suggesting there are some unique properties of β-isomer that are responsible for its inhibition of insect development (see also Hodge and Powell, 2010).

In these assays, the mode of action of BABA in reducing insect performance appears to have two potential routes through which it could act: (1) direct effects on the physiology of the developing insect (by ingestion or contact), or (2) acting via disruption of the microorganism populations that constitute the larval food source. There has been a recent example of BABA directly inhibiting a fungal plant pathogen (Fischer *et al*., 2009), so there may be scope for this compound to inhibit directly the dietary yeasts included in the diet medium that often provide the primary protein source of the larvae.

Nuclear magnetic resonance analysis has identified the presence of unmetabolized BABA in aphids reared on BABA-treated host plants (S. Hodge and J. Ward, 2010, *unpub. data*) suggesting that BABA could be having direct disruptive effects on insect development. The compound is also toxic to plants at high doses, and it has been suggested that it may interfere with amino acid metabolism, possibly by blocking amino acid transport systems. It is unknown whether inhibition of insect growth and development might also be occurring by this route.

Regardless of the mechanism(s) responsible, the results of these assays provide evidence that BABA can inhibit insect performance in the absence of plant-derived defence compounds. The results suggest that further research is required to elucidate how BABA reduces the rate of insect development, both when feeding on BABA-treated plants and when the compound has been incorporated into artificial diets. Investigating the effects of BABA on other species of *Drosophila* and Diptera, and other orders of insects, will provide further indication on the generality of these findings. In the face of these new findings, the lack of direct effects previously observed on aphids and lepidopteran larvae requires re-examination (Hodge *et al*., 2005, 2006).

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Species abundance and sex ratios of *Drosophila melanogaster* and *Zaprionus indianus* in two different habitats of the Tropical Dry Forest of Alamos, Mexico (Diptera; Drosophilidae).

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Introduction

Alamos, Sonora, Mexico lies in the foothills of the Sierra Madre Occidental where the Sonoran desert meets the tropical dry forest. We investigated the sex ratio and abundance of the local Drosophilidae community during September 2010, which is the rainy season. Two species predominated: *Drosophila melanogaster* and an invasive species, *Zaprionus indianus.* We also detected a few individuals from the *Repleta* species group, which we ignored for the purpose of this study.

Zaprionus indianus is an invasive species that has been recorded across Central and South America (Tidon *et al*., 2002). One of the most well-documented cases of *Z. indianus* colonization is in Brazil, where it was first recorded in 1999. In this region, the species is a potential agricultural pest due to its oviposition on the fig crop (de Setta and Carareto, 2005). Considerable speculation exists regarding its recent spread from Africa to other tropical regions around the world. The most likely explanation is increased human travel and transportation of goods, especially agricultural products (de Setta and Carareto, 2005; Tidon *et al*., 2002). This invasive species has been detected in an increasing number of localities, including Alamos where our study supports the presence of a thriving population of *Z. indianus*.

Sex ratios and abundance data provide invaluable information about the ecological dynamics within and between species, including relationships between resident and invasive Drosophilids. The objective of this study was to investigate what species were present in two different environments in Alamos: urban and rural. The urban site was located in the town of Alamos, an area with many barriers in the form of walls, buildings, and other infrastructure. The rural site, which was wooded and lacked the structural barriers of the urban site, was located on the outskirts of Alamos. We focused on *D. melanogaster* and *Z. indianus* as they were sufficiently abundant to perform statistical analyses.

Methods

Site Setup

Adult *Drosophila* flies were collected in September 2010 at two different sites in Alamos, Mexico. The urban site was located in the town center (27° 1'10.76"N, 108°56'5.11"W) and the rural site due west of the city (27° 0'59.32"N, 108°56'49.99"W) 0.9 miles from the urban site. Baits containing a mixture of necrotic fruits in Styrofoam bowls were set out at each site, including bananas, cactus fruit, and mango pieces placed in individual bowls around the site.

Collection and Analysis

Drosophilids were exhaustively collected in the morning and evening using glass aspirators and nets. Flies were kept in vials containing standard cornmeal *Drosophila* medium. To determine the species and sex, the flies were anesthetized using ether and viewed under a Leica dissecting microscope. A Chi Square test was used to determine if there was significant male:female difference within each species.

Results

Drosophila melanogaster and *Z. indianus* were present in substantial numbers. A lower number of *Z. indianus* was seen at night relative to the morning, while the *D. melanogaster* numbers remained relatively constant. A significant male bias was found for both species at both sites (Table 1).

Table 1. Abundance and sex ratio of *Z. indianus* and *D. melanogaster* collected at the Rural and Urban sites in Alamos. A Chi Square test was used to determine if there was significant male:female difference within each species.

