensis*

B. Describe how results will:

1. Reduce mitigation costs of managing the pest

N/A

2. Minimize negative impacts on non-targets

N/A

3. Establish biocontrol agents

N/A

4. Reduce pest densities

N/A

C. Select which of the following OUTPUTS will be achieved by the termination date: (Select YES, NO, or N/A for each output) * *N/A is non-applicable.*

• New rearing techniques	☐ YES	☒ NO	☐ N/A*
• Effective or improved rearing techniques	☐ YES	☒ NO	☐ N/A
• New potential BC species identified, studied, or collected	☐ YES	☒ NO	☐ N/A
• Effective or improve field site evaluation techniques	☐ YES	☒ NO	☐ N/A
• Effective or improve surveying techniques for pest or agent	☐ YES	☒ NO	☐ N/A
• Effective or improve monitoring techniques for pest or agent	☐ YES	☒ NO	☐ N/A
• Publications or educational material	☐ YES	☒ NO	☐ N/A
• Training	☐ YES	☒ NO	☐ N/A
• Other	☐ YES	☒ NO	☐ N/A

Explain here for Other:

For OUTPUTS selected as YES, provide a description:

IV. APPROACH

A. Plan of Action for the proposed objectives - Describe the work to be performed under this work plan. The narrative is to include any information or data that will be shared with APHIS.

Two to four pre-release sites will be selected on each of the four major Hawaiian Islands, Oahu, Kauai, Big Island and Maui. Ten trees will be selected from each site to be evaluated and monitored every other month. Canopy coverage will be rated, EGW damage on leaves and petioles will be rated on 10 selected branches from each tree. During flowering season, ten racemes from each tree will be tagged and evaluated monthly from flower buds to mature seeds. All information and data collected will be submitted to APHIS in the semiannual and annual reports.

B. Indicate which of the following activities will be performed:
(Select YES, NO, or N/A for each output) * *N/A is non-applicable.*

• Survey of pests	☒ YES	☐ NO	☐ N/A*
• Survey of BC agents	☒ YES	☐ NO	☐ N/A
• Environmental release of BC agents	☐ YES	☒ NO	☐ N/A
• BC agent collection – offshore	☐ YES	☒ NO	☐ N/A
• BC agent collection – field	☒ YES	☐ NO	☐ N/A
• BC agent distribution from lab or insectaries	☐ YES	☒ NO	☐ N/A
• Monitoring of pest	☒ YES	☐ NO	☐ N/A
• Monitoring of BC agents	☒ YES	☐ NO	☐ N/A
• Pre-release evaluation, development, or screenings of agent	☒ YES	☐ NO	☐ N/A
• Pre-release site selection and evaluation	☒ YES	☐ NO	☐ N/A
• Post-release site evaluation	☐ YES	☒ NO	☐ N/A
• Post-release evaluation of impacts on non-targets	☐ YES	☒ NO	☐ N/A
• Post-release evaluation of agent's efficacy	☐ YES	☒ NO	☐ N/A
• Rearing of BC agents	☐ YES	☒ NO	☐ N/A
• Mapping of pest or BC agent	☐ YES	☒ NO	☐ N/A
• Outreach or education	☐ YES	☒ NO	☐ N/A
• Training	☐ YES	☐ NO	☒ N/A
• Partnering or Networking	☐ YES	☐ NO	☒ N/A
• Techniques or methods development	☐ YES	☐ NO	☒ N/A
• Technology transfer	☐ YES	☐ NO	☒ N/A
• Other	☐ YES	☐ NO	☒ N/A

Explain here for Other:

For Activities selected as YES, provide a description:

~ Pest population and damages will be surveyed and evaluated in each site every other month during non-flowering season and monthly during flowering season.

~ BC agents likewise, will be surveyed in each site and rates of parasitism will be determined

~ Samples will be collected in the field to be held for parasitoid's emergence and for dissection to determine parasitism rate

~ EGW and its damages will be monitored every other month in each field

~ Existing Biocontrol agent will be surveyed and evaluated

~ The work plan is aimed for pre-release evaluation activities

C. Contingencies - Include other approaches that will be considered if the work plan produces results sooner, later, or different than what you anticipate.

If selected sites and trees become unavailable due to natural causes, alternate sites and trees will be selected.

D. What is the quantitative projection of accomplishments to be achieved?

The project anticipates creating quantitative information of the impact of the existing biocontrol agent on the pest and trees by determining parasitism rate and rating pest damage on trees.

1. By activity or function, what are the anticipated accomplishments by month, quarter, or other specified intervals?

The project anticipates carrying out the selection of sites in the first quarter but all other activities per our project objectives will be on-going throughout all quarters.

