

## **Mason Bees – The Super Pollinator Story**

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### **Introduction**

Smart growers plant to attract nature's valuable pollinators to their flower, herb and vegetable gardens, and orchards. Popular pollinators are bumble bees, honey bees, and the mason bee.

The Orchard Mason Bee is native to the maritime climate of the Pacific Northwest. With proper cool, dry storage, or refrigeration, they have been successfully introduced to other areas of North America.

Raising mason bees is a hobby of mine that has matured over several years into a public service project promoting this super pollinator. Each year I seek new products and information to know more, and share, about this valuable pollinator.

### **Background**

I was first introduced to the Blue Orchard Mason Bee (*Osmia lignaria propinqua* Cresson) by a customer on my rural mail route in the early 1990's. Back then, little information was available on mason bees. Internet search at that time resulted in a few agricultural studies, or an occasional newspaper story. Today, if you type in "mason bee" on an internet search engine, you will be rewarded with hundreds of hits. It is great to see such an increased interest in this beneficial North American pollinator.

Expanding my interest in mason bees began in earnest during the spring and summer of 1999. My son, Christopher, was looking for an Eagle Scout project, but had been turned down on his first two proposals. While making wood mason bee nesting blocks one day, I thought "Why not this?" I shared the idea with Chris, and he thought it

project being approved. Nothing, to the best of our knowledge, had ever been approved that promoted beneficial pollinators.

The mason bee proposal was approved as an Eagle Scout project in early 2000. At Christopher's award ceremony, scoutmaster and district court judge Michael Roewe cited him as the only scout he knew that received an award for "spreading bugs!"

Contact was established with Brian L. Griffin, author of "The Orchard Mason Bee," and Lewis County Extension Service. Griffin graciously coached us through the project. Lewis County Extension Service and Lewis County Master Gardeners granted us permission to use part of their display space at the annual Southwest Washington Fair.

Fairgoer response was positive. This resulted in Christopher and me being asked to present mason bees at the Master Gardener's Fall and Spring "Gardening for Everyone" programs, in partnership with the Lewis County Extension Service.

Several handouts have been created over the past few years to introduce and educate those interested in mason bees. These free handouts are available [in PDF files on this website].

Mason Bee starter blocks can be obtained free of cost: approximately one hundred starter blocks are given away each year only at the annual Spring "Gardening for Everyone" event, put on by the Lewis County Master Gardeners at Centralia College.

Home-made Mason Bee condos are also made available at Gardening for Everyone as a community fundraiser for the Lewis County Master Gardener program.

## **Pollination**

Mason Bees primarily pollinate fruit trees and early blooming nut trees, such as almonds. They also pollinate blueberries, blackberries, strawberries and raspberries.

Flowers, such as azaleas, begonias, camellias and rhododendrons are pollinated by mason bees. These super pollinators are attracted to blue, purple, or yellow single bloom flowers.

Mason bees do not make honey, but make up for that by being much more effective pollinators than honey bees. They are incredible cool weather, spring pollinators, while honey bees are warm and hot weather pollinators. A few mason bees can pollinate a fruit tree compared to several thousand honey bees.

The mason bee body is adapted to collect more pollen than nectar, whereas the honey bee collects more nectar than pollen. Mason bees land on the flowers stigma, while honey bees land on flower petals.

## **Identification**

Be careful with your fly swatter. Look before you hit. Mason bees look similar to house flies. A closer look finds that the mason bee is slightly larger than a house fly. A mason bee has four wings, and a house fly has two wings. Mason bees make a **buzzing sound** similar to other bees. House flies make a humming sound.

## **Stings**

Both mason bees and honey bees may sting. Only the female stings. The male is completely harmless. A mason bee rarely stings. It stings only when you pinch it, handle it roughly, or it gets caught in your clothing. A mason bee sting is similar to a mosquito bite. To date, there is no known allergic reaction to a mason bee sting.

