CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

Memorandum

TO: **HONORABLE MAYOR AND CITY COUNCIL**

FROM: Debra Figone

SUBJECT: **Guava Fruit Fly Eradication Project in San Jose by State**

DATE: July 15, 2013

INFORMATION

For your information, I am sharing with you a notice we have received from the California Department of Food & Agriculture regarding an eradication project to deal with the discovery of guava fruit flies in San Jose. This agricultural pest poses a threat to a number of California crops, and CDFA is undertaking a series of steps to reduce the risk, principally chemical control and fruit removal where appropriate. I encourage you to redistribute this attached information to your constituents.

Debra Figone
City Manager

Attachment

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

OFFICIAL NOTICE
FOR THE CITY OF SAN JOSE
PLEASE READ IMMEDIATELY

PROCLAMATION OF AN ERADICATION PROJECT FOR THE GUAVA FRUIT FLY

On July 3, 2013, two male guava fruit flies (GFFs), *Bactrocera correcta* (Bezzi), were trapped in the city of San Jose, Santa Clara County. Based on the survey data, pest biology, information from the Department's *Bactrocera* Science Advisory Panel (BacSAP), recommendations provided to me by the Department's Primary State Entomologist, and the Department's "Action Plan for Methyl Eugenol Attracted Fruit Flies including Oriental Fruit Fly *Bactrocera dorsalis* (Hendel)", I have determined that an infestation of GFF exists in the area.

Immediate emergency eradication action is needed to protect California from the negative economic and environmental impact the establishment of this pest would cause. GFF is a serious exotic insect pest that is not native to California, The GFF is an exotic insect originating in southern Asia, from Pakistan eastward through India and into Thailand. GFF is known to attack numerous kinds of fruit and vegetables. Damage occurs when the female lays eggs in the fruit. These eggs hatch into larvae, or maggots, which tunnel through the flesh of the fruit, making it unfit for consumption. This pest presents a major threat to a wide variety of California produce, such as guava, peach, cherry, citrus, and melon. The 2008 total production value of GFF host fruit and vegetables in California was $3 billion. Should GFF become established in California, estimates from 2003 were that annual crop loss could be up to $583 million, with annual control costs of over $3.5 million resulting in an increase of up to 252,000 additional pounds of pesticides being used. This loss value does not include losses to export markets, and if GFF became established in California, the state would certainly face detrimental quarantine restrictions directed against host commodities by both the United States Department of Agriculture (USDA) and our international trade partners.

The emergency program is based on an action plan developed in consultation with the Pest Prevention Committee of the California Agricultural Commissioner's Association, United States Department of Agriculture and scientists on the BacSAP. Pursuant to sections 5401-5405 and 5761-5764 of the Food and Agricultural Code (FAC), the Secretary is mandated: to thoroughly investigate the existence of a pest; to determine the probability of the spread of a pest; to adopt regulations (Title 3 of the California Code of Regulations, Section 3591.13) as are reasonably necessary to carry out the provisions of this code; to abate a pest from the established eradication area; and, to prevent further economic damage.

In accordance with integrated pest management principles, the California Department of Food and Agriculture (CDFA) has evaluated possible eradication methods and determined that there are no cultural or biological methods available to eradicate GFF. CDFA will employ chemical control as the primary tool, and will additionally use physical control via host fruit removal when there is evidence that a breeding population exists on a property.

To comply with FAC mandates, the treatment plan for GFF eradication is as follows:

- The male attractant treatment (MAT) makes use of small amounts of the attractant methyl eugenol and the pesticide naled (Dibrom® Concentrate) mixed into a clay matrix (Min-U-Gel® 400) to lure the male flies to bait stations. The male GFFs are killed before they can mate with the female GFFs. This disrupts the breeding cycle and the population is eliminated. Spot applications of approximately five ml will be applied to utility poles, street trees, and other unpainted surfaces using pressurized tree marking guns within a nine-square mile area around each GFF detection site. The bait stations are placed six to eight feet above the ground and out of the reach of the public, and are repeated every 14 days for one to two life cycles of the fly (typically two to six months, dependent on temperature), dependent on the severity of the infestation. Public exposure to naled and related residues as a result of its use in fruit fly eradication is negligible.

- If evidence that a breeding population exists on a property (i.e., immature stages, mated female, or multiple adults), foliar bait treatments may be used within 200 meters of each detection site in order to mitigate the spread of GFF by eliminating those adult life stages not directly affected by MAT (i.e., females and sexually immature males). Foliar bait ground treatments are a protein bait spray that contains an organic formulation of the pesticide spinosad (GF-120 NF Naturalyte® Fruit Fly Bait), and are repeated every seven to 14 days for one life cycle of the fly (typically two to three months, dependent on temperature). Visit the CDFA website to learn more about the treatment process at http://www.cdfa.ca.gov/plant/videos/spinosad/.

