

MU Guide

Beekeeping Tips for Beginners

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Two bee colonies are the ideal number for a beginning apiarist. Expand in a couple of years after your experience and confidence grow. A single hive will produce 50–100 pounds of honey each year.

Start right; build at least one hive from scratch. Assembling new hives is important for the beginner. If you are handy with wood, you'll find it easy to build hive boxes and supers (compartments added to a hive for storing frames, which support the honeycomb). You can order all parts ready to put together. The lumber with which to build boxes and frames will cost as much as the milled product.

Plan for the coming season. Order your bees, hives and equipment well in advance, during the fall. Assemble the equipment during the winter to prepare for the bees, which will arrive during April (see MU publication G 7601, *Seasonal Apiary Management for Missouri*).

Place your hives on the site you have selected for your apiary so you're ready when your bees arrive. Join a local beekeeping association for additional information and help. Join the state association and attend the spring and fall meetings for the most valuable help. For additional information, there are many good reference books on apiculture.

Characteristics of a good colony

A strong population is crucial. The queen lays a full brood pattern, skipping only a few cells, covering 12 to 16 frames. The colony population reaches 75,000 bees during the summer, which includes 30,000 or more field bees. The bees cover all the frames in two hive bodies and the frames in a super or more.

Drones appear in the spring but are forced out of the hive in the fall. About 1,000 of these male bees will live in the hive during the summer.

A good colony is docile when managed and shows little tendency to swarm, yet has workers that are good foragers. Such a colony should produce 50 to 100 pounds of surplus honey each season for the beekeeper. The colony should also produce at least 60 pounds for itself to overwinter.

Never rob a colony of honey back to the brood chamber in the fall. The colony will die of starvation over the winter. Winter starvation is the most common

cause of colony demise in Missouri. A hive must have two deep brood chambers (9⁵/₁₆-inch hive boxes) full of bees and honey (60–90 lb) to overwinter.

Apiary location

Place the apiary near an abundant source of nectar and pollen. Corn provides an excellent source of pollen, and most legumes provide excellent sources of nectar. In town, ornamental trees and plants usually provide ample sources of both. Ornamental plants in cities provide for an extended honey flow.

A good supply of clean water within a quarter mile of the hives is essential. The backyard apiary may need to have a water source provided if there are no bodies of water close by. Bees go to the nearest water source. A shallow pan filled with water and with rocks to rest upon is an excellent addition to your apiary. Providing a water source of this kind will help keep the bees out of your neighbors' yards.

The apiary should face southeast or south with a windbreak behind it. The location should be well drained. The south face of a hillside is ideal, but bees will adapt to less-than-ideal locations.

Deciduous trees that shade the colony in summer afternoons and allow the sun to penetrate in winter are desirable. Place the apiary near an all-weather road because you will need to work the bees in all kinds of weather. A platform on the roof of a house or other building is a good place to keep hives in town.

Equipment

Purchase new equipment at first. Assembling new equipment is a learning experience you should not overlook. Equipment or colonies purchased from another beekeeper should be inspected by the Missouri Department of Agriculture. Some apiarists are unscrupulous enough to sell diseased equipment and bees to unsuspecting buyers. Others do not know about diseases and may unknowingly sell infected hives.

Regardless of how you acquire the equipment, make sure you get standard size, Langstroth equipment with hanging, movable frames (see Figure 1). You can interchange and add standard hive equipment as needed. A brood chamber should consist of (1) two hive bodies (deep supers), (2) one hive body and two shallow

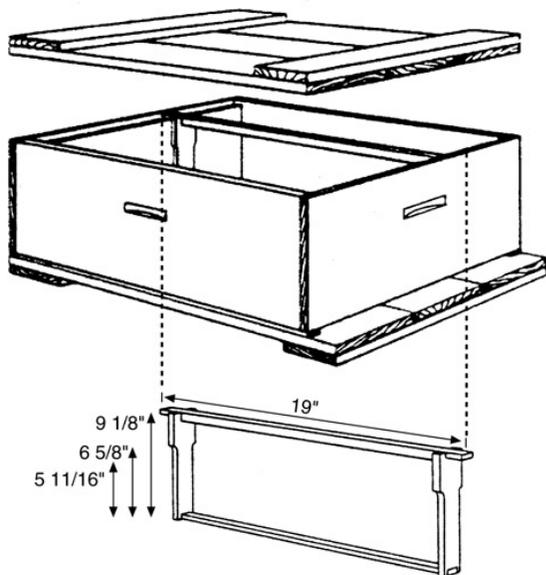


Figure 1. Wooden frames for holding the comb, hang inside the body of a hive. Frames are sized for shallow, medium or deep hive bodies.

