**Research:**

I am interested in learning new ways and tools to incorporate into my research. Broadly, I am interested in Landscape Ecology, specifically, the effects of landscape structure on biological processes in agroecosystems. Landscape ecology or simply, the study of landscapes is a sub-discipline of ecology that considers the ecological agenda in a spatially explicit manner or at a grander scale relative to the system of interest. Imagine looking out of an airplane window or an aerial photograph, and you see a landscape, a purely anthropogenic fragmented landscape. This fragmented landscape contains distinct spatial patterns and structures that function, things flow and move through the pattern over time. The structure is generally composed of patches (clusters of different plants, agricultural fields) corridors (roads, trails, rivers) and a background matrix (forest, grassland, desert). Landscape ecology, in essence, is the study of the behavior and adaptations, distributions and abundance, and the biotic and abiotic interactions of biota. Currently, I am interested in the role the landscape plays on the spatial relationships of agricultural pests and native bee pollinators at the local level, with the goal of improving pest management strategies at a larger scale while conserving native pollinators that have potential benefits for crop production.

**Current Research:**

**Landscape effects on agricultural pests and strategies to improve pest management**

In the United States (U.S.), the average field size has roughly doubled from the 1980s to the mid-2000s, while average cropland has stayed the same. Agricultural landscapes (agroecosystems) of many field crops are affected by this up-scaling of field sizes and modifying semi-natural lands into variable-sized managed fields planted separately to several crops. This will likely influence how semi-natural habitat and edge affect local patterns and processes such as natural-pest control or pest densities, which may have pest management implications for not only large-scale fields but smaller fields as well. These include the choice of sampling sites, and if areas sampled represent the whole field.

**Benefits of Native Bee Pollinators in Agroecosystems**

The diversity and abundance of native pollinators is essential in providing pollination services to a diverse array of crops, many of which receive pollination or unknown pollination benefits from native bees. Under agricultural intensification, as seen in the cotton agroecosystem where field sizes commonly exceed 300 acres, achieving efficient and productive agricultural land use while conserving biodiversity is an important challenge to U.S. agricultural sustainability. I wish to consider a joint bee conservation and cotton management concept, which may ultimately represent a win-win for bee conservation and cotton productivity. Through agriculturally reasonable stewardship effort, can native bees be conserved (addressing the conservation and IPM charge to address U.S. pollinator decline), which in turn provides reciprocal benefit to cotton (addressing the IPM charge to contribute to agricultural productivity)?

**Use of GIS and Remote Sensing**

Geographic information systems and remote sensing, which are often described as “technology,” provide ecologists, and entomologists the ease of storing, retrieving, processing, analyzing, and displaying spatial data and images. Many questions in ecology and plant protection have spatial components, whether you study the dynamics of hosts and natural enemies or the prediction of regional pest-related risks. However, these tools can only be fully exploited when used in conjunction with traditional monitoring and research techniques (i.e., trapping) that provide knowledge of an insect’s biology and ecology. For example, without proper understanding of an insects’ biology, one would not know where to sample or how many samples are necessary to yield useful results.