

Using Mason Bees to Pollinate Apple and Other Fruit Trees

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There is a lot of interest in pollinating fruit trees using native bees. The overall decline in honeybees, and the work involved in maintaining a healthy honeybee hive has stimulated a search for alternative pollinators.

One native bee that has been closely studied is the Orchard Mason Bee (*Osmia lignaria*). *Osmia lignaria* goes by several different common names, among them are orchard mason bee, blue orchard bee and just plain mason bee. There are also other species of native bees that are called mason bees, so it's important to know the scientific name in order to be sure that it's the right species of bee.

There are two different *Osmia lignaria* bees. *Osmia lignaria propinqua* is located generally west of the Rocky Mountains, and *Osmia lignaria lignaria* is east of the Rocky Mountains. Once again it's important to know which bee you are working with. *Osmia lignaria propinqua* is not suited for the eastern climate, and *Osmia lignaria lignaria* is not suited for the western climate.

All of the mason bees on the market (all websites and catalogs) are selling *Osmia lignaria propinqua* so if you live east of the Rocky Mountains do not buy mason bees. Use the "build it and they will come" approach. Just provide the scarce nesting habitat and build up your own local population. *Osmia lignaria* are native to almost every state in the continental U.S., so it's likely that you already have mason bees in your area. It's a good idea to use this approach even if you are west of the Rocky Mountains. Whenever you buy bees you run the risk of importing diseases, predators and pests of mason bees from other areas.

Providing good nesting habitat is quite straight forward, and there are a lot of suppliers of nesting holes on the internet and in garden catalogs. The basic requirement is a hole that is at least 6 inches deep and 5/16 inch in diameter. One end of the hole must be closed. Holes in wood, paper straws, cardboard tubes and hollow plant stems like *Phragmites* are all suitable if used properly. Holes in water resistant or waterproof materials should be avoided to prevent problems with mold and fungus.

One thing that does not get adequately covered in all of the information provided at various websites and in books on mason bees is a way to determine how many bees you need for your fruit trees. About the closest anyone comes are test results that show that 250 female mason bees per acre will maximize the pollination of apples. But that leaves the typical homeowner with little idea about how many mason bees they need.

It would be nice if a simple formula would compute the exact number of bees that a homeowner needs. But nature doesn't really work that way. There are many factors that affect the size of a mason bee population. Among these are the amount of pollen and nectar sources available, the quantity of nesting holes available, and the presence of other pollinators during the nesting period. The spring weather conditions will also affect them. Some of the emerging bees will simply leave the area. Pre-nesting dispersal can vary from 10 - 20 percent for natal nests and 40 - 50 percent for loose cocoon releases.

All that being said, it is still worthwhile to determine a good starting number for nesting holes. Some factors can be computed, and reasonable estimated averages can be made for many of the others.

Much of this analysis has already been done:

Quote:

A nesting BOB [blue orchard bee] female lives an average of 20 days and, during this time, typically provisions two to four nests. ... In commercial orchards, each female typically provisions two to four female cells and five to eight male cells during her lifetime.

How to Manage the Blue Orchard Bee

Jordi Bosch & William Kemp

Taking into account potential pre-nesting dispersal from natal nests and some of the other factors that affect mason bee populations, provisioning of two female cells and five male cells seems like a reasonable estimate for fruit trees. This could be accomplished in one nest (6 inch hole). If sufficient other pollen and nectar sources (in addition to fruit trees) are available, provisioning two nests (holes) would be a reasonable estimate. If a loose cocoon release method is used, the number of holes needed should be doubled.

Using the spacing recommendations for commercial apple orchards and the 250 female bees per acre data, the number of female mason bees required to maximize pollination is:

dwarf apple tree - 1 female mason bee per tree

semi-dwarf apple tree - 2 female mason bees per tree

Full size apple tree - 3 female mason bees per tree

Using the information above, an apple orchard consisting of 5 semi-dwarf apple trees would need a minimum of 5 nests (6 inch holes):

5 semi-dwarf apple trees x 2 female mason bees per tree = 10 female mason bees

10 female mason bees divided by 2 female cells per nest (6 inch hole) = 5 nests

For a loose cocoon release method, the minimum would be 10 nests.

There are two basic methods for managing a population of mason bees. The first is just putting out the required number of new nesting holes every spring. The old nests are left in place, or removed and discarded after the second year.

The second method is to use a system where the mason bee nests are removed and the cocoons cleaned each fall. Mason bee trays are an example of the second method. The trays are cleaned and reused each year.

A note on pesticides. The use of pesticides is a very important factor in maintaining a native bee population. Pesticides is a general term that covers all of the -icides (herbicides, insecticides, fungicides, rodenticides, etc.). Many of them are highly toxic to bees. Pesticide use must be minimized or eliminated to maintain a strong healthy population of native bees.