

# BEEKEEPING: General Information

by R. A. Morse and E. J. Dyce

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**BEEKEEPING:**

**General Information**

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This bulletin provides general information about beekeeping that is not usually included in current publications. Information on specific beekeeping problems can be obtained by writing to the Office of Apiculture, Department of Entomology, Cornell University, Ithaca, N.Y. 14853.

**Extent of Beekeeping Industry**

In New York State about 8,500 people keep at least 125,000 colonies of honey bees. The annual production is about 8 million pounds of honey and 120,000 pounds of beeswax. These figures are higher than the national average of state production but not as high as those for the leading honey-producing states in the Midwest. New York ranks first in the East in honey production and is usually among the first 7 in the country in the number of colonies and production.

**Honey Bee as a Pollinator**

The pollination of agricultural crops is the most important contribution of honey bees to our national economy. Although the value of honey bees for pollination cannot be estimated, it is many times the total value of both the honey and beeswax that they produce. Without cross-pollination many crops would not set seed or produce fruit. Many insects other than the honey bee can carry pollen from one plant to another; but in areas where agriculture has been intensified, such as the fruit areas in New York State, the number of these other insects is inadequate for commercial pollination.

Several conditions have contributed to a decline of the native pollinating insects in certain areas. In recent years there has been a trend toward intensive and specialized agriculture. General or diversified farming is neither popular nor profitable. Land that is used to grow only one crop does not provide nectar and pollen for wild pollinating insects over a long period of time. The elimination of hedgerows when fields are made larger reduces the nesting locations for pollinating insects. Pesticides can affect the populations of certain insects.

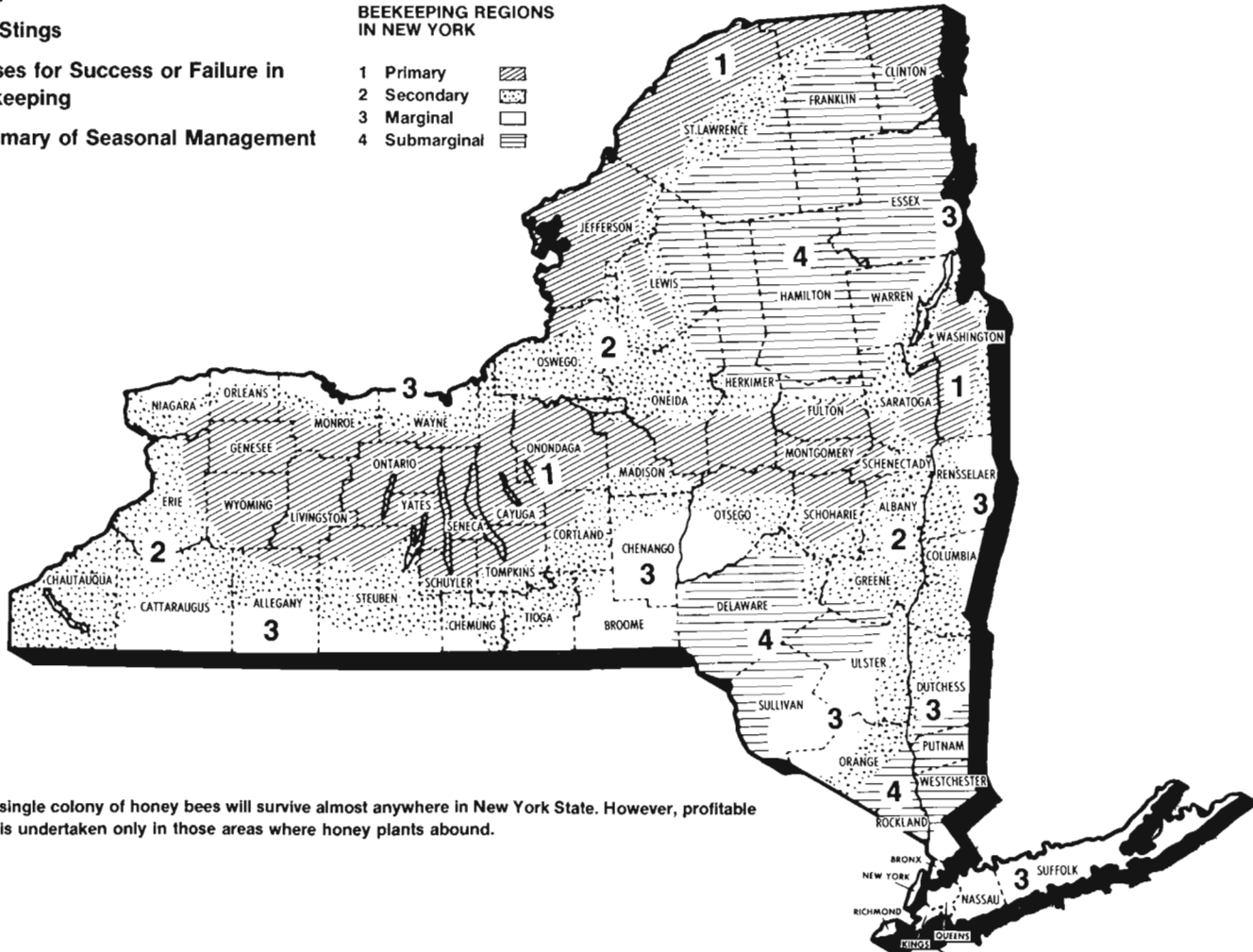


Figure 1. A single colony of honey bees will survive almost anywhere in New York State. However, profitable beekeeping is undertaken only in those areas where honey plants abound.