supers, (3) four shallow supers, or (4) three medium supers. The standard hive body is $9\frac{5}{8}$ inches deep, $16\frac{1}{4}$ inches wide and $19\frac{7}{8}$ inches long. The shallow super is the same width and length but is only $5\frac{11}{16}$ inches deep. The medium super is $6\frac{5}{8}$ inches deep (see Figure 2). You can use all shallow boxes to reduce the weight of individual sections and make them easier to handle, but this can also be inconvenient. Remember four shallow boxes are required for a brood chamber.

Hive boxes are built to contain 10 frames, but using nine frames and a following board is more convenient than using 10 frames. The following board is a 1 x 10-inch board (1 x 4-inch for shallows) the same length as a frame. It hangs in one end of the hive body and is removed when you're working the bees. The board reduces damage to the brood and reduces hive inspection time.

Use full sheets of crimp-wired foundation for brood frames. The wax foundation is wired vertically at the factory. In addition, use two banjo wires strung horizontally across the frames to prevent warping of brood comb. Various plastic foundations and foundation-and-frame combinations are available. Plastic foundation material works well but it must be coated with beeswax, and bees must either be fed or in a honey flow before they will "draw out," or build their comb on, a plastic foundation.

A strong colony will require at least four shallow supers for honey storage. Add them as needed in the spring and extract them when full. Many beekeepers prefer to use medium boxes for brood and supers.

Use crimp-wired wax foundation or plastic foundation in frames. Use nine frames in each super and use stoller spacers on the frame rests. Stoller spacers prop-

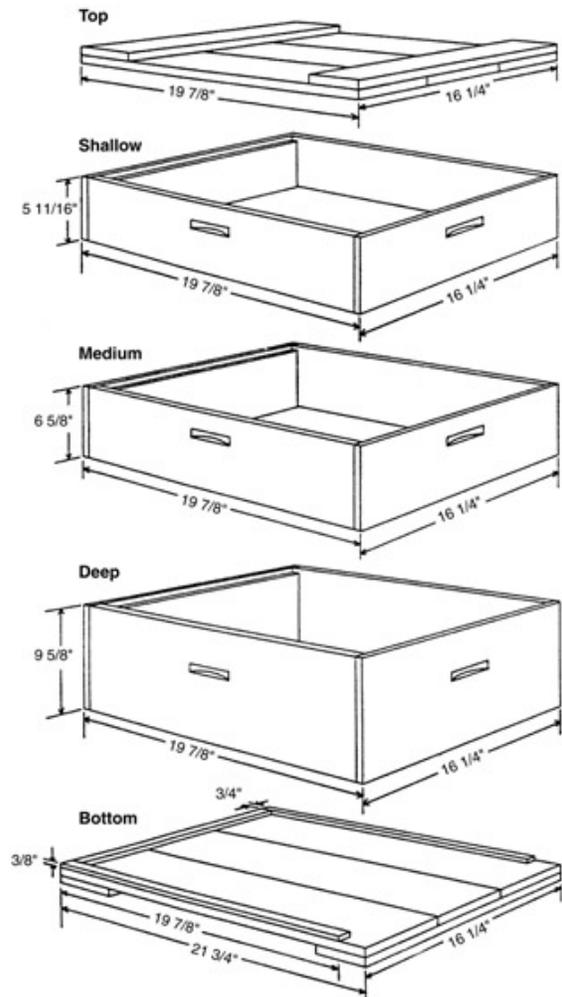


Figure 2. Parts of a bee hive. Bees are reared in a brood chamber in the lowest level of the hive. Honey is stored in upper levels.

erly space nine frames in a 10-frame box.

Special foundations and equipment are made for the production of section comb honey. Section comb honey production is an advanced technique and not recommended for the beginner. Removing comb honey can starve a hive under improper management. Beginners should try cut comb honey first.

