California Department of Public Health

Occupational Health Branch

FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM (CA/FACE)

A Date Palm Worker Dies After Being Stung by Bees

Case Report: 17CA003

SUMMARY

A date palm tree worker died after being stung by numerous bees while working in an organic date orchard. The victim and a co-worker were spraying the dates with high-pressure water when the incident occurred. The victim was reportedly allergic to bee stings and his employer was unaware of his medical condition. The victim was not carrying an epinephrine auto-injector, and the co-worker or others on the farm were not trained in emergency response for bee stings. The CA/FACE investigator determined that, in order to prevent similar future incidents, agricultural employers should ensure the following:

- Workers who are allergic to insect stings or bites should be advised to visit a health care professional to obtain a prescription for an epinephrine auto-injector, carry it with them at all times, and inform their employer and co-workers of their allergy to insect stings or bites.
- A hazard assessment, prevention steps, and incident response plan for insect stings and bites should be incorporated into the company's Injury and Illness Prevention Program (IIPP).

INTRODUCTION

On July 3, 2017, at approximately 10:13 am, a 49-year-old Hispanic male date palm tree worker died while spraying dates with high-pressure water in a date palm orchard. The CA/FACE investigator received notification of this incident on July 7, 2017, from the Cal/OSHA weekly update. On September 7, 2017, he made contact with the president of the business who employed the victim. On September 21, 2017, the CA/FACE investigator, along with an epidemiologist, visited the organic date palm orchard where the incident occurred and interviewed the president of the business. Photographs were taken of the incident scene, as well as the tractor-towed spray rig with aerial lift the victim was in at the time of the incident. The County Coroner and Sheriff Department reports of the incident were reviewed. Telephone interviews with the victim's next of kin and co-worker were conducted later with the help of a Spanish interpreter. A follow-up telephone interview with the president of the business was also conducted.

EMPLOYER

The employer of the victim was a family-owned and operated business that commercially grows, packs, and ships Medjool and Deglet Noor dates. The business started in 1931 and was sold in the 1980's to the family that currently owns and operates the business. They have approximately 100 employees year-round that include agricultural workers and commercial packers. Most of the agricultural workers begin their workday at dawn to avoid the excessive heat in the afternoon. The business has thousands of date palm trees that vary in size and age in numerous orchards throughout the valley. Orchards vary in size from 5 to 40 acres.

DATE PALMS

Date palm trees vary in height according to their age and reach full fruit production in 15-20 years. Dates are naturally pollinated by the wind; they are not typically pollinated by bees. In the commercialized date palm industry, dates are hand-pollinated to ensure a productive date crop. Male flowers are harvested for pollen and female flowers are hand-pollinated, all by date palm workers. Once the dates begin to grow, the workers tie up the dates in clusters to support the weight of the fruit and prevent breaking. Workers then place a cover over the tied dates to keep birds and insects away from the fruit and to minimize damage from the elements. At the time of this incident, the dates had not yet been tied in clusters. Each tree yields one crop per year, with harvest in the autumn and early winter seasons (September through December). Exact harvest time depends on the location and age of the orchard. The tops of the female date palms are accessed by agricultural workers for pollination, tie-down, covering, harvesting, and pruning each year. Mites feed on the dates and can encase an entire cluster of dates in their webbing. If not removed, they will scar the date which results in fruit and economic losses. To keep the mites from destroying the organic dates, workers spray the dates with water to disturb the mites' webbing.

HONEY BEES

There are two subspecies of honey bees in California. European honey bees are typically kept in commercial colonies. Africanized honey bees (AHBs) differ from European honey bees by their aggressive behavior. They swarm more often and are more likely to abandon a hive if disturbed, are agitated by movement and vibration more easily, and defend their hive in larger numbers. They nest in varying and sometimes unexpected locations, such as tree cavities, old vehicles, underground, and inside small containers.

Although it is not known which strain of honey bee was involved in this incident, AHBs comprise the majority of feral honey bee colonies in Southern California. A recent study observed that 70% of feral hives and 65% of foraging honey bees in San Diego County contained AHB genes. Similar results are likely throughout Southern California, as AHBs have been documented in Riverside and Imperial Counties since the mid-1990s. Commercial beehives, which would have contained European honey bees, were not present on the property.

