



Dyce Laboratory for Honey Bee Studies

Master Beekeeper

Dyce Lab

Resources

Information

B-Files

Management

News

The Bee-Files

search this site



THE Bee-Files

Dyce Laboratory for Honey Bee Studies
Department of Entomology
Cornell University
Ithaca, New York

IPM: The Healthy Bee Hive – Minimizing Stress

Nicholas Calderone

July 1999

“The first rule of a physician is ‘Do no harm.’ Beekeepers should heed this counsel as well.”

“Your management system, more than any other single factor, defines your bees’ environment.”

“Evaluate your locations from the bee’s point of view.”

Key Words

Management system: an organized set of manipulations that you perform on your colonies to achieve specific goals

Stress-related condition: an adverse condition caused by subjecting an organism to one or more environmental conditions outside of its optimal range

Dearth: a period when there is no nectar or pollen available for the bees in the field

Sub-lethal effects: damage that does result in the immediate death of an organism but that shortens its life-span or compromises its ability to function normally



Different colors, appropriate stands, the right direction, and clean equipment all contribute to a healthy colony.

In April’s introduction to IPM, I listed your management system as one of the major cultural tools at your disposal in your effort to minimize damage to your bees from pests, parasites, pathogens and predators. While management practices are usually used to help your bees recover from various maladies, they can also be used to help your bees from becoming sick in the first place. Bees, like any living organism, thrive in some environments and experience stress in others. A number of conditions, like European foulbrood and chalkbrood, are thought to be at least partially stress-related conditions. Stress can also affect the life-span of the adult bee and, thus, the size of the colony’s population. This, in turn, will be reflected in diminished crops and weaker colonies going into winter. Your management system, more than any other single factor, defines your bees’ environment.

It is important that you understand your role as your bees’ physician. *Remember!* The first rule of a physician is ‘Do no harm.’ Beekeepers should heed this counsel as well. Everything you do to your bees should promote health and

minimize stress. In this column, I want to discuss some basic management practices that will help you provide your bees with the environment necessary to attain these goals.

SELECTING THE APIARY

The most important decision you make for your bees is your choice of apiary locations. Choose wisely and your bees will prosper. Choose poorly and they will perish.



1. Apiary with several desirable features



2. Apiary with several undesirable features

There are a number of **DO's** to keep in mind when selecting a location:

Do select a site with:

- dry, well-drained ground
- plenty of sun throughout the day
- protection from prevailing winter winds - when evaluating a location, think about how well protected it will be when all of the leaves have fallen from the surrounding trees and bushes in the fall
- a gentle slope to ensure adequate air drainage
- good road access - check out prospective locations in the fall or spring, when the ground is likely to be wet
- protection from vandals
- productive nectar and pollen flows throughout most of the season

There are also a few **DON'TS** you should keep in mind:

Don't select a site:

- in a wet or boggy area
- in a low area or in an area subject to flooding - cold pockets can develop in low-lying areas and heavy rains can cause flooding
- on a hill top - hilltops tend to be windy and this discourages foraging in the summer and makes the bees work harder to keep warm in the winter
- close to your neighbor's property line - bees can cause problems with pets and with people -they can also leave quite a mess during 'cleansing flights', causing damage to cars, houses and other surfaces
- where your bees are likely to be poisoned by pesticides - explore the area around any site you are considering for an apiary - apple orchards are great during bloom but can cause problems after petal fall
- areas where lots of sweet corn is grown can cause problems with PennCap-M

Most locations will possess several desirable traits, but will lack others. A location may be excellent for the production season, yet, it may be very poor for wintering, and vice-versa. If you don't mind moving your bees, you can use two locations for your bees, one for making honey and the other for wintering. Remember! A winter yard can support a lot more colonies than most summer yards, so you don't have to have as many. You may also want, or need, more than one summer location, each with a major flow that occurs at a different time during the season. Make a checklist and evaluate several potential locations before making a final decision. Always evaluate your locations from the bee's point of view.

