College of Tropical Agriculture and Human Resources
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UNIVERSITY of HAWAI'I® MĀNOA

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Subject: **Docket ID Number EPA-HQ-OPP-2009-0317—Draft Biological Evaluation for Malathion**
The following comments are being submitted in response to the April 11, 2016 *Federal Register* notice regarding EPA's announcement of the availability of the draft biological evaluations for the registration reviews of all uses of chlorpyrifos, diazinon, and malathion. These comments are being submitted on behalf of the Western Integrated Pest Management Center and provide input on the use of malathion on various crops in Hawai'i and the American Pacific Territories of Guam, American Samoa and the Commonwealth of the Northern Mariana Islands.

The document appended, below, was compiled from information provided by Cooperative Extension personnel of the College of Tropical Agriculture at the University of Hawai'i at Manoa, the College of Natural and Applied Sciences at the University of Guam, the Cooperative Research Extension and Education Service at Northern Marianas College and Community and Natural Resources at American Samoa Community College.

These comments are being submitted on behalf of the Western Integrated Pest Management Center and provide input on malathion use in the production of various crops in Hawai'i and the American-affiliated Pacific island territories.

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Draft Biological Evaluation for Malathion: Use and Usage Information for Hawai‘i and the American Pacific Territories

Hawai‘i: Papaya

- Pests controlled: white peach scale and papaya mealybug.
- Newer, softer chemistries are available to aid in the control of white peach scale and papaya mealybug. Most growers are trying to avoid organophosphates (OPs) and pyrethroids by using these newer chemistries to help increase populations of beneficial insect which help to control white peach scale and papaya mealybug. However, to prevent the development of insect resistance, the maximum number of applications of these newer pesticides is limited and the limited number of applications is not always sufficient to control the pest(s).
- Malathion is a good, “quick knockdown,” broad spectrum insecticide that is very economical and cost-effective to use.
- For most growers, malathion will not be the first product that they will use. However, it will still be a very important tool for the growers to have available in case their pest populations get out of control.
- Malathion is kept as part of the papaya growers’ toolkit to rotate with other classes of insecticides. For growers, the worst case scenario is when the pests develop resistance to a specific pesticide. Malathion remains a resistance management tool-especially when the maximum amount or number of applications of newer, softer materials have been applied or if pest populations increase to unacceptable levels and become difficult to control.
- Malathion may be selected because the half-life of malathion is very short (due to very quick degradation by UV light).
- Malathion’s short pre-harvest intervals and short reentry intervals are important for papaya production in Hawai‘i because papayas are harvested twice per week. The papaya growers need the short REI.
- While there are insecticides other than malathion to control insect pests on papaya, individually, none of the several important insect pests of papaya has many alternatives. Therefore, papaya growers need use malathion because it is a part of their overall pest management program. The following pests have few alternatives available for use on papaya.
    - Leafhoppers
    - Thrips
    - Mealybugs
    - Aphids
    - Mites
- In general, the other softer products are quite effective in controlling their target insects. However, their weaknesses are:
    - They are much more limited in their spectra of insect control.
    - They are much more costly to use than malathion.

  - They are very limited in the number of applications or maximum application rate per year or crop season.
  - Label language for the alternatives varies regarding specifications of maximum rates and number of applications. In addition to the self-explanatory phrase "per year," label language includes specification for maximum applications "per growing season" and "per crop." Papaya is not grown or harvested on an annual (12-month) cycle, so, phrases such as "per growing season" and "per crop" are commonly interpreted as "per year."
- What is the typical percent of crop treated with malathion each year for each crop/pest combination?
  Percent of crop treated with Malathion would probably be around 20-25%
- Applications are only as needed. The severity of the pest pressure determines the frequency of applications. In most years, growers apply fewer than the maximum number of applications allowed by malathion product labels.

Hawai'i: Pineapple

Note: Pineapples grown in Hawai'i are managed using two or three crop cycles from a single planting requiring a minimum of 2.5 years (for two harvests) 3.5 years or more (for three harvests) to complete from planting to last harvest. The pineapple crop cycle in Hawai'i is not aligned to a calendar year or seasons.

Note: Mealybug wilt of pineapple (MWP) is a devastating disease found in all pineapple-growing regions of the world. The pineapple mealybug wilt associated viruses (PMWaVs) are mealybug transmitted ampeloviruses. All of the PMWaVs identified thus far can be spread by pink and grey pineapple mealybugs, *Dysmicoccus brevipes* and *D. neobrevipes*, respectively.

