objectives

1. Determine the impacts of diversity at a landscape scale on the natural enemy insect community and its ability to control lepidopteran pests in cabbage fields.

2. Examine the role of landscape complexity on the effectiveness of augmentative releases of predators for biological control of lepidopteran pests.

If you are interested in the project or have any question, please feel free to contact us:

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BIOLOGICAL CONTROL IN CABBAGE

Toward Sustainability Foundation (TSF)

Cornell University
College of Agriculture and Life Sciences

NORTHEAST SARE
Sustainable Agriculture Research & Education

Biocontrol across a landscape complexity gradient

1 Landscape complexity and biocontrol

Landscape complexity or landscape structure refers to the spatial distribution and diversity of habitats such as agricultural fields, natural vegetation or forest in a landscape. This landscape structure may affect insect abundance and community composition, which, in turn, affects biological control provided by insect predators and parasitoids. In particular, diverse landscapes with greater proportions of non-crop habitat have been shown to have higher biocontrol rates and less crop damage than more simplified landscapes.

However, such landscape complexity may not be sufficient to constrain pest population below economic thresholds, and growers need to employ other methods to achieve the desired level of control. An alternative to control pest populations is the release of natural enemies in large numbers.

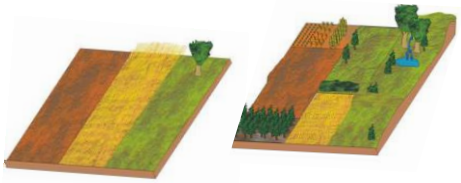

Fig 1. Simple and complex landscapes

The effectiveness of augmentative releases of natural enemies to increase biocontrol services likely depends on a landscape complexity. In this project we would like to know in which landscape context augmentative releases of the spined soldier bug are most effective for controlling lepidopteran pests.

2 Spined Soldier Bug

The spined soldier bug, *Podisus maculiventris*, is a medium-sized predatory stink bug which preys on a wide variety of arthropods including the larvae of imported cabbageworm, cabbage looper and diamonback moth. When prey are scarce, the spined soldier bug may also feed on plant juices, but this feeding is not reported to cause plant damage.

Naturally occurring populations of the spined soldier bug often are not numerous enough to overpower large populations of pests in the spring. However, augmentative releases of this predator has proven successful in controlling diamonback moth population. Individual spined soldier bugs have been recorded as consuming more than 100 diamonback larvae over the equivalent of a season. This species is sold for the control of diamonback moth, but little is known about how its effectiveness could change across landscapes differing in structure and community composition.

Fig 2. Adults and nymphs of the spined soldier bug

3 The experiments

We plan to combine the release of a commercially available predator (spined soldier bug and ladybugs) with the natural enemies already present in the environment.

We will select farms that represent the full range of variation in landscape structure from extremely simple (i.e. predominantly agricultural habitat) to complex landscapes (i.e. predominantly natural habitat). On each farm, we will require to set up two plots of 30X30 feet where we will plant 100 cabbage plants to perform the experiment. One plot will be used as our control plot and left un-manipulated and the other one will be used to release spined soldier bugs to control cabbage pests. Our plots do not need to be part of the main field and could be located on a field edge or fallow land since it is important that it does not get sprayed.

Fig. 3. On your farm we would like to establish our two 30*30 feet cabbage plots. One plot would be left unmanipulated while in the other will be used to release the spined soldier bugs to control cabbage pests.