Mid-Atlantic Apicultural Research & Extension Consortium

Delaware, Maryland, New Jersey, Pennsylvania, West Virginia and the USDA cooperating

BASIC BIOLOGY AND MANAGEMENT OF THE JAPANESE HORNFACED BEE

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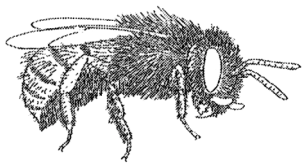
The Japanese hornfaced bee (*Osmia cornifrons)* is a solitary bee commonly used for commercial apple pollination in Japan. The bee has a "fuzzy" appearance and is named for prominent horn-like prongs on the lower part of the face (see illustation). Dr. Suzanne Batra, working at the USDA lab in Beltsville, MD, successfully introduced the hornfaced bee in the U.S. in the 1970's. Since their introduction, many people including traditional beekeepers and fruit growers are successfully managing populations of these bees for tree fruit pollination, especially apples. They are also being investigated as possible pollinators of Brassica (mustard) seed production in Iowa,

There are several native species of *Osmia* in North America, including the blue orchard mason bee (*Osmia lignaria).* This bee is currently being used for the pollination of tree fruit and almonds in the Western U.S. While they are present here in the east, populations of the orchard mason bee do not appear as abundant, and it is difficult to transplant the Western subspecies east of the Rocky Mountains. The Japanese hornfaced bee may be a suitable alternative.

BIOLOGY

The Japanese horn-faced bee is a solitary bee. Unlike honey bees, which live in large colonies with one reproductive queen, the hornfaced bee lives alone and all females reproduce. There is no division of labor in hornfaced bees, such as seen in honey bees. Each female *O. cornifrons* makes her own nest, provisioning the cells for her offspring. Hornfaced bees can nest in hollow reeds or grasses, cardboard tubes, or wooden blocks. Although these bees are solitary, they are gregarious, meaning they will nest in groups.



Hornfaced bees are active for only 6 to 8 weeks from April through June. The male hornfaced bee emerges about one week before pear trees bloom in the spring. Females emerge 2-3 days after males, or longer, depending upon weather conditions. The males mate with the females as soon as the females emerge from their tubes.

Both male and female hornfaced bees make floral visits. In fact, male hornfaced bees are just as efficient as female worker honey bees when it comes to pollinating apple blossoms. Females collect primarily pollen and carry it on the lower surface of their abdomens (unlike honey bees, which carry pollen on their legs). After her ovaries have developed, the female hornfaced bees will begin provisioning the first cell in which she will lay one egg. She will collect a large mass of pollen first and then make several trips to collect nectar, which she will regurgitate on the pollen ball. This sticky nectar acts as glue to hold the egg on the pollen ball. After she has laid the egg, she collects mud and builds a wall between the filled cell and what will be the next cell. She can make 1-2 cells a day when the weather is good and she is young. As she gets older, her wings wear out and eventually she dies.

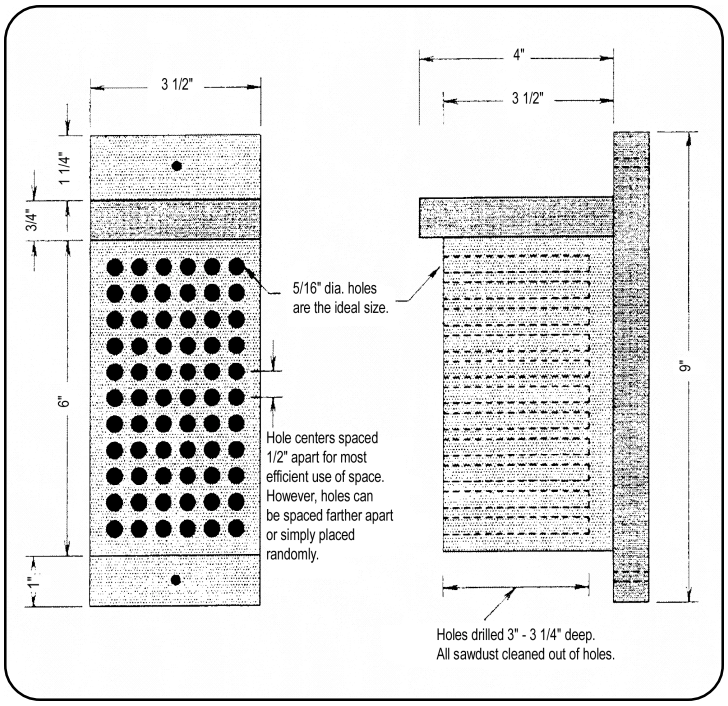
The newly laid eggs take approximately three days to develop into larvae. The larvae consume the pollen ball collected by their mothers over a 2-3 week period. After the larvae have consumed the pollen, they spin cocoons and pupate within their mud cells. The pupae turn into adult bees by mid October but the adult bees will remain within their cells until the following spring.

