MEXICAN RICE BORER OVIPOSITION PREFERENCE AND LARVAL SURVIVAL ON CONVENTIONAL AND BIOENERGY CROPS

T. E. (Gene) Reagan[1], Matthew VanWeelden[3], Blake Wilson[1], Julien Beuzelin[2], and
[1]LSU AgCenter, Department of Entomology, Baton Rouge, LA
[2]LSU AgCenter, Dean Lee Research Station, Alexandria, LA
[3]University of Florida Everglades REC, Belle Glade, FL (Formerly LSU AgCenter)

The Mexican rice borer (MRB), *Eoreuma loftini*, is an invasive stem bore in Texas and Louisiana which is a pest of numerous grass crops including sugarcane, rice, and corn. Production of bioenergy crops in the U.S. is also expected to be impacted by this damaging pest. As acreage of bioenergy crops expands, these crops will likely be grown in close proximity to related conventional crops, potentially influencing pest population dynamics. Better understanding of MRB preferences between bioenergy and conventional sugarcanes and sorghums is needed to mitigate the impact of this pest on agricultural production along the U.S. Gulf Coast. Greenhouse experiments conducted at the Texas A&M AgriLife research station at Beaumont examined MRB oviposition preference and larval survival among mature and immature plants of selected cultivars of sugarcane, energycane, high-biomass sorghum, and sweet sorghum.

Differences in survival of newly hatched larvae (neonates) were detected between cultivars (Table 1). Mortality was greatest on energycane Ho 02-113 suggesting physical characteristics of this cultivar may increase its resistance to MRB. Differences in oviposition preference were not detected between cultivars, however, data suggest sweet sorghum (M81E) may be more attractive than high-biomass sorghums (Table 1). Host plant resistance is a

Table 1. Mexican rice borer oviposition preference and larval mortality in greenhouse assays.

		Plant height (cm)	Eggs per plant	Percent larval mortality (neonates)
Immature	HoCP 04-838	158.2	14.0	85.2
	HoCP 85-845	167.6	48.6	89.7
	L 79-1002	212.4	27.8	76.4
	Ho 02-113	192.8	5.0	95.1
	ES 5200	163.2	6.4	86.8
	ES 5140	173.4	6.0	90.5
	M81E	157.6	102.8	75.0
Mature	HoCP 04-838	369.6a	50.2	43.1
	HoCP 85-845	373.8a	12.8	58.8
	L 79-1002	403.6a	54.8	55.6
	Ho 02-113	373.2a	145.2	79.0
	ES 5200	245.4b	64.0	45.2
	ES 5140	213.2bc	69.2	46.2
	M81E	240.6c	97.4	28.6
	Type III Test of Fixed Effects	$F = 87.2$ df = 13, 52 $P < 0.001$	$F = 1.59$ df = 13, 52 $P = 0.1184$	$F = 4.23$ df = 13, 82 $P < 0.001$

This research is part of the Ph.D. dissertation of Matthew VanWeelden submitted to Louisiana State University for graduation December 2015.

AERIAL INSECTICIDAL CONTROL OF THE MEXICAN RICE BORER

T. E. (Gene) Reagan[1], Blake Wilson[1], Julien Beuzelin[2], and Matthew VanWeelden[3]
[1]LSU AgCenter, Department of Entomology, Baton Rouge, LA
[2]LSU AgCenter, Dean Lee Research Station, Alexandria, LA
[3]University of Florida Everglades Research and Extension Center, Belle Glade, FL

The Mexican rice borer (MRB) (*Eoreuma loftini*) has been the most damaging pest of sugarcane in the Lower Rio Grande Valley (LRGV) of Texas since the early 1980s. The invasive pest began infesting sugarcane in Louisiana in 2012 and is predicted to cause substantial revenue losses once established throughout the state. Insecticidal control of MRB infestations is made difficult by the limited time exposure of larvae on surfaces of leaves and stalks. MRB eggs are laid on the underside of dry curled leaves and larvae quickly enter sugarcane plant tissues where they are protected from insecticides and natural enemies. Insecticidal control of MRB has historically not been economical, and most LRGV sugarcane growers have abandoned this control tactic. However, new insecticidal chemistries have potential to enhance chemical control of this damaging pest.

