

Mosquito Prevalence in Urban Versus Rural Areas in the Bryan/College Station Area in Brazos County, Texas

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Abstract: The Bryan/College Station area in Texas is plagued with many diseases vectored by mosquitoes annually. In this mosquito survey, the main objective was to compare and contrast the genus and species of mosquitoes that were natural to both urban and rural areas of Bryan/College Station. Starting from late February of 2014, mosquitoes were collected in both urban and rural areas with mosquito larvae dippers and adult brooders. The results showed that in the urban areas of Bryan/College Station, *Culex tarsalis* (Coquillett) (Diptera: Culicidae) and *Culex quinquefasciatus* (Say) (Diptera: Culicidae) were abundant. The results for rural areas showed that *Aedes vexans* (Meigen) (Diptera: Culicidae) and *Culiseta inornata* (Williston) (Diptera: Culicidae) were abundant. In pastoral areas there is a lot of livestock, so the mosquitoes that were present were more specific to livestock. The mosquitoes collected in urban areas are mostly adapted for feeding on human hosts. Knowing what mosquito is more prominent in what location will help a great deal in controlling these vectors.

Keywords: Mosquitoes, Bryan, urban, rural

Mosquitoes are the largest carrier of vector-borne diseases. *Culex tarsalis* (Coquillett) (Diptera: Culicidae), the primary vector for Western Equine Encephalitis, is a North American mosquito abundant in western agroecosystems and wetlands. In the United States, *Culex tarsalis* is the dominant mosquito vector for West Nile virus (Goldberg et al. 2010). *Culex quinquefasciatus* (Say) (Diptera: Culicidae) is a mosquito that can be found in any container that holds water from bird baths to tires. Current research does not prove this species is a vector for any diseases. *Culiseta inornata* (Williston) (Diptera: Culicidae) is a

mosquito that is a possible vector of encephalitis. This species can be found in temporary or permanent woodland pools, marshes, and edges of pools. *Aedes vexans* (Meigen) (Diptera: Culicidae) is a mosquito that prefers feeding on cattle and is a very persistent nuisance. This species is an inland floodwater mosquito that can be found in fresh water pools and road side ditches. This species is a vector of Eastern Equine Encephalitis and Cache Valley fever.

Different mosquitoes are found in rural and urban areas in the Bryan/College Station area. The differences in the types of

mosquitoes located in urban and rural areas correlate to the differences in host preferences. In rural areas, the mosquitoes that are more attracted to livestock and swampy areas will be more prevalent like *Aedes vexans* and *Culiseta inornata*. In urban areas, the mosquitoes that prefer a dense population of humans will be more prevalent like *Culex tarsalis* and *Culex quinquefasciatus*. A survey of mosquitoes present in the Bryan/College Station area is beneficial to determine how mosquito control should be handled and carried out to prevent an outbreak of any disease carried by the mosquitoes present.

Materials and Methods

In the urban areas, the specimens were collected from a man-made creek (30°36'01.2''N 96°20'43.0''W) that also served as a flood water source due to run-off water from the creek into the parking lot of Penberthy Sports Complex in College Station, TX. The creek had a cement bottom and dirt walls that were filled with vegetation. This creek had about 6 inches of water at the times of collection. The dates of collection in urban areas were 20-III-2014, 27-III-2014, 3-IV-2014, 10-IV-2014, 16-IV-2014, and 24-IV-2014. The specimens that were collected in rural areas were in both permanent and non-permanent water sources. The mosquitoes in the rural area were collected on a ranch (30°30'18.76''N 96°11'15.33''W). A sample was taken in livestock water troughs, a small pond, and a creek bed with both permanent and non-permanent water sources. The dates of collection in rural areas were 28-II-2014, 7-

III-2014, 14-III-2014, 21-III-2014, 28-III-2014, 4-IV-2014, 11-IV-2014, and 18-IV-2014.