- If evidence that a breeding population exists on a property (i.e., immature stages, mated female, or multiple adults), fruit from each detection site and all properties within 100 meters of each detection site may be removed and disposed of in a landfill in accordance with regulatory protocols. Treatment will occur once at the beginning of the project, but may be repeated if additional flies are detected.

Public Notification:
Any resident whose property will be treated via foliar bait sprays or host fruit removal will be notified in writing at least 48 hours in advance of any treatment, in accordance with FAC Sections 5779 and 5401-5404. Following the treatment, completion notices are left with homeowners detailing precautions to take and post-harvest intervals applicable to any fruit on the property. For MAT applications in public areas, notification is given to the general public via mass media outlets such as newspapers or press releases, and information is posted on CDFA's website at http://www.cdfa.ca.gov/plant/PDEP/treatment/guava_ff.html. Information concerning the GFF project will be conveyed directly to concerned local and State political representatives and authorities via letters, emails, and/or faxes. Press releases, if issued, are prepared by CDFA's information officer and the county agricultural commissioner, in close coordination with the project leader responsible for treatment. Either the county agricultural commissioner or the public information officer serves as the primary contact to the media.

Please contact CDFA's toll-free hotline at 800-491-1899 and staff will be able to assist with any questions related to the project. This telephone number is also listed on all treatment notices.

Enclosed are the Proclamation of an Eradication Project, a work plan, a map of the treatment area, alternative treatment methods analysis, and the pest profile with a host list.

PROCLAMATION OF AN ERADICATION PROJECT
REGARDING THE GUAVA FRUIT FLY

Between July 3 and 5, 2013, three male guava fruit flies (GFFs), *Bactrocera correcta* (Bezzi), were trapped in the city of San Jose, Santa Clara County. Based on the survey data, pest biology, information from the California Department of Food and Agriculture (CDFA) *Bactrocera* Science Advisory Panel (BacSAP), recommendations provided to me by the CDFA Primary State Entomologist, and the CDFA "Action Plan for Methyl Eugenol Attracted Fruit Flies including Oriental Fruit Fly *Bactrocera dorsalis* (Hendel)", I have determined that an infestation of GFF exists in the area.

The GFF is an exotic insect originating in southern Asia, from Pakistan eastward through India and into Thailand. GFF is known to attack numerous kinds of fruit and vegetables. Important California crops at risk include cherry, guava, mandarin, melons, orange, and peach. Damage occurs when the female lays eggs in the fruit. These eggs hatch into larvae, or maggots, which tunnel through the flesh of the fruit, making it unfit for consumption.

Under my statutory authority, as Secretary of the CDFA, I have decided, based upon the likely environmental and economic damage that would be inflicted by this infestation of GFF, that it is incumbent upon me to address this threat. This pest presents a major threat to a wide variety of California produce, with the combined 2011 gross value of these commodities of over $2.7 billion. The permanent establishment and spread of this pest would result in increased production and postharvest costs to safeguard commercial fruit from infestation, increased pesticide applications on both production agriculture and residential properties to mitigate damage, and lost economic activity and jobs from trade restrictions imposed by the United States Department of Food and Agriculture and some foreign trade partners.

My duty to act, and this decision, is based upon authority set forth in Sections 24.5, 401.5, 403, 407, 408, 5401-5405, and 5761-5764 of the Food and Agricultural Code (FAC) authorizing and mandating me: to thoroughly investigate the existence of the pest; to determine the probability that the pest will spread; to adopt regulations (Title 3 of the California Code of Regulations, Section 3591.13) as are reasonably necessary to carry out the provisions of this code; to abate the pest from the established eradication area; and, to prevent further economic damage. The enclosed project work plan describes the actions to be taken by the CDFA which are necessary to mitigate the establishment and spread of this pest.

This decision to proceed with an eradication program is based upon a realistic evaluation that it may be possible to eradicate GFF using currently available technology in a manner that is based on the enclosed work plan developed in consultation with the Pest Prevention Committee of the California Agricultural Commissioner's Association, USDA, and scientists on the BacSAP. Due to the size of the infested area and the number of GFF detected, historical data indicates that eradication is possible. The first California GFF detection occurred in Orange County in 1986, and since that time, several re-introductions have been delimited and successfully eradicated.