MRB populations near a commercial sugarcane field (ratoon CP 72-1210) in Hidalgo Co., TX were monitored with pheromone traps (2 traps/replication) from 14 July–30 September 2015. Trap captures peaked during the first week of August (Figure 1). Larval scouting revealed significant levels of MRB injury in all plots in the experimental field with larvae feeding on >14% of stalks. The aerial insecticide application was made on 11 August 2015 with 5 gallons of water per acre. The experiment was conducted as a randomized block design with 4 replications. Each replication contained five 7-acre plots (four insecticide treatments + nontreated control). MRB injury data were collected on 10–11 November 2015 by recording the total number of internodes, number of bored internodes, and number of emergence holes from two 20-stalk samples from each plot. Because substantial injury was already present at the time of application, the number of bored internodes contained in the top seven internodes of each stalk was also determined as these internodes were more likely to be impacted by the insecticide application. Data were analyzed with ANOVAs with generalized linear mixed models.

Differences were not detected in the percentage of bored internodes or adult emergence per stalks (Table 1). Overall injury was >10% bored internodes in all plots. When only the tops of stalks were considered, differences were detected in percentage of bored internodes among treatments (Table 1). Prevathon (Chlorantraniliprole) was the only treatment to significantly reduce injury over the nontreated control.

Substantial injury to lower internodes in all plots at the time of the insecticide application reduced the level of overall MRB control in this test. Monitoring of larval infestations throughout the growing season would have likely improved application timing. This work shows that pheromone traps are useful in monitoring of areawide MRB populations, but should not be used as the primary pest scouting method. Reduced injury to top internodes in Prevathon treated plots suggests that this chemical may be able to provide an effective level of stem borer control in sugarcane. Continued examination of application strategies and new insecticide chemistry is needed to improve chemical control of MRB in sugarcane.

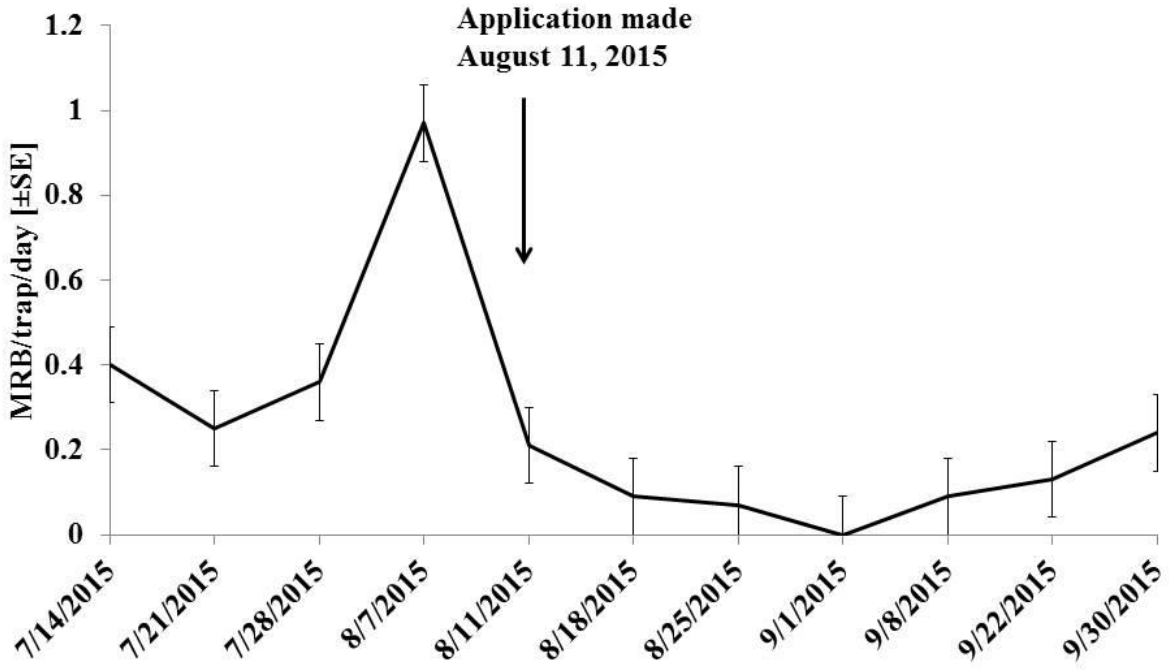

Figure 1. Mean daily MRB pheromone trap captures at the experimental sugarcane field in the RGV, TX, 2015.

Table 1. MRB injury as affected by aerially applied insecticide treatments, RGV, TX, 2015.

