Renting or Keeping Bees for Use in the Orchard
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IT IS ADVISABLE TO DISTRIBUTE THE COLONIES THROUGHOUT THE ORCHARD AT INTERVALS OF ABOUT 200 FEET, EACH DIRECTION

MICHIGAN STATE COLLEGE
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R. J. Baldwin, Director

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BY R. H. KELTY

The increasing use of bees to secure more efficient pollination in Michigan orchards has compelled many orchard owners to decide whether it is cheaper to buy or to rent the colonies which they wish to use. Some factors which may assist orchardists in deciding which course is the more economical for them are presented in this bulletin.

Buying the Bees

The purchase price of a colony of bees is not the final consideration. After buying the bees, the fruit-grower will find that, willingly or unwillingly, he must master some of the fundamental principles of beekeeping practice and give the bees the necessary amount of attention and seasonal manipulation or his original investment may depreciate as much as 50 per cent per year.

This is as true when the sole interest in the bees is for pollination purposes as it is when it is expected that the bees will earn their "keep" by producing honey. Unless bees are given the necessary attention in fall to prepare them for winter, they may be dead by the following May; and, if the colony is not properly manipulated in May, the bees may become so weakened by swarming that the colony will contain but few active field-workers, and a large number of field bees is the chief value of the colony for pollination.

When the supering season approaches, the fruit-grower who hopes to harvest a honey crop, finds it necessary to invest nearly as much in supers and equipment as the bees cost originally. If the surrounding district is favorable to honey production, the bees may return from 10% to 25% on the investment in the form of honey, each year. On the other hand, if the location is not favorable to the secretion of nectar by the clovers and wild flowers, the fruit-grower may find it necessary to feed each colony a dollar's worth of sugar syrup each fall and spring or move the apiary to a more favorable location during the period of nectar secretion to get the desired strength of colony for the fruit bloom period.

The bees do their best work in pollination when the hives are distributed about 200 feet apart throughout the orchard. Intensive orchard practice outside the blooming period will be hampered by any but the very gentlest bees. It is possible that, on some occasions, the bees will be a positive nuisance when distributed in the orchard. It may become necessary to use a permanent location at some distance from the orchards and move the bees into and out of the orchards as they are needed. This problem of moving the bees safely and properly will be discussed in a later paragraph.

The owner of extensive orchards whose pollination problem requires the use of one hundred or more colonies of bees, is, if he owns his own

apiary, in the beekeeping business whether he realizes it or not. He cannot afford to run so many colonies on the "let-alone plan." This means that either he or some member of his working force must devote at least four hours per colony each year to the active and intelligent manipulation of the apiary. Inexperienced beekeepers may find that the required manipulation takes nearer 10 hours per colony each year as they are not in position to use the labor short-cuts which are practiced by extensive beekeepers without damaging the colonies.

There is the ever-present possibility that the apiary may become infected with foulbrood. Fortunately, this hazard has been greatly diminished by the active, state-wide eradication campaign against foulbrood carried on by the State Department of Agriculture, but the foulbrood hazard must not be overlooked or under-estimated by any prospective beekeeper.

The chief advantage to the fruit-grower of owning his own apiary is the certainty that he will have the bees when he wants them. Nevertheless, it must be remembered that careful manipulation of colonies in spring will be necessary to bring these colonies to a strength of population comparable to colonies owned by commercial beekeepers whose income depends on the honey-gathering power of each colony.

In order to give some idea of the investment required to establish an apiary, the following estimates are given:

10 Colonies Operated for Comb Honey

10—3-lb. packages of bees	$50.00
10—Standard 10-frame hives, KD	32.00
10—Hive-bodies with frames, KD	13.00
30—Comb honey supers and sections	53.00
30 lbs. brood comb foundation	26.75
10 lbs. super foundation	9.00
10—Wood and 7-wire queen-excluders	6.70
Miscellaneous equipment, smoker, bee veil, hive tool, foundation fastener, section scraper, 1 lb. frame wire, wire-imbedder	5.00
	$195.45