It is estimated that over 15,000 colonies of honey bees are used to pollinate apples and other fruits in New York State each year. Additionally, New York State bees are moved to Vermont, Massachusetts, Connecticut, and Maine for the same purpose. Although fruit pollination is the primary use for which beekeepers are paid, about 1000 colonies are rented for the pollination of other agricultural crops, including birdsfoot trefoil, cucumbers, and cantaloupes. Beekeepers tend to think in terms of crops from which they receive compensation, but conservationists are aware of the pollination of wild fruit, nut, and seed crops that benefit from an abundance of honey bees.

### Who Keeps Bees?

Bees are kept by persons in all walks of life. For some, beekeeping is an interesting hobby; for those who operate several thousand colonies, it is an important source of income.

### Where Bees Can Be Kept

A small number of people have a great fear of honey bees. Often such people confuse bees and wasps. They may also be unaware of the service honey bees perform for mankind. Beekeepers will testify that bees busy pollinating flowers or gathering nectar will not sting unless disturbed.

Bees have been kept successfully and without being a nuisance in large cities. For a number of years, for example, about 10 hives of bees were kept in the Brooklyn Botanical Garden, which is located in a densely populated area. Since 1925 there has been a fairly large apiary immediately adjacent to the Cornell University campus. It is surrounded by a hedge of evergreens about 10 feet thick and 15 feet high. There is only a single, narrow entrance to the apiary, and the bees are forced to fly over the hedge and above the heads of people or the tops of cars driving in the vicinity.

When bees fly unhindered across a road or from their hive along a path used by walking people, the bees could be a nuisance. Bees accidentally hitting a person are not inclined to sting; however, if such a bee is hit or struck, she may sting. Races of bees vary in their propensity to sting. Beekeepers in congested areas are advised to check their colonies and to requeen those that show a greater tendency to sting.

Beekeepers who have remote apiaries may suffer from vandalism and the occasional curious person who removes a hive cover without knowing what is within. For these reasons beekeepers usually hide their apiaries behind or in woods. This too prevents their flying where they may be a nuisance.

A good apiary location receives a maximum of sunlight. It should have good air and water drainage and slope to the south or east. A windbreak is helpful. A source of clean water is needed by bees, which use water to dilute the food fed to larvae and also to cool the hive in warm weather.

It is an unwritten law among beekeepers that no sizable apiary should be placed within 2 miles of another such apiary. If this practice is violated, there may be too little forage, and the colonies in both the old and new apiary will suffer.

**Figure 2. Although the primary source of income for the New York State beekeeper is the honey produced, thousands of colonies of bees are rented for pollination. Many crops, including these onions grown in muck in central New York, require cross-pollination by insects to set seed.**



## A Skilled Occupation

Beginners in beekeeping are often motivated by a desire to make a living from honey production. So many things are involved that it is impossible to state the number of colonies needed to accomplish this. If bees are given proper attention, 500 colonies are considered the maximum that a skilled beekeeper can manage without extra help. The complete equipment necessary to operate such an outfit efficiently may require an investment of \$100,000. No beginners should consider such an outlay until they have had several years of experience with bees and are convinced that they have the necessary ability to produce and sell enough honey to make the venture a financial success. A good plan is to increase the number of colonies each year while continuing a full- or part-time job.

## How to Acquire a Knowledge of Beekeeping

Success with even a few colonies requires a thorough knowledge of the life and the behavior of bees. A good way to obtain this knowledge and at the same time to learn whether beekeeping is a congenial occupation is to work with a skilled beekeeper. While obtaining practical experience, one should devote spare time to reading the best books and bulletins on the subject. Few persons make a success of beekeeping without practical experience.



## State Apiary Inspection

Most states, including New York, hire a chief apiary inspector and, during the active bee season, several assistant inspectors to inspect colonies of bees for disease. One bacterial disease of honey bees, American foulbrood, is particularly troublesome. It is a disease that affects only honey bees; colonies that become infected almost invariably perish.

New York State law requires that bees sold or moved intrastate must be accompanied by a permit from the Department of Agriculture and Markets. Seasonal permits are issued to those individuals who have bees in more than one location and must move healthy bees and used apiary supplies and equipment between established apiaries and between apiaries and the honey house. Many states into which New York State beekeepers move their bees also require a certificate of inspection.

The inspection of colonies and the destruction of those infected with American foulbrood are in the best interest of the beekeeping industry. The request for the original inspection laws was strongly supported by the New York State Horticultural Society, whose members are concerned about having a healthy industry and bees available to be moved into orchards in the spring for pollination. Support for apiary inspection has also come from conservationists interested in the pollination of wild fruit, nut, and seed crops needed by wildlife.

For their own protection and that of their neighbors, persons owning bees must register with the Chief Apiary Inspector. Those needing certificates of inspection can write to the Department of Agriculture and Markets, Building 8, State Campus, Albany, N.Y. 12235.