Typically, honey bees will swarm in the early spring and summer when they are looking for a new place to set up a hive, but AHBs may swarm more often throughout the year. Swarms can be identified when a large number of bees form a cluster or ball and are not associated with a hive, i.e., offspring and honey comb are not present. Honey bees are usually docile while swarming, but once they have something to defend, such as offspring or a hive structure, they can be very aggressive. Movement within 50 feet and any vibration within 100 feet of their hive will agitate AHBs, and the bees can remain in an overstimulated state for several days. Once a honey bee stings, it releases pheromones which incite other bees to defend the hive and sting as well. All honey bees can sting only once. Their barbed stinger is pulled from their body after a sting, killing it. The venom of an AHB sting is no more venomous than a European honey bee. AHBs are more dangerous because they defend their hives in greater numbers and, as a result, victims sustain more stings.

Prior to this incident, there were a few reports of insect stings among this company's agricultural employees, but, to the employer's knowledge, nobody had needed or sought medical attention because of a sting. After this incident occurred, two feral beehives were found hidden in the date palm trees that were being sprayed. They were not visible from the ground. In this incident, the bees may have been disturbed by either the vibration or movement of the operating equipment or spraying water on the dates.

WRITTEN SAFETY PROGRAMS AND TRAINING

The company had a current (2017) written Injury and Illness Prevention Program (IIPP) in both English and Spanish. The IIPP included prevention programs for known hazards in the date palm industry such as heat, working from heights, thorns on the trees, and lifting heavy objects. At the time of the incident, there was not a specific section in the IIPP that covered insect stings or bites. All supervisors were trained in first aid and cardiopulmonary resuscitation (CPR) and were issued first aid kits. Safety meetings were documented and held regularly throughout the year. Safety meetings covered topics related to the current season work tasks (i.e., temperature and heat-related illness).

THE VICTIM

The victim was a 49-year-old Hispanic male who had been working for this company for 27 years in different capacities. His job title at the time of the incident was foreman. The victim was born in Mexico and his primary language was Spanish. According to the coroner's report and victim's next of kin, the victim had a previous allergic reaction to bee stings, but did not seek medical care for the previous incident.

INCIDENT SCENE

The incident scene was a 40-acre organic date palm orchard with trees that were approximately 50 years old. The trees were situated in straight north-to-south rows with a large lane between

each row (Exhibit 1). The tractor and attached spray rig with an aerial bucket were found in the third row off the east side of the orchard.

Exhibit 1. Rows of date palms. Note: Dates were not tied in clusters or covered by mesh bags at the time of the incident.

WEATHER

The weather on the day of the incident was sunny with temperature at the time of the incident of approximately 106°F.

INVESTIGATION

On the day of the incident, the victim and a co-worker were spraying the date palms with high-pressure water to remove the webbing of the mites. They began work that day around 8 am. The co-worker was in an enclosed cab driving the tractor pulling the spray rig (Exhibit 2). The victim was in the open raised aerial bucket on the spray rig, approximately 40 feet in the air and 20 feet from the palm dates. As the co-worker towed the spray rig down the row of date palms, the victim sprayed water onto the dates to wash away the mites' webbing. During the course of the work, the victim sprayed a bunch of dates where a beehive was hidden and not visible among the palm branches. Multiple bees began to sting the victim. The victim lowered the aerial bucket and exited the spray rig to escape the bees attacking him. The co-worker realized the victim was being stung by the bees and opened the cab door to allow the victim to enter the enclosed cab. The victim, along with some bees, entered the cab of the tractor. The co-worker drove the tractor further down the row of date palms. Both the victim and co-worker were stung by bees while in the enclosed cab. After driving an unknown distance down the row, the co-worker stopped the tractor and both men exited the cab and ran further down the row, away from the bees. Several calls were made to 911 by co-workers and the supervisor. While waiting, the victim complained of chest pain and that he was having a hard time breathing.

While waiting, the victim collapsed and became unresponsive. The co-worker began performing CPR on the victim as he waited for the fire department to arrive. On their arrival, the victim was in cardiac arrest with an asystolic cardiac rhythm. CPR and Advanced Cardiac Life Support (ACLS) measures were performed, with administration of multiple doses of epinephrine and one dose of diphenhydramine. The victim did not respond to these measures and was pronounced dead at the scene.

