

iPiPE in New Mexico: Urban Crop and Beneficial Insect Monitoring

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INTRODUCTION

The arid climate makes landscaping and gardening a challenge in New Mexico. An iPiPE CPP program targeting urban agriculture (community and backyard gardens) and ornamental landscapes for pest and beneficial insect monitoring was started in 2018 to monitor beneficial insects (pollinators and natural enemies) and a perennial pest (grasshoppers). Currently, awareness and use of IPM in urban landscapes is low, but homeowners, city parks, and natural area managers are seeking information on IPM, especially the conservation of beneficial insects. Monitoring beneficial insects and pests across the urban landscape is integral to improving IPM practices for our stakeholders.

Objectives:

1. Compare beneficial insects across different urban green spaces
2. Collaborate with Master Gardeners to monitor beneficial insects in their backyards
3. Document changes in beneficial insect populations across the urban landscape

OVERVIEW

Study Sites:

- Four green spaces sampled: 1) Urban Agriculture sites, 2) Turf, 3) Natural Areas and, 4) Flower Gardens
- Total Number of Sites = 52
 - Student Interns Sampled 39 Sites
 - Master Gardeners Sampled 13 Sites
- Sites located across Albuquerque, Los Alamos, Santa Fe, and Las Cruces

Urban Ag



Natural Area



Turf



Flower Garden



METHODS

Stakeholder Training:

- Interns assisted with stakeholder recruitment
- Conducted three training workshops
 - Taught beneficial insect identification
 - Demonstrated field sampling protocol
- Held in the field identification session
- Engaged stakeholders with iPiPE mission
- Interns answered stakeholder questions and assisted with data entry

Visual Observations:

- At all green spaces visual observations were conducted using two methods: quadrats and walking transects
- Four 10 minute observations using a 1x1 meter quadrat
- For each quadrat percent flower cover and number of flower species were recorded
- Two 20x1 meter transects lasting 4 minutes
- Beneficial insect groups were recorded for the quadrats and transects
- Student interns and Master Gardeners followed the same sampling protocol
- Abundance of beneficial insect groups was compared using a Kruskal-Wallis Test. A Tukeys HSD post-hoc analysis was run for significant results.

Table 1. List of target insect groups for the NM iPiPE project

Pollinators	Predators	Pest
Small Bee	Large Wasp	Grasshopper
Large Bee	Small Wasp	
Large Green Bee	Minute Pirate Bugs	
Bumble Bee	Ladybeetle	
Honey Bee	Lacewing	
Monarch	Syrphid Flies	

Bee Bowls:

- At 7 urban ag sites and 7 turf grass parks, bee bowls were used to sample beneficial insects
- Turf grass was also sampled at urban ag sites adjacent garden areas (7). Bowls ran in a transect from the garden.
- Four sampling stations per site with three bowls per station
 - Each station had one yellow, white, and blue bowl for a total of 12 bowls per site
- Bowls were in the field for 48 hours
- Identified target beneficial insect groups



RESULTS

Target Beneficial Insect Abundance 2018:

- Pollinator abundance varied across treatments ($p < 0.001$)
- Pollinator abundance was significantly higher in flower gardens compared to all other treatments (Fig.1)
- Pollinator abundance was also significantly increased in urban agriculture compared to turf grass parks (Fig.1)
- Predator abundance ($p = 0.03$) was significantly higher in urban agriculture than turf grass parks (Fig.2)

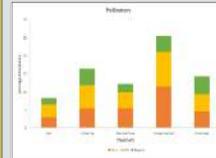


Fig. 1. Average pollinator abundance across iPiPE

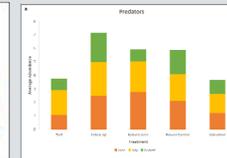


Fig. 2. Average predator abundance across iPiPE



Small Bee Abundance 2018:

- Small bee abundance increased from June (Fig.3) to July (Fig.4); however, no observations occurred in Dona Ana County in June. Abundance was lowest in August.
- Bees smaller than 10 mm were considered "Small Bees" while bees larger than 11 mm, not Halictidae or *Bombus* spp. were considered "Large Bees".

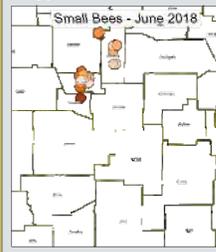


Fig. 3. iPiPE map of small bee abundance in June

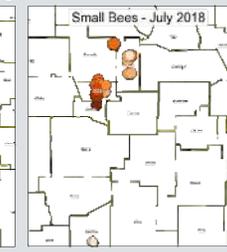


Fig. 4. iPiPE Map of small bee abundance in July

RESULTS

Target Pest Abundance 2018:

- Grasshopper abundance was significantly higher in urban agriculture than turf parks and natural areas ($p < 0.01$, Fig.5)
- Grasshoppers visitation was highest in August at urban agriculture sites (Fig.5 and 6)

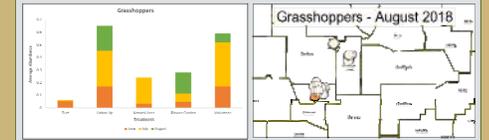


Fig. 5. Average grasshopper abundance across iPiPE Fig. 6. iPiPE map of grasshopper abundance

Bee Bowl Target Insect Abundance 2018:

- No difference was found in pollinator abundance across treatment ($p = 0.16$, Fig.7)
- A significant difference was found for predators with higher abundance in the turf compared to adjacent turf and urban ag sites ($p < 0.0001$, Fig.7)
- A significant difference was found for parasitoids with higher abundance in the turf than in adjacent turf and urban ag sites ($p < 0.0001$, Fig.7)

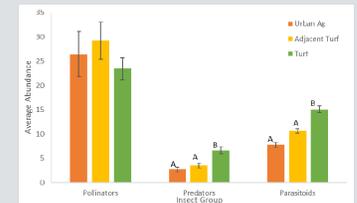


Fig. 7. Average target insect abundance in bee bowl sites. Error bars denote standard error.

SUMMARY POINTS

- Predator visitation varied between urban agricultural areas and turf grass areas.
- Pollinator visitation was significantly higher in flower gardens compared to other green spaces.
- Grasshopper visitation was higher in urban agriculture than turf in August.
- Many of our volunteers will be returning for a second year of observations.
- For 2019, we plan on recruiting and training more volunteers to collect data.

ACKNOWLEDGMENTS

Urban Agricultural Sites <ul style="list-style-type: none"> Ted Zura Hubble House Rio Grande Urban Farm Sean Ludden Desert Oasis Amayo Farm 	Collaborators <ul style="list-style-type: none"> Santa Fe, Los Alamos, ABQ & Las Cruces Parks Master Gardener Program Albuquerque Botanical Gardens The Garden Center Albuquerque Open Space 	Assistants <ul style="list-style-type: none"> Justine Zimmerly Eva Carabotta Esteban Molina Catie Chavez 	
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