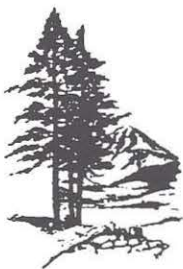


Appendix E: Entomology Report

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Sierra Research Laboratories, Inc.

Urban and Veterinary Entomology

CONSULTING REPORT:

Nuisance Fly IPM for Recology Organics

SRL PROJECT I.D. # RCG16-1

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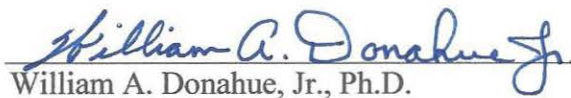
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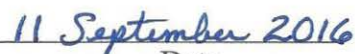
E-mail: dtaylor@recology.com

REPORT DATE:

11 September 2016

REPORT AUTHOR SIGNATURE:


William A. Donahue, Jr., Ph.D.


Date

Title:

Nuisance Fly IPM for Recology Organics

Objectives:

To implement an integrated pest management (IPM) program to mitigate nuisance flies and the associated problems they cause in and around the Recology Organics facility located in Vernalis California.

Personnel:

Bill Donahue (BD), Ph.D. – Sierra Research Laboratories, Inc. - Principal Investigator

Michael Donahue (MD) – Sierra Research Laboratories, Inc. - Scientist I

David Taylor (DT) – Recology Organics – General Manager

Joe Lizarraga (JL) – Recology Organics - Operations Manager

Rod Olsen – Crimson West - Consultant

Site Visit 16 August 2016 – E-mail to JL & DT 8/29/16: I visited Ms. Yamaichi's property at 3855 Welty Road on August 16th to meet with her regarding complaints and issues with nuisance flies on her property. I arrived at 10:35 am and we discussed her fly issues and gave me a brief tour of the property and permission to inspect the premises for flies. She considered the problem "bad" with the populations fluctuating throughout the day. I saw a number of "stinky traps", aerosol fly sprays (hand held and dispensers) and evidence of flies on the porch and fence (fly spots). I did observe adult flies around the property, but I did not consider the numbers to be "bad", but they were definitely a nuisance buzzing and landing on both of us and her dog. Mr. Tom Wolfe from Stanislaus County Environmental Resources arrived a few minutes after my arrival to conduct a nuisance fly assessment also (we did not coordinate the visit, purely coincidental). I was told by Mr. Wolfe that Ms. Yamaichi call Supervisor Di Martini and that generated the visit. I allowed him to make an independent assessment with Ms. Yamaichi without being present.

I observed several species of flies around the property: Sarcophagids (flesh flies) were around the stinky traps which acted as an attractant, these flies are attracted to dead animals. I also observed blow flies (Callophorids) and house flies in and around these traps. The traps were hung on fences around the back yard and some traps had quite a few flies in and around them. I saw a few *Fannia* (little house flies) hovering under the large trees, but these flies usually do not land on people. On the front porch I noticed stable flies (*Stomoxys calcitrans*) resting on the structure and buzzing about. These blood feeding flies will attack certain breeds of dogs, but they did not appear to be biting her dog. There were two horses on the property and the stable flies were landing and biting the horses. These flies are associated with horses and cattle primarily and need moist soil with decaying plant matter to breed in. The horses also had face

flies and/or house flies on their bodies and were troubled by them. I did not find any active breeding sites for any fly species on the property and neither did Mr. Wolfe. I used a sweep net to collect adult flies on the property and brought them back to the laboratory for identification. I collected 5 stable flies and 3 house flies with minimal effort, which I felt was pretty representative of the fly species present and the population pressure (minimal) excluding flies around the stinky traps.

Ms. Yamaichi was pleased both Mr. Wolfe and myself were present and addressing her concerns, giving us permission to come back any time to monitor flies, observe or collect specimens that we may need. We were also encouraged to visit her next door neighbor whom she said has chickens. I talked briefly at the site with Mr. Wolfe and we both concurred that the fly pressure was fairly low, but there is no firm measurement of what constitutes a "bad" fly problem. The stable fly populations were quite high for this time of the year, normally they diminish in hot weather, but are prevalent in the spring and fall in the central valley. With all the cattle operations in a 5 to 10-mile radius of Recology, these flies could be migrating from unknown breeding sites in this area. The house flies, flesh flies and bottle flies are always present in our area and it is difficult to determine where the breeding sites are located to assess changes in those populations over time. Mr. Wolfe and myself then drove to the Recology site where we met with the both of you. I am still working on a fly monitoring program and will report more on that at a later time.