In making this decision, the CDFA has evaluated possible eradication methods. In accordance with integrated pest management principles, the following is a list of the options that I have considered for the eradication of this GFF infestation: 1) physical controls; 2) cultural controls; 3) biological controls; and 4) chemical controls. Based upon input from outside experts familiar with GFF and my professional staff, I have concluded that there are no cultural or biological controls that are effective to eradicate GFF that allow CDFA to meet its statutory obligations. To eradicate GFF, I am ordering that male attractant treatments, consisting of methyl eugenol, a pesticide (naled), and a thickener be applied to utility poles and street trees to eliminate this

infestation. Additionally, in the event of evidence of a breeding population on a property, foliar bait spray treatments will be applied to host trees using ground based equipment and host fruit removal will occur. Descriptions of these options are contained in the enclosed work plan.

The CDFA has prepared and certified a Final Environmental Impact Report (FEIR) entitled "The Exotic Fruit Fly Eradication Program Utilizing Male Annihilation and Allied Methods," which is implemented as per the operations described above. This FEIR identifies and analyzes alternative actions applicable to exotic fruit fly pest eradication projects. The enclosed work plan incorporates the appropriate integrated pest management techniques as described in the FEIR. The CDFA has not detected any local condition which would justify or necessitate preparation of a site specific plan.

Sensitive Areas

The CDFA has consulted with the California Department of Fish and Wildlife, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service in regards to threatened or endangered species in the treatment area. Mitigation measures will be implemented as needed.

Eradication Plan

The eradication area includes those portions of Santa Clara County which fall within an approximate nine-square mile area around each property on which a GFF has been trapped or on which another life stage of the insect is detected. A map of the detection sites with eradication boundaries and the proposed eradication work plan are enclosed. In summary form, the work plan will contain the following elements:

1. Delimitation. Two types of traps will be placed throughout the project area to delimit the infestation and to monitor post-treatment GFF populations. The cardboard Jackson sticky trap is baited with the attractant methyl eugenol mixed with the pesticide naled (Dibrom® 8 Emulsive), and the McPhail trap is an invaginated glass flask baited with Torula yeast and borax in water. The Jackson trap is strongly attractive to sexually maturing males, while the McPhail trap is attractive to both sexes of the fly. Jackson traps and McPhail traps will each be placed at a density of 25 per square mile in the core areas, and Jackson traps will be placed at a density of five per square mile in the remaining delimitation area. Additional traps may be added to further delimit the infestation and to monitor the efficacy of treatments. These traps will be serviced on a regular schedule for a period equal to three GFF generations beyond the date of the last GFF detected.

2. Treatment. Any GFF detections within the original and/or expanded eradication area(s) will be treated according to the following protocol. The CDFA will not apply pesticides to bodies of water or undeveloped areas of native vegetation which lack host plants.

    - The male attractant technique (MAT) will be used to eradicate the adult GFF. The MAT makes use of small amounts of the attractant methyl eugenol mixed with the pesticide naled (Dibrom® Concentrate), and incorporated into a clay matrix (Min-U-Gel® 400) to lure the male flies to bait stations. The flies are killed when they feed at the stations. In each square mile within the eradication boundary, a targeted density of 600 evenly spaced five ml bait stations are applied to utility poles street trees, and

other unpainted surfaces using pressurized tree marking guns mounted on specially modified trucks. The bait stations are placed six to eight feet above the ground. The size of the eradication area is defined as that area within 1.5 miles of each detection site, and squared off to create a nine square mile block, and adjusted to use existing features as boundaries, such as roads. The size of this area may be increased later should additional flies be subsequently detected at other sites. Treatment is repeated every two weeks and continues for one or two fly life cycles beyond the date of the last fly find (typically two to six months, dependent on temperature), or for a minimum of four applications, dependent on the severity of the infestation.

- If evidence that a breeding population exists on a property (i.e., immature stages, mated female, or multiple adults), foliar bait treatments may be used within 200 meters of each detection site in order to mitigate the spread of GFF by eliminating those adult life stages not directly affected by MAT (i.e., females and sexually immature males). The foliage of host trees and shrubs within 200 meters of each detection site will be treated with an organic formulation of spinosad bait spray (GF-120 NF Naturalyte® Fruit Fly Bait) using hand spray or hydraulic spray equipment. Treatments are repeated every seven to 14 days for one life cycle of the fly (typically two to three months, dependent on temperature).

- If evidence that a breeding population exists on a property (i.e., immature stages, mated female, or multiple adults), fruit from each detection site and all properties within 100 meters of each detection site may be removed and disposed of in a landfill in accordance with regulatory protocols. Treatment will occur once at the beginning of the project, but may be repeated if additional flies are detected.

