Natural Enemies and Biological Control of Lepidopteran Brassica Pests in Urban Agriculture

David M. Lowenstein[1] *and Emily S. Minor*[1]

Abstract

Urban farms bring economic and ecological productivity to underdeveloped spaces in Midwestern cities. By adding green spaces and providing a source of local produce, urban agriculture converts blighted sites to more productive uses with plant resources. The small scale of new farms provides an advantage at obtaining natural pest suppression, as many growers follow organic practices. However, the addition of planted row and vegetable crops also raises susceptibility to plant damage by herbivorous pests that locate new forage. We examined the potential for crop damage at community gardens (n=9), urban farms (n=8), and residential gardens (n=12) through surveying growers and investigating biological control at sites across a gradient of habitat complexity. We classified urban farms as agricultural sites managed as a whole unit as opposed to the allotment of independently managed spaces at community gardens. Through distributing a questionnaire regarding farm management practices, we identified cucurbits and brassica as the two crop families with the greatest pest pressure.

In summer 2014, we investigated how habitat around brassica impacts parasitoids and mobile natural enemies. Yellow sticky cards were set up and replaced weekly from June through August to account for temporal variation in natural enemy populations. We measured floral diversity and the number of crop beds at each site to identify how resource diversity and the scale of urban agriculture affect natural enemies. In addition, we analyzed the efficacy of natural enemies in urban farms and community gardens at biological control through the use of sentinel cabbage looper (*Trichoplusia ni* Hübner*)*, a pest of cole crops. We deployed eggs and larvae at sites for two 72 hour periods and assessed mortality of sentinel prey. We set up a time lapse camera at a subset of sites to visually identify natural enemies feeding on prey items. Contrary to work in large agroecosystems, we hypothesized that larger urban food production sites will have more beneficial parasitoid wasps and natural enemies. We anticipated greater resource diversity in farms compared to residential gardens, and we expected this to attract more natural enemies and in turn enhance biological control.

This study will aid urban growers estimate natural pest suppression based on the presence of critical habitat and cultural practices. Gathering data on damage to brassica foliage every other week is expected to corroborate the finding that enhanced parasitoid abundance in larger gardens will effectively reduce plant damage and the occurrence of cabbage worms. Through analyzing seasonal natural enemy population patterns and the rate of biological control, we will offer an update, which accounts for habitat complexity and natural enemy population cycles, on the potential for pest outbreaks on urban brassica.

[1] University of Illinois, Chicago, dlowen2@uic.edu