Trade Name	Common Name	Rate (fl oz /acre)	% Bored internodes (whole stalk)	% Bored internodes (top only)	Emergence/ stalk
Nontreated	NA	NA	15.6	12.9a	0.27
Confirm	Tebufenozide	16.0	16.7	11.1a	0.29
Diamond	Novaluron	12.0	13.7	9.2a	0.22
Prevathon	Chlorantraniliprole	20.0	10.1	3.7b	0.21
Belt	Flubendiamide	4.0	10.8	5.6a	0.20
		df =	4, 12.0	4, 12.0	4, 20.62
		F =	1.23	3.95	2.98
		P =	0.351	0.029	0.0432

This research is part of the Ph.D. Dissertation submitted to Louisiana State University by Blake E. Wilson for graduation in May 2016.

MEXICAN RICE BORER INFESTATIONS IN LOUISIANA SUGARCANE

T. E. (Gene) Reagan[1], Blake Wilson[1], and Julien Beuzelin[2]
[1]LSU AgCenter, Department of Entomology, Baton Rouge, LA
[2]LSU AgCenter, Dean Lee Research Station, Alexandria, LA

The primary pests of sugarcane in Louisiana and Texas are the sugarcane borer (SCB) (*Diatraea saccharalis*) and the Mexican rice borer (MRB) (*Eoreuma loftini*). The SCB has been the most damaging pest in Louisiana for decades, while the MRB is an invasive pest which began infesting sugarcane in the state in 2012. Although it has only recently begun attacking sugarcane in Louisiana, MRB causes significant damage to sugarcane in Texas and is predicted to cause substantial revenue loss to the Louisiana sugarcane industry.

MRB populations in commercial sugarcane fields in Calcasieu, Jefferson Davis, and Vermilion Parishes were monitored with pheromone traps and scouting for larvae throughout the growing season in 2014 and 2015. Pheromone traps are effective at trapping adult male MRBs and are used to monitor population trends. At the end of the growing season (4 Nov 2014 and 29 Oct 2015) two 25-stalk samples were collected from opposite sides of each field and the number of internodes, bored internodes, larvae, and adult emergence holes were recorded. Bored internodes were classified as either MRB or SCB based on characteristic feeding signs.

Mean daily MRB trap captures peaked in late October 2014 and in late July/early August in 2015 (Figure 1a). MRB larval injury generally increased throughout the growing season (Figure 2b). MRB infestations in Vermilion Parish sugarcane were very low, with only a single larva recorded in each year. The percentage of MRB injured stalks was >5-fold greater in 2015 than in 2014. The percentage of bored internodes at the time of harvest was relatively low in both years of the survey. SCB injury was greater than MRB in 2014, while MRB was more prevalent in 2015 (Table 1). Live MRB larvae were present in sugarcane stalks at the time of harvest in both years.

MRB infestations in southwestern Louisiana sugarcane did not reach damaging levels either year of this survey. Mixed infestations of SCB and MRB are expected to become increasingly common as MRB populations advance further eastward into the sugarcane production regions of southern Louisiana. Favorable environmental conditions such as drought can exacerbate MRB infestations, and the potential for damaging MRB populations to occur in Louisiana remains high. Transportation of increasing amounts of MRB infested sugarcane to sugar mills further east has potential to rapidly spread MRB into the heart of the sugarcane production region in Louisiana.

Table 1. Stem borer infestations in southwestern Louisiana sugarcane, 2014–2015. Injury data collected just prior to harvest. LS Means ± SE.

		Percentage MRB bored internodes	Percentage SCB bored internodes	Live MRB larvae/Ha
2014	Calcasieu	0.42 ± 0.20	0.87 ± 0.60	456 ± 278
	Jefferson Davis	0.10 ± 0.06	3.10 ± 1.57	273 ± 189
2015	Calcasieu	2.47 ± 0.92	0.75 ± 0.52	8216 ± 2769
	Jefferson Davis	1.44 ± 0.44	0.90 ± 0.48	3283 ± 1131

