

# SALT LAKE CITY MOSQUITO ABATEMENT DISTRICT

## Executive Director's Report

February 2024

### 1. Personnel:

Personnel	
Staff	Seasonal
12	6

Type of Work	2024	3 - Year Average
Adulticiding	0.00	0.00
Wetlands / Rural	12.50	1.00
Fish Culture	30.50	46.33
Catch Basins / Gutters	0.00	0.00
Tree Holes	0.00	0.00
Prison	5.00	0.00
Service Request	0.00	0.00
Traps	.50	11.17
Laboratory	296.00	171.50
Office / Administration	721.25	732.67
Equipment Maintenance	286.00	303.75
Facility Maintenance	43.75	191.42
Training	208.50	48.00
Education	75.50	10.92
Unmanned Aerial System	4.00	2.33
CSU Grant	139.00	0.00
Other Grants	0.00	0.00
Other / Errands	88.25	95.17
Comp. Time Used	308.50	82.67
Vacation	76.50	112.33
Additional Hours	0.00	2.08
Holidays	92.00	74.67
Sick Leave	20.50	42.25
<b>Total</b>	<b>2,408.25</b>	<b>1,928.26</b>

## 2. Office Activities:

- Education Specialist Rehbein met with Hannah Paige from the AMCA regarding public relations on 1 February 2024 and again on 8 February 2024.
- Nick Delisi, former SLCMAD interna and current Assistant Manager at St. Tammany Parish Mosquito Abatement District in Louisiana, along with three other employees (Hieu Duong, Briana Hornsby, Jennifer Bushnell) visited the District and stayed in our dormitories on 1-3 February 2024.
- Executive Director Faraji and Education Specialist Rehbein attended a Senate Committee hearing with Senator Escamilla and ES Rehbein presented on funding requests and education programs for the new State Prison on 2 February 2024.
- Assistant Director White attended a conference call with Dr. Norah Saarman (USU) and Kelly Oakeson (UPH) on 5 February 2024.
- Molecular Biologist Byers met with Paul Burns, MA Department of Public Health Arbovirus Surveillance Lab Supervisor, on 5 February 2024.
- Executive Director Faraji attended the CDV Vector Week meetings in Ft. Collins, Colorado on 6-9 February 2024. He also met with Dr. Brian Foy and Dr. Greg Ebel from CSU regarding RaHP Vec grant activities.
- Executive Director Faraji attended a committee meeting for a PhD student from Indiana University (Sajjad Khan) on 6 February 2024.
- Education Specialist Rehbein attended and participated in the National Communications Campaign interviews for AMCA on 6-7 February 2024.
- Education Specialist Rehbein met with Jordy Allen to discuss garden plants and grants on 8 February 2024.
- Laboratory Director Bibbs assisted Jason Bird from Utah County MAD with CO<sub>2</sub> fill systems for vector surveillance on 8 February 2024.
- Education Specialist Rehbein met with Caitlin O'Shaughnessy Coffrin for an AMCA stakeholder interview about the AMCA/CDC project exploring public perceptions about mosquito adulticides on 8 February 2024.
- Executive Director Faraji and Assistant Director White attended the weekly RaHP Vec meetings on 12 February 2024.
- Education Specialist Rehbein remotely attended and presented at the Wyoming Mosquito Management Association on 12-13 February 2024.
- Assistant Director White and Laboratory Director Bibbs met with Joe Camacho from Target Specialty Projects regarding carbon dioxide alternatives on 13 February 2024.
- Executive Director Faraji and Assistant Director White attended the monthly UMAA manager's meeting on 14 February 2024.
- Molecular Biologist Byers met with Rich Chappoose from the Ute Tribe, regarding a mosquito project on 14 February 2024.
- Education Specialist Rehbein met with Megan MacNee, Kristen Healy, Peter Bonkrude, Mark Clifton, Dan Markowski, and Hannah Paige to discuss a national mosquito control awareness campaign on 14 February 2024.
- Executive Director Faraji, Assistant Director White, and Urban Field Supervisor Sorensen attended the weekly Owner/Architect/Engineers meetings on 14 February 2024.
- Laboratory Director Bibbs attended a conference call with Dr. Brad Willenberg from UCFL on 15 February 2024.
- Executive Director Faraji met with Mike Banfield from Banfield Biologics regarding a CDC BAA grant application on 15 February 2024.
- Executive Director Faraji and members of staff met with Dick Loomis from the Ouelessebouyou Alliance regarding the Mali Mosquito Control project and site visits on 15 February 2024.