Public Notification

Any resident whose property will be treated via foliar bait sprays or host fruit removal will be notified in writing at least 48 hours in advance of any treatment, in accordance with FAC Sections 5779 and 5401-5404. Following the treatment, completion notices are left with homeowners detailing precautions to take and post-harvest intervals applicable to any fruit on the property. For MAT applications in public areas, notification is given to the general public via mass media outlets such as newspapers or press releases, and information is posted on the CDFA website at http://www.cdfa.ca.gov/plant/pdep/treatment/guava_ff.html.

Information concerning the GFF project will be conveyed directly to concerned local and State political representatives and authorities via letters, emails, and/or faxes. Press releases, if issued, are prepared by the CDFA information officer and the county agricultural commissioner, in close coordination with the project leader responsible for treatment. Either the county agricultural commissioner or the public information officer serves as the primary contact to the media.

If you have specific questions related to this program, please contact John Hooper, Program Supervisor, at (916) 654-1211.

Karen Ross

Karen Ross, Secretary

7/9/13

Date

Attachments

ERADICATION PROJECT WORK PLAN FOR
METHYL EUGENOL RESPONDING EXOTIC FRUIT FLIES
(Includes *Bactrocera correcta*, *Bactrocera dorsalis* complex, and *Bactrocera zonata*)

DETECTION

1. Detection Trapping

The California Department of Food and Agriculture (CDFA) maintains a cooperative State/County trapping program for the various fruit flies to provide early detection of any infestation in the State. Traps are serviced by either County or State personnel and funded by the Department. The program uses two types of traps: the cardboard Jackson sticky trap baited with the attractant methyl eugenol mixed with the pesticide naled (Dibrom® 8 Emulsive), and the McPhail trap, an invaginated glass flask baited with Torula yeast and borax in water. The Jackson trap is strongly attractive to sexually maturing males, while the McPhail trap is attractive to both sexes of the fly. Traps are hung from branches of host trees at specified densities in susceptible areas of California. County or State employees inspect these traps weekly or bi-weekly throughout the year in southern California and from April or May through October or November in northern California.

2. Intensive Trapping

Intensive trapping is triggered after a single fly is caught. Following confirmation of the specimen, trap densities will be increased over an 81 square mile area (9 miles x 9 miles). Within the next 24 hours, 25 Jackson and McPhail traps are placed in the square mile core around each find. Five Jackson traps are placed in each mile of the remaining delimitation area. Traps in the core will be checked daily during the first week. Traps in the first buffer zone will be serviced every two days; those in the remainder of the delimitation area are checked at least once during the first week. All traps in the delimitation zone will be checked weekly following a week of negative trap catches. Intensive trapping ends after the third complete life cycle following the last fly find. This time period is determined by a temperature-dependent developmental model run by the Pest Detection/Emergency Projects Branch in Sacramento.

3. Post-Treatment Monitoring

The success of the eradication program is monitored by intensive trapping levels for three life cycles of the fly after the last fly has been detected. If no flies are caught during that time, trap densities return to detection levels.

4. Larval Survey

Fruit on a property where a fly has been trapped may be inspected for possible larval infestation. Small circular oviposition scars are occasionally visible indicating an infested fruit. Fruit on properties adjacent to a trap catch may also be inspected. If two or more flies are trapped close to each other, fruit cutting may be extended to all properties within a 200 meter radius of the finds, concentrating on preferred hosts. Larvae have been found in citrus, peaches, figs, apples, Catalina cherries, pineapple guava, strawberry guava, tomatoes, and bell peppers in California.

TREATMENT

1. Male Attractant Technique

The male attractant technique (MAT) makes use of small amounts of the attractant methyl eugenol mixed with the pesticide naled (Dibrom® Concentrate), and incorporated into a clay matrix (Min-U-Gel® 400) to lure the male flies to bait stations. Flies are killed by the pesticide when they feed at the stations. MAT is applied as five ml dollops to utility poles, street trees, and other unpainted surfaces using pressurized tree marking guns. The bait stations are placed six to eight feet above the ground and out of the reach of the public. The project boundaries will be nine-square miles around each site where flies were detected. Project boundaries may be enlarged if the number and distribution of flies trapped warrants it. Application is made to a targeted density of 600 evenly distributed sites in each square mile. Treatment is repeated every two weeks and continues for one or two fly life cycles beyond the date of the last fly find or for a minimum of four applications, dependent on the severity of the infestation.

2. Foliar Sprays

If evidence that a breeding population exists on a property (i.e., immature stages, mated female, or multiple adults), the foliage of host trees and shrubs within 200 meters of each detection site will be treated with an organic formulation of spinosad bait spray (GF-120 NF Naturalyte® Fruit Fly Bait) using hand spray or hydraulic spray equipment. Affected properties will be notified in writing at least 48 hours prior to treatment. Following treatment, completion notices are left with the homeowners detailing precautions to take and post-harvest intervals applicable to any fruit on the property. Treatments are repeated at seven to 14 day intervals.

