

California Department of Pesticide Regulation  
Environmental Monitoring and Pest Management  
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DRAFT

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Comparison of Two Rinsing Procedures to Remove Malathion Residue  
from Lettuce after Baited Malathion Application  
for Mediterranean Fruitfly Eradication.

I. INTRODUCTION

The procedure currently used by the California Department of Food and Agriculture (CDFA) Chemistry Laboratory Services to remove dislodgeable malathion residue from vegetation involves three washes using 250, 100 and 100 ml aliquots of 2 % soap solution in water (450 ml total volume) for a total washing time of 2 hr. This procedure, which is a modified version of the method developed by Gunther et al. (1974), does not accurately reflect the procedure which consumers use to wash garden vegetables.

Smith et al. (1955) reported that washing lettuce with tap water for 30 sec, one hr after malathion treatment reduced malathion dislodgeable residues from 16.3  $\mu\text{g/g}$  (unwashed) to 1.83  $\mu\text{g/g}$ . Rinsing lettuce samples for 60 sec, 24 hr after malathion application reduced residue from 3.61  $\mu\text{g/g}$  (unwashed) to less than 1  $\mu\text{g/g}$ . Malathion was applied at 1.75 lb active ingredient (ai)/acre using various formulations.

This study will be conducted to compare malathion residue levels in lettuce between a water rinse procedure which typifies the procedure consumers may follow and the normal laboratory method used to estimate dislodgeable residue.

## II. OBJECTIVE

The objective of this study is to compare malathion residue data between two lettuce rinsing procedures.

## III. PERSONNEL

This project will be conducted by Environmental Hazards Assessment Program personnel under the overall supervision of Kean S. Goh, Senior Environmental Research Scientist. Key personnel are listed below.

Project Leader: J Leyva

Field Coordinator: Adrian Bradley

Senior Scientist: John Troiano

Data Analysis: Sally Powell

Chemistry Laboratory Liaison: Nancy Miller

Chemist: Paul Lee

Laboratory: California Department of Food and Agriculture Chemistry

Laboratory Services

ALL QUESTIONS CONCERNING THIS STUDY SHOULD BE DIRECTED TO KEAN S. GOH AT:

(916) 654-0613, FAX (916) 654-0539.

#### IV. EXPERIMENTAL DESIGN/SAMPLING METHODS

Malathion (Clean crop malathion ULV) combined with Nu-Lure insect bait will be applied to green-leafy lettuce with a 100- $\mu$ L electronic microsyringe. The application rate and formulation will be as close as possible to that used in an aerial application to eradicate the medfly.

The baited malathion mixture for fruitfly eradication program includes 284-mL Nu-Lure bait and 83-mL Clean crop malathion (238-g active ingredient per hectare (Segawa, 1991; Sava, 1993)). Segawa et al. (1991) reported average malathion ai deposition of 2212  $\mu$ g/ft<sup>2</sup> from aerial fruitfly eradication spray programs. It will be assumed that one lettuce head area covers approximately 1 ft<sup>2</sup>. Forty heads of green-leafy lettuce will be treated, every lettuce head will receive 9  $\mu$ L (approximately 2212  $\mu$ g/ft<sup>2</sup>, 8.42  $\mu$ L).

After application, twenty lettuce heads will be washed with 2 L of distilled water (25°C) for 15 seconds and twenty lettuce heads will be rinsed with 2 % Surten® solution. Prior to rinsing lettuce heads, distilled water conductivity, temperature and pH will be determined.

Ambient air temperature and relative humidity will be measured in the morning (8:00), noon and evening (20:00).

##### Malathion Application/Sampling Collection

1. Measure the weight of a green-leafy lettuce head to 0.01 g. Record these weights on chain of custody. Place lettuce head in a 4" X 10" 3-L glass jar. This will be repeated for 39 lettuce heads.

