

# Caring for heat- and smoke-affected apiaries

*Following a bushfire or prolonged heat event honey bees can suffer heat and smoke stress. Stressed colonies can take months to recover and some may eventually die. Intensive care is required to help bee colonies recover and minimise losses to the apiary.*

## WHEN SHOULD I INSPECT MY HIVES FOR HEAT AND SMOKE DAMAGE?

Beekeepers whose apiaries have been affected by prolonged heat or a bushfire should undertake a thorough inspection of each hive as soon as possible to minimise any losses.

## WHAT IS HEAT AND SMOKE STRESS?

Under normal summer conditions, bee colonies maintain an optimum hive temperature of 35 degrees Celsius by natural evaporative cooling using water that the bees collect. Should cooling fail under extreme heat conditions, the queen and worker bees can suffer heat stress, and beeswax combs and honey may melt.

Heat stressed colonies may take months to recover to full honey production and/or pollinating potential. Colonies with partial meltdown of combs can rebuild combs over time, but most colonies suffering total meltdown of combs are unlikely to recover.

Hives that were in very close proximity to or only partially burnt by fire will be severely affected. The bee colonies residing in these hives will have suffered from smoke / heat stress to varying degrees rendering many unproductive for an undetermined period and some may eventually die.

Signs of a heat or smoke stressed bee colony include:

- Total meltdown of the hive with the entire colony of bees smothered by melted wax and honey.
- Partial melt down with extensive losses of bees.

- Loss of field bee population.
- Failed queen.
- Queen not laying for some time even after the heat has subsided.
- Gap in brood production which becomes evident in the coming months.

## HOW DO I MANAGE A HEAT AND SMOKE AFFECTED HIVE?

Damaged hive components should be replaced as quickly as possible. Melted wax and honey should be cleaned up immediately to prevent exposure and the spread of diseases.

To limit stress on weak colonies and provide the best chance of recovery, consider uniting disease-free weak colonies. Reducing the entrance size and the cavity size of the hive will help a weak colony regulate temperature and prevent robbing. This will also reduce the risk of the development and spread of pests and diseases.

Heat and smoke stress are known to affect the longevity of queen bees and worker bees. Queens may stop laying for some time even after the heat has passed, or they may fail altogether. You may consider requeening your hive when you are able.

You may also notice a sharp decline in the number worker bees in the coming weeks and should manipulate hive size accordingly to ensure the colony is large enough to maintain the hive. Honey and pollen stores should be monitored to prevent starvation.

## HOW MUCH WATER DO I NEED TO GIVE MY BEES?

You must provide a plentiful water supply for your bees. Placing water in close proximity to the apiary will reduce bees' flying time and distance and can minimise additional stress on the bees. During hot weather a hive can use between 1-4 litres of water per day.

## WHAT DO I FEED HONEY BEES TO PREVENT STARVATION?

When nectar and pollen is in short supply or unavailable, bees will draw on their honey and pollen stores in the hive. During these times, it is important to frequently monitor the amount of honey and pollen in the hive because when it has all gone, the colony will starve.

Starvation can be prevented by moving bees to an area where plants are yielding nectar and pollen or by feeding them white table sugar, or syrup made with white sugar and water. Bee colonies can be kept alive for long periods by feeding white sugar.

**NEVER use raw, brown and dark brown sugar, and molasses as these may cause dysentery in bees.**

### Honey as feed for bees

**DO NOT feed honey to bees unless it is from your own disease-free hives.** Spores of American foulbrood disease can be present in honey, so feeding honey from an unknown source, for example, a supermarket or even another beekeeper, may cause infection in your hives. If you feed suitable honey to your bees, it must be placed inside the hive. **NEVER** place honey in the open outside the hive as this is illegal under the *Livestock Disease Control Act 1994*.

### How and when to feed bees

Bees from nearby managed and feral colonies will be attracted to sugar syrup or dry sugar if it is in the open. You will end up feeding other bees as well as your own. Besides being a waste of money, feeding in the open may cause robber bee activity in the apiary and possible interchange of bee disease pathogens.

Placement of sugar syrup or dry sugar in hives is best done towards evening to minimise any tendency for other bees to rob the hives that are fed.

### Making and feeding sugar syrup

Some beekeepers prefer a ratio of one part of sugar to one part of water, measured by weight (known as 1:1). Others prefer a dense syrup of two parts of sugar to one part of water (known as 2:1). Generally, 1:1 syrup is used to supplement honey stores, stimulate colonies to rear brood and encourage drawing of comb foundation particularly in spring. The stronger syrup is used to provide food when honey stores in the hive are low. Measuring the sugar and water by weight or volume is fine because there is no need to be 100 per cent exact about the sugar concentration.

Heat water in a container large enough to hold both the water and sugar. As soon as the water has begun to boil gently, remove the container from the heat source. Pour in the sugar and stir the mixture until the sugar crystals are dissolved. Never boil the mixture as the sugars may caramelise and may be partially indigestible and toxic to bees. Always let the syrup cool to room temperature before feeding it to bees.

The cooled syrup can be given to hives using one of the following four suggested methods.