If you have six or more colonies, consider purchasing an extractor. With three or fewer colonies, you should follow cut comb honey production techniques. Cut comb honey requires no investment in an extractor. With comb honey, only wooden ware is stored, whereas comb storage requires fumigation. You can make a one-frame radial extractor using wood, screws, eyebolts, and wax sealer (see Figure 3). You may consume honey from this extractor, but it should not be sold.

Honey plants

Spring honey plants in Missouri include (in approximate order of importance) clovers, sweet clovers, other legumes, tulip poplar trees, dandelions, maple trees,

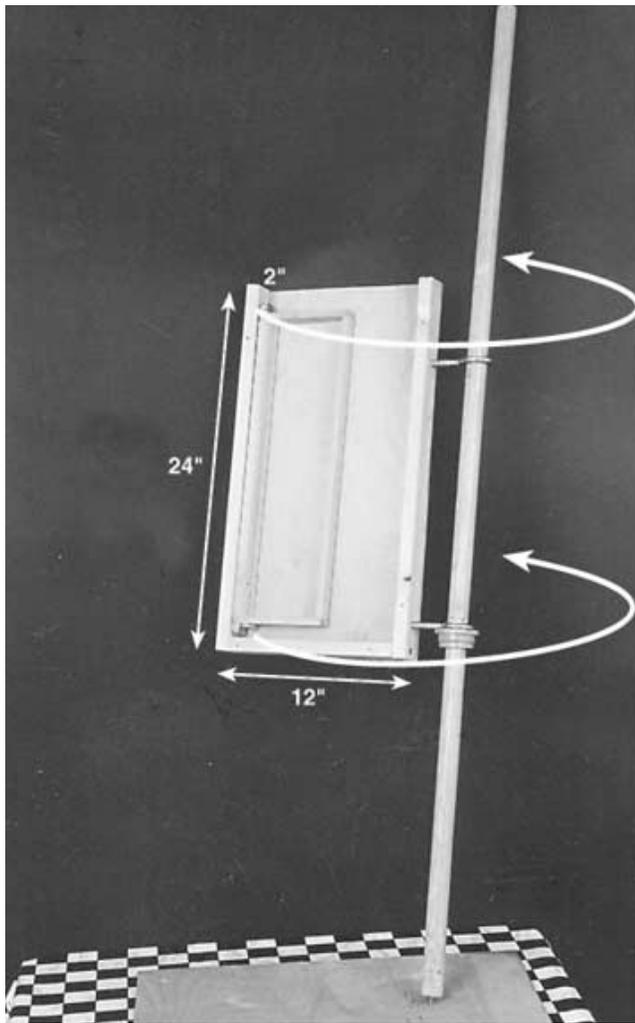


Figure 3. Single-frame radial extractor for removing honey from the comb (extractor shown here with cover removed).

locust trees, willow trees, basswood trees, fruit trees and berry plants. Corn, sorghum and other grasses are important pollen sources.

In summer and fall, bees find nectar and pollen in soybeans, garden plants, various ornamentals, asters, goldenrod, milkweed, morningglory, smartweed, sumac and sunflowers. Bees will use thousands of species. Those listed here may not be the most important in your area.

Plants bloom at different times in different places. As a rule of thumb for knowing when a given species will bloom, use Hopkins' Bioclimatic Law. In North America east of the Rockies, a 400-foot increase in elevation, a 4-degree change in latitude north, or a 10-degree change in lon-

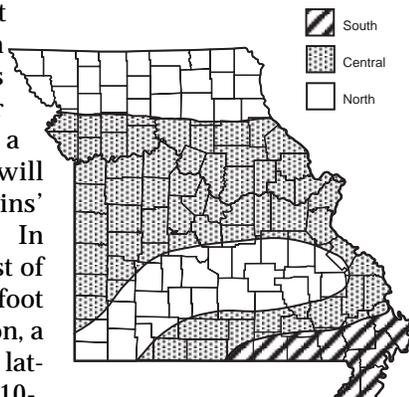


Figure 4. Missouri planting regions.

gitude east will cause any given biological event to occur four days later in the spring or four days earlier in the fall. If tulip poplars begin to bloom in the Bootheel region around May 15, in Columbia they should bloom five days later, and in Lancaster on the Iowa border, they should bloom 10 days later (see Figure 4).