Note: If mealybugs are observed in fruit estimation surveys at various points in each of the crop cycles, insecticides for mealybug control are applied, typically once and possibly twice during each crop cycle.

- In recent years, there has been a sharp decline in pineapple acreage in Hawai'i. In 2013, there were approximately 4,000 acres of agricultural lands in pineapple cultivation; in 2016 an estimate is approximately 2,400 acres. In 2013, it was estimated that approximately 10 percent of the total acreage of pineapples were treated with Malathion at least once each year.
- Malathion is effective for control of mealybugs in pineapple grown in Hawai'i. To control grey and pink mealybugs, malathion is rotated with diazinon. (For mealybug control, malathion is also used in conjunction with chlorpyrifos and endosulfan. However, the chlorpyrifos registration is for non-bearing pineapple only. Endosulfan has been cancelled.)

- Use of malathion is limited because of the odor that may result from foliar spray applications during low wind or adverse wind conditions. Special care is exercised to mitigate any odor nuisances that may result from malathion applications and malathion is used in locations which are located away from residential areas.
- Malathion is not as effective as diazinon for control of mealybugs. Malathion is typically applied at higher rates than diazinon.
- Malathion also offers control of scales, micro lepidoptera and white grub larvae.
- Due to the use reduction measures for diazinon and the cancellation of endosulfan (Thiodan), the need for malathion may increase. Mealybugs and mealybug wilt cannot be controlled with only two applications of diazinon per year. Endosulfan is effective against mites and other insects which affect pineapple production; malathion may be more important to control some of these other pests when endosulfan use has ended. However, insect control practices are transitioning to use of newer chemistries which may allow less frequent use of malathion. If effective against the targest pests, the combination new, safer insecticides with malathion would reduce the likelihood of insects developing resistance to insecticides.
- Maximum application rate are applied when very heavy mealybug infestations are observed. The maximum application is rarely used.

Hawai'i: Seed Corn (research)

Note: This answer represents a concern of sites where seed corn is grown for corn seed breeders. Because of the relatively small size of these operations, and their focus on seed breeders these are considered to be research sites and are planted in small plots.

- Malathion is one of the few insecticides seed corn producers use that is effective in controlling corn thrips (*Frankliniella williamsi*).
- Corn thrips in seed corn is a problem because it transmits, in a non-persistent fashion, a virus known as Maize Chlorotic Mottle Virus (MCMV). Growers are able to minimize the spread of MCMV if they can control the insect vector. To the extent that they have a number of insecticide products with different modes of action to control corn thrips the more likely they are to minimize the development of resistance. Malathion plays an important role, as an organophosphate insecticide, that is effective in controlling corn thrips.

Hawai'i: Macadamia Nuts

- Macadamia growers do not use malathion on a regular basis and have not used it for a number of years. Some orchards simply have the good fortune of few insect pest problems or insect pests which do not result in damage of economic consequence. (Not all of Hawai'i's macadamia orchards are so fortunate.)

- The macadamia nut growers' need for malathion has been and remains to rapidly respond to new pests that may arrive or unusual outbreaks of existing pests. A historical example of an unusual outbreak is Southern Green Stinkbug (SGSB), a pest that can have serious outbreaks in macadamia orchards. At the time of the last serious outbreak of SGSB, affected macadamia growers had the options of using either malathion or endosulfan. Endosulfan use on macadamia nuts was phased out in 2012.
- Macadamia in Hawai'i has been protected from insect pest for many years due to USDA-APHIS import regulations. However, since the 1980's the shot-hole borer (*Hypthenemus obscurus*) and macadamia feltid coccid (*Eriococcus ironsidei*) have arrived in Hawai'i from Central America and Australia. Both pests contribute to nut losses and tree death.
- Hawai'i developed the global commercial macadamia industry with its research and selection of cultivars suitable for optimum nut production. Macadamia originated in Australia. There, many of the economically damaging pests require 3 to 5 insecticide applications per year. Some of Australia's pests have not been observed in Hawai'i. However, Hawai'i's environment is ideal for both macadamia nut trees and their pests. With increased numbers of travelers from Australia (such as those on Hawaiian Airlines' direct Australia-Hawai'i routes), the risk that any new pest could establish itself in Hawai'i is great.