2. What criteria will be used to evaluate the project?

Field data and relevant information collected in the pest survey will be documented in the HDOA survey program database and reported in the HDOA Annual Report and journal publications.

3. What methodology will be used to determine if identified needs are met?

Documented results will show that the project needs have been met. Documentation includes local HDOA weekly updates and HDOA annual reports.

4. What methodology will be used to determine if Results and benefits are achieved?

Periodic reviews by the Project Coordinator and the PPC entomologists assigned to manage

project will ensure that work plan and activities are implemented and carried out.

V. RESOURCES

A. What resources are required to perform the work?

- Project leader and existing HDOA Staff

-Travel funds to neighbor islands (Maui, Kauai, Big Island) to survey and monitor trees

- Funds to purchase supplies to conduct field surveys and monitoring

1. What numbers and types of personnel will be needed, and what will they be doing?

The HDOA staff that will undertake various aspects of the project are as follows:

-Biological Control Section Chief shall serve as the Project Leader. The Section Chief will manage the financial administration of the agreement, manage data in coordination with the CAPS Entomologist and CAPS Technician into appropriate databases and oversee all reporting.

-Insectary Supervisor Entomologist will oversee the survey and evaluation of the pest and existing biocontrol agent in the field and processing of samples collected in the field.

-Insectary Entomologists (2) will assist in the field survey and laboratory examination of material collected from the field.

-Pest Control technicians (2) will assist in the field survey and laboratory examination of material collected from the field.

2. What equipment will be needed to perform the work? Include major items of equipment with a value of $5,000 or more.

a. What equipment will be provided by the cooperator?

- Vehicles
- Microscopes
- Weather stations

b. What equipment will be provided by APHIS?

None

c. What equipment will be purchased in whole or in part with APHIS funds?

None

d. How will the equipment be used?

The vehicles will be used to transport personnel to and from work sites in the field, microscopes for identifying the pests, and weather stations to monitor the weather.

e. What is the proposed method of disposition of the equipment upon termination of the agreement/project?

Equipment will remain with the Hawaii Department of Agriculture.

3. Identify information technology equipment, e.g., computers, and their ancillary components. *All information technology supplies (e.g., small items of equipment, connectivity through air cards or high speed internet access, GPS units, radios for emergency operations etc.) should be specifically identified.*

- Network servers
- Local area network
- Internet access
- Desktop/Laptop/Tablet Computers
- Printers/Plotters
- Scanners
- Software including Microsoft Office, statistical analysis software, and ARC MAP
- GPS Units

4. What supplies will be needed to perform the work? Identify individual supplies with a cumulative value of $5,000 or more as a separate item.

a. What supplies will be provided by the Cooperator?

None

b. What supplies will be provided by APHIS?

None

c. What supplies will be purchased in whole or in part with APHIS funds?

Cages, GPS units, cameras, and field survey and collection supplies

d. How will the supplies be used?

To collect, process, record, and manage pest survey information

e. What is the proposed method of disposition of the supplies with a cumulative value over $5,000 upon termination of the agreement/project?

N/A

5. What procurements will be made in support of the funded project and what is the method of procurement (e.g., lease, purchase)?
(Cooperator procurements shall be in accordance with OMB Circulars A-102 or A110, as applicable.)

Cooperator procurements shall be in accordance with OMB Circulars A-102 or A110, as applicable.

Supplies, manuscript fees, and consumables related to pre-monitoring studies of *A. nitens* will be purchased with State of Hawaii credit card (pCard) or through purchase order(s) in accordance, Departmental and State of Hawaii procurement rules and regulations.

6. What are the travel needs for the project?

a. Is there any local travel to daily work sites? Who is the approving official? What are the methods of payment? Indicate rates and total costs in the Financial Plan.

None

b. What extended or overnight travel will be performed (number of trips, their purpose, and approximate dates). Who is the approving official? What is the method of payment? Indicate rates and total cost in the Financial Plan.

There will be 8 interisland trips to each county (Hawaii, Maui, and Kauai) for a total of 24 trips for 2 employees. The approving official is the HDOA plant pest control branch manager and administrative services officer. Payments will be made with a State of Hawaii purchasing card or with purchase orders.

