ABSTRACT

Native bees provide a critical service for many of our native plants through pollination (Schaffer et al. 1983). This study examines the population sustainability of a native carpenter bee species, Xylocopa virginica (L.), using populations collected from the nine eco-regions of New York State. After a failed attempt with the nuclear gene “wingless”, the nuclear gene “PEPCK” is being amplified and sequenced. Polymorphisms were found in some DNA sequences suggesting at least some genetic variation exists. These DNA sequences will be used to create a phylogeny of the bees and overall genetic variation of the species across NYS will be examined using an AMOVA (Analysis of Molecular Variance). Allelic richness and tests of Hardy-Weinberg Equilibrium will be performed on the data and used to generate a map of genetic diversity, which will allow us to assess the sustainability of this important native pollinator.

METHODS

Ten adult X. virginica are being collected from one population from each of the nine ecoregions of New York State from April to June, the next time that the bees are out, with the help of exterminators. Collected insects are placed on dry ice in order to preserve them until their DNA is extracted.

Once the carpenter bees are collected, whole genomic DNA will be extracted, followed by amplification of the nuclear gene PEPCK, using the primers of Leys et al. 2002. Purified PCR product will be sequenced on the Biology Department’s DNA sequencer. Overall genetic variation of the carpenter bees in New York State will be examined using an AMOVA (Analysis of Molecular Variance) and pairwise Fst. Allelic richness and tests of Hardy-Weinberg Equilibrium will be performed on the data and used to generate a map of genetic diversity.

RESULTS

Initial sequencing of PEPCK and comparison with published sequences has revealed six polymorphic sites, four of which are in introns and two in exons (one resulting in an amino acid change). This high level of variability suggests that population variation will able to be assessed.

SIGNIFICANCE OF RESEARCH

This study will help determine the population sustainability of Xylocopa virginica within New York State. This information will also provide insight as to whether or not the European invaders are affecting the native bees in this region.

LITERATURE CITED

Remko Leys, Steve J.B. Cooper and Mike Schwarz (2002) Molecular phylogeny and historical biogeography of the large carpenter bees, genus Xylocopa (Hymenoptera: Apidae) Biological Journal of the Linnean Society, 77, 249-266