Site Visit with Clark Pest Control at Recology - 22 August 2016: JL, DT, BD met with Scott Coelho and James Roque of Clark Pest Control to discuss adult fly spraying options for the Recology facility. The primary topics were: 1) logistics and coordination of activities for fly spraying and Recology operations, 2) using organic fly spays – product selections & options, 3) wind and weather patterns that may affect treatments, and 4) tour the site to observe Recology operations and fly activity. Clark Pest Control will make a separate proposal to Recology for scope of the pest control and cost.

Adult Fly Monitoring: 30 August 2016 – BD & MD – Based on the conversations from the visit to Ms. Yamaichi's and discussions with Mr. Lizarraga & Mr. Taylor we began to assess how to monitor adult fly populations at various locations. The Olsen trap was employed to detect primarily stable flies, *Stomoxys calcitrans*, but will catch other flies. Fly Stick Tube sticky traps with and attractant were used primarily to catch house flies, but will also catch other nuisance fly species (Fig. 1). Five locations were selected on the Recology Site using a line transect design to determine fly population densities at various locations on the facility (see attached site map with trap locations plotted). The traps were set in line with the predominant wind direction from the north-west to the south-east. Both Olsen and Fly Sticks were placed approximately 5' apart at each location sheltered from the wind and blowing dust and debris. The traps were left for 3 days then collected and brought back to the laboratory for counting and identifying the flies caught. The flies caught in the two traps at each site were added together and the total number of adult flies caught is reported. Two trap locations were also set-up at Ms. Yamaichi's property, one by the horse corrals and one in the front yard.

Adult Fly Monitoring Results: Recology Trap location #1 had the highest population of flies as this location was the newest green waste placed in windrows and had the greatest adult fly activity. The total number of flies caught was 3,138 in both traps. The predominant species

were house fly, *Musca domestica*, little house fly, *Fannia* spp., and a very small wasp species, possibly a parasitic species. Trap location #2 was on the south side of the new green waste rows and caught a total of 1,447 adult flies. The predominant species included house fly, little house fly, blow flies (Calliphorids), small iridescent flies and gnats. Trap location #3 was located next to the employee break room (trailer) and had a total of 667 flies trapped and were primarily house flies, little house flies and blow flies. Trap location #4 was near the office building and had a total of 752 flies caught and were of the same mix as the employee break room. Trap location #5 was located at the far south-east corner of the Recology site outside the fence in the landscaped area. The total number of flies trapped was 94, significantly lower than any other location on the Recology site and only house flies were caught at this location.

Results from the two trap locations at Ms. Yamaichi's were as follows: Horse corral – a total of 144 adult flies were caught with approximately half stable flies, *S. calcitrans* and the other half house flies, *M. domestica*. Adult stable flies are biting flies that feed on blood primarily cattle, horses, dogs and people. The larval habitat (eggs laid) is usually around areas where animals are feed hay which falls to the ground and is worked into the soil with animal manure, urine and water. The stable fly larvae complete their life cycle in the larval habitat (eggs-larvae-pupae), but adult flies can migrate many miles to find both blood sources and new places to lay their eggs (oviposition sites). I did not find stable fly or house breeding sites (larval habitat) at the site, but the horses were definitely attractive to the stable fly adults and we observed them being bitten. The front yard trap location had 46 flies caught in the two traps and were approximately half stable and half house flies.

Observations, Discussion and Recommendations: The site visit to Ms. Yamaichi's property was productive in that I had an opportunity to hear from her directly and learn of the fly issues that she was experiencing. The predominant fly species on her property with stable flies and house flies with both species around the property on the house as well as on the horses. Both species of flies will roost on the building and leave their fecal spots, but only the stable fly will bite animals and people. I did not find any breeding sites for either species, but again their migration distances can easily be up to 5 miles. Ms. Yamaichi allowed myself and staff access to her property to assess the fly problem and to begin a monitoring program.

The meeting with Clark Pest Control allowed everyone present to discuss the fly problems and see the site first hand. The proposed idea was to spray the entire facility with an organic adult fly knockdown product and Clark would send a proposal to Recology. Other issues included how to avoid windy times of the day for applications and to also work around the recycling activities by Recology personnel avoiding unnecessary human exposure to the pest control products and safety issues with all the equipment and vehicles on site.

The adult fly monitoring with Olsen and Fly Stick Traps provided very useful information in determining fly population densities and identifying predominant fly species to be controlled. The 3-day trapping period is sufficient to give robust and consistent data and will be expanded to locations within a 1 to 5-mile radius of Recology to determine: 1) potential fly migration patterns, 2) local fly breeding sites and dispersal, 3) recommended fly treatment procedures and time intervals, 4) various fly populations (species) throughout the year to assist in IPM decisions using various means of control options, 5) determine action thresholds based on neighbor's

perceptions and fly trap counts and other measures, 6) determine action thresholds for the Recology site which may be different from those of the neighbors, 7) assist in making decisions on allocation of resources (human, financial and physical) to address fly issues.