Hawai'i: Other crops

- In Hawai'i, in addition to the specific crops reported, above, malathion is also being used for various vegetable crops, as well as for ornamentals (includes cut flowers, potted and cut foliage and tropicals, palms, orchids and other plants).
- Malathion remains a good rotational alternative for a wide variety of crops. It is an economical broad spectrum insecticide for controlling common insects like mites, aphid, scale, mealybug and many others.
- For long eggplant, malathion is used as part of a rotation program to control aphids and spider mites. For each pest to be controlled, it is estimated that approximately 10% of the crop is treated with malation. Long eggplants are harvested twice per week; growers need the short REI of malathion products.
- For cucurbits, malathion is used to control aphids and fruit flies, pests which are otherwise very difficult to control. The most important of these cucurbit crops are cucumbers and watermelons. Endosulfan had been used for aphid control. After use of endosulfan on these was was terminated in 2012, the combination of malathion and methomyl has been the most effect chemical control for aphids.
- Workers on cucurbit farms are in the field on a daily basis, performing activities such as harvesting and weeding; they need the short REI of malthion products.

American Pacific Territories: Guam, Commonwealth of the Northern Mariana Islands (CNMI) and American Samoa)

Malathion is very important to crop production in the American Pacific territories because it is readily available for the growers to purchase. There are very few alternative insect control products available to growers in these territories. Moreover, in this part of the world (between 15.25˚N and 14.25˚ S latitude) the crop growing cycles are continuous; crops are grown--and pest present are present--year-round. Malathion provides rapid knockdown of many of the pests of found on these islands.

Malathion is used on a wide variety of crop/pest combinations in the American Pacific territories. On Guam, the crops (or sites) on which malathion is used include yam, sweet potatoes, head cabbage, Chinese cabbage (napa), cantaloupes, corn, cucumbers, muskmelons, pepinos (a cucurbit), okra, green onions, peppers, pumpkins, squash, radishes, tomatoes, watermelon, eggplants, avocadoes, citrus, guava, mangoes, papayas, pineapples and ornamental landscapes. In CNMI, crops include cabbage, head cabbage, Chinese cabbage (napa), corn, cucumbers, cantaloupes, muskmelons, watermelons, pumpkins, squash, pepinos, other cucurbits (such as bittermelon), green onions, hot pepers, radishes, tomatoes, eggplants, okra, long beans papayas, pineapples and ornamental nursery crops. In American Samoa, crops include brassica vegetables, lettuce, tomatoes, peppers, yardlong beans, other vegetable crops and citrus.

- In American Samoa, there are only a handful of insecticides available for use on crops in American Samoa. Malathion is almost certainly the most widely used.
- In American Samoa, unlike the available alternatives, malathion can be used as needed, when pests reach threshold levels, rather than as prophylactic.
- Outbreaks of pests on American Samoa's crops do not occur all the time, but when they do, malathion is usually the only effective product available that provides good control quickly.
- In American Samoa, some imidacloprid products are available and can be used for some of their crops and pests. However, generally, applications of imidacloprid must be applied prophylactically because these products have long preharvest intervals. A short PHI allows more frequent harvesting of crops such as indeterminate tomatoes, cucumbers, and long beans which are harvested continuously over a period of time as the fruits mature.
- On Guam, malathion is considered to be a critical for use on tropical fruits (guava, mango, papaya and pineapple) to control aphids, mealybugs and scales. Few alternative controls are available.
- On Guam, malathion is used because it is a broad spectrum pesticide. This confers an advantage when there are different species of pests to be controlled on a particular crop.
- On Guam, malation is used as a "knock down" pesticide rather that a slower-acting pesticide, such as azadirachtin. Farmers use malathion when they need to kill insects quickly.

- In CNMI, malathion is considered to be critical for use on cucurbits to control fruit flies. And aphids and on hope pepper to control ants. Alternative controls are not available.
- In CNMI, an alternative is a Restricted Use Pesticide. Most growers are not certified. Malathion is considered as effective as the available RUP.
- In CNMI, malathion and carbaryl are the pesticides that are available for growers. It would be considered critical if either of them were no longer available.
- The Extension staff of the Northern Marianas College promotes IPM strategies. So, pesticides, in general, are not the first option for pest control. However, malathion is the pesticide tool most easily available for growers who need to apply chemical controls.