It is sometimes advantageous to move bees during the year to new nectar sources. About July 1, you may wish to move the bees from town to a soybean field. Always move the bees at least five miles from their permanent site. If you must move them less than five miles, move them twice. Make the first move five miles from both the original location and the desired location. Allow a week to pass before moving to the desired location.

Disease prevention

To prevent disease, buy new equipment or have used equipment inspected by the Missouri Department of Agriculture.

Apply Terramycin twice a year (spring and fall) before and after the honey flow. This prevents foulbrood disease. Mix Terramycin powder in powdered sugar (1 part Terramycin, 50 percent, to 20 parts powdered sugar; or 1 part Terramycin, 25 percent, to 10 parts powdered sugar) and sprinkle 3 level tablespoons over the brood frames in each hive. Dust three times at one-week intervals. For a single hive, mix 1 level teaspoon of Terramycin, 25 percent (TM25), with 3 level tablespoons of powdered sugar. You may wish to use extender patties made of 3 parts sugar, 1 part vegetable shortening, and 3 level tablespoons of TM25 per hive. Treat once each spring and once each fall.

Nosema disease of adult bees is controlled by spring and fall applications of Fumadil "B" (Fumagillin). Add Fumagillin to honey or sugar water when feeding the bees. Fumagillin comes in 0.5-gram doses. This is enough to make 5 gallons of syrup for five colonies. For one colony use 1 level teaspoon of fumigillin mixed in 6 ounces of warm water to add to a gallon of water. Do not use antibiotics during the honey production season.

Tilt hive slightly forward to prevent water from accumulating inside. Ventilate the hive through the top. Moist conditions inside promote dysentery and other diseases.

Keep a good supply of food for the colony at all times. Most colonies that are lost die of starvation during the winter or spring.

Mite control

Acarapis woodi (Rennie)

Tracheal mites were found in Jackson County, Missouri, on April 17, 1986. These mites are now present in every county of this state. First described in 1921, tracheal mites were a probable cause of Isle of Wight disease. Most honeybees on that island were killed by this mite. All surviving bees were tracheal mite resistant. The

Italian bee *Apis mellifera ligustica*, comprising three of four colonies in Missouri, has strains susceptible to tracheal mite. Treating colonies continuously with oil-sugar patties (1 part vegetable shortening with 2 parts sugar) has been proven to depress mite populations. It is best to use honeybee queens and package bees that are resistant to tracheal mites. Resistance is documented in carniolan bees *Apis mellifera carnica* and the somewhat resistant Buckfast bee. Currently resistance is developing or being developed in other races of honeybee. Using resistant bees with shortening and sugar patties will give sufficient control of tracheal mites.

***Varroa jacobsoni* Oudemans**

The Varroa mite is a more severe problem than any other in beekeeping with the possible exception of honey prices. Varroa mites have an established parasitic relationship with *Apis cerana*. When this parasite came in contact with *Apis mellifera*, results were devastating. Varroa mites were detected in West Plains and Hayti, Missouri, during 1989. These mites have since spread throughout the state. Without treatment, a colony of bees will die from Varroa parasitism. Research to develop resistance is under way. Resistance is the only good long-term solution to Varroasis in honeybees.

In the interim, colonies should be treated with fluralinate-impregnated plastic strips (Apistan) twice each year. Treat for 60 consecutive days each fall during October and November. The strips lose their effectiveness after two months and must be removed to avoid development of resistance to this miticide. A second treatment for 30 days each spring before the honey flow during February or March is advised where mites have a history of depopulating hives over the winter. Monitor for mites every other month. Use a white poster board cut to fit on the bottom board. Cover this cardboard with vegetable oil spray and place this on the bottom board to collect mites. An 8 mesh screen can be used to cover this mite trap for help in reducing debris. This board can be removed in a few days and inspected for mites. If you are not sure, ask a beekeeping friend or go to your local extension office for identification of mites. If one is found, you can assume 500 are present.

Another method is the ether roll or detergent roll method. Capture about 300 bees and place them in a clear pint jar. Spray a two-second burst of ether starting fluid or a 25 percent solution of dish detergent in water into the jar. Close the jar and roll it on a flat surface for one minute. Mites will stick to the side of the jar. Until resistance is developed in bee populations, Varroa mites must be controlled by other means. Formic acid, when registered by the Environmental Protection Agency, should be alternated with Apistan to prevent development of resistant mites.