10 Colonies Operated for Extracted Honey

10—3-lb. packages of bees	$50.00
10—Standard 10-frame hives, KD	32.00
40—10-frame hive bodies with frames KD	53.00
75 lbs. brood comb foundation	65.00
2½ lbs. frame wire	1.30
10 Wood and 7-wire queen-excluders	6.70
1 2-frame hand-power extractor	25.00
1 Steam-heated uncapping knife	3.50
1 Copper steam generator	2.50
1 40-gallon honey tank	10.00
Miscellaneous equipment—smoker, bee veil, hive tool wire imbedder	4.00
	$243.00

Expanding these inventories to include equipment for larger apiaries, the approximate investment for various sizes would be:

25 colonies—comb honey equipment	$ 400.00
25 colonies—extracted honey equipment	475.00
50 colonies—comb honey equipment	755.00
50 colonies—extracted honey equipment	845.00
100 colonies—comb honey equipment	1,465.00
100 colonies—extracted honey equipment	1,640.00

The above estimates are based on the purchase of 3-pound packages of bees for each colony, with sufficient new, standard bee equipment to properly manage a commercial apiary whose average honey crop would be from 80 to 150 pounds per colony.

The proper method for handling package bees is as follows:

Order three-pound packages with queens from a reliable shipper, 60 to 90 days in advance of the desired date of arrival. Packages should be received April 15 to May 1 for best results.

A few days before arrival the buyer should make arrangements with the local express agent to receive notice by telephone as soon as the bees are received. An extra day in the express office may do the bees some harm.

If a large portion of the bees are dead on arrival, a "Bad Order" statement should be secured from the express agent and forwarded to the shipper immediately, who will replace the loss promptly and also file claim for damages.

If the bees are in acceptable condition, they should be removed to a cool, dark room for a few hours, during which period the screened sides of the packages should be repeatedly painted with a sugar syrup made of equal parts of cane or beet sugar and warm water. This will quiet the bees.

The hives in which the bees are to be placed should be placed in the location they are to occupy permanently or during the blooming period. Each hive should be equipped with four frames containing full sheets of foundation, an inner cover with feeder-hole in the center and an empty super in which to place the feeder. The entrance to the hive should be contracted to one inch and be screened until dark.

When the bees have become quiet after feeding, take the packages to the apiary. To install the packages, remove the cover of the package, take out the queen-cage, which is usually suspended on a wire, and fasten the cage to a tack driven in the top of a center frame so that the queen cage will hang between the frames near the top. At this time, the pasteboard which covers the opening to the queen-cage candy is removed. Test the candy with a tooth pick, and, if hardened, make a hole through the candy no larger than a match.

Release the bees by placing the package on its side in the hive beside the frames of foundation where the queen cage is fastened, with the opening of the cage toward the queen. The bees will be attracted by the odor of their queen and leave the package to form a cluster about the queen cage.

Place an inner cover over the hive and invert a pepper-box type feeder, made by punching several holes in the lid of a friction top pail, over the

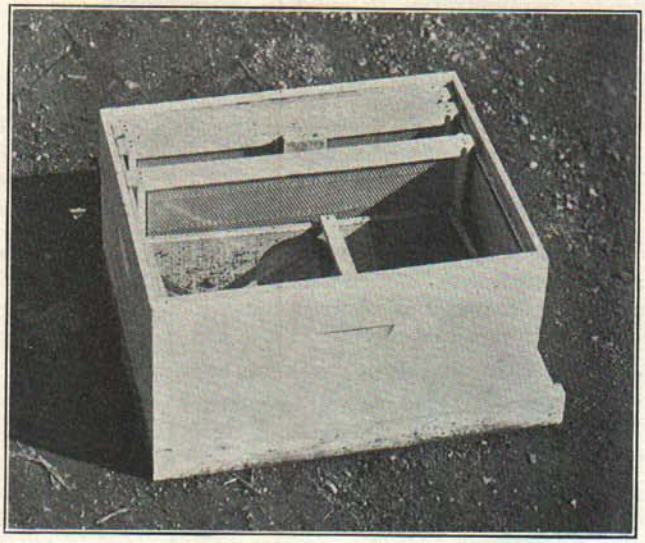

Fig. 1. After hanging the queen cage between two frames, the package of bees is placed in the hive on its side with the opening toward the suspended queen-cage.

