



NSW Agriculture

# Honey bees on canola

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## Introduction

Canola (or oilseed rape) is a major beekeeping floral resource, producing quantities of both nectar and pollen in the early spring period. Canola is a winter-growing oilseed crop which is of major importance in the wheatbelt areas of temperate Australia.

There are two species of canola, *Brassica napus* and *B. rapa* but the varieties grown now are mainly *B. napus*. The name canola represents a variety in which the erucic acid makes up less than 2% of the total fatty acids in the oil, and the oil-free and air-dried meal must contain less than 40 micromoles of total glucosinolates per gram of meal.

The emphasis on *B. napus* varieties has implications for the role of honey bees in the pollination of this species.

## Beekeeping management

Canola blossom is frequently one of the earliest floral species available to commercial honey bees in the southern areas of Australia, flowering from September to October, depending on the geographic location, time of sowing and general condition of the crop.

Canola can be a major benefit in the management of honey bees or it can create major problems in bee management.

Canola can produce an abundance of both nectar and pollen but frequently the nectar does not yield until the weather is on the warmer side. Honey bees will not readily fly below 12°C and maximum flight is achieved above 19°C.

The flowering time coincides with the period from early spring to mid-spring in which weather patterns can be unpredictable. If the conditions

are mild and warm during the daytime, this will provide ideal foraging conditions for field honey bees.

The condition of the bees when they are first introduced onto a canola crop will have a significant impact on the appropriate management strategies to be considered by the beekeeper. If a colony is reasonably strong in population and healthy then the colony will quickly react to the available nectar and pollen, combined with the warmer spring conditions, and will rapidly expand its brood area.

Large numbers of bees in early spring in a congested hive will often lead to serious swarming problems. A strong colony is also likely to gather surplus quantities of nectar to ripen into honey. Honey crops are often obtained from this floral source.

A weak colony should benefit from being placed on canola blossom. The fresh nectar and pollen supply will encourage the colony to breed and to expand the brood area. If the colony experienced a particularly severe winter or is suffering from Nosema disease, access to canola blossom could help the colony to overcome the disease by enabling the bees to rapidly expand the population, displacing the old bees and quickly populating the hive with young, healthy bees.

However, the reverse can happen just as often, when the adult workers are placed under so much stress, foraging for pollen and nectar, ripening nectar and keeping the brood area warm, that the longevity of the bees is reduced and the hive population declines. This, particularly when combined with poor weather, will see the levels of Nosema increase.

## Swarm control

With the rapidly expanding population, swarming can be a problem with strong colonies. This is to be expected when working floral resources with surplus pollen and nectar resources, combined with the warming weather conditions associated with early spring.

Some fairly rigorous activity by the beekeeper is often needed to minimise swarming. Measures to slow or minimise swarming in the apiary include:

- Remove all capped honey and extract it.
- Move the brood — either to another hive (a weak hive) or above the queen excluder.
- Place 1–3 frames of foundation and/or empty drawn comb in the brood nest area. It is important that you don't overdo this too early, as it is possible with the cooler nights still prevailing in early spring to cause developing brood to chill and die. Thus, this procedure must only be considered with strong hives. The procedure could be carried out every 7–14 days.
- Remember that colonies headed by old queen bees are more likely to swarm than those with young queen bees. Plan on regular re-queening in late spring through to early autumn — at either 12 or 18 month intervals.
- It may be necessary to remove loads of bees from canola crops if it is increasingly difficult to stop swarming. A break in the stimulation provided by a fresh supply of nectar and pollen may improve the situation.

## Honey

The management of honey from bees on canola crops is unlike managing honey from most other sources in Australia. Honey obtained from canola candies very rapidly. Frequently beekeepers, after working this floral source, are confronted with the problem of honey combs full of candied honey which it is not possible to extract. Often these combs have to be stored to feed back to bees at a later date or simply sent back to the bees, where they are often only partly reworked by the bees and filled up with honey from a new floral source. The canola honey continues to act in seeding the new honey and this honey can also candy as a result, although not as rapidly as straight canola honey.

Some varieties of canola produce honey with a lower tendency to candy or granulate.

The beekeeper has a dilemma when working canola. To reduce swarming in the apiary, the beekeeper can provide plenty of comb space in the hive. This will allow the bees to spread the fresh nectar through a larger area to allow the ripening process to continue. On the other hand, it is important to extract honey on a regular basis when working canola crops to avoid problems with honey candying in the comb.

Canola honey should be removed as soon as it is ripe and capped. These combs should be extracted as soon as possible after removing them from the hive, preferably the same day or within 24 hours of removing the honey from the hive. Keeping the combs in a hot room will assist in slowing the candying process in the combs.

Do not leave canola honey in the comb or at any stage in the extraction process (settling tank, sump or lines). Remember that this honey crop cannot be handled the same way as honey from other sources.

Research in Canada has shown that canola varieties vary in the quantities of nectar and sugar constituents of the nectar available to foraging bees. Beekeepers based on the Central Tablelands of NSW have observed good yields of honey from the canola variety Rainbow. Some beekeepers have also observed that with some varieties no nectar surplus is obtained. The sugar ratios will influence the rate at which the canola honey candies — honey that candies slowly is obviously more desirable.

## Nutrition and canola pollen

Canola blossom provides an abundant quantity of yellow-coloured pollen that is very attractive to foraging honey bees.

