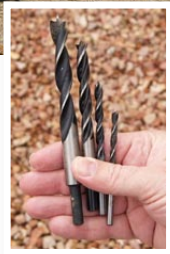


Bee walls, habitat and nesting blocks



Valley Bees



Bee Wall



Habitat, Homes and Hollows for Native Solitary Bees

Native solitary bees have two basic needs: Food and shelter. It's as simple as that.

Though bees' housing needs vary, they all feed exclusively on nectar and provision their larvae with pollen. Of course, a good nectar and pollen source must be present when each species is active, which may be for only a few weeks per year.

They must have access to a diversity of plants with overlapping blooming times so that flowers are available to forage all year round. And because native bees come in a range of sizes, it is important to provide flowers of various sizes, shapes, and colours.

They need places to nest. Solitary native bees don't build the wax or paper structures we associate with honey bees, social stingless bees or wasps. Many solitary bees nest in a small series of tunnels and cells they construct underground. These burrow narrow tunnels down to small chambers. In order to build these nests, bees need direct access to the soil surface, often on sloped or well-drained sites. Others nest in narrow tunnels often left behind by wood-boring beetle larvae in dead trees (carpenter bees will excavate their own holes), and a few use the soft pithy centres in some plants. Some bees require small cavities, either in tree boles, underground, or under clumps of fallen grass. Whether underground or in wood-tunnels, most solitary bees spend most of the year maturing in their nest (brood) cells. In these cells, they are vulnerable to nest disturbances such as soil tillage or tree removal.

Bees need protection from most pesticides. Insecticides are primarily broad-spectrum and are therefore deadly to bees. Furthermore, indiscriminate herbicide use can remove many of the flowers that bees need for food.

Avoid disturbing the soil surface during flowering; never apply insecticides to plants in flower (apply herbicides in the most targeted way possible e.g. spot spraying), and leave logs, branches, posts, wood whenever they do not pose a hazard. Create holes for nesting.

Enhance habitat for bee communities by removing vegetation from small patches of sunny, well-drained soil.

Solitary bees will be productive year-round if temperature range is good, however most activity in your garden will be in September through to late Autumn (April May). Little is known of the complete life cycle of solitary bees. Basically, there are two generations of leaf cutter in a year, most of the others lay just once.

Creating foraging habitat for bees :

Patches of foraging habitat can be created in many different locations, from backyards and school grounds to golf courses and city parks.

Even a small area planted with good flowers will be beneficial for local bees, because each patch will add to the mosaic of habitat available to bees and other pollinators. Have a diversity of plants flowering all season. Most bee species are generalists, feeding on a range of plants through their life cycle.

By having several plant species flowering at once, and a sequence of plants flowering through spring, summer, and fall, you can support a range of bee species that fly at different times of the season.

Choose several colours of flowers. Bees have good colour vision to help them find flowers and the nectar and pollen they offer. Flower colours that particularly attract bees are blue/violet, mauve/pink, white, and yellow.

Plant flowers in clumps. Flowers clustered into clumps of one species will attract more pollinators than individual plants scattered through the habitat patch.

Some plants used by solitary bees for nesting :

Grass tree spikes, bamboo, dried/dead cane of lantana, raspberry or elderberry, mango, soft deadwood such as banksia, casuarina, melaleuca and leptospermum.

Enhancing pollinator habitat is an opportunity to educate landowners, community and friends about the value of this habitat for the ecosystem.

Construction of Solitary Bee Nest Sites

BY TIM HEARD - RESEARCH SCIENTIST FOR CSIRO ENTOMOLOGY
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Basically, the bee wall should consist of two separate elements :

One of timber and the other of mud brick.

The wooden wall is basically a set of shelves upon which the nesting materials are placed. It should be made of unpainted recycled hardwood elements that provide a rustic appearance. See the example of Chris Fuller's wall.

The mud brick wall provides an earthen nesting substrate for bees, particularly blue banded bees. See example of John Klumpp's wall below as an example. John uses large blocks of pre-formed styrofoam (available at concrete supplies) filled with rammed dirt. An alternative is to make mud bricks. The mud texture is critical. Blue banded bees are quite particular about the texture of the mud. Generally use a mix of 3 parts sand and 1 part clay, but vary the types of sand and clay to increase the chance of making a brick that appeals to the bees. Poke holes of 6 mm diameter and 60 mm depth into the bricks as they are drying. These are pilot holes to encourage the bees to start nesting.