3. Host Removal

If evidence that a breeding population exists on a property (i.e., immature stages, mated female, or multiple adults), host removal (fruit stripping) may be used in conjunction with the other treatment options. Host fruit will be removed from all properties within a 100 meter radius around the detection sites. The fruit is taken to a landfill for burial using regulatory compliance protocols. Treatment will occur once at the beginning of the project, but may be repeated if additional flies are detected. Affected properties will be notified in writing at least 48 hours prior to removal of the fruit.

SENSITIVE AREAS

The CDFA has consulted with the California Department of Fish and Wildlife, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service in regards to threatened or endangered species in the treatment area. Mitigation measures will be implemented as needed.

PUBLIC INFORMATION

Any resident whose property will be treated via foliar bait sprays or host fruit removal will be notified in writing at least 48 hours in advance of any treatment, in accordance with Food and Agricultural Code Sections 5779 and 5401-5404. Following the treatment, completion notices

are left with homeowners detailing precautions to take and post-harvest intervals applicable to any fruit on the property. For MAT applications in public areas, notification is given to the general public via mass media outlets such as newspapers or press releases, and information is posted on the CDFA website at http://www.cdfa.ca.gov/plant/pdep/treatment/.

Information concerning the project will be conveyed directly to concerned local and State political representatives and authorities via letters, emails, and/or faxes. Press releases, if issued, are prepared by the CDFA information officer and the county agricultural commissioner, in close coordination with the project leader responsible for treatment. Either the county agricultural commissioner or the public information officer serves as the primary contact to the media.

INTEGRATED PEST MANAGEMENT ANALYSIS OF ALTERNATIVE TREATMENT METHODS TO ERADICATE METHYL EUGENOL RESPONDING EXOTIC FRUIT FLIES
July 2013

The treatment program used by the California Department of Food and Agriculture (CDFA) for control of methyl eugenol responding exotic fruit flies (MEREFFs) employs an area wide chemical treatment called male attractant technique, complemented with a targeted foliar bait spray treatment using an organic pesticide and with fruit removal, as needed.

Below is an evaluation of alternatives treatment methods for MEREFFs which have been considered for eradication programs in California. These flies include, but are not limited to, the oriental fruit fly (*Bactrocera dorsalis*) (OFF) and its sibling species (collectively referred to as *Bactrocera dorsalis* complex) (OFF complex), guava fruit fly (*Bactrocera correcta*) (GFF), and peach fruit fly (*Bactrocera zonata*) (PFF).

A. PHYSICAL CONTROL

Mass Trapping. This method involves placing a high density of traps in an area in an attempt to physically remove the adults before they can reproduce. For MEREFFs, trapping is considerably enhanced when an insecticide is added to the lure to help capture adults. Mass trapping with lure only and without an insecticide, would capture some adult OFF, but would not eradicate an infestation.

Active Fly Removal. Adult flies are mobile daytime fliers, and adults could theoretically be netted or collected off of foliage. However, due to their ability to fly when disturbed, and the laborious and time prohibitive task of collecting flying insects from several properties by hand, it would be highly improbable that all of the adults could be captured and removed. Larvae live inside the fruit, so all potentially infested fruit in the entirety of the eradication area would have to be removed and disposed of in order to eliminate the larvae from the environment. For these reasons, active fly removal is not considered to be an effective alternative.

Fruit Bagging. Fruit bagging involves individually enclosing each developing fruit in a bag which prevents fruit flies from laying eggs. In order to be effective, frequent monitoring of the bagged fruit is needed to identify and repair damage to the bags before female flies can enter and lay eggs. Fruit bagging is considered an economically inefficient option for area wide treatment because it is so labor intensive. It is also intrusive to residents, who may oppose having their home grown produce confined inside bags. Additionally, this method may possibly promote the dispersal of female flies in search of egg laying sites, thus spreading the infestation if other treatments are not used outside the fruit bagging area. For these reasons, fruit bagging is not considered to be an effective alternative.