Exhibit 2. Spray rig with open raised aerial bucket similar to the one the victim was in at the time of the incident.

CAUSE OF DEATH

According to the death certificate, the cause of death was anaphylactic shock due to multiple bee stings.

RECOMMENDATIONS

The CA/FACE investigator determined that, in order to prevent future incidents, agricultural employers should ensure the following:

Recommendation #1: Workers who are allergic to insect stings or bites should be advised to visit a health care professional to obtain a prescription for an epinephrine auto-injector, carry it with them at all times, and inform their employer and co-workers of their allergy to insect stings or bites.

Discussion: In this incident, the victim was allergic to bee stings, did not have an epinephrine auto-injector with him, and his employer was unaware of his condition. Most people who have a known allergy to bee stings carry an epinephrine auto-injector with them and are trained on how to administer it when needed. Workers performing work duties in areas that could or are known to have stinging or biting insects should be advised by their employer of the hazards and risks associated with their work. Additionally, employers should advise all workers that if they have a known allergy to stinging or biting insects, the employee should visit a health care professional

and, if prescribed, carry an epinephrine auto-injector with them while at work to possibly prevent incidents such as this one. Employers should also ask their employees who could come into contact with stinging or biting insects to disclose any such allergies to them. Workers with known allergies should inform their employers and co-workers about their allergy and let them know where they keep their epinephrine auto-injector. Workers who know about a co-worker's allergy and where to locate their epinephrine auto-injector should assist their co-worker if needed when they experience an allergic reaction while at work.

If the victim had carried an epinephrine auto-injector, he may have been able to administer the injection to himself immediately after he began to experience an allergic reaction. Alternatively, his co-worker could have retrieved the epinephrine auto-injector and helped administer this to the victim. If this had been done at the onset of his allergic symptoms, the victim may have been able to continue breathing until emergency personnel arrived.

Recommendation #2: A hazard assessment, prevention steps, and incident response plan for insect stings and bites should be incorporated into the company's Injury and Illness Prevention Program (IIPP).

Discussion: In this incident, the victim and his co-worker were not aware of beehives or swarms within the date palm orchard where they were spraying. Since these workers had not experienced prior problems with bees or other stinging insects, they may not have considered the potential for a life-threatening incident. When starting work in any agricultural area, a hazard assessment of the work area, including 100 yards around the worksite, should include surveying for stinging and biting insects. An AHB colony can come into an area and establish a hive in as short as 12 hours, so daily assessments should be conducted of the work area. It is also important to know what work has recently been conducted in the area because, once disturbed, AHBs can remain agitated for several days.

The presence of a beehive or swarm may be first noticed by observing bees flying around. Buzzing can be heard from hives as well, but close proximity is needed to hear it. The best way to spot bees associated with a hive is to look for flight patterns. There are always insects flying about, but honey bees will be constantly leaving and returning to a centralized location while they are foraging, which typically begins in the early morning. It may be advisable to have the same group of workers surveying the worksite for insects each day, as they will become familiar with typical insect behavior in the orchards and may be able to identify flight patterns associated with a hive. Hives are often located in places that are protected from the elements and possible predators (i.e., under the eaves of a roof, under floorboards, or under tree branches); they may be difficult to see and are occasionally in unexpected places. AHBs swarm in smaller numbers than European honey bees and can colonize smaller cavities about 1-5 gallons in volume, like utility boxes. Two feral beehives were later located in trees within the area that was being sprayed during this incident.

If a hive or nest is discovered during a hazard assessment, work in that area should not be conducted until the hive or nest has been removed. If a hive is found, all employees, especially

those with known allergies, should avoid the area until the hazard is removed. A professional bee keeper or bee removal service should be contacted to remove the hive.

At the time of this incident, the employer did have a documented IIPP, but it did not include a specific plan or training on insect stings and bites. Implementing such a plan and training program would ensure the employees were aware of the proper prevention and incident response to insect stings and bites. For employees who are working in areas with possible interactions with stinging and biting insects, proper awareness and training is recommended for when they encounter bees or other insects during their work. The insect bite or sting program should include, but is not limited to: 1.) A description of the insect hazard and its location and identification in the worksite. 2.) Possible precautions (behavior and clothing) to take to avoid insect attacks and/or bites and stings. 3.) Training on the proper response if the insect is encountered or attacks an employee. 4.) What to do if someone is stung or bit by the insect, including first aid and epinephrine auto-injector training.