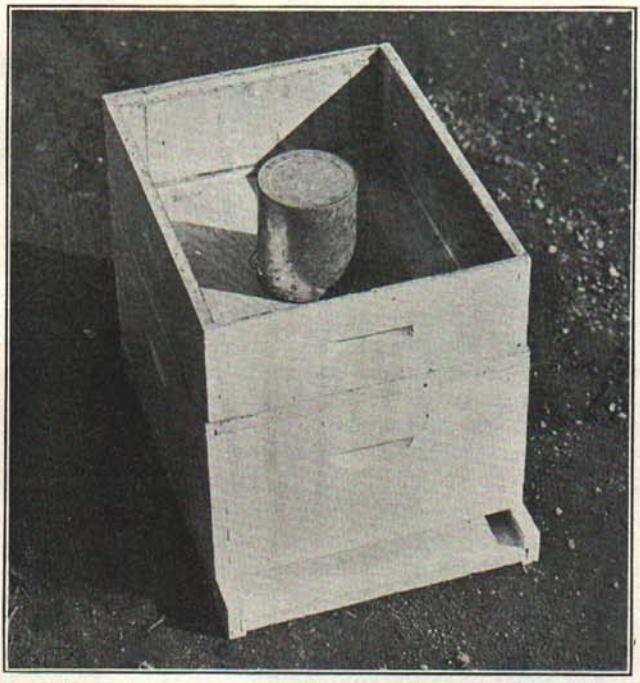

Fig. 2. The feeder in position over the hole in the inner cover, protected by an empty super.

hole in the inner cover. The feeder should be filled with warm sugar syrup made by dissolving one pound of sugar in one pint of water. An empty super is placed on the hive to help keep the syrup warm and also to lessen the danger of robbing.

The screen may be removed from the entrance to the hive the first evening unless the wind is strong, in which case, it will be as well to confine the bees for a few days to lessen the danger of "drifting." If the weather is warm, the bees must be released or they might smother.

It is now considered best to do nothing whatever to the newly-introduced bees for a period of a week after the packages have been installed except to give them more sugar syrup as fast as it is used. Each package should be fed 20 to 30 pounds of syrup during the first 10 days, even if there is an abundance of bloom. If the bees are gathering nectar heavily they will not take the syrup, but if they need food, they need it badly.

On a warm day about a week after the package is placed in the hive the empty package may be removed and the remaining frames of foundation placed in the hive. The four frames on which the bees are clustered should be placed in the center of the hive, the new frames being placed on either side. Continue feeding if necessary. Make certain that the queen has been released from her cage, and hastily examine the newly made comb for the presence of eggs or brood. The queen should be laying freely a week after arrival.

Do not manipulate the bees more than to continue feeding if necessary, until several combs have been drawn out from foundation and filled with honey and brood. Otherwise the bees may kill their queen.

Sometimes bees may be purchased locally at bargain prices. A fair price for a good strong colony of Italian bees, in a good hive, preferably a 10-frame hive, with plenty of honey to carry the bees and their brood until the next honey flow, is from eight to 12 dollars for a one-story hive, and from 10 to 15 dollars for a two-story hive.

The colony must be free from foulbrood, in fact the law forbids the sale of bees without a permit which is issued by the State Department of Agriculture only after an inspection shows that the colony is disease-free. A permit must also be obtained to move the bees to their new location. These regulations do not apply to the purchase of package bees, but they do apply to the purchase of nuclei, which are small colonies composed of two or three combs of emerging brood and bees, usually shipped from the Gulf States in the same manner as package bees. With brood and honey present, these nuclei may transmit foulbrood but packages of bees, which are fed on sugar syrup while in transit, should be disease-free.

If the fruit grower wishes to avoid the possibility of being unable to obtain sufficient rental bees to fill his pollination requirements, and, at the same time, finds that the prospect of a nectar-flow from local flowers is remote, he may still make certain of strong colonies for the blooming season by purchasing each spring one 3-pound package of bees for each colony needed, to be used during the blooming season only. In that case, the amount of equipment required would be reduced to a minimum, and it is possible that some arrangement could be made for disposing of the bees after the blooming season, the fruit grower retaining his hives for more package bees the next season. By this plan, if the bees were

allowed to die after the blooming season, the cost in addition to the original investment for hives, which should not exceed five dollars per colony, would be approximately five dollars per colony per year. If the bees were sold after the blooming season, the cost should not exceed two dollars per colony per year. The advantage of this plan over the rental proposition would be the certainty of having a supply of bees when they are wanted, and it is possible that, with a favorable season, the bees would live over with a minimum expenditure of labor and feed. With the rapidly increasing acreage of sweet clover, locations which are not now favorable for honey production, may be greatly improved.