- Education Specialist Rehbein attended an ESA VBDN Group meeting on 15 February 2024.
- Education Specialist Rehbein attended the Jordan River Commission Technical Advisory Committee meeting on 15 February 2024.
- Education Specialist Rehbein attended an AMCA moderator training on 15 February 2024.
- Executive Director Faraji and Assistant Director White met with Mike Muldoon and Lyel Clarke from Clarke Mosquito Control regarding the Mali Mosquito Control project and site visits on 15 February 2024.
- Education Specialist Rehbein had an interview with Emma Tribble from the Western IPM Center about the prison project on 15 February 2024 for their newsletter and website.
- Executive Director Faraji, Assistant Director White, Laboratory Director Bibbs, Molecular Biologist Byers, and Education Specialist Rehbein attended the annual conference of the West Central Mosquito and Vector Control Association where Executive Director Faraji presented the vector control survey results for CO/NM/TX/UT/WY. They also attended the first annual meeting of the RaHP Vec.
- Urban Field Supervisor Sorensen attended the weekly Owner/Architect/Engineers meetings on 21 February 2024.
- Executive Director Faraji and Assistant Director White attended the weekly RaHP Vec meetings on 26 February 2024.
- Executive Director Faraji and Education Specialist Rehbein attended the North American Invasive Species Management Association for the National Invasive Species Awareness Week on 26 February 2024.
- Education Specialist Rehbein met with Hanna Paige and Megan MacNee from the AMCA regarding public relations on 27 February 2024.
- Executive Director Faraji, with assistance from Assistant Director White and IT/GIS Specialist Dewsnap submitted the annual NPDES report to the DWQ on 28 February 2024.
- Executive Director Faraji met with Sahar Azarmi, a potential graduate student for Dr. Neil Vickers at UU, on 28 February 2024.
- Education Specialist Rehbein met with Carlynn Christian regarding STEAM Days on 28 February 2024.
- Education Specialist Rehbein talked with Utah Pollinator Pursuit and Sageland Collaborative regarding a City Nature Challenge event on 28 February 2024.
- Education Specialist Rehbein met with Craig Wallentine from UPHE regarding State Prison mosquito control efforts on 28 February 2024.
- Executive Director Faraji, Assistant Director White, and Urban Field Supervisor Sorensen attended the weekly Owner/Architect/Engineers meetings on 28 February 2024.
- Executive Director Faraji, CFO Fairbanks, and Trustee Christensen conducted interviews for Bond Counsel on 28 February 2024.
- Executive Director Faraji attended a CDC/COE cross collaboration meeting on 29 February 2024.
- Operations Supervisor Hardman met with Dick Loomis and others from the Ouelessebougou Alliance on 29 February 2024 to discuss Mali MP and show them our facilities.
- Education Specialist Rehbein met with Media Cause and AMCA regarding a public relations campaign on 29 February 2024.
- Executive Director Faraji attended an Entomological Society of American Medical/Urban/Veterinary/Entomology leadership meeting on 29 February 2024.
- Education Specialist Rehbein attended at the Mana Academy for an after-school program on 29 February 2024.

### 3. Shop/Field/Lab Activities:

- Trap maintenance and fabrication continues.
- Equipment maintenance and readiness continues.
- Assistant Director White and Laboratory Director Bibbs have been conducting seasonal and intern interviews.
- Winterization and replacing of field locks continues.
- Field crews are working on a pesticide blower.
- Operations Supervisor Hardman assisted with Ogden hangar maintenance needs on 28-29 February 2024.
- Badging has been completed for employees at Ogden Airport.
- All ATV's and vehicles have been picked up for the upcoming season.
- Little Cat, small tracked vehicle was prepped for sale to MAD-Davis.

### 4. Weather:

February's weather was warmer (by 4.3°) and wetter (by 2.07") than normal.