## Beekeeping Literature and Beekeepers Associations

### PRACTICAL BOOKS

- Honey Bee Brood Diseases* by Henrik Hansen. Wicwas Press, 425 Hanshaw Road, Ithaca, N.Y. 14850. 32 pages. 1981.
- Beekeeping in the Midwest* by Elbert R. Jaycox. Office of Agricultural Publications, 1301 W. Gregory Drive, Urbana, Ill. 61801. 169 pages. Revised, 1981.
- Making Mead* by Roger A. Morse. Wicwas Press, 425 Hanshaw Road, Ithaca, N.Y. 14850. 127 pages. 1980.
- Rearing Queen Honey Bees* by Roger A. Morse. Wicwas Press, 425 Hanshaw Road, Ithaca, N.Y. 14850. 128 pages. 1979.
- Comb Honey Production* by Roger A. Morse. Wicwas Press, 425 Hanshaw Road, Ithaca, N.Y. 14850. 128 pages. 1979.
- ABC and XYZ of Bee Culture* by A.I., E.R., H.H., and J.A. Root. A.I. Root Co., Medina, Ohio 44256. 723 pages. 1978.
- The Hive and Honey Bee*, edited by Dadant and Sons. Dadant and Sons, Inc., Hamilton, Ill. 62341. 740 pages. 1975.
- The Complete Guide to Beekeeping* by Roger A. Morse. E.P. Dutton Inc., 201 Park Avenue South, New York, N.Y. 10003. 219 pages. Revised edition. 1974.
- Queen Rearing* by H.H. Laidlaw and J.E. Eckert. University of California Press, Berkeley, Calif. 94790. 165 pages. 1962.
- Honey Plants Manual* by Harvey B. Lovell. A.I. Root Co., Medina, Ohio 44256. 64 pages. 1956.
- Starting Right with Bees*, revised and edited by Walter Barth. A.I. Root Co., Medina, Ohio 44256. 100 pages. 1956.
- Five Hundred Answers to Bee Questions* revised and edited by Walter Barth. A.I. Root Co., Medina, Ohio 44256. 100 pages. 1955.

**Figure 3.** This apiary is surrounded by trees that protect it from high winds, but is large enough for the colonies to receive a maximum of sunlight. The building in the rear is used for the storage of extra supers and equipment.





### SCIENTIFIC BOOKS

*Honey Bee Pests, Predators and Diseases*, edited by Roger A. Morse. Cornell University Press, Ithaca, N.Y. 14850. 432 pages. 1978.

*Sociobiology* by Edward O. Wilson. Belknap Press of Harvard University Press, Cambridge, Mass. 02138. 416 pages. 1975.

*Bees and Beekeeping* by Roger A. Morse. Cornell University Press, Ithaca, N.Y. 14850. 320 pages. 1975.

*The Social Behavior of the Bees* by Charles D. Michener. Belknap Press of Harvard University Press, Cambridge, Mass. 02138. 404 pages. 1974.

*The Insect Societies* by Edward O. Wilson. Belknap Press of Harvard University Press, Cambridge, Mass. 02138. 548 pages. 1971.

*Bees: Their Vision, Chemical Senses and Language* by K. von Frisch. Cornell University Press, Ithaca, N.Y. 14853. 157 pages. Revised edition. 1971.

*Communication among Social Bees* by Martin Lindauer. Harvard University Press, Cambridge, Mass. 02138. 161 pages. Revised edition. 1971.

*Insect Pollination of Crops* by John B. Free. Academic Press, 111 Fifth Avenue, New York, N.Y. 10003. 544 pages. 1970.

*The Dance Language and Orientation of Bees* by Karl von Frisch. Belknap Press of Harvard University Press, Cambridge, Mass. 02138. 566 pages. 1967.

*Anatomy and Dissection of the Honeybee* by H.A. Dade. Bee Research Association, 11 Poplar Grove, Maidstone, Kent, England. 158 pages, plus plates. 1961.

*Anatomy of the Honey Bee* by R.E. Snodgrass. Comstock Publishing Co., Cornell University, Ithaca, N.Y. 14853. 330 pages. 1956.

### BEEKEEPING JOURNALS AND ASSOCIATIONS.

Beekeepers associations in several states issue journals or newsletters to their members. New York State currently has 11 local (often county) associations as well as the statewide Empire State Honey Producers Association. This latter group issues a newsletter twice a year, immediately before its annual 2-day meeting, which is usually held in December, and its annual summer picnic, usually held in late July. Dues for the Empire State Honey Producers Association are \$10 per year. Information about local associations and the state association can be obtained by writing the Office of Apiculture, Department of Entomology, Cornell University, Ithaca, N.Y. 14853.

The following monthly journals have national and international distribution. They are available on a subscription basis by writing directly to the publishers. Each carries extensive advertising by suppliers of beekeeping equipment.

*The American Bee Journal*, published by Dadant and Sons, Hamilton, Ill. 62341.

*Gleanings in Bee Culture*, published by the A.I. Root Company, Medina, Ohio 44256.

*The Speedy Bee*, published by Troy H. Fore, Jr., P.O. Box 998, Jesup, Ga. 21545.

Of the bee journals published in other countries, *Bee World*, published by the International Bee Research Association (IBRA), Hill House, Chalfont St. Peter, Gerrards Cross, Bucks., England SL9 0NR, is outstanding. For many years this journal has published articles and abstracts in English of all the important scientific papers on beekeeping throughout the world. To serve bee research and beekeeping more effectively, the association changed its policy in 1962 and now publishes 3 separate bee journals: *Bee World*, *Apicultural Abstracts*, and *Journal of Apicultural Research*.

Membership in the IBRA is open to all persons interested in bees and beekeeping. Application forms can be obtained by mail.

Figure 4. To inspect a colony, the outer telescopic lid and inner cover are removed. The beekeeper next smokes the top bars of the frames. Note that the beekeeper stands to one side of the colony so as not to interfere with flight to and from the entrance.