Siting your colonies

Site your colonies on stands that raise them between 4" and 8" off the ground on. This will keep the bees dry and warm and will keep the entrance above the grass. It will also protect your equipment from moisture damage. There are many types of stands. A couple of cinder blocks will work fine. A two-hive stand or a pallet that holds four hives allows you to push your colonies together for wintering, thereby reducing the surface-area to volume ratio. This means that your bees will lose heat less rapidly. A major disadvantage of multiple-hive stands is that you



3. Hives on stands.

sacrifice accessibility to your bees, so it is more difficult to work them. This can be very annoying.

Place your colonies somewhere between southeast and south. Make sure that they are in full sun on the south side. This will help warm your bees, especially in the morning. Tilt your colonies forward about 5 degrees, just enough to ensure that water does not collect on the bottom board. Another problem to avoid is drifting. Drifting can spread diseases and mites. If progressive, it will significantly weaken some of your colonies, and they will make less honey. You can minimize drifting by placing your colonies in an irregular pattern within the apiary. The use of colored landmarks – signs – can also reduce drifting.



4. Apiary with identifying marks.

Nectar and pollen flows

Beekeeping is a lot like the stock market. Everyone thinks he is an expert when the market is going up, but the real expert makes money when the market is going down. So too, a good nectar flow makes everyone think that he is a good beekeeper, but the real beekeeper can make honey even when the nectar flow is poor and his neighbor is feeding his colonies.

Become familiar with the nectar flow patterns of each of your apiaries. This gives you something by which to gauge each year's flow. When you find yourself in a year that is below average, you can move bees to an alternate location or, in extreme cases, provide feed. Remember! While nectar flows usually exhibit broad regional trends, there can be considerable variation within a region, whether the year is above or below average. Some locations can support a seemingly unlimited number of colonies in a good year. But in most years, most locations support a limited number of colonies. Overstocking an apiary can seriously diminish the average yield per colony. It can also reduce the size of your colonies. As a result, you will lose out on any subsequent crops that year; and, your bees may be too weak to winter. Careful production records, a scale colony in every yard and several years of experience are your best tools for learning the value of each of your apiaries. Remember! Nothing makes for a healthy colony like a good nectar and pollen flow.

Overheating

Overheating places your bees under stress. You can reduce overheating by painting hives with white paint or some other light color. Aluminum paint, especially on your outer covers, is also suitable. If you live in an especially hot region, you will want to locate your bees so that they do not bear the brunt of the midday sun. An upper entrance can also help. It will allow for airflow through the hive, and this will help the bees regulate the temperature and speed the drying of nectar.



5. No matter how you supply water -supply water.

Supplemental water is essential during dry spells and hot weather. Bees need water to cool the hive and to rear brood. Water comprises about 66% of brood food and is essential to the maintenance of the proper humidity in the brood nest. If your bees do not have ready access to a continuous supply of fresh, clean water – within a ¼ mile - you should provide it. A galvanized laundry tub or 5-gallon plastic pail will work fine. Place the water near the bees and change it weekly. Be sure to use floats on the water so that the bees do not drown. Providing water will also reduce the chances that your bees will become a nuisance during hot, dry spells when they will forage for water wherever they can find it, even in a neighbor's garden fountain or swimming pool.

Feeding your bees

When there is a dearth of nectar, colonies will reduce brood rearing and begin to consume their stores. Depending on when this occurs, colony populations may dwindle and be too small to winter or to make a crop. Full-sized colonies with less than 3 combs of stored honey are at risk. If you find a colony with honey stores below this level during the summer, feed one gallon of sugar syrup (1 part granulated cane sugar to 1 part hot water) for each comb below this level. Colonies can also experience a pollen dearth. Pollen is essential for brood rearing and bees will cannibalize

existing brood if they experience a dearth of pollen in the field. If you notice brood being eaten, a lack of stored pollen, and a lack of foragers returning to the nest with pollen, you should feed the colony a pollen substitute or supplement. Or, you could move your bees to a better location.

