Effects of cropping history on European corn borer abundance in processing sweet corn and snap beans

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European corn borer (ECB), *Ostrinia nubilalis*, has historically been an important pest of corn in eastern North America. While corn is ECB's preferred host, it will infest other crops, including snap beans. In recent years, ECB populations have decreased; this is primarily attributed to increased adoption of *Bt* corn varieties, leading to areawide suppression of ECB. However, there are still "hot spots" of high ECB populations found near sweet corn fields (Fig. 1). Because of the perceived risk for ECB infestations in snap bean and low tolerance for contamination, processing snap bean growers continue to apply one to two pyrethroid applications per field to prevent infestation. If the cause of these hot spots can be determined, growers will have a better understanding of risk of ECB attack for an individual field and fields classified as low-risk could receive fewer (or no) insecticide applications.

One suggested cause of ECB abundance is the dominance of *Bt* corn in the local area. Areas with little *Bt* corn might act as refuges where ECB populations thrive, whereas areas where *Bt* corn dominates may have few ECB. Another potential cause for ECB abundance may be where processing sweet corn (*Bt*-free) is concentrated. Two separate hypotheses were developed to test these ideas: (a) snap bean fields in areas where *Bt* corn is grown intensively will have fewer ECB than those where *Bt* corn is not grown intensively, and (b) processing (*Bt*-free) sweet corn fields in areas where processing sweet corn is grown intensively will have more ECB than those where processing sweet corn is not grown intensively (Fig. 2). These hypotheses were tested by monitoring numbers of ECB caught in traps placed in fields meeting these conditions.

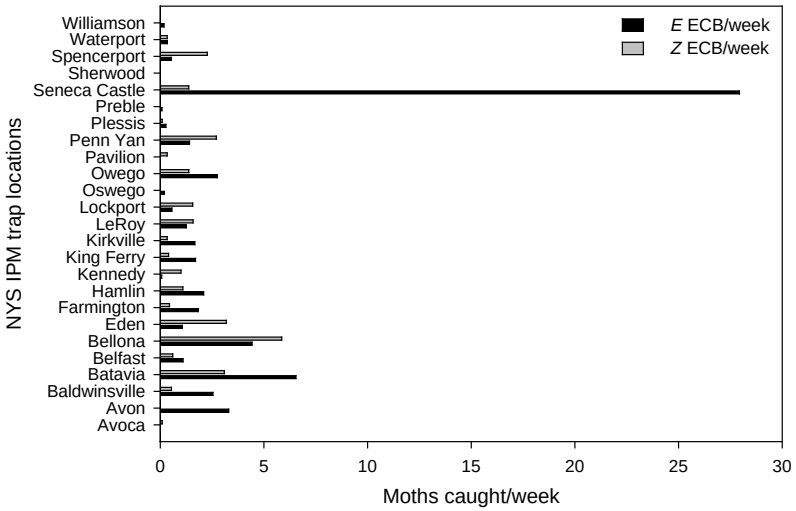

Fig. 1. Trap catches of *E* and *Z* strain ECB recorded from the New York State Integrated Pest Management Sweet Corn Pheromone Trap Network in 2015. Note high levels of *E* strain ECB in Seneca Castle.

Snap Bean Study. Snap bean fields were monitored for ECB moths using pheromone-baited traps in 2014 and 2015 (Fig. 3). Half of the snap bean fields were located in areas where field corn had been intensively grown and half in areas where field corn had not been intensively grown (we

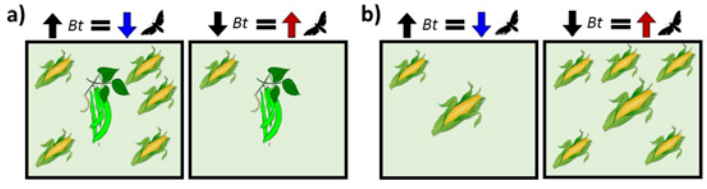

Fig. 2. a) Snap bean fields surrounded by *Bt* corn fields are hypothesized to have lower ECB populations. b) Processing sweet corn fields surrounded by processing sweet corn fields (*Bt*-free) will have higher ECB populations.

assumed that most of the field corn was *Bt*). One pheromone trap was placed along the edge of each snap bean field in a "grassy action site" where ECB were predicted to be active. Each trap included a lure for the *E*-race. Traps were monitored weekly for three weeks and always encompassed the bloom period of the snap bean crop, which is the crop stage most attractive to egg-laying moths.

No differences were found in ECB *E* trap catch in the 'high' and 'low' corn intensity groups in either year (Fig. 4). ECB *E* catches were low overall, making any statistical difference between the groups difficult to detect. Additionally, if there was any trend, it appears that the 'high' corn intensity group caught more moths than the 'low' intensity group; this contradicts our original hypothesis. Therefore, it appears that the intensity of *Bt* corn does not affect the abundance of moths in nearby snap bean fields.