### Interstate beekeepers organizations.

The best source of information about beekeepers meetings and organizations is a current bee journal. *The American Bee Journal*, *Gleanings in Bee Culture*, and *The Speedy Bee* carry notes on county, state, interstate, national, and international meetings.

**The Eastern Apicultural Society** was formed in the late 1950s to bring beekeepers together at an annual meeting, to talk about mutual problems. The society meets in one of the New England states, Ontario, New York, Ohio, Pennsylvania, Delaware, Maryland, West Virginia, or Virginia, usually at a state college. The 3-day meeting, often held in August, includes a honey, beeswax, and gadget show. Demonstrations are given during good weather.

**The American Beekeeping Federation** is one of two national organizations that represent the industry. The federation publishes its own newsletter and holds an annual meeting, usually in January. The location of the annual meeting is changed from year to year to provide beekeepers in different sections of the country a better opportunity to attend.

**The American Honey Producers Association** is a group of commercial beekeepers who have joined together to solve industry problems. The association publishes its own newsletter. It, too, moves the location of its annual meeting from year to year so as to accommodate beekeepers in various parts of the country.

**County and local associations.** Active beekeepers' associations meet in several areas in New York: Finger Lakes Beekeepers Club, Long Island Beekeepers Club, Mid-York Beekeepers Association, Monroe County Beekeepers Association, Northeast & Schenectady County Beekeepers Association, South-eastern Beekeepers Club, Southern Tier Beekeepers Association, Ulster County Beekeepers Association, Westchester County Beekeepers Association, and Western New York Honey Producers Association.

For further information the local county agricultural agent should be contacted.

County and state organizations exist in most states and welcome persons from out of state. Many persons in New York City, for example, regularly attend meetings in New Jersey. Information about such meetings will be found in the bee journals or can be obtained by writing to a state college of agriculture.

**BULLETINS.** Three bulletins pertaining to bees and beekeeping are available by writing the Distribution Center, 7 Research

Park, Cornell University, Ithaca, N.Y. 14850.

*Wintering Honey Bees in New York State* by E.J. Dyce and R.A. Morse. Information Bulletin 109. 10 pages. 1978.

*Package Bees: Their Installation and Immediate Care* by G.F. Combs and R.A. Morse. Information Bulletin 7. 8 pages. 1971.

*Bait Hives in Northeastern States* by R. Morse. Information Bulletin 187. 8 pages. 1982.



Figure 5. To check on colony condition, the frames are removed one at a time. The beekeeper holds the smoker between his legs for immediate use should additional smoke be needed to calm the colony.

**USDA PUBLICATIONS.** The United States Department of Agriculture has bee laboratories in Maryland, Wisconsin, Utah, Wyoming, Arizona, and Louisiana. These are research laboratories; but in each case there is a close association with the state land-grant college, and some teaching and extension are usually done with persons interested in beekeeping. The USDA has several bulletins and circulars about certain aspects of beekeeping available without charge. For further information about USDA publications write USDA, Bioenvironmental Bee Laboratory, Plant Protection Institute, Agricultural Research Station, Beltsville, Md. 20705.

**Annual statistics for the USDA.** Figures on the number of colonies and the annual production of honey and beeswax for each state can be obtained without cost from the Crop Reporting Board, Statistical Reporting Service, USDA, Washington, D.C. 20250.

#### **BEEKEEPING LIBRARY AT CORNELL UNIVERSITY.**

The Everett Franklin Phillips Beekeeping Library consists of thousands of books, bulletins, pamphlets, and volumes of beekeeping journals. It is probably the most valuable collection of beekeeping literature in the world. Some notable collections have been included, such as the entire beekeeping library of Moses Quinby, all books known to remain from the libraries of L.L. Langstroth, Dr. C.C. Miller, and Dr. John Anderson, the Dr. Ludwig Armbruster Library, the Evard French Library, and a large collection of first editions. Among the most valuable items are Langstroth's handwritten journal, his letterpress book, and a diary of Moses Quinby.

Most items in the library, except the special treasures, are available to serious users through Interlibrary Loan Service. Applications should be made to any public library.

Some of the most valuable parts of this library have been obtained by exchange with foreign institutions and libraries, and there is constant need for extra copies of older books and all volumes of beekeeping journals. Such gifts are welcome and should be addressed to the Office of Apiculture, Department of Entomology, Cornell University, Ithaca, N.Y. 14853.

#### **Cornell Home Study Course in Beekeeping**

The Cornell home study course in beekeeping is designed to help beekeepers make their apiaries more profitable. Ownership of an apiary or at least one colony of bees is desirable but not necessary. The course requires a limited knowledge of the handling of bees. Written reports on 9 lessons and 3 practical exercises are required. All papers are graded and returned. The enrollment fee for the course is \$20. One textbook must be purchased.

Applications and information concerning the course should be addressed to Office of Apiculture, Department of Entomology, Cornell University, Ithaca, N.Y. 14853.

#### **Cornell Summer Short Course in Beekeeping**

The Cornell summer short course in beekeeping, which starts on a Friday evening and continues through Sunday, is offered each year, usually in mid-July. Participants stay in the University dormitories and eat in the University cafeteria for the weekend.

The program consists of lectures and demonstrations designed for beginners and those in their first years as beekeepers. Weather permitting, colonies are examined by participants under the guidance of instructors.