#### Temperature:

	Monthly Avg.	Normal	High	Low
January	34.8°	31.4°	62°	14°
February	40.9°	36.6°	63°	24°

<https://w2.weather.gov/climate/index.php?wfo=slc>

#### Precipitation:

	Total for Month	Normal	Most in 24 hours
January	1.28"	1.43"	0.36" on 17 <sup>th</sup>
February	3.37"	1.30"	0.36" on 17 <sup>th</sup>

<https://w2.weather.gov/climate/index.php?wfo=slc>

#### Great Salt Lake (elevation in feet above sea level):

	January 1	February 1	March 1
2023	4,189.4 ft.	4,190.0 ft.	4,190.6 ft.
2024	4,192.6 ft.	4,192.8 ft.	4,193.8 ft.

<https://waterdata.usgs.gov/monitoring-location/10010024/#parameterCode=6214&period=P7D>

## Short Communication

# Blinded by the light: does heat or light enhance wild mosquito (Diptera: Culicidae) attraction to CO<sub>2</sub>-baited traps in the Great Salt Lake area?

Alexandra Harker<sup>1,2</sup>, Kelsey Fairbanks<sup>1</sup>, M. Andrew Dewsnap<sup>1</sup>, Ary Faraji<sup>1,⊙</sup>,  
Christopher S. Bibbs<sup>1,\*</sup>

<sup>1</sup>Salt Lake City Mosquito Abatement District, 2215 North 2200 West, Salt Lake City, UT 84116, USA, <sup>2</sup>Department of Health Services, Brigham Young University-Idaho, 525 S Center St, Rexburg, ID 83460, USA, \*Corresponding author, mail: [chris@slcmad.org](mailto:chris@slcmad.org), [csbibbs@outlook.com](mailto:csbibbs@outlook.com)

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The New Jersey Light Trap has been among the earliest trap models used for mosquito surveillance in the United States. This trap was modernized in the 1950s to the miniature CDC light trap, with the addition of CO<sub>2</sub> following soon after. The incandescent light has the tendency to attract nontarget insects, as well as losing a substantial portion of their energy as heat. Few studies have delineated whether heat or light in isolation make a difference in field collections using the former traps within the United States. Our study focused on isolating heat and light variables by using incandescent bulbs, light emitting diode (LED) bulbs, and electric heating patches affixed to a base model CO<sub>2</sub> trap as designed at the Salt Lake City Mosquito Abatement District. Sites were selected in the urban and suburban foothills and canyons of the Wasatch Mountain front, industrial areas near the Salt Lake City International Airport, and rural wetlands in the marshes outlying the Great Salt Lake. Five traps were replicated within each sector during the summer and fall summer seasons. Collections were composed of *Aedes dorsalis* (Meigen), *Culex pipiens* L., *Culex tarsalis* Coquillett, and *Culiseta inornata* (Williston). Composition changes were a result of seasonal, rather than spatial, shifts. The results showed that LED light traps depressed collections of key species. Otherwise, there were negligible differences in collections among incandescent, heat film, and base model traps. In the Intermountain West, the miniature CDC trap is reliable enough to make programmatic decisions even if light usage varies by district.

**Key words:** urban, rural, *Aedes*, *Culex*, host-seeking

## Introduction

The development of the United States Centers for Disease Control and Prevention (CDC) miniature light trap by [Sudia and Chamberlain \(1962\)](#) in the 1960s replaced its predecessor, the New Jersey Light Trap (NJLT) developed in 1932 ([Mulhern 1942](#)). It was shortly thereafter adopted as a “gold standard” for mosquito surveillance programs across the United States because of its lightweight configuration and simple design, which made it practical for arboviral surveillance in various locations ([McNelly 1989](#)). In 1980, an additive lure component, CO<sub>2</sub> in the form of dry ice, notably improved trap performance, with a 400–500% increase in mosquito catch numbers ([Newhouse et al. 1966](#)). With the addition of CO<sub>2</sub>, particularly in absence of an onboard light, the CDC trap utility was improved for vector species with less bycatch of nontarget insects ([Reisen et al. 1983, 2000, McNelly 1989](#)).