Adult Japanese hornfaced bees begin emerging approximately one week before pear bloom in Pennsylvania. They are very industrious little bees and are interesting to watch! You should not be concerned about honey bees and *Osmia cornifrons* competing with one another, since they have very different foraging patterns and therefore will not be competing for the same resources. In fact, when you use both honey bees and hornfaced bees in the same orchard, you might expect to get more and larger fruit from the trees.

MANAGEMENT

Japanese hornfaced bees are relatively easy to manage. They will nest in cardboard tubes or wood blocks that have 5/16" diameter openings and are between 4 and 10 inches deep.

The bee population tends to double or triple from year to year, depending upon how many nest sites are available. *Osmia* populations grow most rapidly when there are many nest sites available for the females. Females will tend to nest in the same area



(instead of flying off to seek a new nesting site) when there are 3 to 5 times as many empty as there are full tubes. These bees are susceptible to parasitic wasps if they are left in the field during June and July. It is best to remove them from the field after the adult bees have died. Bees should be stored in an unheated but secure shelter.

The Japanese hornfaced bee is not cold tolerant and must be sheltered when temperatures get below 10 F. They do best in a humid, temperate climate, in USDA Plant Hardiness Zones 5-8. Because the bees cannot survive cold temperatures but still must have a cold period in order to emerge in the spring, it is best to place the nesting materials in an unheated barn or other such building during the winter. You may place hornfaced bees in a refrigerator for winter storage, but make sure humidity levels stay around 75% humidity. Hornfaced bees require a cold period before they can emerge from their cells. Please be aware that *Osmia* from the West may not adjust well to the climate here in Pennsylvania.

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SOURCES OF SUPPLIES, BEES, AND INFORMATION FOR MANAGING SOLITARY BEES

This list of solitary bee resources was compiled using information obtained from http://www.uidaho.edu/pses/Strickler/SolitaryBees/supply.htm. Generally, the list includes only those sources found east of the Rocky Mountains, since *Osmia* that are brought from the west coast often do not thrive in our climate. This website and the others listed here include other information about the Japanese hornfaced bees and other solitary bees.

***The Pollen Bee Foundation, Inc.**, Don Whitehead, 4005 Harrison Road, Beltsville, MD
Telephone: 301 937 5478 Fax: 301 937 5478
Website: Donwhitehead@webtv.net
This is a recently formed organization for people who are interested in pollen bees, including *O. cornifrons*. Dr. Suzanne Batra, who successfully introduced the Japanese hornfaced bee to theUnited States, is a founding member of this organization and may be contacted through the Pollen Bee Foundation, Inc.

***The Pollination Scene** - Dave and Janice Green, PO Box 1200, Hemingway, SC 29554
Website: http://www.pollinator.com
Email: Pollinator@aol.com
Beekeepers. They have a list of researchers and people who have managed *Osmia*.