If a swarm of bees or a beehive is encountered in the workplace, the employee should get to a safe place or a safe distance away from the insects and report it to their supervisor for removal and communication to all other employees to avoid the area. Avoid movement or making loud noises, generating vibrations, and using power equipment near the hive as it could agitate the colony. If bees attack an employee, the employee should leave the area as quickly as possible, run if possible, or get to an enclosed space that the bees cannot enter (i.e., a sealed building or vehicle with closable doors). If on foot, AHBs will chase for long distances, sometimes up to a quarter of a mile. Do not jump into a body of water. The bees will stay in the area and sting the person when they surface to breathe. Once in a safe location, gently brush bees away from the body; do not swat or squish bees. If stung, remove stingers as soon as possible by scraping the stinger out sideways with a fingernail or a credit card. Workers should seek medical attention if they feel ill after being stung. In this incident, the co-worker who was with the victim promptly got the two of them away from the hazard (the bees), called 911 for help, and performed CPR. Employers should ensure their employees are aware of the symptoms and first aid response to insect stings and bites. This is especially important since employees may be unaware of an allergy. Training on the proper first aid response to insect stings or bites should be given by the employer.

In this incident, if a hazard assessment had been performed and the hive of bees had been identified and removed, the victim may not have disturbed the bees and been stung. The victim did appropriately remove himself from the immediate area, seek shelter in the enclosed cab, and run away from the bees. Unfortunately, that was likely not enough to avoid the subsequent life-threatening allergic response.

GLOSSARY OF TERMS

Epinephrine auto-injector – a medical device for injecting a measured dose or doses of epinephrine (adrenaline) by means of auto-injector technology. It is most often used for the treatment of anaphylaxis (a severe, potentially life-threatening allergic reaction).

Feral – existing in a natural state, as animals or plants; not domesticated or cultivated; wild.

Foraging – characterized by or dependent upon the acquisition of food by such means; food-gathering.

REFERENCES

Division of Occupational Safety and Health - Title 8 regulations - Subchapter 7 - General Industry Safety Orders, Group 3. Tree Work, Maintenance or Removal §3421. General. §3427. Safe Work Procedures. §3428. Operating Rules.

Africanized Honey Bees – CDPH web page
(see: https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/AfricanizedHoneybees.aspx)

Bee Stings Safety – USDA ARS Honey bee Research
(see: https://www.ars.usda.gov/pacific-west-area/tucson-az/honey-bee-research/docs/bee-stings-safety/)

Africanized Honey Bee Pest Profile – CDFA Plant Health & Pest Prevention Services
(see: https://www.cdfa.ca.gov/plant/pdep/target_pest_disease_profiles/ahb_profile.html)

Africanized Honey Bee Update – UC Riverside
(see: http://bees.ucr.edu/ahb-update.html)

Chao, T., and R. R. Krueger. 2007. The date palm (Phoenix dactylifera L.): Overview of biology, uses, and cultivation. HortScience 42:1077 –1082.

Negm M.W., De Moraes G.J., Perring T.M. (2015) Mite Pests of Date Palms. In: Wakil W., Romeno Faleiro J., Miller T. (eds) Sustainable Pest Management in Date Palm: Current Status and Emerging Challenges. Sustainability in Plant and Crop Protection. Springer, Cham

Special thanks to Elizabeth Andrews, Ph.D., California Department of Public Health.

Hank Cierpich
FACE Investigator

Robert Harrison, MD, MPH
FACE Project Officer

Laura Styles, MPH
Research Scientist

March 20, 2018

****

FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The California Department of Public Health, in cooperation with the Public Health Institute and the National Institute for Occupational Safety and Health (NIOSH), conducts investigations of work-related fatalities. The goal of the CA/FACE program is to prevent fatal work injuries. CA/FACE aims to achieve this goal by studying the work environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact. NIOSH-funded, state-based FACE programs include: California, Iowa, Kentucky, Massachusetts, Michigan, New Jersey, New York, Oregon, and Washington.

****

Additional information regarding the CA/FACE program is available from:

California FACE Program
California Department of Public Health
Occupational Health Branch
850 Marina Bay Parkway, Building P, Third Floor
Richmond, CA 94804
www.cdph.ca.gov/face