What value a good hollow log to stingless bee colonies?

Bob Luttrell

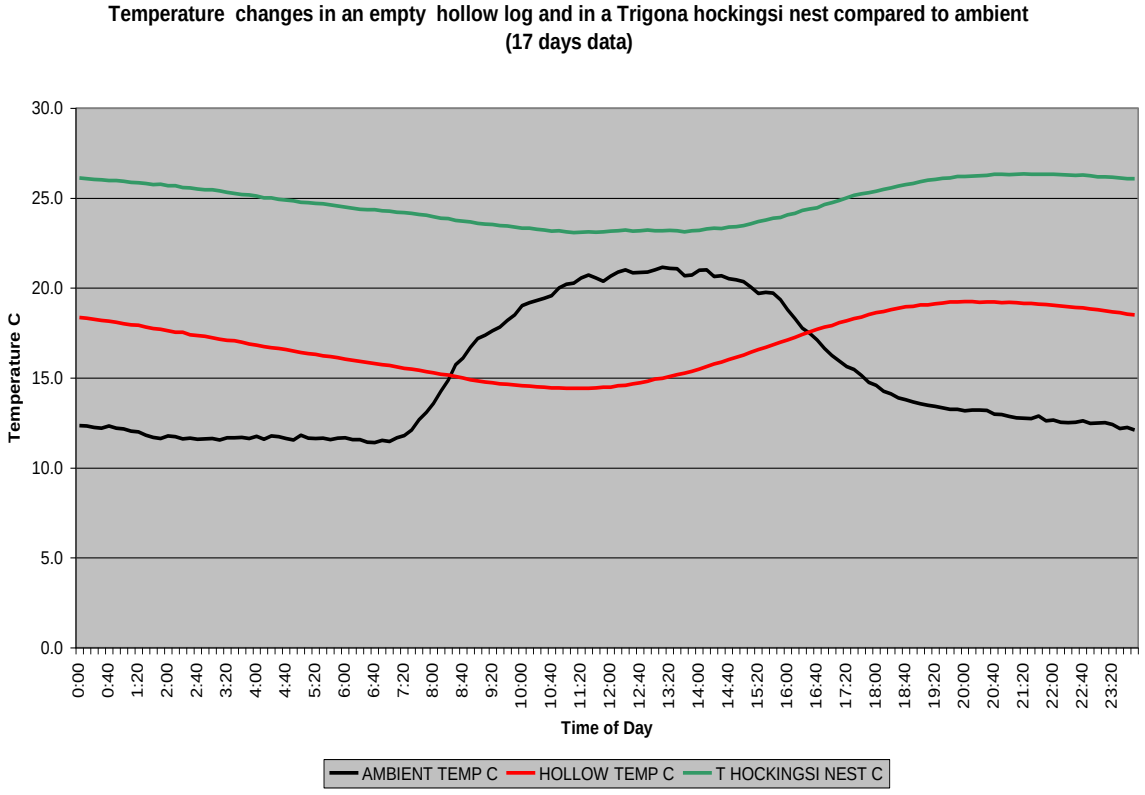
In all our efforts to design boxes or hive structure to suit the stingless bees, we are somewhat frustrated about what to aim for, by the range of nest sites that the stingless bee themselves chose. For example, in ground water meter boxes, Telstra pits, concrete block walls, even steel pipes are some of the diversity of other nest sites that have been observed

The literature quotes that the average tree occupied by Trigona carbonaria is a 30 -35cm diameter trunk with perhaps a 10 -15cm pipe. This gives a much greater wall thickness than the typical box structure, frequently made from 25mm pine boards, rectangular in shape, but with a volume approximating that of a colony in a tree. Trigona carbonaria colonies at the southern end of their range, in the Sydney/Bega area are recorded as having a preference for even bigger trees. As well the bees have adapted to the southern conditions by increasing their body size, presumably both these changes help their survival in the cooler conditions in the south.

Another major difference of course is the more upright nature of a hollow log, and of course it normally has the rest of tree on top, certainly even in a trimmed log, there is much more protection at the top from the impact of solar radiation. This different orientation and chance surface to volume proportions in a box could explain the major differences in performances between our attempts at making a box, and the hollow log

Of course there is no work that shows just what condition the best do best in, and ultimately this can only come after much more research. Once a colony occupies any space , they have a limited ability to control the environment within that space, and have proven very adaptable, but at what cost? Heat has proven to be a major killer of boxed colonies especially the extreme heat waves that have been experienced in recent years. The bees seem to have a greater ability to survive very cold conditions, than heat. From my observations, if the temperature in a nest cavity reaches the mid 40's, loss of the colony is likely. It has become recommended practice to locate colonies in a position which gives them morning sun, and protection from the midday/afternoon sun. Box hives with double lid designs, the tropical lid,

offer more protection from incident solar radiation, and are advisable in most situation.
Certainly placement of colonies where they get morning sun has a beneficial effect in that workers become active earlier than colonies that are more shaded in the morning
Many variations of box design, and insulation have evolved as meliponists as we are a very individual and inventive group.
In this note, I am not making any recommendations as to what should be used, the standard OATH (Original Australian Trigona Hive) has proven very successful, and convenient to manage. Yet in the countries of South America where there has been more research into this group of bees, similar boxes have a range of additions/modifications.
My measurements of temperature in a hollow log, and in a colony in a hollow log indicate that conditions there are very different to swhat one would expect.
The graph below represents a 17 day recording period



Comparison of the black ambient temperature line with the red hollow temperature based on recordings every 10 minutes show the very dramatic

effect that the log has had in this test. The response has been repeated in multiple recording sessions, and is very consistent. Statistical analysis has show the differences to be significant. I intend to set up a permanent recording system to give more data on this, and other hive environments. Certainly the lag in temperature response in the hollow is surprising and dramatic, the peaks and troughs of the ambient temperature are removed. The green line from a sensor inside a Trigona hockingsi colony in the log, believed to be in the involucrum protected brood area because of bee response to the placement of the sensor, causes a slight further lag in temperature but simply lifts the hollow temperature some 7-8 °C .
This is a small piece of data, much more is needed to explain conditions that exist within colonies. I intend to add more to this discussion, including some similar graphs of the responses of artificial box structures. Temperature in these have a very short lag in general, of the order of 2-3 hours at best, a very different set of conditions to a hollow log

The T hockingsi log, and a series of hive box types under test using a datalogging temperature recorder, taking a reading every 10 minutes . The log has a block on top as well as a sealing piece of plywood, to reduce effect of the sun from the top. The 'Stevensons Enclosure' is the ventilated structure at the rear where ambient is recorded. All are in full sun.

I am always happy to discuss issues that may be of concern to both you and the stingless bees, and welcome any suggestions for better or alternative ways to do things

Bob the Beeman