Host Fruit Removal. Removal of host fruits involves the physical removal of all suitable fruit from both the host plant and from the surrounding ground, in order to eliminate developing eggs and larvae. The fruit is collected and double- bagged before being buried in a landfill. Califomia's MEREFF program performs host fruit removal within a 100 meter radius of detection sites which are indicative of an active breeding area, such as those with immature stages, a mated female, or multiple adults, as an added measure to reduce populations within that area and to prevent spread of adult life stages which are not targeted under the preferred area wide treatment of male attractant technique, such as sexually immature males and females,. Fruit removal is not considered an economically inefficient option for area wide treatment because it is so labor intensive. It is also intrusive to residents, who may oppose losing their home grown

produce. Additionally, this method may possibly promote the dispersal of female flies in search of egg laying sites, thus spreading the infestation if other treatments are not used outside the fruit removal area. For these reasons, fruit removal is most useful as a complimentary treatment to one or more other treatments.

B. CULTURAL CONTROL

Cultural Control. Cultural controls involve the manipulation of cultivation practices to reduce the prevalence of pest populations. These include crop rotation, early harvest (i.e., harvesting green fruit before it is suitable for oviposition), using pest-resistant varieties, and intercropping with pest-repellent plants. None of these options are applicable for MEREFF eradications in an urban environment with multiple hosts, and may only serve to drive the flies outside the treatment area, thus spreading the infestation.

Host Plant Removal. Removal of host plants involves the large scale destruction of plants by either physical removal or phytotoxic herbicides. Host plant removal is not considered an economically inefficient option for area wide treatment because it is so labor intensive. It is also intrusive to residents, who may oppose losing their plants. Additionally, this method may possibly promote the dispersal of female flies in search of egg laying sites, thus spreading the infestation if other treatments are not used outside the host plant removal area.

C. BIOLOGICAL CONTROL

Microorganisms. No single-celled microorganisms, such as bacteria, have been shown to be effective controlling MEREFF.

Nematodes. No nematodes have been shown to be effective controlling MEREFF.

Parasites and Predators. Parasites and predators are not considered an effective stand alone eradication method because their success is density dependent; they are more effective against dense prey populations than against light populations, so their effectiveness decreases as the prey populations decline. Although several organisms, such as parasitic wasps, have been investigated as potential biological control agents against exotic fruit fly species, they have only been used in suppression programs and not in eradication programs. Since there is insufficient research documenting their efficacy in an eradication program, using these organisms could lead to the ineffectiveness of the program.

Sterile Insect Technique (SIT). SIT is currently used to suppress OFF and GFF populations in mango orchards in Thailand, and research is ongoing for use against OFF in Hawaii and against a member of the OFF complex, *Bactrocera philippinensis*, in the Philippines. However, there are no production-level colonies of these species outside of Thailand, and these facilities and research colonies are too small and too far away to support an active eradication effort in California. In addition, for introduced populations of the OFF complex, there is uncertainty as to which species has actually invaded, and therefore SIT using the wrong species could lead to ineffectiveness of the program.

D. CHEMICAL CONTROL

Male Attractant Technique. The use of male attractant technique (MAT) (formerly male annihilation technique) in California can be traced back to the 1960's. The current formulation

was developed in the 1970's and has been successfully employed over the years in California and Florida to eradicate introduced populations of MEREFFs. MAT makes use of small amounts of the attractant methyl eugenol mixed with the pesticide naled (Dibrom® Concentrate), and incorporated into a clay matrix (Min-U-Gel® 400) to lure the male flies to bait stations. Sexually maturing males are strongly attracted to methyl eugenol because it is needed for proper production of their sex pheromone. The male flies responding to the methyl eugenol die from the pesticide when they feed at the stations. In each square mile within the eradication boundary, a targeted density of 600 evenly spaced five ml bait stations are applied to utility poles, street trees, and other unpainted surfaces using pressurized tree marking guns mounted on specially modified trucks. The bait stations are placed six to eight feet above the ground. The size of the eradication area is defined as the sum of all areas within 1.5 miles of each detection site, with each squared off to create a nine square mile block. The size of this area may be increased later should additional flies be subsequently detected at other sites. Treatment is repeated every two weeks and continues for one or two fly life cycles beyond the date of the last fly find, or for a minimum of four applications, dependent on the severity of the infestation.

Foliar Bait Treatment. Foliar bait treatments use an insecticide mixed with a food attractant in order to kill adults, particularly females. The bait makes the treatment selective for flies, and therefore biological control agents for other pests are not affected. CDFA uses this treatment if evidence that a breeding population exists on a property (i.e., immature stages, mated female, or multiple adults). The goal is to decrease the population density and to target adult life stages which are not susceptible to MAT (e.g., mated females, sexually immature males) in order to contain the population while MAT drives the population to extinction. The foliage of host trees and shrubs within 200 meters of each detection site is treated with an organic formulation of spinosad bait spray (GF-120 NF Naturalyte® Fruit Fly Bait) using hand spray or hydraulic spray equipment. This treatment is repeated at seven to 14 day intervals for one life cycle beyond the last fly detected. While effective in the area treated, this type of treatment is considered economically inefficient to apply in a biologically relevant timeframe over the entirety of the eradication area, so it is used as a complimentary treatment to MAT rather than a standalone treatment.