In the research conducted by [Magnarelli \(1975\)](#) in New York, various permanent water and opportunistic species were reliably collected using the CO<sub>2</sub> addition, including *Anopheles quadrimaculatus* Say, *Anopheles walkeri* Theobald, *Coquillettidia perturbans* (Walker), *Culex restuans* Theobald, and *Culiseta morsitans* (Theobald), amidst trap totals in excess of 5,000 mosquitoes over 17 wk. Furthermore, in a study conducted by [Feldlaufer and Crans \(1979\)](#), 14 species from 6 genera were collected from various floodwater and saltmarsh environments. The most abundant species included *Aedes canadensis* (Theobald), *Aedes cantator* (Coquillett), *Aedes vexans* (Meigen), and *Aedes sollicitans* (Walker), and *Culex salinarius* Coquillett, which represented 98% of the 15,000 mosquitoes collected in the study. In the western United States, where diversity gives way to explosive abundance of 1 or 2 species, *Culex tarsalis* Coquillett was collected more abundantly with CO<sub>2</sub> as the only attractant ([Reisen et](#)

RESEARCH

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# Diuresis and $\alpha$ -glucosidase inhibition by erythritol in *Aedes aegypti* (Diptera: Culicidae) and viability for efficacy against mosquitoes

Irvane E. Nelson<sup>1,2</sup>, Kobi A. Baker<sup>1</sup>, Ary Faraji<sup>1</sup>, Gregory S. White<sup>1</sup> and Christopher S. Bibbs<sup>1\*</sup>

## Abstract

**Background** Sugar alcohols, such as erythritol, are low-impact candidates for attractive toxic sugar baits (ATSB) to kill mosquitoes. To determine whether erythritol has a viable future in ATSB formulations, a suite of assays was conducted to diagnose toxicity mechanisms and starvation effects on mortality in *Aedes aegypti* (L.) as a model system.

**Methods** We measured general carbohydrate load, glucosidase levels, and free glucose in intoxicated adult mosquitoes to observe whether sugar digestion was impaired. We assayed the effects of sugar combinations with erythritol on larvae and adults. To measure erythritol effects when mosquitoes were not resource-deprived, additional assays manipulated the prior starvation status.

**Results** Up to 50,000 ppm of erythritol in water had no effect on larvae within 72 h, but an ammonia spike indicated diuresis in larvae as early as 4 h ( $F_{8,44} = 22.50$ ,  $P < 0.0001$ ) after sucrose/erythritol combinations were added. Adult consumption of erythritol was diuretic regardless of the sugar pairing, while sucrose and erythritol together generated above 80% mortality ( $F_{2,273} = 33.30$ ,  $P < 0.0001$ ) alongside triple the normal excretion ( $F_{5,78} = 26.80$ ,  $P < 0.0004$ ). Glucose and fructose paired individually with erythritol had less mortality, but still double the fecal excretion. When ingesting erythritol-laced meals, less sugar was detected in mosquitoes as compared to after sucrose meals ( $\chi^2 = 12.54$ ,  $df = 1$ ,  $P = 0.0004$ ).

**Conclusions** Data showed that erythritol is a linear competitive inhibitor of  $\alpha$ -glucosidase, marking it as a novel class of insecticide in the current research climate. However, the efficacy on larvae was null and not persistent in adult mosquitoes when compared across various starvation levels. Despite significant diuresis, the combined effects from erythritol are not acute enough for vector control programs considering ATSB against mosquitoes.

**Keywords** Starvation, Sugar alcohol, Excretion, Toxicity, Sugar meals

## Background

Erythritol, a sugar alcohol and food-grade artificial sweetener, has been observed in other animals to substitute glucose in the catalytic binding pocket of  $\alpha$ -glucosidase [1]. Erythritolic inhibition in  $\alpha$ -glucosidase has been directly measured once before in true bugs [2], and the sugar alcohol has since become a heavily discussed topic for the potential to kill mosquitoes [3], fruit flies [4], vinegar flies [5], house flies [6], ants [7], and psyllids [8]. Mosquitoes and other flies have been the focal pests in erythritol studies [3, 9–11]. Evidently, erythritol is also

\*Correspondence:

Christopher S. Bibbs

csbibbs@outlook.com; chris@slcmad.org

<sup>1</sup> Salt Lake City Mosquito Abatement District, 2215 North 2200 West, Salt Lake City, UT 84116, USA

<sup>2</sup> College of Science, Science Research Initiative (SRI), University of Utah, 1390 Presidents Circle, Crocker Science Center, rm 310, Salt Lake City, UT 84112, USA



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