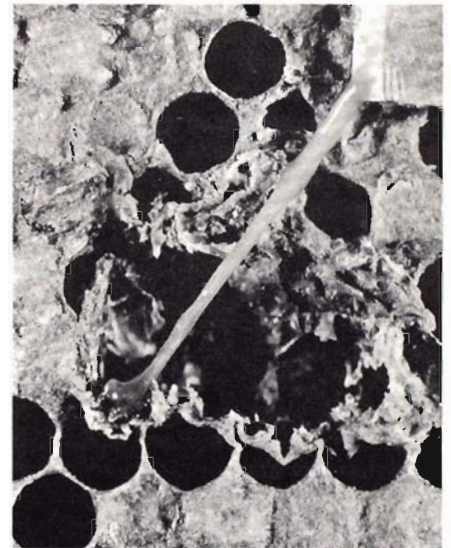
Applications and information concerning the course can be obtained from Office of Apiculture, Department of Entomology, Cornell University, Ithaca, N.Y. 14853.

#### **Visual Material**

Motion pictures on the life, habits, and behavior of honey bees can be obtained from Audio-Visual Resources Center, 8 Research Park, Cornell University, Ithaca, N.Y. 14850. A catalog listing the films available and the procedure for obtaining them will be forwarded on request.

#### **When to Start Beekeeping**

The best time to start beekeeping is in the spring. Many beginners start by buying packages that consist of 2 or 3 pounds of bees and a mated queen, shipped in a temporary wire cage without combs from the southern states. It is advisable to install package bees on full sheets of comb foundation instead of drawn combs and to feed them sugar syrup instead of honey. These precautions are taken to guard against the possibility of spreading American foulbrood. The same precautions should be taken in hiving stray swarms of bees. Established colonies purchased from a neighboring beekeeper should be well supplied with honey and should be in standard hives in good condition and accompanied by a certificate of disease inspection from the Chief Apiary Inspector, Department of Agriculture and Markets, Building 8, State Campus, Albany, N.Y. 12235.



**Figure 6.** The ropey substance being pulled from a cell is the remnants of a larva killed by the bacteria that causes American foulbrood, a difficult disease to control. Beekeepers should always be alert to diseases and pests that may affect their bees adversely.



**PACKAGE BEE INSTALLATION.** For the best results package bees should be received and installed between April 15 and May 15 in New York State. Packages installed at a later date usually do not have time to build sufficient colony population to gather the 60 to 75 pounds of honey needed by a colony for wintering successfully in the state.

Information Bulletin 7, *Package Bees: Their Installation and Immediate Care*, is available by writing to Distribution Center, 7 Research Park, Cornell University, Ithaca, N.Y. 14850. The price of the bulletin is 35¢.

## Buying Bees

### WHERE TO BUY BEES AND QUEENS.

Package bees and queens can be purchased from southern producers, most of whom advertise in the beekeeping journals. Established colonies and equipment for sale are also advertised in the journals.

**KIND OF BEES TO PURCHASE.** Italian bees are recommended for beginners because they are most commonly used by beekeepers in this country and are raised by practically all the queen and package-bee producers. A few breeders raise Caucasian and Carniolan bees, but most beekeepers consider Italian bees the best.

## Equipment

**TYPE OF EQUIPMENT TO USE.** In 1851, L.L. Langstroth discovered the "bee space" and invented a beehive that has become standard in the United States and in many other countries. The "bee space" (1/4 to 5/16 in.) is an area large enough to permit the free passage of bees but too wide to induce bees to deposit propolis and too narrow for comb building. The Langstroth or standard hive opens at the top, and the frames (9 1/8 in. high by 17 5/8 in. long) that contain the individual combs are hung in each hive body to provide a bee space all around each frame. The portion of the hive used for rearing brood (brood chamber) consists of 1 or 2 hive units, and the space for storage of honey consists of additional units (supers) placed above.

**Figure 7.** This package of bees, shipped north from a southern state, contains about 12,000 bees and a queen. Persons starting with package bees in New York should receive their bees between April 15 and May 15; only by starting the package this early will the bees gather the 60 to 80 pounds of honey they need to winter satisfactorily.



Some beginners produce section comb honey, but a high-quality product requires considerable skill in colony management. For home use, comb honey can be produced in shallow frames of standard length on thin comb foundation made especially for this purpose (embossed sheets of pure beeswax, which form the midribs of the combs). Most beekeepers produce extracted honey for which full-depth supers are generally used. A centrifugal honey extractor is required for the removal of the honey; for a beginner it need not be an expensive model.

Items required by the beginner are listed in the catalogs of supply manufacturers, and additional equipment needed for any one type of honey production can be ordered separately. The 10-frame hive is the type most widely used in the United States. Because this equipment is available at all bee supply houses and has the greatest resale value, the beginner should purchase hives of this type.

**WHERE EQUIPMENT CAN BE PURCHASED.** Hives and other beekeeping equipment are manufactured by several companies in various parts of the United States. Beekeepers can obtain the names and addresses of these firms from any of the beekeeping journals and write for catalogs.

**HOMEMADE EQUIPMENT.** Many commercial beekeepers believe that it pays to buy accurate factory-made equipment. The frames fit better in the hives and require less effort for removal and replacement. On the other hand, beginners often wish to make their own equipment. If hives are to be made at home, the best plan is to buy a complete hive for a model. Exact dimensions must be adhered to, or the bees will build comb and deposit propolis where neither is desired. (Information on dimensions for beekeeping equipment is available by writing to the Office of Apiculture, Department of Entomology, Cornell University, Ithaca, N.Y. 14853.)