#### 1. Container with sealable lid

Fill a clean jar, tin with a push-down lid, or similar container with sugar syrup. Drill or punch the lid with 6-8 very small holes. Cut two 12 millimetres high risers from a piece of wood and place them across the top bars of the frames that are in the top box of the hive. Invert the filled container and place it on the risers. Next, place an empty super on the hive to enclose the feeder and then replace the hive lid. The risers provide a bee space between the top bars and the holes in the container lid. It is a good idea to remove the cardboard insert commonly found in jar lids.

#### 2. Plastic bag

Partially fill a plastic freezer bag with sugar syrup, about half full. Gently squeeze the bag to expel all the air. Tie the neck of the bag using an elastic band. Place the bag on the top bars of the frames in the top box of the hive, under the hive cover. Use a very small diameter nail to punch about 6-8 small holes into the upper surface of the bag. The bees will suck the syrup through the holes. Never put the holes on the under surface of the bag as the syrup may leak out faster than the bees can gather it. This may lead to loss of syrup outside the hive and cause robbing by nearby bees. It is important to have a bee space between the upper surface of the bag and the under surface of the hive lid so the bees can gain access to the syrup. If required, a wooden riser of the dimensions of the hive may be used to raise the lid.

#### 3. Shallow tray

Place sugar syrup in a shallow tray, such as aluminum foil tray, under the hive lid. Bees need to be able to reach the syrup without falling into the liquid and drowning. Some grass straw or wood straw of the type used in cooling devices may be placed in the syrup for this purpose. It is important not use any straw or floating that has been treated, or been in contact, with chemicals as this may be hazardous to bees. The hives should be on level ground to prevent any loss of syrup and a riser may need to be used if the tray is not shallow.

#### 4. Frame / division board feeder

Place sugar syrup in a 'frame or division board feeder'. This is a container, the size of a full-depth Langstroth frame, that has an open top and which sits in the super as a normal frame does. The feeder requires a flotation material or other means to allow bees to access the syrup without drowning.

## HOW OFTEN DO I NEED TO FEED?

It is normal for bees to remove syrup from a feeder, reduce the water content and store it in the combs as if it were honey. Whatever feeder is used, a medium to strong colony will usually empty it in a matter of days.

For colonies with virtually no stored honey and no incoming nectar, the initial feed will be largely determined by the

amount of brood, the size of the colony and to some degree, the size of the container used to hold the syrup. It is safer to over-feed a colony than to skimp and possibly cause the death of the colony.

An initial feed of around 1-3 litres could be tried. It is then important to frequently check the combs to see how much syrup has been stored. This will give a guide as to how often and how much syrup should be given. Feeding can be stopped when nectar becomes available.

Properly ripened syrup should have a moisture content of around 18 per cent. Syrup that is not ripened adequately will ferment and adversely affect bees.

## CAN I USE DRY SUGAR?

Medium to strong colonies can also be fed dry white table sugar placed on hive mats or in trays under the hive lid. Bees require water for liquefying the sugar crystals. They will obtain supplies from sources outside the hive and sometimes use condensation that may occur inside the hive.

Some beekeepers prefer to wet the sugar using water to prevent it from solidifying. In effect, this creates a partial syrup. Weak colonies may be incapable of gathering enough water and feeding of dry sugar to them is not recommended.

Regardless of colony size, feeding dry sugar works best during autumn and spring when humidity is relatively high. The hot, dry conditions of summer make it hard for bees to dissolve sugar crystals into a liquid.

It may be preferable for a colony at starvation level to be first fed syrup before dry sugar is given. This will give the bees immediate food without the need to liquefy crystals. Bees will generally not use dry sugar when they are able to collect enough nectar for the colony's needs. The sugar will remain in the hive and in some cases will be deposited by the bees outside the hive entrance. A small amount of dry sugar may be converted to liquid and stored in the cells.

## Important note

Sugar remaining in combs must not be extracted with the next honey crop. The sugar will contaminate the honey and the extracted product will not conform to the legal standards set out in the [Australia New Zealand Food Standards Code - Standard 2.8.2 – Honey](#).

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Ideally, the amount of sugar that was given to the hive will be fully eaten by the bees at the time hives are placed on a honey flow. This is not always possible to achieve. Also, during expansion of the brood nest, sugar stored in brood nest combs may be moved by the bees to the honey super.

## SHOULD I FEED A POLLEN SUBSTITUTE?

A good supply of pollen is important for brood rearing as well as honey bee nutrition and health. Pollen from different species of plants vary in their nutritional value and a varied mix will help provide bees with a balanced diet. When pollen is not available from flowers bees will consume the pollen, they have stored in the hive. If there is no pollen available for your bees there are several pollen or pollen supplement products available on the market. These may assist bees maintain body protein and continued brood rearing.

## WHERE CAN I GO FOR MORE GENERAL INFORMATION ON THE BUSHFIRES?

For more information on bushfire recovery, please contact Agriculture Victoria on 1300 502 656 or visit <http://agriculture.vic.gov.au/bushfires>

Where can I get more information about beehive management?

For more information on beehive management see <http://agriculture.vic.gov.au/agriculture/livestock/honey-bees> or email [honeybee.biosecurity@agriculture.vic.gov.au](mailto:honeybee.biosecurity@agriculture.vic.gov.au)

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