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Mosquito Surveillance

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Abstract
As blood-sucking insects, mosquitoes are particularly important to human health. They not only are annoying pests but also are capable of transmitting debilitating or lethal pathogens, mostly viruses, to humans. In order to assess the threat posed by mosquitoes to humans in the state of Iowa, the Iowa State University (ISU) Medical Entomology Laboratory has conducted a surveillance program designed to monitor mosquito populations and mosquito-borne viruses in Iowa for the last 40 years. In 2007, three research farms administered by the ISU College of Agriculture and Life Sciences (Horticulture Station, Ames; McNay Farm, Chariton; and Western Farm, Castana) participated in our surveillance program, and this report summarizes their surveillance efforts.

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Mosquito Surveillance

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Introduction

As blood-sucking insects, mosquitoes are particularly important to human health. They not only are annoying pests but also are capable of transmitting debilitating or lethal pathogens, mostly viruses, to humans. In order to assess the threat posed by mosquitoes to humans in the state of Iowa, the Iowa State University (ISU) Medical Entomology Laboratory has conducted a surveillance program designed to monitor mosquito populations and mosquito-borne viruses in Iowa for the last 40 years. In 2007, three research farms administered by the ISU College of Agriculture and Life Sciences (Horticulture Station, Ames; McNay Farm, Chariton; and Western Farm, Castana) participated in our surveillance program, and this report summarizes their surveillance efforts.

Materials and Methods

New Jersey light traps (NJLT) were used to collect mosquitoes for population monitoring while gravid and Mosquito Magnet™ traps (MM) were used to collect mosquitoes for use in virus testing. Of the three farms, only the Horticulture Station operated a NJLT. Surveillance started in June with the delivery of traps and associated supplies to the research farms and ended in mid-October with the cessation of mosquito activity. Mosquito collections by the McNay and Western Research Farms were mailed frozen in coolers (for virus preservation) to the laboratory. Collections by the Horticulture Station were picked up directly.

Once at the laboratory, mosquitoes were identified to species and counted. Of mosquitoes collected in gravid traps and MM, specimens of *Aedes triseriatus* were tested for infection with LaCrosse encephalitis virus, and all *Culex* species were tested for infection with West Nile, Western Equine encephalitis, and St. Louis encephalitis viruses. RNA was isolated from ground mosquito tissue and subjected to reverse transcription. Resulting DNA was amplified with virus-specific primers using PCR, and products were run through gel electrophoresis for virus detection.

Results and Discussion

Table 1 displays the total number of mosquitoes collected at each of the research farms for the entire surveillance season. *Aedes* and *Culex* mosquitoes together composed 98% of the total mosquito count, with *Aedes* mosquitoes (pest species) being nearly three times as abundant as *Culex* mosquitoes (most efficient vectors of West Nile Virus). This abundance ranking (*Aedes, Culex,* other) is typical in comparison with mosquito populations across the state.

Of the 10,826 mosquitoes collected by gravid traps and MM at the three sites, there were 40 specimens of *Ae. triseriatus* in 24 pools and 2,370 in 348 pools of *Culex* species. As illustrated in Table 2, none of these mosquitoes tested positive for any viruses transmissible to humans.

Please visit www.iowamosquito.net for more information in relation to mosquito populations across the state of Iowa.

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Table 1. Mosquito species collected on three ISU research farms in 2007.

Species	Horticulture Station (NJLT)	Horticulture Station (gravid and MM)	McNay (gravid and MM)	Western (gravid and MM)	Total
Ae. atropalpus	0	0	1	24	25
Ae. canadensis	0	0	3	9	12
Ae. japonicus	0	0	5	0	5
Ae. sollicitans	5	0	5	0	10
Ae. triseriatus	0	5	21	14	40
Ae. trivittatus	4	7	205	3	219
Ae. vexans	88	273	7,622	19	8,002
Aedes Sum	97	285	7,862	69	8,313
Cx. erraticus	0	6	10	0	16
Cx. pipiens complex	13	985	1241	83	2,322
Cx. tarsalis	19	9	5	29	62
Cx. territans	1	2	0	0	3
Culex Sum	33	1,002	1,256	112	2,403
Anopheles punctipennis	2	19	67	1	89
An. quadrimaculatus	0	6	98	1	105
An. walkeri	0	1			
Coquillettidia perturbans	0	3	0	0	0
Culiseta inornata	4	2	1	0	7
Psorophora ciliata	0	0	36	0	36
Ps. columbiae	0	0	5	0	5
Other Sum	6	31	207	2	242
Grand Total	136	1,318	9,325	183	10,958

Table 2. Virus testing of mosquitoes collected on three ISU research farms, 2007.

	Horticulture Station		McNay		Western	
	Ae. triseriatus	*Culex* spp.	*Ae. triseriatus*	*Culex* spp.	*Ae. triseriatus*	*Culex* spp.
Pools tested	1	199	17	105	6	44
WNV[1]	negative	negative	negative	negative	negative	negative
LAC[2]	negative	negative	negative	negative	negative	negative
SLE[3]	negative	negative	negative	negative	negative	negative
WEE[4]	negative	negative	negative	negative	negative	negative

[1]West Nile Virus.
[2]LaCrosse Encephalitis Virus.
[3]St. Louis Encephalitis Virus.
[4]Western Equine Encephalitis Virus.