## Bee Stings

Bee stings are annoying to most experienced beekeepers as well as beginners, but the degree of sensitivity varies considerably. Experienced beekeepers suffer pain from the initial prick of a sting, but they quickly build up an immunity to bee venom, which reduces or eliminates the aftereffects.

The degree of pain and swelling resulting from a sting depends on the length of time the sting remains in the skin and the amount of poison that enters the flesh. Therefore, it is important to rub or scrape out the sting immediately.

Bees and other stinging insects seem to be disturbed by the odor of sweat and most perfumed substances. They are less inclined to sting light-colored, smooth-textured clothing. Beekeepers should therefore prepare for work in the apiary by washing with nonfragrant soap and dressing in clean, white coveralls or khaki clothing that covers their bodies as much as possible.

## Causes for Success or Failure in Beekeeping

Four primary considerations contribute to the success of beekeeping: (1) control of American foulbrood, (2) control of wax moths, (3) keeping the colonies headed with young productive queens, and (4) enough room for the rearing of brood and the storage of honey.

In recent years pesticides have increasingly become a problem for beekeepers in some areas. Most such losses can be avoided by the selection of the proper pesticide and time of application.

**DISEASES OF BEES.** The control of bee diseases is a major problem in beekeeping. Of the diseases that affect the brood of bees, American foulbrood is the most serious. Losses normally result because beekeepers fail to examine each colony thoroughly for this disease in the spring, the summer, and the fall.

The bacterium that causes the disease (*Bacillus larvae*) forms a resistant spore capable of withstanding high temperatures and existing in bee equipment for years. Colonies of bees can die of American foulbrood without the owner's realizing what caused their death. Beginners in beekeeping should be cautious about buying used equipment.

When disease breaks out in any one portion of the state, all colonies surrounding the source of infection must be examined. For this reason it is required that all colonies be housed in hives with frames that can be removed without difficulty. The keeping of bees in boxes or hives from which the combs cannot be removed is illegal.

At one time European foulbrood caused enormous losses in New York State; but with the use of improved methods of colony management and by the introduction of Italian stock, this disease has been held under control. It is still present in the state, however, and remains a problem in many apiaries.

A virus disease known as sacbrood occurs throughout the state. Because this disease and European foulbrood resemble American foulbrood in certain respects, and since there is such a wide difference in their destructiveness, exact diagnosis is important. Information on differences in symptoms of these 3 diseases is given in Farmers' Bulletin No. 2255, *Identification and Control of Honey Bee Diseases*, which can be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The price is \$1.00.

The Bioenvironmental Bee Laboratory, Plant Protection Institute, Agricultural Research Station, Beltsville, Md. 20705, examines samples of brood and adult bees without charge. For diagnosing brood or brood remains, one should send a sample of comb, about 4 by 4 inches, containing the affected brood or brood remains; avoid including any honey in the sample.



**BEE POISONING.** Very rarely are honey bee colonies killed by insecticides in New York State. However, each year many colonies lose their entire field force and may suffer some loss of brood as a result of air spray used to protect forests and farm crops or in public health programs. Diagnosing a bee loss from pesticides is not always an easy matter. In the case of some insecticides there will be large numbers of dead bees on the bottom board and immediately in front of the colony. Under normal circumstances, even though the normal death rate in a colony of honey bees may be 1000 or 1500 bees a day, worker bees within the colony carry the bodies of their dead some distance from the hive; and the dead bodies are neither found nor seen. Therefore, an accumulation of more than 3 or 4 dead bees per day immediately in front of a colony entrance is cause for suspicion.

In the case of certain pesticides, the foraging bees may not be able to return to the hive and may die in the field where they are little noticed by the beekeeper. However, in the case of any loss due to pesticides, there should be a slightly larger than normal accumulation of dead bees in front of the colony entrance. Depletion of a field force means that there may be fewer than the normal number of bees in a hive; and oftentimes, because there are fewer bees, there may be some chilled brood. Also, colonies that suffer from losses due to pesticides will often suffer from stress diseases such as European foulbrood and sacbrood. This is especially visible 2 to 6 weeks following the pesticide application.

The fact that some honey bees die from pesticides each year is evidence that we still have much to do to make our environment safe and clean. When honey bees die, our data indicate that many species of beneficial insects are also affected. During the decade of the 1970s, the federal government compensated beekeepers who lost bees because of pesticides. This program was halted in late 1980 because it had done nothing to stop the problem.

**Figure 8.** This colony of honey bees has plugged its entrance with propolis, which is the gums and resins collected from pine and poplar trees. The excessive use of propolis, a trait typical of Caucasian bees, makes keeping them a nuisance although they are good honey collectors.

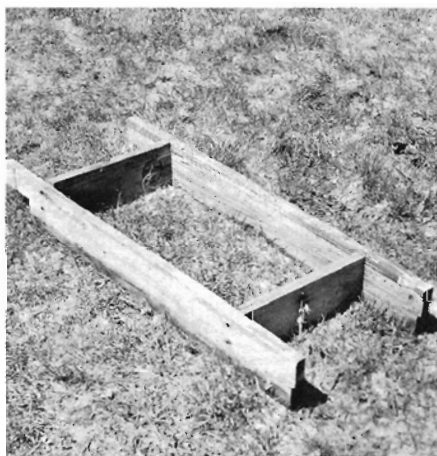
The New York State Department of Environmental Conservation has supervision over the use of pesticides in the state. It works closely with the National Environmental Protection Agency. Whenever honey bees are killed by a pesticide, the loss should be reported and documented by calling one of the department's regional offices. Representatives from the department will determine if the material was misused and what steps should be taken to avoid a similar loss in the future.