Foliar Cover Spray Treatment. Foliar cover spray treatments use a contact insecticide in order to kill adults. This treatment is non-selective and will affect any insects which come into contact with it, including biological control agents. In order to sufficiently cover an area, much more pesticide must be applied per area than with foliar bait sprays. For these reasons, cover sprays are not used for this program.

Soil Treatment. Contact insecticides drenched into the soil have been used against MEREFFs in the past. The goal is to directly kill larvae entering the soil to pupate, pupae in the soil, and adults emerging from pupae by drenching the soil surrounding host plants. The insecticide previously used for this purpose contains the organophosphate insecticide diazinon. However, this treatment has not been used since 2001 in California because of its environmental toxicity, difficulty in removing obstructing ground clutter and debris, and a perceived lack of effectiveness in the varied soil types found in urban environments.

E. RESOURCES

California Department of Food and Agriculture. 1993. The Exotic Fruit Fly Eradication Program Utilizing Male Annihilation and Allied Methods. Final Programmatic Environmental

Impact Report. State of California, Department of Food and Agriculture, Sacramento, California. State Clearinghouse Number 90021212, April 1993. 572 pp. http://www.countyofsb.org/agcomm/fruitfly/ExoticFFEIR.pdf

United States Department of Agriculture. 2001. Fruit Fly Cooperative Control Program. Final Environmental Impact Statement 2001. 385 pp. http://www.aphis.usda.gov/plant_health/ea/downloads/fffeis.pdf

PEST PROFILE

Common Name: Guava Fruit Fly

Scientific Name: *Bactrocera correcta* (Bezzi)

Order and Family: Diptera, Tephritidae

Description: The adult guava fruit fly (GFF) is about the size of a housefly, 5 millimeters (mm) in length. The top of the thorax is black with yellow patches, the abdomen is yellow-orange with a dark T-shaped mark, and the face has two black spots which "bleed" toward each other, sometimes connecting to each other in the middle. The wings are clear with a very light dark streak along the front edge to about 3/4 length, followed by a separate light dark spot at the tip. Immature stages of GFF have not been described in the literature, but are likely typical for members of this genus; i.e., the egg is very small, white, cylindrical, rounded at the ends and about six times as long as wide; the maggot (larva) is creamy-white, legless, and may attain a length of 6 to 10 mm; and the pupa is encased in a dark brown cylindrical puparium.

History and Economic Importance: GFF is an exotic insect originating in southern Asia from Pakistan eastward through India and into Thailand. GFF feeds on many kinds of fruit and vegetables. Important California crops at risk include guava, peach, cherry, citrus, and melons. Damage occurs when the female lays eggs in the fruit. These eggs hatch into larvae, or maggots, which tunnel through the flesh of the fruit, making it unfit for consumption. The first California detection occurred in Orange County in 1986, and since that time, several re-introductions have been delimited and successfully eradicated.

Distribution: GFF is widespread through much of the mainland of southern Asia, from Pakistan eastward to Thailand and southern China.