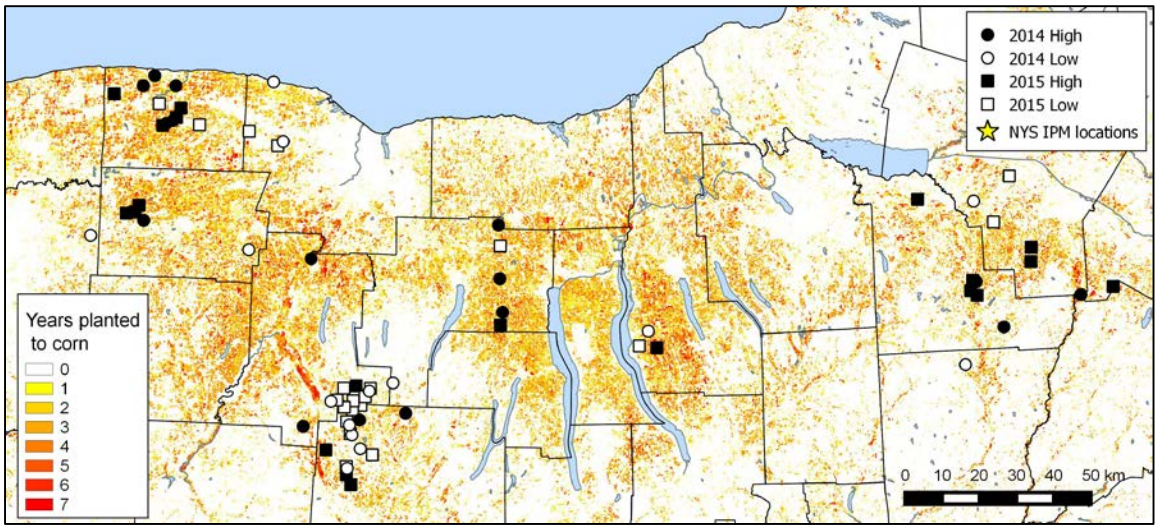

Fig. 3. Locations of snap bean fields (2014: circles, 2015: squares). The corn intensity group of the snap bean field is indicated by a black (high) or white (low) shape. Map shading indicates the number of years an area was planted to corn.

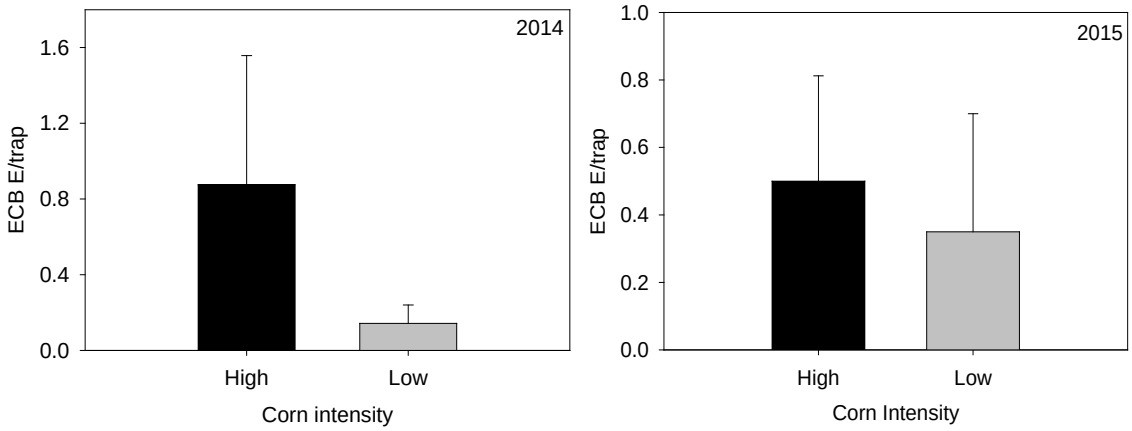

Fig. 4. ECB *E* caught in snap bean fields in high and low corn intensity areas (2014 and 2015).

Sweet Corn Study. A similar study was conducted in processing sweet corn in 2015, but traps were placed near fields where processing sweet corn had been intensively grown or not intensively grown (Fig. 5). In this study, two pheromone traps were placed in each field, one with an *E*-race lure and one