7. Are there any other contributing parties who will be working on the project?

☐ YES ☒ NO
If YES, answer below:

a. List Participating Agency/Institution:

N/A

b. List all who will work on the project:

N/A

c. Describe the nature of their effort:

N/A

d. Contribution:

N/A

VI. GEOGRAPHIC LOCATION OF PROJECT

A. Is the project statewide or in specific counties, townships, and/or national or state parks? (List all that apply)

The project is statewide

B. What type of terrain (e.g., cropland, rangeland, woodland) will be involved in the project?

Paved and dirt roads in various areas, forests, hilly sites and woodland

C. Are there any unusual features which may have an impact on the project or activity such as rivers, lakes, wild life sanctuaries, commercial beekeepers etc? (list all that apply)

None

D. Are there tribal lands in proximity to the project area that may be impacted, positively or negatively, by the project?

None

VII. DATA COLLECTION AND MAINTENANCE

A. What type of data will be collected and how will it be maintained?

Ratings of pest damage on test trees, pest and biocontrol agent population fluctuations, parasitism rate, GPS coordinates of survey and monitoring sites, dates, survey method, county

B. Address timelines for collection, recording, and reporting of data.

All field data will be collected and recorded every other month and entered in a master data file. Periodic update and progress of work is provided in HDOA weekly reports and staff meetings. Semi-annual and final written reports will be submitted to APHIS within six months after the start and termination of the project.

C. How will APHIS be provided access to the data?

Data will be provided in the semiannual and annual reports submitted to APHIS.

D. Identify if the data collected relate to the following measures.
* *N/A is non-applicable.*

• The number of BC species that become established and sustainable	☐ YES	☒ NO	☐ N/A*
• The number of BC programs that are developed, implemented, or transferred to States or others	☐ YES	☒ NO	☐ N/A
• Total number of sites that are managing targeted pests using biocontrol	☐ YES	☒ NO	☐ N/A
• Total number of new agents identified, studied, or imported	☐ YES	☒ NO	☐ N/A
• Total number of pre-release and site evaluations, or surveyed	☒ YES	☐ NO	☐ N/A
• Total number of sites monitored	☒ YES	☐ NO	☐ N/A
• Successful development of rearing and release technology	☐ YES	☒ NO	☐ N/A
• Number of eligible sites with targeted pests participating in biocontrol	☒ YES	☐ NO	☐ N/A
• Number of targeted pests managed using biocontrol	☐ YES	☒ NO	☐ N/A
• Number of publications, presentations, databases, and educational material	☐ YES	☒ NO	☐ N/A
• Number of agent colonies or insectaries created	☐ YES	☒ NO	☐ N/A
• Time of monitoring released BC agents in the field	☐ YES	☒ NO	☐ N/A
• Cost operating rearing laboratories	☐ YES	☒ NO	☐ N/A
• Total number of BC individuals reared	☐ YES	☒ NO	☐ N/A
• Total number of BC individuals released	☐ YES	☒ NO	☐ N/A
• Cost of BC individual reared	☐ YES	☒ NO	☐ N/A
• Cost of BC individual released	☐ YES	☒ NO	☐ N/A

For data variables selected as YES, provide a description:

- The number of pre-release and survey sites will be recorded and mapped
- Total number of sites monitored will be recorded
- The number of eligible sites with targeted pests participation in biocontrol will be recorded and mapped as well

E. All survey data from federal cooperative agreements involving pest surveys, will be entered into an APHIS, PPQ approved database. The State Plant Health Director, or his/her designee, is responsible for assuring data quality.

1. If using NAPIS database.

   a. First record for the State and/or County will be entered within 48 hours of confirmation of identification by a qualified identifier.

   b. All other required records, both positive and negative survey data, must be entered within two weeks of confirmation.

VIII. Reporting instructions:

All Reports will be completed in ezFedGrants. Reports include:

A. Narrative accomplishment reports in the frequency and time frame specified on the Agreement Award Face Sheet.

B. Federal Financial Reports, SF-425, in the frequency and time frame specified on the Agreement Award Face Sheet.

IX. APHIS Will:

1. Include any significant Agency collaboration and participation
   - Provide funds to the cooperator to cover costs as outlined in the financial plan.
   - Provide additional guidance and/or technical assistance to the project coordinator, as requested.
   - Assist in clarifying survey methods and detection, as well as, identification resources, as needed.
   - Support the work and financial plan development by the cooperator.
   - Ensure that cooperator receives survey supplies, as provided by the program.

2. Project oversight and performance management
   - Notify the project coordinator of reporting deadlines.
   - Provide guidance in the compilation and submitting of reports and other administrative matters.
   - Maintain data spreadsheets showing due dates for reports, requests for allocation, forms submitted, tracked by the survey specialist.
   - Provide general oversight and quality assurance of the program.

SIGNATURES

8-10-18
Phyllis Shimabukuro-Geiser, ROAR Date

8-13-18
Vernon Harrington, ADODR Date