## **Compatible**

You can raise either mason or honey bees, or both, with positive results. Honey bees are social bees that live in colonies in the wild, or in man-made hives. Mason bees are solitary pollinators that live in individual nesting chambers. They live next to other mason bees without any problems. Likewise, they may live next to honey bees without any trouble, or next to other solitary pollinators such as alfalfa and leafcutter bees. Each serve their purpose as nature's pollinators.

## **Foraging**

Mason bees are beneficial pollinators within a 100-yard area, or the length of a football field. Set up mason bee shelters at strategic intervals if you have an orchard, blueberry, strawberry or raspberry field. Two hundred and fifty mason bee nesting tubes are recommended per acre. However, since only one-third of a nesting chamber are females, and they are the primary pollinators, it is suggested that the number of nesting chambers be tripled for effective pollination of an acre.

One honey bee hive is required to pollinate an acre. There is an average of thirty to 40-thousand honey bees in a healthy hive.

Mason bees fly from tree to tree, while bees fly from blossom to blossom on a tree, thereby qualifying mason bees as better pollinators. During good weather, mason bees visit about 10 flowers per minute, and 22 to 35 flowers per trip, gathering pollen and nectar at the same time. They pollinate upwards of 2,000 blossoms on a good day. Mason bees pollinate ninety-five to 99-percent of flowers they visit.

## **Dwellings**

Mason bees are not fussy where they live. They adapt easily to either homes in the wild, or man made dwellings, as they cannot make their own nesting holes. Birds and wood boring insects provide many of their nesting holes. You'll find mason bees setting up residence in hollow stems, stumps, knotholes, snags, tree limbs, fence posts, driftwood, and even empty snail shells. They've even adapted to living under cedar shingles and siding. But, don't worry, as mason bees are not destructive wood eating insects like termites and beetles.

### **(1) Bamboo**

Bamboo is a strong, fast growing, woody plant that is a member of the grass family. Five-sixteenth ( $5/16^{\text{th}}$ ) inch diameter holes needed for orchard mason bees are inconsistent in bamboo. However, mason bees will adapt to slightly smaller or larger bamboo holes. Bamboo will last several years with proper maintenance.

A bamboo **Mason Bee House** is available at Gardener's Supply Company ([www.gardeners.com](http://www.gardeners.com)). Instructions to make a **Bamboo Bungalow** may be seen at Mountain Bugs ([www.mountainbugs.com](http://www.mountainbugs.com)). The **Bamboo Garden Nursery** ([www.bamboogarden.com](http://www.bamboogarden.com)), near Portland, Oregon, offers over 300 varieties of bamboo that you can grow

### **(2) Binderboards**

Binderboards were developed for loose cell management of solitary bees. They open like a book, thus the name binderboard. The best binderboards are made from wood.

Binderboards allow solitary bee cells to be safely removed in the fall or winter, allowing removal of dead larvae and predators; and, using x-ray analysis, assess for diseases and

parasites. Annual treatment of binderboards is also done at this time.

**Binderboards** are available at Pollinator Paradise ([www.pollinatorparadise.com](http://www.pollinatorparadise.com)).

**QuickLock Trays**, which are similar to binderboards, are available at **Bee Diverse** ([www.beediverse.com](http://www.beediverse.com)). Each QuickLock tray has a different color.

### **(3) Condos**

Use good quality, dry seasoned wood (i.e. fir, pine, or spruce) with as few cracks as possible. DO NOT use chemically treated, or aromatic (i.e. cedar, redwood) woods. You may paint your condo block, but allow the paint to dry thoroughly before drilling holes.

Only use a sharp 5/16<sup>th</sup>-inch **brad point drill bit** to drill clean cut nesting holes. Drill holes 3/4-inch apart on a 4x4x7-1/2 inch wood block. **Mountain Bugs**

([www.mountainbugs.com](http://www.mountainbugs.com)) offers instructions on how to make a wood nesting block for mason bees. Mason bee condos/blocks are usually available at local garden stores, and in several national garden seed and supply catalogs.