Dippers to catch the Dipteran larvae were made so that they were able to be caught in water sources. A two-liter plastic bottle was cut in half and the bottom half of the two-liter (Coca Cola, Cleveland, OH) was taped (Scotch, Minneapolis, MN) to a long stick. This made the larvae to be more accessible to being caught on the surface of water sources. Some of the larvae collected were then kept in vials ranging from 5 mL to 10 mL of 95% ethanol (Bioquip, Rancho Dominguez, CA). Those that were preserved in 95% ethanol were identified using a dichotomous key for larvae of mosquitoes. The rest of the larvae that was collected were placed in an adult brooder. The brooders were made using two-1 mL plastic water bottles (ChunBai, Hebei, China). One water bottle was cut about one-fourth from the bottom and placed over another water bottle that was about halfway full with water so that it was covering the opening of the bottle. A net (Bioquip, Rancho Dominguez, CA) was put over both and held together with rubber bands (Office Impressions, Brooklyn, NY) so that the bottles did not come apart. After a day or two after the mosquitoes emerge as adults, they were put in the freezer for about 15-20 minutes and then were point-mounted. They were then identified using a dichotomous key for adult mosquitoes.

Results

The urban mosquitoes collected were *Culex tarsalis* and *Culex quinquefasciatus* (Table 1). There were no mosquitoes collected on 20-III-2014, 27-III-2014, and 24-IV-2014.

There were more *Culex quinquefasciatus* larvae and adults collected than *Culex tarsalis*. There were more larvae collected than adults. The rural mosquitoes collected were *Culiseta inornata* and *Aedes vexans* (Table 2). There were no mosquitoes

collected on 7-III-2014, 14-III-2014, 28-III-2014, 11-IV-2014, and 18-IV-2014. There were more *Aedes vexans* larvae and adults collected than *Culiseta inornata*. There were more adults collected than larvae.

Table 1. Larvae and adult mosquitoes collected from the urban area coordinates

Date Collected	Amount Collected	Larvae Species Identified	Adult Species Identified
20-III-2014	No mosquitoes collected	-	-
27-III-2014	No mosquitoes collected	-	-
3-IV-2014	7 larvae and 5 adults	4 <i>Culex tarsalis</i> and 3 <i>Culex quinquefasciatus</i>	2 <i>Culex tarsalis</i> and 3 <i>Culex quinquefasciatus</i>
10-IV-2014	3 larvae and 3 adults	3 <i>Culex quinquefasciatus</i>	3 <i>Culex quinquefasciatus</i>
16-IV-2014	30 larvae and 4 adult	30 <i>Culex quinquefasciatus</i>	4 <i>Culex quinquefasciatus</i>
24-IV-2014	No mosquitoes collected	-	-

Table 2. Larvae and adult mosquitoes collected from the rural area coordinates.

Date Collected	Amount collected	Larvae Species Identified	Adult Species Identified
28-II-2014	5 larvae	5 <i>Culiseta inornata</i>	-
7-III-2014	No mosquitoes collected	-	-
14-III-2014	No mosquitoes collected	-	-
21-III-2014	10 larvae and 8 adults	10 <i>Aedes vexans</i>	8 <i>Aedes vexans</i>
28-III-2014	No mosquitoes collected	-	-
4-IV-2014	5 larvae and 65 adults	5 <i>Aedes vexans</i>	65 <i>Aedes vexans</i>
11-IV-2014	No mosquitoes collected	-	-
18-IV-2014	No mosquitoes collected	-	-

Discussion

In urban areas, *Culex tarsalis* and *Culex quinquefasciatus* were collected because these species are found in standing water. In rural areas, *Culiseta inornata* and *Aedes vexans* were collected because these species are found in flood water and they prefer livestock as their primary host instead of humans. In the late winter and early spring of 2014, the weather was very sporadic. In the colder times of the month, collecting any mosquito larvae was difficult. A previous study showed that weather conditions such as severe droughts or flooding events will affect both the agricultural business and the amount

of outbreaks of mosquito-borne diseases (Anyamba et al. 2014).

The location also affected the mosquito population. The reason more mosquito larvae were collected in rural areas than urban might be due to the fact that the ranch was a private property. In urban areas, the city is held more responsible for the control of mosquitoes unlike rural areas where control for mosquitoes is carried out by private property owners. Control for mosquitoes in both rural and urban areas needs to be carried out to prevent an outbreak of any disease carried by the mosquitoes present.

References

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