Moving bees

Moving bees is often necessary, but it is not without risk. Bees can overheat and die and queens can be lost. If you move bees when it is warm out, use a top screen to provide ventilation. This is especially important for strong colonies or whenever the bees will be confined for a drive or more than a few hours. Be sure to load your bees so that the combs run parallel to the road. This will keep them from swinging together when you are starting and stopping and will prevent bees from being crushed.



6. Top screen on hive.

Move bees at night or on cool or rainy days when there is no flight. If you move them on a nice day, you will lose your foraging force. When moving bees, follow the rule – ‘Less than a foot, more than a mile’ – although I would suggest more than two miles. Bees orient to their colony’s entrance. If you move them more than a foot, but stay within their established flight range, they will return to the site of the original entrance and be lost. You can lose your foraging force this way, as well. When this happens, the food supply line that the nurse bees are drawing on to produce brood food is disrupted. This places your bees under great stress. I have seen colonies moved short distances come down with serious cases of EFB and chalkbrood from which they never recovered. If you move your bees more than two miles, most of the bees will find themselves in an unfamiliar environment and will re-orient to the new location.

Occasionally, a property owner will let you site your bees on his land, but soon ask that you move them a few yards or so after they have oriented to their entrance location. This can create a lot of work for you, because you will have to move them two miles away for two weeks, and then move them back. It is also an extra move for the bees, and that means extra stress. Be sure the property owner understands that your bees cannot be easily relocated once they are set down.



7. TM on brood nest.

Chemicals

Sometimes, chemicals must be used to prevent AFB or to control parasitic mites. Misuse of terramycin can cause brood mortality. Be sure that you use the proper dose applied in the proper manner in a ring around the brood nest (Fig. 7: TM on brood nest). Non-registered formulations of Amitraz, Apistan and Coumaphos are not only illegal, they can also be toxic to bees because proper application rates have not been established and because they contain solvents that are toxic to bees. You also increase the risk of contaminating your hive products. Pesticides and formulations that are not registered for use in bee colonies should **NEVER** be used on bees.

Recently, there has been considerable interest in the use of essential oils for control of parasitic mites. Essential oils may someday play a role in mite management, but they also carry some risk. Many essential oils can be toxic to honey bees as well as to mites. You may not see a large bee-kill, but the bees may suffer from sub-lethal effects. Generally, these are not noticed by casual observation, but they can have a significant and negative impact on your bees. Remember! Anything that shortens the life of a bee will weaken the colony, reducing its honey producing capacity and its ability to successfully winter.



8. Queen introduction cage

Requeening

Keep young, vigorous queens in your colonies at all times (Fig. 8: queen introduction cage). Queen failure will significantly weaken a colony and that will reduce its ability to produce a crop and to successfully winter. It is absolutely essential that your colonies have young, vigorous queens going into winter.

Pollination

Renting your bees for pollination can place them under considerable stress, both from the move and from conditions found on site. Some crops, like melons, squash, cukes and cranberries, generally yield little nectar. Other crops may yield nectar, but colony density during pollination is so high that individual colonies do not get much in the way of pollen or nectar. Lowbush blueberries in the northeast are one example of such a crop. Other crops produce limited amounts of pollen or pollen that is not, by itself, adequate for rearing healthy brood. The result is that your colonies

rear less brood, consume stores, and often break down with EFB or chalkbrood. Provide your bees with a slow-release pail of syrup and possibly a pollen patty while they are working these crops.

Bees in pollination are often within a stone's throw of bees from half a dozen other beekeepers. This situation is conducive to the spread of mites, AFB and other diseases. If you are going to place your bees in a high-density situation, be sure that you are using terramycin as a prophylactic against AFB. Make your last application 45 days before you plan to super for honey production. This would also be a good time to be treating for varroa, but you will have to remove the strips before adding your honey supers. Follow these rules, and your bees will come out of pollination in good condition for making honey.