### **(4) Liners**

Usage of replaceable liners helps reduce mite and fungal infestations. Liners may be used in straws or Orchard Mason Bee nesting blocks. Liners are available at **Knox**

**Cellars** Native Pollinators ([www.knoxcellars.com](http://www.knoxcellars.com)). **Pollinator Paradise**

([www.pollinatorparadise.com](http://www.pollinatorparadise.com)) offers both translucent and pre-split liners.

### **(5) Reeds**

Reeds have nodes similar to bamboo. Hachi Ashi reed bundles are used for nesting by the Horned-Faced Mason Bee in Japan for commercial pollination of apple and cherry trees. Dale Nielson ([www.osmia.com](http://www.osmia.com)) of Logan, UT, uses reeds to raise large mason bee populations. He is presently experimenting with large wild rye ornamental grass, as a pathogen is stunting reed growth in southern Idaho and Utah. Reeds, with proper annual cleaning, may last up to two decades.

### **(6) Recycle**

Use the trunk of your Christmas tree to convert it into a mason bee home. Remove the bark and cut the trunk into 8-inch long rounds. Drill 5/16<sup>th</sup>-inch holes at regular intervals around one-third of each round section..

### **(7) Straws**

Avoid using plastic drinking straws for raising mason bees, as they promote condensation and fungus detrimental to mason bees. Use a quarter-inch (1/4) wood dowel, or #2 wood pencil, to make your own paper straws. Parchment paper is suggested to make straws, as it is water resistant. Instructions on making straws may be seen at **Mountain Bugs** ([www.mountainbugs.com](http://www.mountainbugs.com)). Foot long (12-inch) **wax coated cardboard straws** are available from **Ruhl Bee Supply** ([www.ruhlbeesupply.com](http://www.ruhlbeesupply.com)). These may be either cut, or folded in half, to make six-inch nesting holes for mason bees. **Cardboard nesting straws** are also available from **Bee Diverse** ([www.beediverse.com](http://www.beediverse.com)).

## **(8) Observation Units**

**Bee Diverse** ([www.beediverse.com](http://www.beediverse.com)) offers the **Peek-a-Boo Nest**, or Mason Bee Observation Box. It features a removable wood block with six observation chambers, covered with clear plastic. Instructions are included with the Peek-a-Boo Nest.

**Gardens Alive!** ([www.GardensAlive.com](http://www.GardensAlive.com)) offers a **Mason Bee Nest** that comes with 10 glass and two replacement nesting tubes to observe mason bees. This sturdy observation unit may be hung up, and comes with easy to read instructions.

**Pollinator Paradise** ([www.pollinatorparadise.com](http://www.pollinatorparadise.com)) offers the **7 Hole Cabin**. This upright observation nest opens on the left side to reveal seven chambers with pre-slit liners. This allows folks of all ages to easily see development of mason bees inside the liners.

## **Nesting Holes**

The nesting hole in which mason bees live are partitioned like apartments. Pollen, nectar and an egg are laid in each partition, and capped with a mud plug. That's how they earn the name "mason" or "mud" bee. Female eggs (fertilized) are laid in the back third to half, and male eggs (unfertilized) are laid in the remaining front portion of each nesting chamber.

## **Mud Source**

Finding mud for mason bees to seal nesting holes is usually not a problem during spring in the Pacific Northwest. If needed, a small water-filled trench may be dug to provide a mud source for mason bees.

## **Emergence**

Mason bees thrive in spring's cool, damp climate. Emergence varies from year to year, depending on climate change and the blossoming of their food source. Generally, they emerge mid March to early April. The females are quite active throughout May, and conclude their season soon after. If you desire developing a large population of mason bees, store their nests in refrigerated conditions (35 to 40 degrees Fahrenheit), or in an unheated, cool, dry place such as a garage or storage shed. Stagger their spring release every two weeks in March and early April. Place their nesting units near, or within 100 yards of their primary food source. Up to 1,000 nesting holes per acre is suggested for effective pollination.