At the time of my initial meeting with Joe and Dave at Recology the primary constraint in a fly management program was the Organic classification of the site, but after further discussions with Joe and Dave (9/8/16) there may be other options for fly control. The green waste coming into the facility is not organic certified waste from organic production or commercial sources. Recology does not utilize an Organic Certification entity, but the end compost product is chemically analyzed and determined to be "Organic". Since the composting process generates high levels of heat during this natural decomposition process many chemicals and undesirable organisms are broken down into basic chemical units or killed. The composting process goal is a 90-day turnaround time from coming in to going out. Fly conducive conditions may be only for the first 2-4 weeks of the process and several control options may be worth investigating.

Options to Investigate & Consider for Moving Forward:

- 1) Adult fly knockdown agents such as organic certified sprays as well as EPA Exempt (25(b) options, fly specific bacterial and fungal sprays (Elector PSP - Spinosad, fungal pathogen - *Beauveria bassiana*), botanical insecticides – pyrethrum, Pyrethrins + synergists), short residual sprays with rapid degradation.
- 2) Granular fly baits in selected areas applied in bait trays, on bait cards or as scatter baits – examples Zyrox fly bait (Indoxacarb), Quickstrike (dinotefuran), Conserve Fly Bait (Spinosad + Z9) or Elector fly bait if still being marketed. Need to monitor for fly bait acceptance and resistance.
- 3) Insect Growth Regulators (IGR) break the life cycle of flies by preventing molting, metamorphosis and reproduction. Tekko 10 or Tekko Pro (novaluron spray or granule) or Neporex (cyromazine) granules are two products that are used for fly control on dairies, poultry and other animal confinement operations to control house flies in manure. I have conducted extensive field trials in the central valley and these studies were used to obtain US EPA and California state registrations. They are very effective in controlling breeding flies (maggots) before they molt to adults and become a nuisance. I may be able to arrange an efficacy study with the manufacturers of the products and the California Department of Pesticide Regulation (DPR) to obtain a site designation for green-waste recycling on the labels. In the mean time I could do the field test under the Research Authorization Program managed by DPR.
- 4) Insecticide (deltamethrin) impregnated mesh used for stable fly control on dairies. I have a sample coming from Y-Tex Corporation to conduct field trials around the central valley, I can include Recology and the surrounding areas for these evaluations. May be useful for limited house fly control due to the quick on-set of insecticide resistance with house flies, but could work well on other fly species.

- 5) Turning new green waste more frequently (3X/week) to disrupt fly breeding and attraction as well as making the material less conducive to fly activities.
- 6) Expand fly monitoring (sticky traps) to include more sites at the Recology site and the surrounding areas up to 5-miles (neighbors), but to also evaluate fly populations in Stanislaus County to determine what the seasonal fly pressure is for the county in general at various times of the year. What is the normal “background” level of flies?

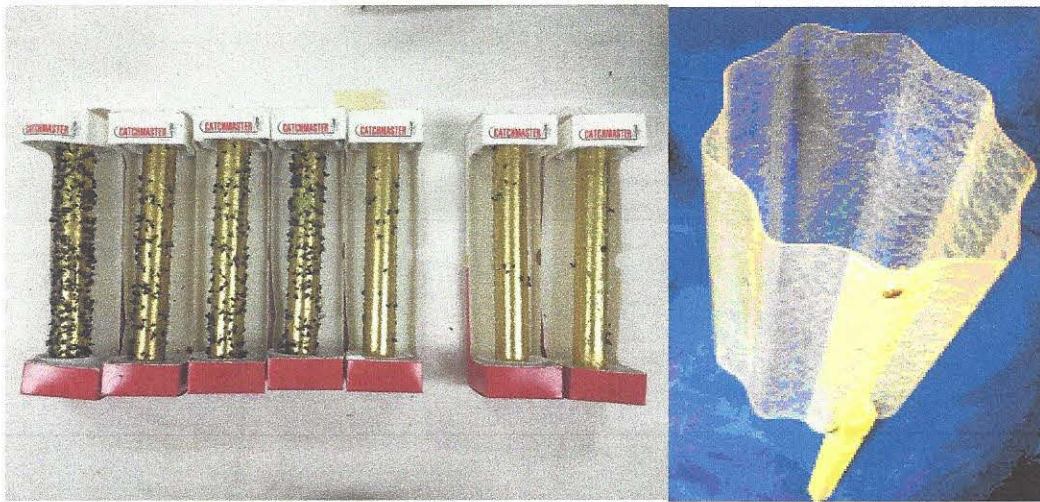


Fig. 1. Fly Sticky Traps (Olsen trap on right) used for population monitoring and species identification.

SRL Project I.D. # REC16-1



Combined Fly Stick Counts (Alsynite + Gold Stick) – 8/31 – 9/2/16

Note: This site map will be updated in the future.

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