

9. What we hope to do next

- a) Because bee populations can vary from year to year and because the data collected on wild was incomplete, we would like to complete the diversity and density studies on wild brambles and cultivated raspberries for two additional years. In addition to helping us verify these results, it would also allow us to build a complete collection of pollinators of brambles in Pennsylvania. This collection could be expanded over time to include all pollinators of brambles in the Northeast.
- b) We have had success holding *Osmia cornifrons* under refrigeration at 1-2°C for an additional month past the time they would normally emerge. In the western U.S., *Osmia lignaria* have been "held back" in this way to provide additional pollinators for rape and other crops. We would like to try to hold groups of both *O. cornifrons* and *O. lignaria* under refrigeration to determine if we can successfully time their emergence with the bloom of red raspberries in late July into August. If so, this could provide raspberry growers with an additional managed specialized pollinator of brambles that would be available during later bloom. This will also tell us if we can make these bees available for high tunnel production of raspberries during both early Spring and later in the Fall production windows.
- c) Improve artificial nesting (habitat) boxes for native pollinators. Do spaced nesting tubes with orientation markings make individual females more efficient, and if so, can solitary bee populations be built-up more quickly by providing nesting boxes by spacing tubes and providing orientation markings? Can the boxes be used to reduce the build up of parasites or deter predators?
- d) Determining pollination visitation rates. Due to a variety of factors that influence the diversity and abundance of bramble pollinators including: variations in habitat surrounding farms, the absence of wild honey bee colonies, and the management practices that results in delayed blooming and thus the absence of pollinators that specialize on Rosaceous plants, we hope to identify an easy field technique that would allow growers to determine if pollinator visitation to their crop is optimal. We think that the Index of Visitation could be used to extrapolate the degree of total flower visitations over the effective life of the blooms and thus give a good approximation of the efficiency of pollination deriving from the bees observed. Whether these are bumble bees, honey bees, or solitary bees, this would be a quick method to determine if sufficient pollination is taking place during the early blooming period. If not, then adjustments could be made, and if adequate, then so much the better, but at least the grower would know the status of pollination, and not guess or forget about it altogether.

10. How do we plan to continue to use these practices

During the 2003 calendar year we will be in England on sabbatical (Imperial College, Wye Campus). Upon our return in 2004 we hope to continue our efforts to develop a sustainable management systems for native pollinators of brambles by working to accomplish the objectives above in item #9 through the submission of a new 2-year project.

11. Explain what you did for your outreach program

As a result of this work, we plan to submit at least two articles to leading fruit growing publications in the Northeast. Please see the draft of the first article attached here.