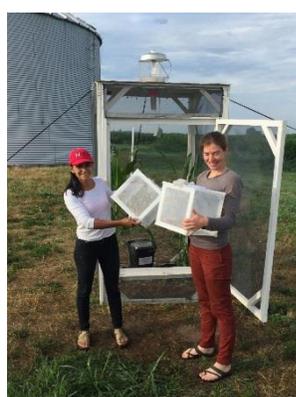
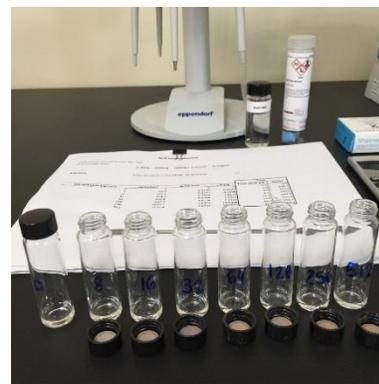


Potential for Bt and pyrethroid resistance in western bean cutworm

PhD student Débora Montezano has been working on the biology and ecology of western bean cutworm (WBC) as it relates to resistance to genetically-modified Bt corn plants and pyrethroid insecticides. She will be joined by a post-doctoral research associate in 2017 to work on these projects. WBC is a destructive insect pest that can cause severe yield loss in corn and dry bean crops. In the last years, farmers and crop consultants have begun to express concern over the performance of existing control methods, such as pyrethroid insecticide applications and Bt corn varieties. Given the potential for severe yield reduction as a result of this pest (heavy infestations can result in up to 60% of corn kernels sustaining feeding damage, which reduces both quantity and quality of grain), the loss of current control practices poses a critical problem for producers and for the environment. One of the reasons why current control of WBC has reduced efficacy could be explained by the increasing use and overuse of one or more pyrethroid insecticides. This project focus on the potential decrease in pesticide susceptibility in WBC populations, including screening for field-evolved resistance to pyrethroid insecticides from identified problem sites and its effect on beneficial arthropods. The impacts of insecticide resistance are often severe and far-reaching: they can lead to economic losses and an increase in pesticide application amount and frequency, which can have negative consequences for farm workers, beneficial organisms, water quality, and over-all environmental health. Delaying or preventing adaptation to pesticides in pest species is the goal of resistance management. This project focus on providing important information for developing effective resistance management plans. One of the major accomplishments for this project has been the establishment of a WBC colony at the lab in North Platte.



Biological control of western bean cutworm

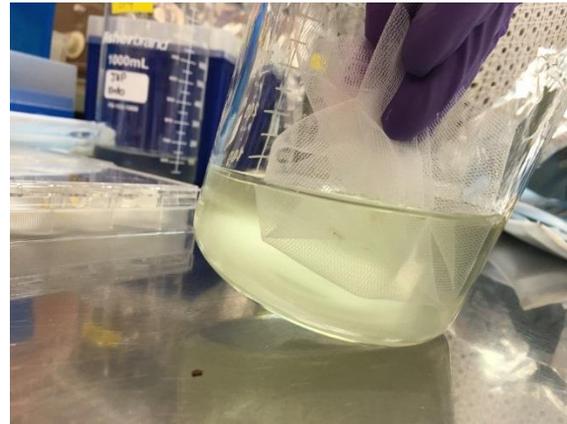
Western bean cutworm is a serious corn and dry bean pest in western Nebraska. To help growers manage this pest, we are researching insect predators of western bean cutworm eggs and larvae. We collect insects in corn fields during the western bean cutworm season. Then using DNA molecular techniques we can determine whether a collected insect has fed on western bean cutworm or not. By knowing what beneficial insects are feeding on western bean cutworm, growers and crop consultants may choose to reduce insecticide treatments and let our insect allies feed on pest insects. The pink spotted lady beetle, *Coleomegilla maculata*, is an important predator for several agricultural pest insects. It feeds on insect eggs, aphids, and corn pollen. We are researching whether this lady beetle is a reliable predator of western bean cutworm eggs and larvae through a series of feeding tests.



Biological control of western corn rootworm

PhD student Camila Oliveira Hofman is working on the discovery stage of integrating biological control to protect corn roots from the western corn rootworm. Biological control of insects, using live organisms for pest control, can be done using predators/parasitoids, or microbes. This project investigates 1) what microbes (fungi, nematodes) are in the soil in cornfields in Nebraska that can be used as a killing agent for the western corn rootworm and 2) how effective are these microbes, specifically fungi, in killing rootworm larvae and adults. During the first two years of research, Camila was able to isolate over 150 pathogens that may be useful in protecting corn plants from feeding damage due to corn rootworm larvae. With the information obtained from the first two years of this study, we will answer the first question and have a better idea what are the microbes that are living in the same environment as the rootworm. Currently, Camila is working on testing the fungi we isolated against rootworm larvae and adults. This will answer our second question of how effective are these microbes in causing rootworm mortality. To know what microbes are in the soil that cause mortality to insects we set up “baiting assays”.

These baiting assays are composed of insect larvae and soil from our field sites. If there are microbes in the soil that kill insects these insects will become infected and die.



Role of spiders in pest management

Masters student Samantha Daniel will be identifying and conducting gut-content analysis on spider specimens collected from Nebraska crop fields. This analysis will determine whether significant predation on western corn rootworm and other important pests is occurring. We know very little about the role of spiders in Nebraska crop fields, and this work will improve our understanding of these important predators.