## **Life Cycle**

Males emerge when spring temperatures are consistently above 55-degrees Fahrenheit and swelling tree buds and blossoms await them.

Females emerge three to fifteen days after the males. Ninety percent of females emerge enmasse between 9 and 11 a.m. on one day. A brief mating ritual occurs shortly after the female emerges and takes her maiden flight. One male can mate with several females, then dies a few days after the last female is impregnated.

The pregnant female finds a nesting hole, marks it with her scent (pheromone), and begins building nesting cells. She deposits and mixes a sticky pile of pollen and nectar, upon which she lays an egg with the aid of her oviposter (stinger), then seals each chamber with a mud plug.

The shorter the nesting hole, the fewer female and male eggs are laid; and, conversely, the longer the nesting hole, the greater the number of eggs laid. A female

lays one or two eggs per day, or between 34 and 36 eggs during her short lifespan. The female continues this regeneration process for thirty or more days, then dies shortly after completion of her work.

Eggs begin hatching about a week after they are laid. The larvae eat the pollen-nectar mixture over the next 28 to 29 days. The larvae eliminate their waste in a corner of their nesting chamber, then rest several days. An insulated, waterproof cocoon is spun, followed by a month's rest. Metamorphosis is completed in September when the pupa molts and becomes an adult bee. The adult bee then hibernates over fall and winter.

### **Enemies**

Predators are primarily birds, such as woodpeckers, and insects, like wasps.

Fungus and disease are also detrimental to mason bees. This should not be a problem if you keep their nesting holes clean and dry.

Mason bees are also sensitive to chemicals, herbicides and pesticides. Do not spray on or near their nesting area or habitat. If you must spray, do so sparingly, and only before and after the mason bees have completed their nesting season.

### **Nesting**

Honey bees require a few hundred dollars to set up a hive. Mason bees need only a few dollars to begin raising them. All you need is a little time and patience, a **sharp 5/16<sup>th</sup> inch brad-point drill bit**, and 4 x 4-inch untreated wood blocks. Mason bees may avoid rough-cut nesting holes. That is why a sharp drill point is a must. Use good quality, dry, seasoned wood with as few cracks as possible, such as birch, fir, pine, spruce or hemlock. Measure the 5/16<sup>th</sup>-inch holes  $\frac{3}{4}$  an inch apart, and drill the horizontal holes with the wood's grain to within  $\frac{1}{2}$ -inch of the back of the wood block.

You can also use wax coated nesting tubes to raise mason bees, placing them in a clean, tin **coffee can** (one end left intact), or a large **PVC pipe** (one end capped). Nesting tubes are available with or without paper liners.

### **Placement**

Mason bee nesting units may be placed in trees and upon fence posts if they are protected from the elements. Otherwise, they will suffer from exposure to wind, rain and snow, and you may not have any mason bees left to raise.

Build and install a shelter atop a fence post, or attached to a tree, with the **open side facing east**. Be sure that the nesting unit has an overhanging roof to protect it from the rain, and tied down or secured so they do not blow in the wind. Remember to remove the nesting block in late September.

Always place mason bee nesting on the sheltered side of a building that is free of rain and wind damage. High up under a building's eaves should accomplish this, but not so high that it places you in danger securing them to the building's side. Place condos and nesting tubes facing east/southeast to catch the early morning sun. Afternoon shade protects mason bee larvae from overheating.

## Maintenance

Organize and set up an annual cleaning and replacement program to head off problems and maintain a healthy mason bee population.

Female mason bees have a strong tendency to return to the old nesting chambers from which they just emerged. . Precious and critical pollination is wasted during the short bloom season when females are cleaning out their old nesting chambers of debris and mud to set up this year's nesting. Direct females away from old nesting areas by conveniently having new, clean nesting available to them near their old nesting.