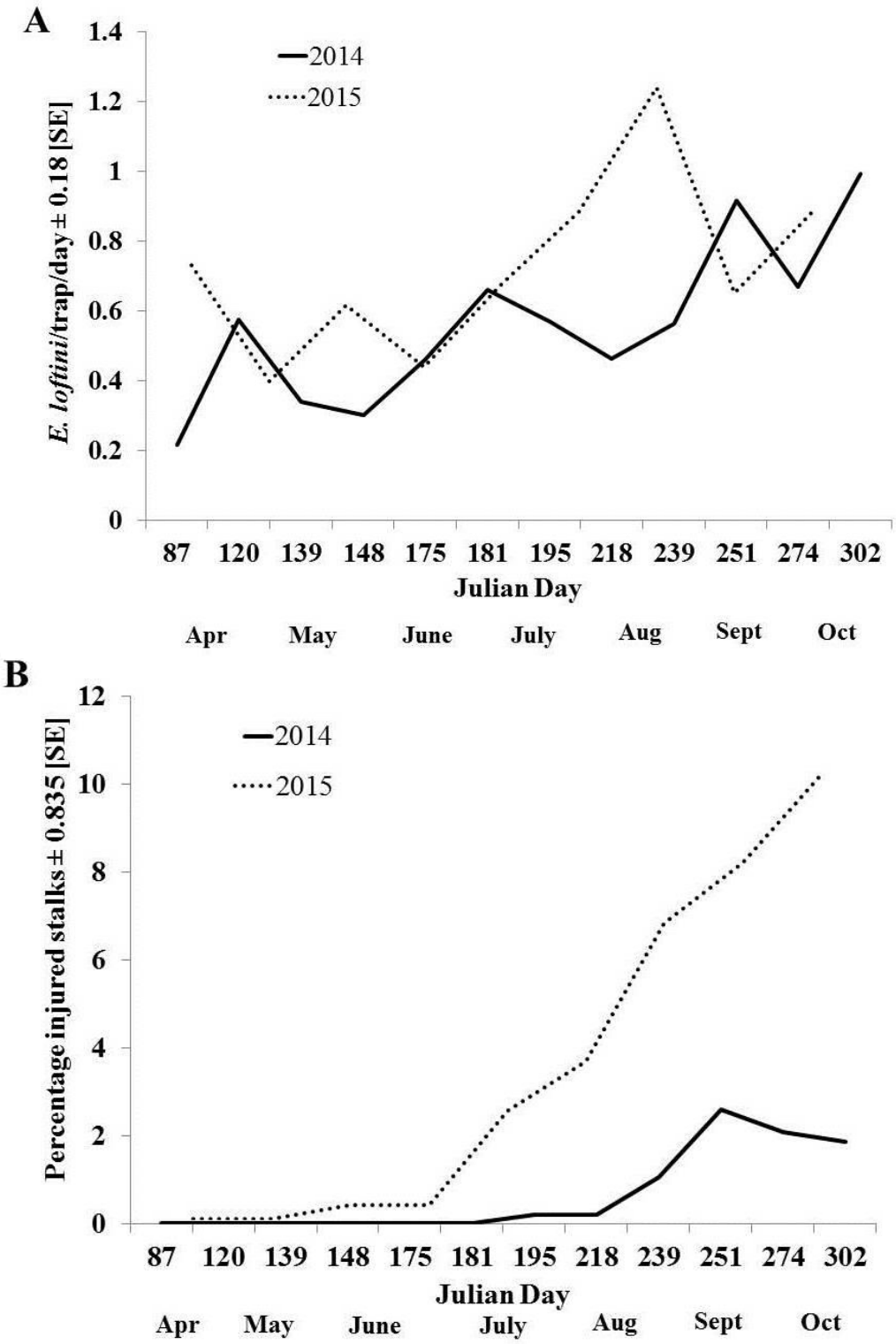

Figure 2. MRB (*E. loftini*) pheromone trap captures (A) and larval injury (B) in commercial sugarcane fields in Calcasieu and Jefferson Davis Parishes, 2014–2015.

This research is part of the Ph.D. Dissertation submitted to Louisiana State University by Blake E. Wilson for graduation in May 2016.

MEXICAN RICE BORER EXPANSION AND DISTRIBUTION IN LOUISIANA

T. E. (Gene) Reagan[1], Blake Wilson[1], and Julien Beuzelin[2]
[1]LSU AgCenter, Department of Entomology, Baton Rouge, LA
[2]LSU AgCenter, Dean Lee Research Station, Alexandria, LA

The Mexican rice borer (MRB) (*Eoreuma loftini*) is an invasive insect which originated in Mexico and is a pest of sugarcane and other grass crops. The MRB has been the dominate pest of sugarcane in Texas since the 1980s, and was first detected in Louisiana in 2008. MRB populations can be monitored with pheromone traps. These bucket traps are baited with a female sex pheromone which can detect adult male moths even at low population densities. Seventy-seven pheromone traps were used to document MRB expansion and distribution in southwestern Louisiana.