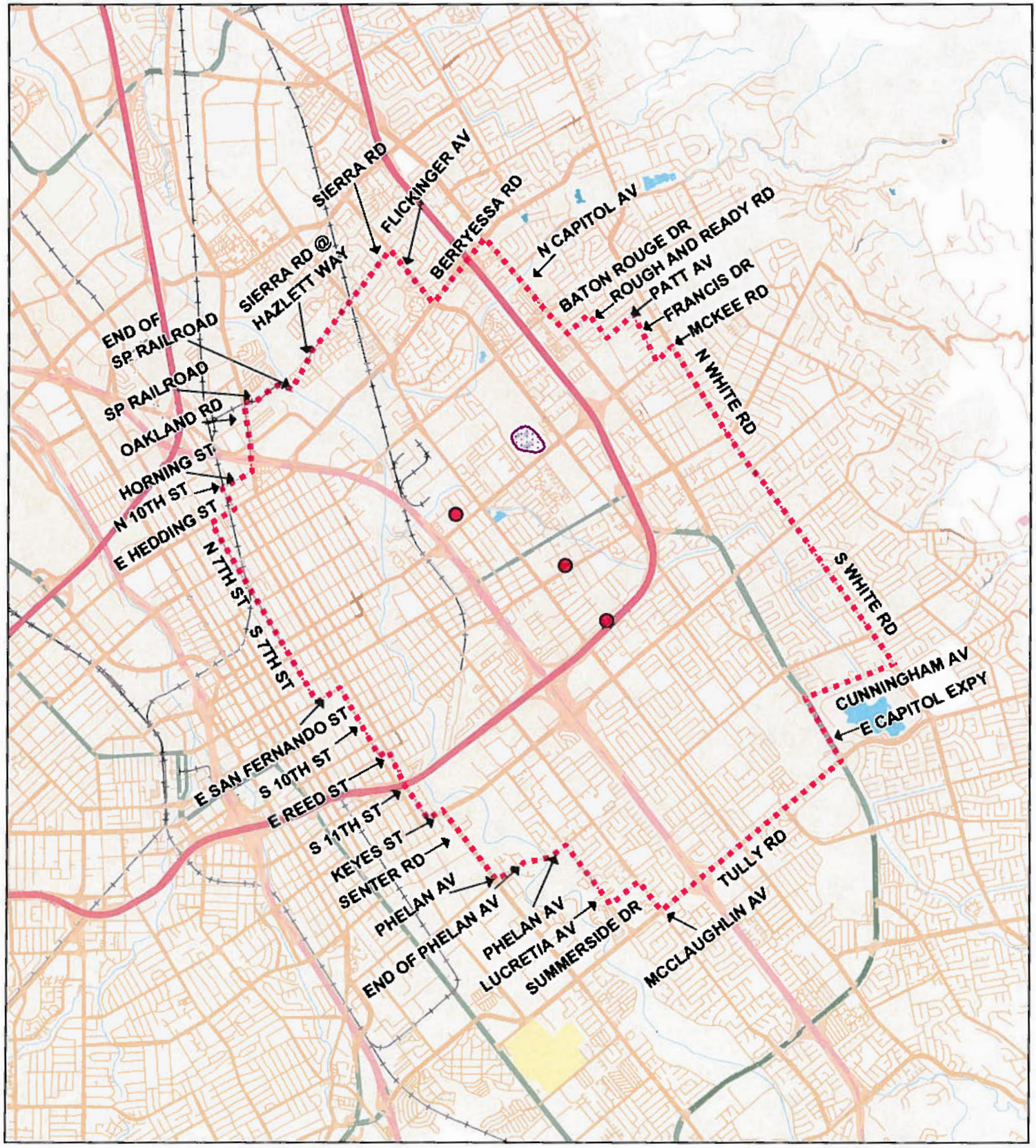
Life Cycle: Females lay eggs under the skin of host fruits. The amount of time it takes for egg development depends on the ambient temperature, but is normally about two days. Maggots tunnel through the fruit feeding on the pulp, shed their skins twice, and emerge through exit holes in eight to 17 days, depending on temperature. The larvae drop from the fruit and burrow into the soil to pupate. The pupal period varies from seven to 18 days. The newly emerged adult females need 16 to 38 days to mature sexually prior to egg-laying. Breeding is continuous, with several annual generations.

Hosts and Damage: A number of commercially valuable fruits and vegetables are attacked by GFF (see Partial Host List below). Fruit that has been attacked may be unfit for consumption due to the larvae tunneling through the flesh as they feed. Decay-producing organisms then enter, leaving the interior of the fruit a rotten mass.

Partial Host List

Common Name	Scientific Name
Acerola	*Malpighia glabra*
Areca nut	*Areca catechu*
Banana	*Musa paradisiaca*
Black plum	*Syzygium cumini*
Carambola	*Averrhoa carambola*
Cashew	*Anacardium occidentale*
Castorbean	*Ricinus communis*
Cherry, sour	*Prunus cerasus*
Cherry, sweet	*Prunus avium*
Dragon fruit	*Hylocereus undatus*
Guava	*Psidium guajava*
Jujube	*Ziziphus jujuba*
Jujube, Indian	*Ziziphus mauritiana*
Longan	*Dimocarpus longan*
Malay apple	*Syzygium samarangense*
Mandarin	*Citrus reticulata*
Melon	*Cucumis melo*
Mombin, purple	*Spondias purpurea*
Orange, sweet	*Citrus sinensis*
Papaya	*Carica papaya*
Peach	*Prunus persica*
Pummelo	*Citrus maxima*
Sandalwood	*Santalum album*
Sapodilla	*Manilkara zapota*
Surinam cherry	*Eugenia uniflora*
Tropical almond	*Terminalia catappa*

GUAVA FRUIT FLY
SAN JOSE, SANTA CLARA COUNTY
2013



cdfa

GFF

MAXIMUM PROGRAM BOUNDARY

SENSITIVE ENVIRONMENTAL AREA / TREATMENT MITIGATIONS IN PLACE