Wax moth control

A strong colony with a large population of young

housekeeping bees is the best defense against wax moth. You may want to fumigate small amounts of equipment in large plastic garbage bags.

If you leave any supers and hive bodies off the hive for a week or more, you must fumigate with paradichlorobenzene moth crystals (not naphthalene) before placing them back on. To fumigate, stack equipment as on a hive, seal up all air holes and put the stack on a flat surface. Put a piece of notebook paper over the top frames to hold the fumigant on the stack. Put a sheet of plastic over the fumigant and cover the entire stack with a flat board or telescoping cover. Seal side cracks between the supers with tape. Two tablespoons of paradichlorobenzene will fumigate eight supers or four hive bodies.

Check the stack periodically for damage and to see if the fumigant has disintegrated. Always air the fumigated equipment 24 hours before placing it on the bees.

Weak colonies may be dusted with *Bacillus thuringiensis* (Certan) over the top of the frames. Give weak colonies a new queen at the first opportunity. Supers may be put in a freezer for 24 hours to kill wax moth. Fumigation requires a license.

Protection from insecticides

Pesticide applicators

1. Use spray applications instead of dusts.
2. Apply sprays when plants are not in bloom or late in the day when the bees are not out.
3. Use insecticides less toxic to honeybees whenever possible.
4. Use insecticides with a short residual.
5. Reduce insecticides drift with proper application procedures.
6. Keep spray equipment in good repair for efficient pesticide application.
7. Direct spray toward target plants with the nozzle as close to the target as feasible.
8. Do not spray directly over colonies.
9. Notify beekeepers 48 hours before spraying sweet corn, fruit trees, cotton, soybeans or flowering crops.

Beekeepers

1. You are responsible for protecting your colonies. Confine the colonies for three days during heavy spraying, but bees must be allowed to fly on the fourth day. Draping colonies with wet burlap will protect them as long as the burlap remains soaked. You must moisten it every two hours.

2. Whenever possible locate colonies away from frequently sprayed fields. If this is impossible, an upwind location is better than a downwind location.

Familiarize yourself with spray practices and chemicals used around your apiary.

Glossary

Apiary: Group of bee colonies in one location (bee yard).

Apiculture: The science and art of studying and using honeybees for man's benefit.

Beeswax: Wax secreted from glands on the underside of bee abdomens, then molded to form honeycomb.

Brood: Immature or developing stages of bees; includes eggs, larvae (unsealed brood) and pupae (sealed brood).

Brood chamber: The area of the hive where the brood is reared; usually the lowermost hive bodies; contains brood comb.

Brood nest: Area of hive where bees are densely clustered and brood is reared.

Colony: An entire honeybee family or social unit living together in a hive or other shelter.

Comb: A beeswax structure composed of two layers of horizontal cells sharing their bases, usually within a wooden frame in a hive. The words "comb" and "frame" are often used interchangeably; for example, a frame of brood, a comb of brood.

Comb foundation: A sheet of beeswax embossed on each side with the cell pattern.

Comb honey: Honey in the sealed comb in which it was produced. It is also called section comb honey when produced in thin wooden frames (sections) and comb honey when produced in shallow frames.

Draw: To shape and build, as to draw comb from a sheet of foundation.

Dysentery: A malady of adult bees marked by an accumulation of excess feces or waste products, and by their release in and near the hive.

Field bee (forager): Worker bee that travels outside the hive to collect nectar, pollen, water and propolis, a waxy substance that bees use in the hive as cement.

Foulbrood: A general name for infectious diseases of immature bees that cause them to die and their remains to smell bad. The term most often refers to American foulbrood.

Frame: A wooden rectangle that surrounds the comb and hangs in the hive. It may be called Hoffman, Langstroth or self-spacing because of differences in size and widened end-bars that provide a bee space between the combs.

Hive body: A single wooden rim or shell that holds a set of frames. When used for the brood nest, it is called a brood chamber; when used above the brood nest for honey storage, it is called a super. It may be of various sizes and adapted for comb honey sections.

Honey flow: Period when bees are collecting nectar in plentiful amounts from plants.

House bee: A young worker bee, one day to two weeks old, that works only in the hive.

Langstroth hive: A hive with movable frames. The bee space around the frames allows you to move the frames. It was invented by L. L. Langstroth.