2. Baited malathion will be applied at 20:00 hr to simulate an evening application. Nine discrete 1- $\mu$ L droplets of baited malathion will be applied onto one head of green-leafy lettuce placed in the 3-L glass jar. This will be repeated for 39 samples (Table 1).
3. Jars containing lettuce will be placed outdoors immediately after application and left uncapped for 12 or 36 hr. Cover jar's mouth with cheese cloth to protect lettuce from animals. The jars will be placed under blue ice inside an open ice chest.
4. Twelve hr after application, 10 lettuce heads will be rinsed following washing procedures described below, and 10 lettuce heads will be rinsed with 2% Surten solution (CDFA current method). Twenty lettuce heads will remain in the ice chest for an additional 24-hr period.
5. After the 24 hr, 10 lettuce heads will be rinsed following washing procedures described below and 10 lettuce heads will be rinsed with 2% Surten<sup>®</sup> solution (CDFA current method).

#### Washing procedure

- a. Pour 2 L of distilled water (25<sup>0</sup>C) into a 3-L glass jar containing the lettuce.
- b. Cap jar with a Teflon<sup>®</sup>-lined lid, and swirl the jar by inverting it "up and down" 12 times for 15 seconds.
- c. Decant the water rinse and transfer it into a 2-L glass bottle immediately after swirling is completed. Water rinse samples will be collected and analyzed for malathion and malaoxon residues.
- d. Extract and analyze washed lettuce heads for malathion and malaoxon penetrated residue following CDFA Laboratory Services current procedure.

## VI. CHEMICAL ANALYSIS/QUALITY CONTROL

Chemical analysis will be conducted by CDFA, Chemistry Laboratory Services. Rinse water samples will be extracted and analyzed for malathion and malaoxon with gas chromatography (detection limit of 1 µg/sample). Washed lettuce heads will be extracted and analyzed for malathion and malaoxon penetrated residue. Blank and spiked samples will be submitted to the laboratory. Analysis results will be reported in µg/g (wet weight basis).

## VII. TIMETABLE

|                       |            |
|-----------------------|------------|
| Malathion Application | June, 1993 |
| Chemical Analysis     | June       |
| Data Analysis         | June       |
| Memo Completed        | July, 1993 |

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Table 1. Total number of water rinse (dislodgeable) and washed lettuce (penetrated) samples.

| Sample Type  | Time Post Application (hr) | Washing Procedure            | Number of Samples |
|--------------|----------------------------|------------------------------|-------------------|
| Water Rinse  | 12                         | Distilled water <sup>a</sup> | 10                |
|              | 36                         | Distilled water              | 10                |
| Dislodgeable | 12                         | 2% Surten <sup>b</sup>       | 10                |
|              | 36                         | 2% Surten <sup>b</sup>       | 10                |
| Penetrated   |                            |                              | 40                |

a = Water rinse procedure (distilled water).

b = CDFA, current 2% Surten<sup>b</sup> dislodgeable method for vegetation.

## IX. REFERENCES

- Gunther, F.A., J.H Barkley, and W.E. Taylor (1974) Worker Environment Research. II. Sampling and processing techniques for determining dislodgeable pesticide residues on leaf surfaces. Bull. Env. Contam. Toxicol. 12:641-644
- Sava, R. (1993) Protocol entitled: "Monitoring malathion in the fruit fly aerial treatment programs" California Environmental Protection Agency, Department of Pesticide Regulation
- Segawa, R. (1993) Environmental monitoring of malathion aerial application used to eradicate mediterranean fruit flies in southern california, 1990 California Environmental Protection Agency, Department of Pesticide Regulation. EH 91-3
- Smith, F. F., P. Giang, and E.A. Taylor (1955) Reduction of Malathion Residues on vegetables by Washing. J. Econ. Entomol. 48:209-210.

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IX. BUDGET

Personnel

|       |                    |           |
|-------|--------------------|-----------|
| 1 ERS | 30 hr X \$18.74/hr | \$ 562.20 |
| 1 ERA | 30 hr X \$11.72/hr | 351.60    |

Supplies

|                    |        |
|--------------------|--------|
| (jars and lettuce) | 500.00 |
|--------------------|--------|

Chemical Analysis

|                           |                 |
|---------------------------|-----------------|
| 40 Samples X \$150/Sample | <u>6,000.00</u> |
|                           | \$7,413.80      |

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