As of December of 2015, the MRB has been detected in nine Louisiana Parishes: Calcasieu, Cameron, Beauregard, Allen, Jefferson Davis, Acadia, Vermilion, Evangeline, and St. Landry (Figure 1). The highest trap captures are now occurring in Calcasieu, Cameron, and Jefferson Davis Parishes (Figure 2). Populations near the eastern and northern edges of MRB range remain relatively low. The mean population center was calculated four times per year from 2013–2015. This population center measures the rate of expansion based on mean daily trap captures throughout southwestern Louisiana. Eastward expansion was detected in all but two periods (Figure 3), and the mean population center moved east at a rate of approximately 7 miles/year. This rate is consistent with MRB expansion through Texas. Introduction of MRB populations into Florida in 2012 may have resulted from transportation of infested grasses, but human aided movement of MRB in Louisiana appears to be minimal at this time. MRB moths were not detected in areas surrounding sugarcane mills in Iberia, St. Mary, and St. Martin Parishes during any years of this survey.

The cooperative MRB monitoring program between the LSU AgCenter and the Louisiana Department of Agriculture and Forestry (LDAF) will continue to document range expansion and distribution. At its current rate of spread, the MRB is predicted to be present throughout most of southern Louisiana within the next 15 years.

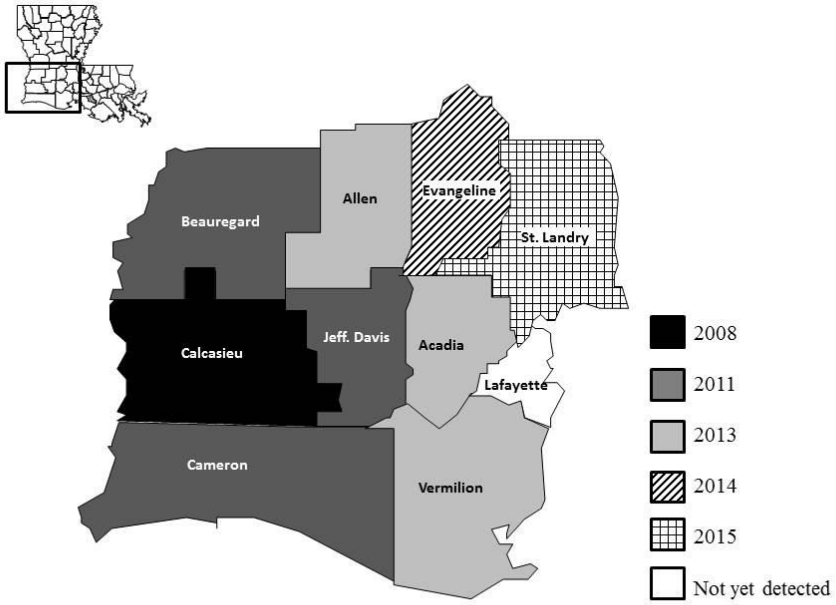

Figure 1. Mexican rice borer range expansion in Louisiana 2008–2015.

