

**Department of Pesticide Regulation  
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**Study 198: Pesticide and Nutrient Removal from Nursery Runoff Using  
A Vegetative Buffer Strip**

**June 26, 2000**

**I. INTRODUCTION**

The Red Imported Fire Ant (RIFA) quarantine requires nurseries to treat all nursery stock with bifenthrin, chlorpyrifos, or diazinon thus increasing the potential for pesticide runoff. El modeno Gardens in cooperation with other local nurseries and the University of California's Cooperative Extension under a Pest Management Alliance grant, have proposed the use of a Canna vegetative buffer strips in reducing the levels of nutrients and pesticides in runoff water. This would be an economical method of filtering the runoff water prior to it leaving the facility and discharging into creek. Additional benefits could be realized if the buffer strip could be used to produce an economically viable horticultural plant.

Grasses and legume cover crop have been demonstrated as effective buffer strip plants to filter out runoff water and reducing pesticide runoff (Hirschi et al. 1997). We plan to assess the efficacy of this Canna filter strip system in reducing pesticide from running offsite.

**II. OBJECTIVE**

The objectives of this study are to:

1. Measure the concentration of selected pesticides entering and leaving the buffer strip.
2. Measure the amount of insecticides in sediment deposited in vegetative buffer strip over time.

### III. PERSONNEL

This study will be conducted by EHAP under the general direction of Kean S. Goh, Agriculture Program Supervisor IV. Key personnel include:

Project Leader: Dave Kim

Field Coordinator: Johanna Walters

Statistician: Terri Barry

Laboratory Liaison: Carissa Ganapathy

Cooperators: Toby Mancini - el modeno Gardens

Darren Haver - UC Cooperative Extension

John Kabashima – UC Cooperative Extension

Analyzing Laboratories:

California Department of Food and Agriculture, Center for Analytical Chemistry

California Department of Fish and Game

Questions concerning this project should be directed to Kean S. Goh (916) 324-4072

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### IV. STUDY DESIGN

The study site is at el modeno Gardens' Orange County facility, a containerized nursery. The site has approximately 90 acres, which drain into a concrete lined ditch. The nursery has a computer controlled irrigation system, which reduces irrigation runoff to 20 to 40 gallons per minute. The concrete lined ditch is approximately 163 yards (489') long with sloping sides, ~4feet wide at the bottom and ~9feet wide at the top, and ~3 1/2feet deep. The channel is to be split down the middle running the 163-yard length using sandbags, creating a 2' 6" high separation. This will create an overflow channel in times of high flow, bypassing the vegetative buffer strip. The buffer strip will consist of three successive settling basins along the 163 yard ditch planted with *Canna x 'Tropicana'*.

Monthly water samples will be collected at the inlet and the outlet of the buffer strip. The first sample collection is prior to planting of the vegetation. This sample will consist of two sampling events 6-8 hours apart.

Based on pesticide use and irrigation data, two sampling events will occur during anticipated high pesticide concentration events. During these events 2-4 samples will be collected over an 8-hour period.

Water collected from each site will be analyzed for insecticides including bifenthrin, diazinon, chlorpyrifos, and malathion. Water quality parameters (electro-conductivity, pH, and water temperature) will also be measured. Toby Mancini will also monitor for EC, pH, NH<sub>4</sub>, NO<sub>3</sub>, (NO<sub>2</sub>+NO<sub>3</sub>), total orthophosphates, and inlet and outlet flows.

Sediment samples will be collected from each settling basin at six time periods (1-2 months) and analyzed for insecticides including bifenthrin, chlorpyrifos, and diazinon.

## **V. SAMPLING METHODS**

Water samples will be collected using a stainless steel bucket. Samples will be split into amber glass bottles using a Geotech® 10-port splitter then sealed with Teflon®-lined lids according to SOP FSWA004 (Ganapathy 1998). Specific chemical analyses require the preservation of field samples by adjusting the sample pH to 3.0 using 3N hydrochloric acid. Samples will be transported and stored on wet ice or refrigerated at 5°C until extraction.

A measurement of discharge will be recorded at the inlet and outlet with equipment supplied by UC Cooperative Extension

## **VI. CHEMICAL ANALYSIS / TOXICITY TESTING**

Chemical analysis on all applied RIFA insecticides will be performed by the CDFA's Center for Analytical Chemistry. Quality control measures are described in SOP QAQC001.00 (Segawa 1995).

DFG's Analytical Laboratory will perform sediment sample analysis.

## **VII. DATA ANALYSIS**

Concentrations of insecticides will be reported as micrograms per liter ( $\mu\text{g/L}$ ) for water, and (ng/g) for sediment (which is equivalent to parts per billion (ppb)).

## **REFERENCES**

- Ganapathy, C. 1998. Instructions for Splitting Water and Rinsing the Geotech Dekaport Splitter and Splitting Equipment. Department of Pesticide Regulation. SOP FSWA004
- Hirschi M., R. Frazee, G. Czapar, D. Peterson. 1997. Sixty ways farmers can protect surface water. North Central Regional Extension Publication 589. U. Illinois Extension, Urbana-Champaign.
- Segawa, R. 1995. Chemistry Laboratory Quality Control. CAL/EPA Department of Pesticide Regulation. Environmental Hazards Assessment Program. SOP QAQC001.00.