Nosema disease: An infectious disease of adult bees caused by a protozoan, *Nosema apis*.

Package bees: Two to 4 pounds of worker bees, usually with a queen, in screen-sided wooden cage with a can of sugar syrup for food.

Paradichlorobenzene (PDB): A white crystalline substance used to fumigate combs and repel wax moths.

Pollen: Male reproductive cells of flowers collected and used by bees as food for rearing their young. It is the protein part of the diet. Frequently called bee bread when stored in cells in the colony.

Pollen substitute: Mixture of water, sugar and other material, such as soy flour or brewer's yeast, used for bee feed.

Propolis: A mixture of tree resins and enzymes used by bees as a cement and to fill in small spaces in the hive.

Queen: Sexually developed female bee. The mother of all bees in the colony.

Rendering wax: Melting old combs and wax cappings and removing refuse to partially refine the beeswax. May be put through a wax press.

Super: A hive body used for honey storage above the brood chambers of a hive.

Swarm: A group of worker bees and a queen (usually the old one) that leave the hive to establish a new colony; a word formerly used to describe a hive or colony of bees.

Telescoping cover: A hive cover, used with an inner cover, that extends downward several inches on all four sides of a hive.

Uniting: Combining one honeybee colony with another.

Wax moth: An insect whose larvae feed on and destroy honeybee combs.

Wired foundation: Comb foundation with vertical wires embedded in it for added strength.

Wiring: Installing tinned wire in frames as support for combs.

Acknowledgment: *The contributions of Flernoy Jones (retired MU extension entomologist) to the development of this publication are acknowledged.*

Sources of beekeeping information and supplies

Equipment supply

- Brushy Mountain Bee Farm
610 Bethany Church Rd.
Moravian Falls, NC 23654
1-800-921-3640
- Dadant and Sons
51 South 2nd St., Hamilton, IL 62341
(217)847-3324
- Drapers Super Bee
914 S. Street, Auburn, NE 68305
(402)274-3725
- Lapp's Bee Supply Center
Box 460, Reeseville, WI 53597
1-800-547-1960
- Mid-Continent Agrimarketing
1465 N. Winchester
Qlathe, KS 66061-5881
1-800-547-1392
- Mann Lake
501 S. 1st St., Hackensack, MN 56452-2001
1-800-233-6663
- Walter T. Kelley Co., Inc.
3107 Elizabethtown Rd.
P.O. Box 240, Clarkson, KY 42726
(501)242-2012

Beekeeping associations

- American Beekeeping Federation
Box 1038, Jesup, GA 31545
- American Honey Producers
Box 256, Alvin, TX 77511 (281)992-802
- Missouri State Beekeepers
Ray Nabors (573)333-0258
Neal Bergman (573)888-1301
Ian Brown (314)398-5014
Larry Hensley (314)355-6935
Don Moore (573)265-8706
Milton and Pamela Wright (417)257-1770
Sharon Gibbons (314)394-5395
Glen Davis (316)229-2972

Journals and periodicals

- American Bee Journal*
Dadant and Sons, 51 South 2nd St.
Hamilton, IL 62341
- Bee Culture*
A. I. Root Company, P.O. Box 706
Medina, OH 44256

- The Speedy Bee*
P.O. Box 998, Jesup, GA 31545
- Bee World*
IBRA 18 N. Rd., Cardiff Cf1 3dy, UK (+44) 222-372409
- Beekeeping Education Service
Box 817E, Cheshire, CT 06410-0817
Fax: (203) 250-7575

Books and references

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Mark L. Winston, Harvard University Press, Cambridge, Mass. (1987).
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edited by Dadant and Sons
Dadant and Sons, Inc., Hamilton, Ill. (1991).
- Honey Bees and Beekeeping*
Keith Deleplane, University of Georgia, available from Dadant and Sons, Inc. Hamilton, Ill. (1995).
- Honey Bee Pests, Predators, and Diseases*
Roger A. Morse and Richard Nowagrodzki, editors, Wicwas Press, Cheshire, Conn. (1990).
- Queen Rearing and Bee Breeding*
Harry H. Laidlaw, Jr., and Robert E. Page, Wicwas Press, Cheshire, Conn. (1997).
- Queen Rearing Simplified*
Vince Cook, available from Dadant and Sons, Inc., Hamilton, Ill.



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