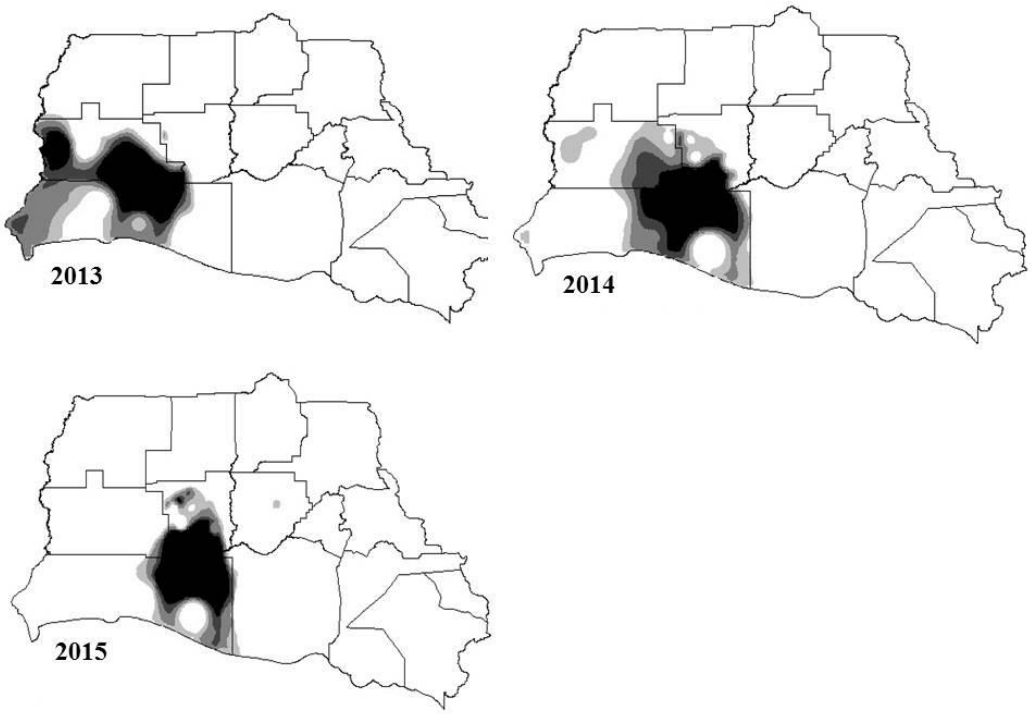

Figure 2. MRB "hotspots" in southwestern Louisiana, 2013–2015. Darker colors indicate areas of higher trap captures.

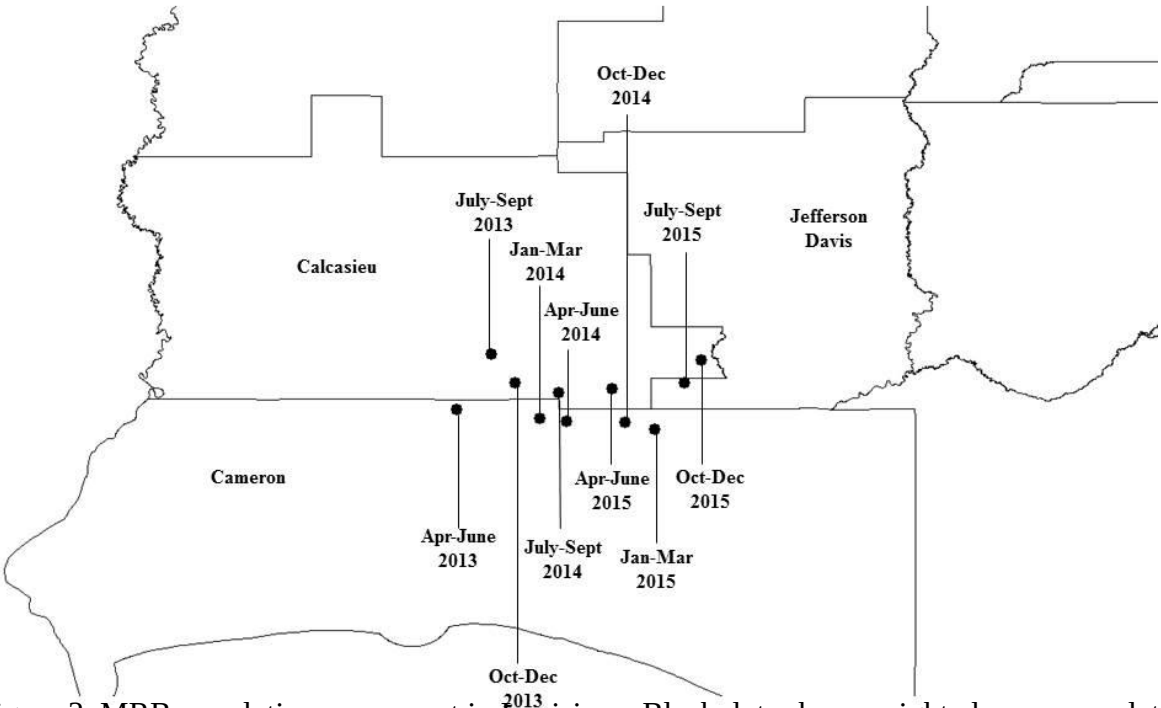

Figure 3. MRB population movement in Louisiana. Black dots show weighted mean population centers at three month intervals, 2013–2015.

This research is part of the Ph.D. Dissertation submitted to Louisiana State University by Blake E. Wilson for graduation in May 2016.