Certified Best Practices for Sustainably Sourcing and Managing Orchard Bees

Introduction

Orchard mason bees, along with other solitary nesting bees, are wonderful pollinators and thus can be in high demand. Unfortunately, sometimes the supply does not meet the demand. This problem can only become worse without responsible methods of trapping and propagation. Irresponsible methods have been shown to deplete the native bees locally, including non-target species, and may contribute to reduced pollination rates in local flora.

This document of best practices is intended to provide guidance on how to manage mason bees sustainably. At this point, the focus is on the blue orchard bee (*Osmia lignaria*) specifically. As the orchard bee industry evolves and individual producers provide more feedback, we will update these Certified Best Practices in an effort to further enable the growth of this important industry. We also expect to expand these efforts towards the responsible acquisition and management of other bee groups – e.g., some collected as bycatch (non-target species) as interest grows, since other solitary cavity nesting bees are also growing in popularity. For now, many of the general guidelines would apply in any case.

Our Certified Best Practices are broken into four different parts made up of protocols for: 1) harvesting/propagation, 2) bee development management, 3) pest management, and 4) shipping.

Vendors who follow these protocols should be able to successfully manage populations long term, without negatively affecting other groups of bees. A certification program is available through the OBA.

Harvesting/Propagation

Currently, for numerous reasons, policies driving bee conservation are still evolving. Here we provide Certified Best Practices (CPBs) by the Orchard Bee Association (OBA). These CPBs are developed from existing work and expertise of the

membership which are intended to mitigate the potential impacts of localized bee propagation/harvesting on natural populations and to assure the continued presence of all species of native bees. This section is broken down into four practices used to harvest bees from public/private open lands, rural/urban areas, enclosed structures, and orchards.

Blue orchard bees (specifically, *Osmia lignaria* in the bee family Megachilidae) occur naturally across most of the United States. In the eastern part of North America, blue orchard bee distribution extends from Nova Scotia to Georgia and west to Michigan and Texas. In the West, the blue orchard bee has been found from southern British Columbia to southern California and eastward to South Dakota and Texas. Two distinct subspecies separated by the 100th Meridian are currently recognized in the scientific literature: the eastern *O. lignaria lignaria* and the western *O. lignaria propinqua.* Intermediate forms have been found in Arizona, as well as a genetically distinct group of *O. l. propinqua* in Arizona, New Mexico, and Texas*. In mid-latitude regions, blue orchard bees have been found in locally dense populations from sea level to 6,000 feet.

In natural environments, orchard bees make their linear nests in the abandoned burrows of large wood-boring beetles but will also adopt man-made "trap-nests" if placed out before they emerge in the spring. For wild trapping in public and private open lands, trap nests are generally a group of about 50-100, six inch (15.25 cm) long linear tubes that are about ¾" apart and about 3/8" in diameter (between 7 and 8 mm) in some sort of insulating substrate, like cardboard, wood or Styrofoam. Although this nest size is also attractive to other species of *Osmia* bees, because of the timing and location of the trap-nest, there are not usually many other species utilizing the nests if kept to the aforementioned dimensions. The more consistent the nest size, the fewer unwanted, nontarget species will occupy them.

For locating populations, early in the spring the trap nests are placed such that they offer a relatively low density of tunnels (ex: 1000 nest holes per 80,000 square meters) in an area that is likely to have mason bees. Higher rates of long-term success come from placing groups of nests in several different environments shown to have had bees in previous trapping events to help mitigate failure at any particular location on any particular year. It is critical that locations chosen have both diverse, early bloom and moist soil available.

In more managed environments, clean (explained in the pest management section) populations of bees can be released in open rural areas like private farms or even urban/suburban settings such as backyards for propagation.

Mason bees can also be propagated in large, fine mesh field cages. Make sure you are starting with a clean population. The advantage is that bees cannot disperse and must mate and nest within the confined structure.

Many managers release blue orchard bees in orchard settings. However, attempting to increase orchard bees by orchard pollination is risky at best. Generally, the purpose of the bees in this setting is to pollinate the crop and not to propagate bees. Most orchards do not have adequate long-term bloom to support the six-week nesting period of the adult mason bee.

Propagation attempts are not recommended in orchards unless cover crops are present and in bloom before and just after the orchard bloom, and/or plant perimeter forage is composed of appropriate plants that bloom for up to a month after orchard bloom has ended. If the crop is sprayed with pesticides while bees are actively nesting, especially during establishment, it may have a negative impact on the number of offspring produced.

*pers. comm. Dr. Michael Branstetter, USDA-ARS, PI-BMSR, Logan, UT

Management during offspring development

The purpose of this set of guidelines is to provide Certified Best Practices for managing blue orchard bees through summer egg-adult development and pre-wintering and wintering of cocooned adults to minimize stress, promote rapid development, and provide the maximum number of healthy bees for the next season.

It is also important to be aware that bees of the same species will develop at different rates if they originate from different growing regions (different phenotypes). This means that if you are trying to build populations, you should not mix these different groups when rearing and when you release them. If you mix at release, the offspring will be a mix and so some offspring will be mis-timed with whatever rearing technique you are using. Failure to appropriately time pre-wintering and wintering temperature regimens for the bee stock will result in high winter mortality.

Pest Management

Blue orchard bee nests characteristically contain naturally occurring parasites, predators, and other pests (see Bosch & Kemp 2001). Your trap-nest can be built to prevent some of these by mechanical means (i.e., nest material with walls too thick for parasites to insert the ovipositor). In this section, we provide methods for managing these natural enemies before spring release, providing more sustainable populations of orchard bees.

Provided images of common pests will help you to identify them so you can follow suggestions on control. If not controlled and allowed to increase in numbers, they

generally overwhelm the host population within about 3 years due to the artificially dense nesting bee population.

Shipping protocols for distributors

Several issues are involved in shipping bees, primarily where to ship which bees and how to ship successfully. There is ongoing discussion in the government and scientific communities about primarily where to ship which bees. We hope that OBA can have some guiding influence on decisions as policies are confirmed and implemented. We will try to keep this updated, but please check the links provided for current policy with the different entities since we do not want to mistakenly suggest anything outside of existing compliance or see anyone doing so out of ignorance.

An important aspect of the commercial shipping and distribution process is keeping track of what bees came from where, and to where they are being shipped. Different techniques are available to distributors, from notes on boxes to bar codes to blockchain type information. From this, information about the bees from source to consumer can be tracked in a straightforward manner, but only if established ahead of time.

Reference:

Bosch, J., and W. P. Kemp. 2001. How to Manage the Blue Orchard Bee as an Orchard Pollinator. Sustainable Agricultural Network, Handbook No. 5, Beltsville, MD.