Overwintering

Beekeeping is a cyclical enterprise. Your success in one phase of the cycle depends on your success in the previous phase. A successful production season begins with strong, healthy colonies in the spring. This requires careful planning and attention the previous summer and fall. Colonies must go into the winter with strong populations of healthy bees and with adequate stores of honey and pollen. One of the biggest mistakes I see beekeepers make is attempting to winter weak or marginal colonies. The old adage – “take your losses in the fall” – is often ignored. Weak colonies should be thoroughly inspected in the fall to determine the cause of their condition. Any colony that is heavily infested with mites or disease a month before the fall flow is over should be destroyed. Treating a colony at that time may eliminate the problem, but it cannot buy the time necessary to produce a healthy flush of new bees for winter. The bees that are present are probably of poor quality and may be more of a detriment to another colony than a benefit. So, take the extra honey, and use the income to buy a package or nuc next spring. Colonies that are weak because of queen failure or poor nectar and pollen flows earlier in the season should be combined with moderately strong to strong colonies. Uniting weak colonies with each other is not likely to produce a strong colony.

Colonies should have adequate stores of high quality feed on which to winter. Those with inadequate stores should be fed. The best winter food is capped honey from a disease free source - which generally means another one of your colonies that you know to be free of disease. Be sure that it is not crystallized. High fructose corn syrup (e.g., Crystal 55 from ADM) and sugar syrup (2 parts granulated cane sugar to 1 part hot water) also make suitable winter feeds. Beet sugar has a higher percentage of ash and is not a good bee food.

Colonies must also have enough pollen stored in the fall to support brood rearing during the late winter and early spring build up when fresh pollen is not yet available in the field. Colonies going into the winter without stored pollen have been shown to be 72% smaller in the spring than colonies with adequate pollen stores. How much pollen you need depends on how long your bees will be without natural forage. In the northeast, bees typically go without natural forage from mid to late October through early April. Under these conditions, I recommend 500-600 square inches of pollen in the center combs of the upper brood chamber. As the fall flow winds down, it's a good idea to place a couple of partial combs of pollen in the upper hive body in which your bees will be wintering and have the bees fill them up with honey.

Early inspections

Be sure that you make a late winter inspection. You need to know if your bees are alive and if they have sufficient food to get them through until nectar and pollen are available and accessible in the field. You shouldn't break the cluster at this time, but full combs of capped honey can be used to replace empty combs on the sides of the cluster. Do not remove brood at this time because low temperatures and brisk winds will chill it. Never open your hive when it is raining.

Beekeeping is a highly skilled enterprise. It takes a lot of know-how and a commitment to carefully designing and implementing a management system that reflects a thorough knowledge of the bees' biology. Never underestimate the value of providing the optimal environment for you bees. If you incorporate the recommendations presented here into your management system, you will help your bees maintain vigor and health. Of course, your management system must also have carefully outlined procedures for controlling pests, parasites, pathogens and predators. In my next column, I will outline an IPM program for control of parasitic mites.

Recommended Reading

Ambrose, John T. 1992. Management for honey production. In *The Hive and the Honey Bee* (Graham ed), pp. 601-655. Dadant and Sons. Hamilton, IL.

Avitabile, A. 1992. For the Beginner. In *The Hive and the Honey Bee* (Graham ed), pp. 575-600. Dadant and Sons. Hamilton, IL.

Furgala, B. and D. M. McCutcheon. 1992. Wintering productive colonies. In *The Hive and the Honey Bee* (Graham ed), pp. 829-868. Dadant and Sons. Hamilton, IL.

Shimnuki H., and D. A. Knox, B. Furgala, D. M. Caron, and J. L. Williams. Diseases and pests of honey bees. In *The Hive and the Honey Bee* (Graham ed), pp. 1083-1151. Dadant and Sons. Hamilton, IL.

Caron D. IPM for beekeepers. *American Bee Journal* 139: 363-365.



[Master Beekeeper](#) | [Dyce Lab](#) | [Beekeepers Resources](#) | [General Information](#)
[B-Files](#) | [Bee Management](#) | [News](#) | [Events](#) | [CU Bee Courses](#) | [Home](#)



Cornell University

© Copyright 2003, Nicholas W. Calderone, Associate Professor, Department of Entomology, Cornell University, Ithaca, NY 14853

[Webmaster](#)

Updated April 2005

Web Site Design: *L.Fazzar*