**APIARY PESTS.** The wax moth (*Galleria melonella*), often referred to as the bee moth, wax worm, and web worm, is found throughout the state and causes severe damage to combs. The moths lay eggs in the crevices of the hives. On hatching, the minute, highly mobile larvae make their way to the combs. The larvae grow rapidly and construct strong tunnels of silk as they burrow through and among the combs, feeding on the pollen, cocoons, and honey. On reaching maturity, the larvae spin tough silken cocoons around themselves, emerging later as adult moths.

During warm weather, weak colonies as well as combs in storage are subject to wax-moth attack. Destruction is rapid and so complete that the combs are reduced to a mass of webs and debris in a few weeks.

Stored combs should be examined every 2 weeks. When the first signs of wax moth appear, they should be fumigated. Paradichlorobenzene is the fumigant most commonly used.

A circular, *Wax Moths and Their Control*, can be obtained by writing to the Office of Apiculture, Department of Entomology, Cornell University, Ithaca, N.Y. 14853.



**IMPORTANCE OF GOOD QUEENS.** A colony of bees normally consists of 1 queen (the mother of the hive), thousands of worker bees (sexually undeveloped females), which do all the work in the field and the hive, and some drones (males), whose sole function is to mate with the young queens. Since the queen lays all the eggs in the hive, the growth and productivity of the colony is entirely dependent on her. It is therefore highly important that each colony contain a young, prolific queen. The degree of success among large and small beekeepers normally depends on the amount of attention given to queens. Good queens result in better wintering, faster buildup in population in the spring, less trouble with swarming, and a larger crop of honey.

**ROOM FOR BROOD REARING AND STORAGE OF HONEY.** Insufficient room for the queen to lay eggs and for the bees to store honey is one of the greatest causes for failure in beekeeping. Swarming is the natural method of reproduction in honey bees. A crowded or congested brood chamber stimulates the colony to swarm. Honey bees normally expand their brood nest in an upward direction. If this expansion is restricted, even weak colonies prepare to swarm. Swarming usually takes place during the period of greatest brood rearing. In New York State this peak is normally in the spring after the dandelions commence to bloom and before the clovers start to yield nectar. During this period it is especially important to provide ample worker comb in which the queen can expand her nest in an upward direction.

The problem of swarm control is greatest between the dandelion and clover honeyflows, but continues later into the season if there is not enough room for the bees to store nectar. Bees short of storage space are forced to hold the nectar in their honey stomachs. When these bees are unable to work in the fields, they crowd the brood chamber; the crowding stimulates swarming and results in a reduction in the honey crop.

**Figure 9.** A hive stand, made of heavy wood treated with a wood preservative, serves a useful function. The colonies are raised about 6 inches off the damp ground and above the grass. In the winter, 2 colonies can be pushed together and wrapped with black paper on the stand. The dead air space below the colonies keeps the hive dry.

## Summary of Seasonal Management

It is not difficult or time consuming to manage a few colonies for honey production or pollination, but it is imperative to give the colonies adequate attention at definite periods during the active season.

The following summary of seasonal management for central New York State is designed to help beekeepers manage their colonies efficiently.

The dates given are approximate for central New York in a normal season. Southern counties are usually from 1 week to 10 days earlier and northern counties from 1 week to 10 days later. This plan of operation is satisfactory during an average year, but should be modified to meet changing honeyflow conditions. Successful beekeeping is a combination of art and science; the beekeeper who produces a maximum crop combines both.

### **First warm day during late March or early April when the bees are flying:**

1. Clean the entrances of the colonies. In the fall, colony entrances are reduced in size (about 2 1/2 in. long by 3/8 in. high) to help the bees keep warm and to prevent mice from entering. Sometimes dead bees or dislodged insulating materials restrict or clog the entrances and should be removed. As the weather becomes warm in the spring, the entrances should be enlarged.

2. Close the entrances of dead colonies or remove them to a bee-tight building or cellar where it is impossible for bees to rob the honey from the combs. This precaution prevents the spread of American foulbrood.

3. Unite queenless colonies or those with failing queens by placing them above strong queen-right colonies separated with a sheet of newspaper. The paper should be pierced in 2 or 3 places. If time and temperature permit, it is advisable to remove the failing queens.



4. Strengthen weak colonies containing young prolific queens by placing them above strong colonies with a queen excluder and a piece of newspaper between them. The colonies should be united during the latter part of March or early April and separated toward the end of the dandelion or fruit-bloom flow. When the colonies have been separated, set the stronger of the 2 colonies on a new stand. This helps to equalize the field forces of the 2 colonies because many of the field bees in the stronger colony will return to their old location.

5. Feed the colonies if necessary with a mixture of 1 or 2 parts of white sugar to 1 part of water, by weight or measure. Feeding is rarely necessary if ample food is provided in the fall.

**Late April or early May when the dandelions and fruit start to bloom:**

1. Unpack the colonies and check for food, diseases, and performance of the queens in egg laying.

2. Provide ample worker comb in which the queen can lay and freely expand her nest in an upward direction. This is necessary to prevent the bees from preparing to swarm. The brood nest can be expanded in 2 general ways:

a. Reverse the brood chambers of all strong colonies, and add a super of worker comb when the colonies need more room.

b. Add a super of worker comb on top of each colony.