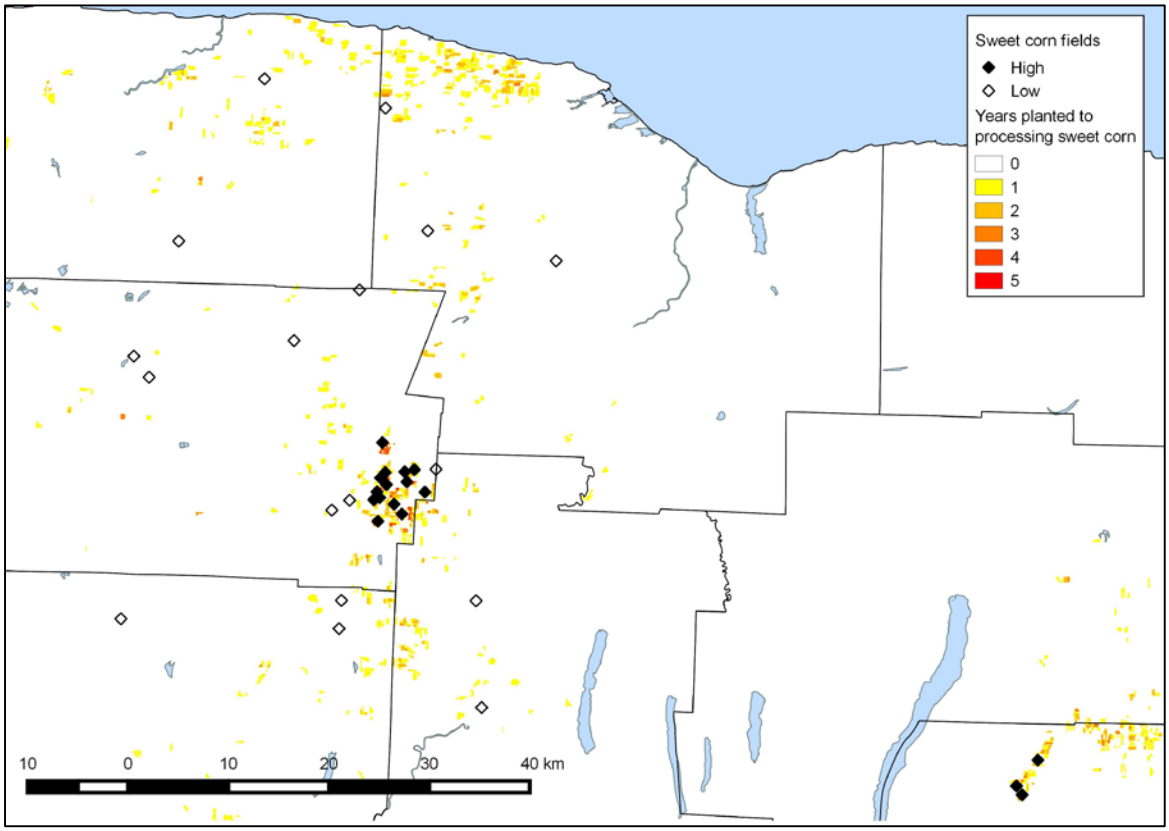

Fig. 5. Locations of processing sweet corn fields (2015). The processing sweet corn intensity is indicated by a black (high) or white (low) shape. Map shading indicates the number of years an area was planted to processing sweet corn.

with a *Z*-race lure. Traps were monitored weekly for three weeks, targeting the late whorl-early tassel to harvest period when the corn is most attractive to female moths.

The difference in ECB *E* trap catch was marginally significant (Fig. 6). Therefore, it is possible that the *Bt*-free processing sweet corn is providing a refuge for ECB *E* populations, resulting in higher ECB *E* catches, where processing sweet corn is grown intensively. ECB *Z* trap catch did not statistically differ between the two sweet corn intensity groups, but was greater in areas of production intensity (Fig. 6).

Overall, very few moths were caught in both our snap bean and sweet corn studies, emphasizing that ECB abundance has substantially decreased over the past decade. Pesticide applications specifically for ECB control, especially in processing snap bean, are likely unnecessary.

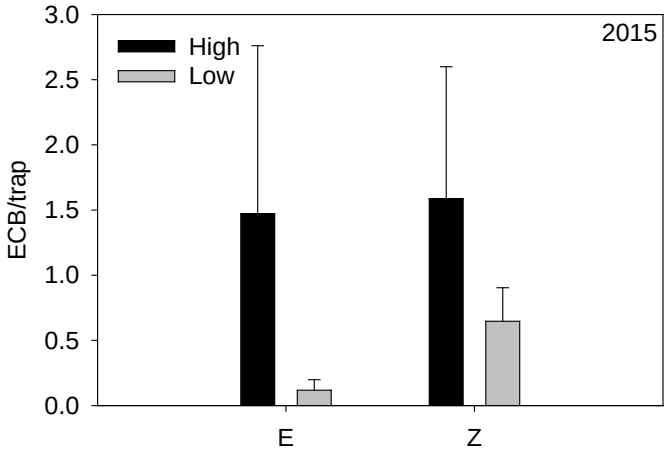

Fig. 6. ECB *E* and *Z* caught in processing sweet corn fields in high and low sweet corn intensity areas (2015).