Crude protein levels of less than 20% cannot satisfy colony requirements for optimum production. For an expanding colony, actively working a honey crop and producing significant amounts of beeswax, a pollen source with a crude protein level of 25–30% is desirable, with all the essential amino acids above the minimum levels.

Canola pollen generally achieves this level of quality, with crude protein levels ranging from 22% to 27%. The fat content of canola pollen is also considerably higher at around 7%, considerably higher than many pollens that are often around 2%. The significance of these levels is not fully understood in relation to honey bee nutritional requirements but this pollen is certainly very attractive to honey bees.

A large quantity of canola pollen can be collected from this floral source. Trapping pollen to store and feed back to bees at a later date may

be an option. It is also recognised that trapping pollen has also reduced the swarming incidence of strong colonies which can be a management problem when working this floral source.

### **Pollination**

There is a degree of controversy over the need for insect pollination of canola. Some reports claim that canola is largely self-pollinated and does not need honey bees, whereas other reports indicate greater seed yields when honey bees are present. Research conducted in Australia in 1997 indicated an increase in yield by 18% on the variety Karoo (pers. comm. Rob Manning, WA Department of Agriculture). Reports indicate that bees may also cause seed set to occur earlier, resulting in shorter, more compact plants with more even seed maturity, making such crops easier to harvest and less prone to the pods shattering.

There are distinct advantages in having honey bees on the crop if it is being grown for increase in seed. The seedling vigour and growth of a self-pollinated flower is not as vigorous as seed from cross-pollinated flowers. It is highly likely that honey bees benefit canola crops, but it is difficult to categorically state to what degree.

Information from Canada indicates the need for large numbers of bee hives for the pollination of hybrid canola seed, where stocking rates of six hives per hectare have been reported. These higher stocking rates reduce the honey produced by 75% as the main aim is to maximise seed production, and honey production is secondary. A normal stocking rate for honey production was stated as 0.5 hives per hectare (one hive per two hectares) for non-hybrid canola varieties.

### **Canola varieties**

There is some confusion and concern by beekeepers over the possible future use of genetically modified canola varieties in Australia, due to concerns about marketing honey produced from such sources. The European market has shown strong resistance to any products exported into their countries that have been produced from genetically modified organisms or products (GMs). There are also other potential problems and there has been a significant amount of discussion from American and Canadian sources, but serious problems have not been reported to date.

GMs are also referred to as transgenics. Some transgenic varieties of canola have been

genetically manipulated to give new properties to plants. These include production of protease inhibitors which confer resistance to fungi and insect attack. The intent is to reduce the use of chemicals in the growing of canola crops.

However, the chemicals produced by genes designed to inhibit insect feeding may also impact on pollinating insects in two ways:

- directly affecting bees foraging on the nectar and pollen
- modifying substances such as nectar and pollen that attract honey bees.

Two main groups of canola types currently dominate plantings in NSW. They are:

- regular varieties: Scoop, Surpass 600, Rainbow, Oscar, Grouse, 46CO1, Charlton, Dunkeld, 47CO2, Range, Monty, Hyola 42 and Mystic
- triazine-resistant varieties: Clancy, Surpass 600TT, Pinnacle, Drum, Karoo and Hylite 200 TT.

(Source: Agnote DPI/229, *Canola variety and management guide 1999*. Note: the number of varieties is increasing each year.)

### **Hybrid seed production**

Some beekeepers have been asked to provide bees for the pollination of hybrid canola for seed production. In these circumstances, two lines of canola are grown alongside each other. The line from which seed is to be produced is male sterile, so pollen must be provided from the male part of the adjacent lines. In these circumstances, a very high stocking rate of honey bees is needed to transfer pollen from the male fertile line to the female part of the male sterile line.

### **Pesticides**

As with honey bees working any agricultural or horticultural crop, the risk of pesticide sprays is a serious threat to the health and well-being of the honey bees. Bees find canola very attractive and will fly several kilometres to forage on the blossom of canola crops. For growers it is often necessary to apply an insecticide to control pests during flowering when the bees are the most active but insecticides kill bees and serious losses have been experienced while hives have been working canola crops.

It benefits both the grower and the beekeeper to have bee hives on canola crops, so it is very important for growers and beekeepers to talk regularly to avoid problems associated with pesticides and to ensure that adequate notice is received to remove bees.

Where there is a choice of pesticides, it is possible to select chemicals that are less damaging if applied correctly. Spraying crops at sunset, after most of the bees have returned to the hive, with a chemical that will only remain toxic for 6–10 hours, will ensure a safe environment for the bees when they resume foraging in the morning. Some insecticides remain toxic for a number of days and bee hives should be removed from the crop if these chemicals are to be used.

### **Overseas situations**

Canola is a major honey source in the world bee-keeping scene, especially in Canada. In many northern hemisphere countries, canola flowers later than in Australia, in the spring or early summer. Colonies are already built up in population by this time and often large quantities of honey are extracted, canola often being the main floral source in some regions.

The honey characteristics are the same for these countries as in Australia, but beekeepers have adapted their management strategies to cope with the quickly candying honey. Management decisions and timing are critical when working bees on canola, due to the speed at which canola honey can candy and the need to build up colonies after the winter period ready for the main honey gathering season.

### **Further information**

Contact your local office of NSW Agriculture for information on the location of the nearest district agronomist for current information on canola, or the nearest apiary officer for information on beekeeping.

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The information contained in this publication is based on knowledge and understanding at the time of writing (March 2002). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of New South Wales Department of Agriculture or the user's independent adviser.