Both walls need to be protected from damp rising from the ground by being mounted on a base. I suggest a base of fired bricks. For the wood wall, post of galvanised steel, wood or brick could be used instead. The base also serves the purpose of raising the wall to closer to eye height.

Both walls need to be protected from rain by a roof. I suggest a roof of a wooden frame covered in corrugated galvanized iron sheeting. A generous overhang on the roof will protect both the wall and the bees. Rustic, rough wooden poles could be used for an attractive appearance. Recycled sheeting could be also used.

I recommend that the wall be placed on the **north facing slope** for winter warming. It should be positioned and built so that it receives minimal direct summer sun. A seat may be installed in front of the wall to encourage visitors to sit and watch the action.

Parts of the wall should be **protected by thick hedges of vegetation** as some bees like it private. I recommend that the south, east and west sides of the wall be protected by vegetation. Allow the vegetation to grow over the wall. The north side may be exposed for warming by the sun and to allow visitors to approach and inspect the wall. Both sides of the wall are open, that is they have no walls, so that bees can approach from the either the open side or the protected side.

Local solitary bees will adopt the nesting materials provided. I suggest that we initially provide only a small number, but great variety, of nesting materials. Then when you see which ones are adopted by your local bees, you can add more of those. Note that wasps and other insects may also colonise the nest materials. This adds another element of interest.

Also parasites of wasp and bees will follow their hosts, again adding to the biodiversity.

Remember : bees need a source of water

Types of nests could include :

1 Blocks of wood (both hardwood and softwood) with various sized holes drilled (see sizes below) at approximately **20 mm centres**. Make holes smooth and blind (that is not right through the timber).

3 mm hole	70 mm deep	(few)
5 mm hole	120 mm deep	(most commonly used)
6.5 mm hole	150 mm deep	(most commonly used)
9.5 mm hole	150 mm deep	(few)
13 mm hole	150 mm deep	(few)

2 Bundles of bamboo, rush and lantana stems, with open end, cut about **150-200 mm** lengths (cut close to node so one end is open, other closed), pack horizontally into and **protected by enclosures** of recycled materials, such as plastic pipe, or wooden frame. Some bees like **hollow stems** and other like **pithy stems** that they chew out themselves. Bundles can also be hung in tree, but fix firmly so they do not swing in the wind.

3 Bundles of wax drinking straws, packed into enclosures.

4 Tree stumps preferably rotting and with beetle holes.

5 Mud bricks of various textures.

6 Bare ground : clear patch of ground and compact the surface. Put in a step, so that you have a flat slope and a vertical surface.

7 Sand pits : in a sunny well drained spot, dig a pit about 600 mm deep and fill with mixture of fine-grained sand and loam. If necessary use chicken wire to protect the pits from cat poo, etc. Weed the sites when necessary.

8 Sand piles : make a pile or raised bed of mixture of fine-grained sand and loam. This option is better than a pit where the natural soil is poorly drained.

If you wish to **identify the species** of bees occupying the nest, then insert a roll of newspaper in the hole. When the nest is occupied, pull out the newspaper and place in a container for emergence of the adult bee. Don't forget that many of these solitary bees will sting.

Other insects may also occupy these nests, including wasps and parasites of the bees.

You can expect an **increase in bee numbers** in the second and third year after construction. But sometimes the numbers of some species decrease as parasites accumulate.

Male bees will sometimes be found around the bees roosting in trees etc. They usually do not enter the nests. Keep your eye open for these.

Note that most of these bees are solitary but **some are gregarious** and so like nesting near others of their own species.

Herb & Insect Spiral



Herb and Insects Spiral from Urban Bees.
Chris Fuller's Bee Village at Kin Kin.
Wall faces north-east.

This wall of dry stones built in a spiral shape helps to warm and dry light soil. This structure favours the growth of Mediterranean aromatic plants and nectariferous plants that bees love. Temperature and hygrometry differ between the top and the base of the spiral.

At the top, where the soil is the driest :

- **Lavender, hyssop, savory, thyme, rosemary, common rue, Aegean wallflower, red valerian, and sedum**, for example, can be planted.

A little lower :

- **Burnet, pyrethrum, and borage** thrive along the slope.

At the base, where the soil is cooler and more nutrient rich :

- **Dill, oregano, basil, chives, mint and lemon balm** flourish.

The stones of the spiral are deliberately placed with wide spaces between them and set with lime, in order to welcome other living creatures (ladybirds, spiders, hedgehogs, lizards etc).

The spiral offers homes and food to a multitude of small creatures by making maximum use of a small area (two to four metres in diameter).