***USDA ARS, Bee Biology and Systematics Lab**, Utah State University, Logan, UT 84322-5310
Website: http://www.loganbeelab.usu.edu
There are several scientists here who are working on solitary bees. They also keep a list of suppliers and advisors for solitary bees and beekeepers

***USDA ARS, Plant Introduction Station** - Richard Wilson and Craig Abel
G-204 Agronomy Hall, Iowa State University, Ames, IA 50011
Email: rlwilson@iastate.edu
These researchers are using *O. cornifrons* to pollinate several crops, including mustards, at their research station in Iowa.

***Custom Paper Tubes** - P.O.Box 44187, Cleveland, OH 44144-0187
Telephone: 216 362 2964 or 800 766 2527
Fax: 216 362 2980
Website: http://www.papertubes.com
This company is a supplier of cardboard tubes for *Osmia*. According to their website, they will send you a

free sample of their tubes. cptubes@aol.com

***Jonesville Paper Tube Corp**.- 540 Beck St., P.O.Box 39, Jonesville, MI 49250
Telephone: 517 849 9963
Website: http://www.papertube.com
Email: info@papertube.com
This company manufactures cardboard tubes for bees and lots of other things.

***Orchard Bees** - Greg Dickman, 4391 County Rd. 35, Auburn, IN 46706
Telephone: 219 925 5076
Website: http://user.dekalbnet.org/gdi2364
Email: buzzin@ctlnet.com
Have *Osmia lignaria* and *O. cornifrons*, nesting tubes, brochure on rearing, video, large bee populations available.

***Nancy A. Troup** - 10618 Honeyfield Road, Williamsport, MD 21795
Telephone: 301 223 9662;
Website: beestroup@erols.com
Raises and sells *O. cornifrons*. Has paper tubes with liners, phragmite reeds, and presents talks on *Osmia*.

***Raymond Williams** - P.O.Box 1943, Binghamton, NY 13902-1943
Telephone: 607 775 3369 Email:
Has several species of solitary bees, including *Osmia cornifrons*. Contact him for more details and how to attract pollen bees.

Books and Publications - (Some sources used in preparing this publication):

How to Manage the Blue Orchard Mason Bee as an Orchard Pollinator. Nov. 2001. Sustainable Ag Network Handbook Series Bk #5. ISBN 1888626062.

The Orchard Mason Bee: The Life History, Biology, Propagation and Use of a North American Native Bee. 1999. Knox Cellars Publishing Co., Washington State. 128 pp.

Woodcrafting for Wildlife. Pennsylvania Wild Resource Conservation Fund & Pennsylvania Game Commission (Plans for building Osmic nesting block, see figure on previous page).

Batra, Suzanne W.T. 1994. Diversify with Pollen Bees. American Bee Journal. 34(9): 556-557.

Batra, Suzanne W. T. 1997. Solitary Bees for Orchard Pollination. Pennsylvania Fruit News, April.

Batra, Suzanne W.T. 1998. Management of Hornfaced Bees for Orchard Pollination. USDA publication, February.

Sanford, M. Pollination, the Forgotten Agricultural Input

Web Sites

http://www.uidaho.edu/pses/Strickler/SolitaryBees/supply.htm
http://www.pollinatorparadise.com/Binderboards/Binderboards.htm

MAAREC, the Mid-Atlantic Apiculture Research and Extension Consortium, is an official activity of five land grant universities and the U.S. Department of Agriculture. The following are operating members:

University of Delaware, Newark, Delaware
University of Maryland, College Park, Maryland
West Virginia University, Morgantown, West Virginia
Rutgers University, New Brunswick, New Jersey
The Pennsylvania State University, University Park, Pennsylvania
USDA/ARS Bee Research Lab, Beltsville, Maryland

Requests for information or publications should be sent to: MAAREC, 501 ASI Building, University Park, PA 16802 Phone: (814)865-1896 Fax: (814)865-3048 Web site: http://MAAREC.cas.psu.edu

This publication is available in alternative media on request.

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Participants in MAAREC also include state beekeeper associations, and State Departments of Agriculture from Delaware, Maryland, New Jersey, Pennsylvania and West Virginia.

MAAREC Publication 5.5 Author: Lana Adams, The Pennsylvania State University.