

Solitary Bee Nesting Activity Study
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May 4, 2009

The NASA scale hive study is proving that honey bee hive weight change gives a good measure of the period of the honey bee nectar flow. The scale hive data shows that the nectar flows have changed in the Mid-Atlantic. Are our Native Pollinators changing their period of activity and keeping up with the changes in nectar flows? To address this question, we need a simple and accurate way of determining the activity periods of representative native pollinators to within a few days, that can be used throughout the region. The few native pollinator abundance surveys being done are directed toward finding out what bees are present, and cannot be repeated easily over time throughout the region, and most are destructive (the captured bees die). Consequently, there is surprisingly little detailed information (almost none) on the activity periods and how they vary across the region, and over time.

This is a pilot study designed to see if the activity of tube-nesting bees can be measured by recording when they complete their nests. If it works, this type of sampling can be done by amateurs and school children, is relatively inexpensive, and will improve the abundance of these important pollinators. But it must be tested to see if the data are useful before going full bore.

In 2009, the HoneyBeeNet Project will provide some interested volunteers with sets of nesting tubes designed for *Osmia* bees, the orchard mason bees. Other similar species also find the tubes attractive for nesting. The 'nests' are bundles of cardboard tubes, 5/16" diameter (most in 3" PVC shelters), commonly sold as nesting tubes by garden supply stores. The bundles are placed outside in suitable and convenient locations. Wild bees will find them and build their nests. The females fill the tubes with a series of chambers, each with a supply of pollen (moistened with nectar) and an egg. Each chamber is plugged with a mud cap. One tube is used at a time, and gets a mud plug on the end when it is full. The female bee then starts to work on another tube. Several females may be working a nest bundle at the same time. What we ask the volunteers to do is to record the number of tubes that get finished each day. Volunteers with and without hive scales can participate in this. Recording the numbers frequently (daily if possible) should take no more than a few minutes. A simple data log sheet format is provided. A few capped tubes can be returned for identification of the species, and the remaining tubes can be allowed to over-winter, producing a new generation next spring. Sam Droege of the Patuxent Wildlife Center has volunteered to oversee the identification, and Pete Ma at Goddard has taken Sam's identification course, as have others in the region. We will see if the technique can give us meaningful data by comparing it to scale hive records, temperatures, and blooming data in the region.

We will start with one 'nest' per volunteer. We expect that the number of tube finished per day will begin with a small number, increase to a peak, and then diminish as the season winds up. We are interested in when it begins (we may be a little late this year), when it peaks, and when its over.

Data can be sent back either as email messages (greatly preferred), or as completed log sheets via the mail. We use excel, and like comma delimited text files.

Osmia bees and similar tube nesting bees are solitary, non-social bees, and are relatively common throughout the US. They are not aggressive, and reports of them

stinging are extremely rare. They do not make their own tubes, but instead use old beetle tunnels and pith holes in the center of twigs and stalks. Unlike carpenter bees, they do not chew holes in your house. The natural sites are relatively rare, and they readily adapt to what we provide. The females provision the nest, then die. The eggs hatch and the larvae complete development that year and over-winter in the tube as pupae. Adults emerge next spring, and the cycle repeats. There is a great deal of useful information on the internet, including guides that can be downloaded (see links). This might provide the basis for an interesting school science project. The same tubes can be re-used, new paper liners are readily available.

Some bundles come with a PVC housing, made from a 6.5" section of 3" PVC drain pipe, holding about 47 cardboard tubes. Alternatively, a bundle of cardboard tubes taped together works fine provided the location is safely out of the rain, or another shelter is made for them. An empty plastic soda bottle with the top cut off leaving a 7" container can work. Tape the whole thing with duct tape to keep the temperature reasonable. Regardless, it is important that the bottom of the tubes are completely blocked to prevent tiny parasitic wasps from entering. Duct tape seems to work OK for the PVC arrangement, or wax, clay, plastic plugs, or 1/2" sections of 5/16" dowels would work. Thinner walled paper liners make reconditioning the tubes, and inspection of the larvae, easier. The ends of the cardboard tube need to be expanded a bit for easy insertion – a plastic pen or pencil works fine. After starting insertion, fold over 1/4" of the end of the paper liner and crimp it to block the back end. Additional blocking is still needed to prevent wasps from entering – tape should work.

Put them up, and they will come. The nests should be securely fastened horizontally to a support. Sunny, south-facing sites under eaves of your house or outbuildings, deck railings, porch railings, fenceposts, and the like, where the females can easily spot them, work well. Don't hide them under dense branches. Tying or taping them to horizontal limbs, or in the crotches of trees also works. Its probably best if they are not in full summer sun. They can be from a few feet to several feet above the ground. They should be horizontal, with the opening slightly down, so that they do not collect water, and they should not swing about. Do not jar the nests during construction or in the first few months, or you may dislodge the egg or larvae from its pollen ball, resulting in death of the larvae. The orientation should not change - rotating the nest will confuse the females and result in her abandoning the tube she was working on. The location should be within a few hundred yards of trees or plants that provide pollen. For our purposes, the nests should be located where you can easily see and count the number that are filled – eye level. Keep the log sheet handy, but protected from weather. The bees also need access to mud, or dirt and water, not a problem in this area, and the water supply for your honey bees will suffice.

You might note that females carry their pollen under their abdomen, on an especially hairy area called the scopa. Also, you can shine a flashlight down the tubes to see partially constructed nests, and sleeping females.

Counting the Completed tubes

You have three choices – record only the number of new nests completed each day or count the total completed to date, or both. Doing both serves as a good check. Zero's should be recorded. Either way, it will help to have marks to guide you. They will also help the females. Try making a series of 3 or 4 lines on the tube ends using a magic marker (pick the least smelly brands) to divide the bundle into sectors. Also, making a small mark on the cardboard tube end (not the mud) of completed nests should help. Make it small, so it does not distract the females. Taking a digital photo is another aid – the cameras usually list the date and time. Cell phone cameras may be good enough. We do not want to get your entire collection of photos, though - just the numbers. When the season ends (maybe mid June), send them to wayne.esaias@nasa.gov as a list like the following example:

Your Name,

Location (full address and lat- lon of the nest),

Date nest was established,

Total tubes at start

Date	Time (AM /PM)	number today	total completed
April 15, 2009	8 pm	1	1
April 16	9 pm	0	1
April 17	7:30 p	1	2
etc			

If there are no new plugged tubes, write down a '0'. Note the days that you miss with a dash or n/a. If you miss one day, and you come back and see 3 more capped tubes, your only choice is to say that 1.5 were completed today, and 1.5 on the day you missed.

We don't want the bees to run out of empty tubes. When the number of filled tubes is about 25 or so, make plans to put up another set. Contact Wayne who might have some (but my stocks are low). Plan on putting up a new set before all are capped in the first. We don't have a good idea as to how fast they will complete nests. Usually the first year the bees are less abundant. Wooden blocks also work.

Any comments you have on the procedure, your results, and ways to improve are greatly appreciated. Send your results in by July 1 (or sooner), and we will write up a short study report.

Links

<http://osmia.com/> a supplier of Osmia and supplies, good pictures of tubes

<http://www.sare.org/publications/bob.htm> to download a 1Mbyte pdf detailed 89 p

manual - How to Manage the Blue Orchard Bee by J. Bosch and W. Kemp, USDA ARS

<http://www.ars.usda.gov/Main/docs.htm?docid=18333> "Blue Orchard Bee"

<http://www.ars.usda.gov/Main/docs.htm?docid=10743> "How to make blocks" USDA

or search on orchard bees, or Osmia.