Author Brian Griffin uses the “**hole in a box trick**” to re-direct mason bees to new nesting. He places all nesting blocks in a cardboard box. The box is tightly taped shut, and a single 5/16<sup>th</sup>-inch hole is drilled in the box (top, or near top on side facing east). Place the box outside next to, or near, new nesting units. As the box warms in the sun, mason bees will emerge in the dark, and, seeing day light, will seek exit thru the clear, open hole. They will not return to the cardboard box. Mason bee activity will soon begin in the new, clean nesting habitat. Remove the cardboard box when bee emergence has ceased. Open the box and take out all the old nesting blocks. Re-drill the 5/16<sup>th</sup>-inch holes, clean and sanitize, dry, and set aside for usage next spring.

Paper liners and wax coated tubes should be replaced every three years, or sooner, if needed. Paper liners are available in six inch lengths. Waxed tubes are usually available in one-foot lengths. Purchase a few more liners or tubes than actually needed. That way you will have extras on hand when the need arises.

Wood nesting blocks last several years with proper care. Remove and inspect them each year when it appears the last females have emerged. Discard those that are no longer usable. Replace with new, or recycled clean nesting blocks.

### **Storage**

Mason bees may be left out during the fall and winter months in mild climates. They can tolerate and survive moderate frosts. Pay close attention to the weather, and bring them indoors when the forecast calls for hard frosts.. Refrigerate nesting units between 33 and 38-degrees Fahrenheit, or store them in a dry, unheated building.

### **Sources**

Browse thru gardener supply and seed catalogs, visit your local nursery and bird shop, and click on mason bee internet sites to find your mason bee needs. **Bee Diverse**, **Knox Cellars**, and **Pollinator Paradise** are the **three best** mason bee websites to date. Each offer unique nesting solutions for raising mason bees

### **Information**

**Agricultural bulletins** on mason bees are available at state and county extension service offices, and pamphlets thru bee supply companies.

**Fact sheets** on mason bees, and other pollinators, are available at The **Xerces Society** ([www.xerces.org](http://www.xerces.org)).

Books and videos may be checked out at your community library, or purchased thru mason bee suppliers.

**Karen Strickler** and **Margriet Dogterom**, both of whom have PhD's, are highly recognized educators known for their pollination studies, including mason bees.

The most **authoritative books** on mason bees are: “**The Orchard Mason Bee**” by Brian L. Griffin; “**Pollination with Mason Bees**” by Dr. Margriet Dogterom, PhD., and “**How to Manage the Blue Orchard Bee**” by Jordi Bosch and William Kemp.

“**All About Mason Bees**” and “**The Orchard Mason Bee**” videos are available from Bee Diverse and Knox Cellars Native Pollinators, respectively.

Dr. Margriet Dogterom, PhD, has developed “**A LEARN-AT-HOME, Introductory Online Course**” on mason bees, available at BeeDiverse.com.

### **How to Help**

**Insufficient habitat**, especially in urban areas, is the major reason there are not enough bees to pollinate flowers, gardens, herbs, berries, shrubs and trees.

Set aside a **small area of your yard** to attract nature’s pollinators. Plant more single bloom flowers in your garden and near the orchard to sustain valuable pollinators.

Native plants and heirloom varieties should also be included as a food source for these beneficial pollinators.

. Purchase plants that are healthy and pest free. Plant annuals and perennials that flower at different times to avoid too many pests at one time.

Do not spray crops, weeds, or flowers in bloom. If you must spray, use organic, environment friendly sprays only. Post the boundaries of your property with “**Do Not Spray with Chemicals**” signs.

Arrange large and smaller resting stones in your pollinator sanctuary, along with feeders, and bird and bug watering stations, or baths, for our feathered and winged friends

Finally, set aside a relaxing place to watch the Blue Orchard Mason Bee each Spring, and countless hours of enjoyment observing nature's other valuable pollinators throughout Summer and early Fall.