A log with beetle holes

This design is not only useful but pleasant to the eye.



Right :

John Klumpp's Blue Banded bee wall. This one is made by pouring mud into a polystyrene packing frame.

An alternative is to make mud bricks and pack them together.

Some additional notes :

Solitary bees don't clean out old debris from the previous year, and so each year they need clean housing.

As solitary bees, no-one directs traffic - each bee must find her nest on her own. Large artificial systems with too much uniformity can confuse solitary bees - asymmetry and bold decorations that define areas can help individual bees find their nests.



Most nest systems need weather-resistant housing - a large diameter pipe capped at one end; a tennis ball tube; a milk carton set in an open wooden box; some other variation. To reduce rain soaking the nests, tilt the nests a bit forward after first binding them together, (with masking tape, wire). Shelter from strong wind is also important.

Be aware of this fella!

Black Parasitic Wasp

for solitary bees



This wasp homes in on partially completed nest holes and takes a look inside. If the bee is in residence, the wasp withdraws to a strategic distance and waits. Once the bee leaves, the wasp creeps up and if the coast is clear, inserts into the hole its long tail with its needle-like egg laying tubes.

If successful, the offspring of this wasp will be the product of that nest site instead of the offspring of the solitary bee!

Article from www.aussiebee.com.au

Paper tubes / straws / hole liners

The simplest bee homes are holes drilled in wood or made in clay.

While easy to make, they have several disadvantages. Pests, especially mites, are a natural part of the bee life cycle. In wood or clay, the mature cocoons cannot be removed for cleaning, so pest populations remain high. It is also nearly impossible to clean the holes for re-use without destroying either unhatched adults or freshly laid eggs.

Many people who have drilled bee nesting blocks will use paper liners. These treated paper or cardboard tubes fit into holes in wood, clay or other mediums, or are sometimes used alone. The bees nest in the tubes (or 'straws'), which can be removed when the bees are mature. Once removed, they can be exchanged, brought to another site, stored in suitable safe containers to await hatching etc.

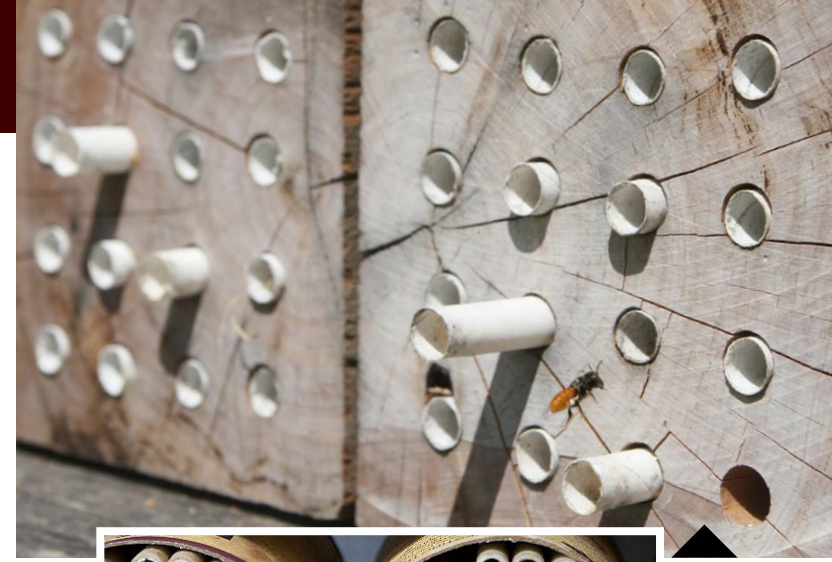
Fresh liners in the holes then provide clean nest spaces for the following season. Some liners can be opened for access to the cocoons for cleaning, but many are difficult. In those, bees still emerge in association with pests.

The liners can either be purchased, or you can make them yourself. We are currently in the process of working this through for our bees here in this area, and it is a work-in-progress. We will be preparing a document over the coming months to clarify this whole process, but in the meantime, there is a bit of info available on the www, or speak to people who are currently actively involved in the solitary bees. And start researching...and experimenting. Let us know.

From 'Paper Liners That Work'



Make your own!



This resin bee takes a liking to the liners!



Chris Fuller, as well as a number of our Valley Bees members, are currently experimenting with various techniques, and we will try to keep you updated.

Try ANBees Forum - Yahoo Groups

These guys sell the liners :

www.pollinatorparadise.com/Binderboards/new_products