Species-Location	Male		Female		
	n	%	n	%	X^2 (1:1)
Morning					
Z. indianus-Rural	298	64.9	161	35.1	40.8†
Z. indianus-Urban	1	33.3	2	66.6	0.33
D. melanogaster-Rural	285	69.9	123	30.1	64.3†
D. melanogaster-Urban	53	71.6	21	28.4	13.8†
Night					
Z. indianus-Rural	1	33.3	2	66.6	0.33
Z. indianus-Urban	1	100	0	0	
D. melanogaster-Rural	284	63.8	161	36.2	34.0†
D. melanogaster-Urban	162	58.9	113	41.1	8.73*

p<0.005.
† p<0.001.

Discussion: Abundance of species in the *Rural* vs. *Urban* areas of Alamos

Our study in Alamos supports previous work on the abundance of *Z. indianus* among habitat types at the local scale in Brazil. Tidon *et al*. (2003) and Silva *et al*. (2005) found *Z. indianus* to be more abundant in the summer season and in open environments, where the climate is similar to their native African climate. Da Mata *et al*. (2009) showed significant overlap in the multivariate space between Africa and South America, possibly accounting for the successful range expansion of *Z. indianus*. These researchers have suggested that *Z. indianus* might be more genetically diverse than other *Drosophila*, which would allow for its wider physiological tolerance (Da Mata *et al*., 2009).

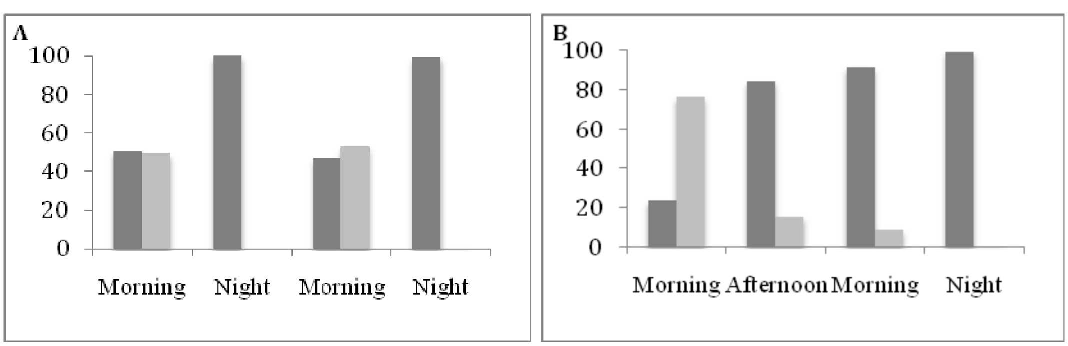

Figure 1. Percent abundance of *D. melanogaster* and *Z. indianus* at different times of the day on two successive days at the rural site (1A) and urban site (1B) in Alamos. The darker bars represent *D. melanogaster,* the lighter ones represent *Z. indianus*.

Figures 1A and 1B reveal that *Z. indianus* are most prevalent at the baits in the morning, and their numbers decrease as the day progresses, becoming almost absent at night at either the rural or urban sites. We cannot exclude the possibility that exhaustive sampling at the urban site on the first day of collection (unpublished data) explains the very low numbers of *Z. indianus* on the second day of collections.

Initially, we speculated that *Z. indianus* might displace *D. melanogaster* with its invasion, but our results indicate otherwise. We observed a continuous presence of *D. melanogaster* while *Z. indianus* is almost absent at night. The low numbers of *Z. indianus* at the urban site is consistent with the preference of this fly for open habitats (Tidon *et al*., 2003; Silva *et al*., 2005). Species composition at the urban site almost entirely consisted of *D. melanogaster* at any time of the day, consistent with its position as a cosmopolitan species with humans. Although *Z. indianus* does not appear to alter the diurnal activity of *D. melanogaster*, there may be other effects from this invasion on native species. Habitats in Alamos seem to provide ample resources to support the coexistence of these species.

As observed previously, male *D. melanogaster* spend considerable time courting at the feeding site, and copulating pairs are only observed infrequently (Partridge *et al*., 1987; Gromko and Markow, 1993). Our observations suggest that females of both species either experience a higher mortality and are thus less abundant, or that they spend considerable time at other sorts of habitats or resources. Our understanding of the impact of *Z. indianus* on other Drosophilids would be enhanced by monthly monitoring of species composition at both sites coupled with determination of the actual operational sex ratio at different times of year.

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Additional phenotypes of a myotonic dystrophy *Drosophila* model.

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Introduction

Myotonic dystrophy type 1 (DM1) is a dominant autosomal genetic disease with a broad range of symptoms. Clinically, it affects up to 11 systems including muscular, nervous, ocular, digestive, respiratory, and cardiovascular tissues. Characteristic features are loss of muscle strength (with a distal to proximal pattern), myotonia, excessive daytime sleepiness, excessive fatigue, abdominal pain, as well as dysphagia (Harper, 2001). The genetic basis of DM1 is the expansion of unstable CTG repeats in the 3′ untranslated region of the *Myotonic Dystrophy Protein Kinase*