In each method a frame of sealed brood is raised from the lower brood chamber into the super, which is added. Both of these methods provide enough room for the bees to work in an upward direction.

3. Feed if necessary. Starvation of bees between the dandelion and clover flow is one of the principal causes of unprofitable beekeeping. Never let a colony get below the equivalent of 3 full combs of honey, especially at this critical time of year.



Figure 10. Two colonies of bees have been placed side by side on a hive stand and wrapped in black tarpaper. The black paper serves to warm the colonies on cool winter days and to give the adult bees an opportunity to fly and void fecal matter. Occasional flights in December through March are necessary if colonies are to winter successfully.

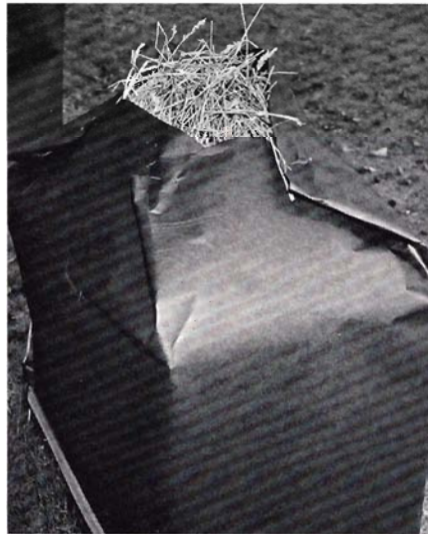


Figure 11. In this partially completed winter pack the wheat straw, which has been placed on top of the 2 colonies, is visible. Wheat straw absorbs excess moisture; and with the straw heaped in the middle of the 2 colonies, the winter pack sheds snow and rain.

4. Colonies can be checked for queen cells by separating the hive bodies and examining the bottom of the combs of the upper hive bodies. If queen cells are being built in anticipation of swarming, use one of the following methods to prevent swarming:

a. Remove all queen cells and reverse the brood chamber.

b. Divide the colony into 2 parts making certain that the brood, bees, and honey are divided about equally. All the queen cells should be removed from the division containing the queen, but 1 or 2 of the largest queen cells should be left in the queenless part.

c. Remove all the queen cells and exchange the position of strong colonies in the apiary with weak ones. Enough field bees usually leave the strong colonies, return to their old locations, and enter the weak colonies to prevent further trouble from swarming for at least 2 weeks.

5. It is unnecessary to clip the wings of the queens if enough room is provided.

6. Fumigate stored combs if even 1 wax moth larva is found in them.

**At the beginning of clover honeyflow (usually during the last half of June):**

Beekeepers manipulate their colonies in different ways at the beginning of the clover flow to discourage swarming. Two of the most popular ways are as follows:

1. Place the queen in the lowest chamber. This is usually accomplished by driving the bees down out of the supers into the lowest chamber with smoke, certain acid fumes, or shaking them from the combs. Add a queen excluder and a super of drawn combs, and then place the hive body or hive bodies containing brood on top of this super of drawn combs. An additional super of combs should be placed on top of the colony to insure ample space for the storage of honey. Confining the queen to 1 hive body during the light honeyflow is a popular method among beekeepers.

2. Allow the queen to lay in 2 brood chambers throughout the entire season. With this method, swarming is usually prevented by reversing the brood chambers at least once or twice during May and early June. At the beginning of the clover flow, remove 5 or 6 frames of brood from each colony and place them in the center of the third super, which is added at this time. Shake each frame of brood as it is removed to dislodge the bees. This permits inspection of the combs for American foulbrood and, at the same time, prevents the queen from being carried up into the supers. Next, place a queen excluder between the second chamber and the third super, which now contains 5 or 6 frames of brood. This method provides ample room for the queen to lay in the 2 lower brood chambers and at the same time stimulates the bees to work in the supers above the excluder.

3. Examine the colonies for room and for queen cells about every 2 weeks during the clover honeyflow.

***At the end of the clover honeyflow (latter part of July or early August):***

1. Requeen or, at least, mark the colonies that need new queens so that they can be requeened as soon as time permits. Young queens ensure good wintering and a maximum honey crop the following year.

2. Examine the colonies for disease before removing the honey crop.

3. Remove and extract the clover honey crop, and return the supers to the colonies for buckwheat or other fall honeyflows.

***At the end of buckwheat and (or) fall honeyflow (usually during the latter part of September):***

1. Unite all weak and queenless colonies with other strong colonies.

2. Examine the colonies for disease.

3. Remove the supers and queen excluders and reduce each colony to 2 hive bodies for winter. Make certain that the top hive body or second brood chamber is full of honey.

4. Remove and extract the surplus honey, and store the supers for winter.

***Pack the colonies for winter (usually about the middle of October):***

1. Colonies in 2 hive bodies should weigh about 130 pounds. Feed colonies that do not meet this weight.

2. Detailed information on wintering honey bees in New York State is contained in Information Bulletin 109 available by writing to Distribution Center, 7 Research Park, Cornell University, Ithaca, New York 14850. There is a 50¢ charge for this bulletin.

To complete their work on schedule, commercial beekeepers who operate several apiaries will usually find it necessary to start their work earlier and continue later than the dates indicated.

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Cooperative Extension, New York State College of Agriculture and Life Sciences, New York State College of Human Ecology, and New York State College of Veterinary Medicine, at Cornell University, and U.S. Department of Agriculture, cooperating. In furtherance of acts of Congress May 8 and June 30, 1914, and providing equal opportunities in employment and programs.