The choice of a suitable location for an apiary which is to be used mainly for pollination purposes depends upon the abundance of nectar-bearing plants in the immediate vicinity. Bees fly freely for distances of about two miles in mid-summer when weather is favorable, but in spring, especially during fruit-bloom season, weather conditions may be so unfavorable to bee flight that they do not satisfactorily "cover" areas of more than an acre or two of mature orchard. Therefore, even if the immediate locality is so favorable to beekeeping that it is deemed advisable to locate the permanent apiary in or at one side of the orchard, best results in pollination will be obtained when the colonies are distributed throughout the orchard at intervals of about 200 feet.

To avoid losses of bees which will return to former locations if less than two miles from their new quarters, move the apiary a week before blossoming season to some new location at least three miles away and leave the bees there until ready to return them to the orchard. Bees seem to retain the sense of location for about four days, so the apiary should be left in the new location about one week for safety. Then the hives may be relocated throughout the orchard without appreciable loss of bees which return to the permanent apiary site. A little straw or brush loosely placed over the entrance when the bees are relocated in the orchard will help them to orient themselves in their new location. If quite a few bees are noticed flying about the permanent apiary site, they may be saved by placing one or two hives, which contain two combs of emerging brood and bees on the old stand. These returning bees will cluster in these hives at night fall and accept their new home, whereas they would otherwise cluster on the ground and perish.

The moving of bees is a job that requires careful preparation to avoid trouble and loss. The first consideration is to provide sufficient ventilation to avoid smothering the bees while they are in transit; yet, in cool weather, too much ventilation may chill some brood. If the weather is warm, 80 degrees Fahrenheit, when ready to move the bees, each strong colony should be given a screened, empty super on top of the brood nest in which to cluster during the trip. If the weather is cool, say 40 degrees, then a screen in a full-width entrance, $\frac{3}{8}$" x 14", or better $\frac{7}{8}$" x 14", will suffice for average strength colonies. Extra strong colonies should always be given clustering space on top except in very cool weather.

Whoever takes bees on the highway becomes liable for damages following injury suffered by the public. Therefore the hive parts should be well stapled together and absolutely bee-tight prior to moving. The work of stapling and screening should be done during mid-day when the bees are flying freely so that they will have quieted down by dusk. The entrances are then screened, and the hives are ready to move. If

convenient, it is safer to move the bees during the night, so that the entrances may be opened as soon as the hives are placed in the new location. By morning the bees will have quieted down and there will be less danger of "drifting" from hive to hive. It will be well also to place the hives in a broken line to assist the bees in locating their own hive, and if there is much wind, sprinkle some straw lightly over the entrance.

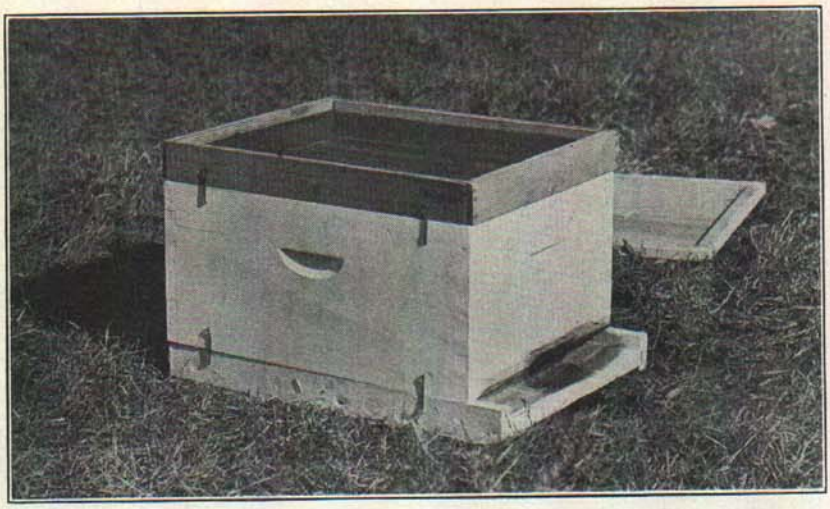

Fig. 3. Hive properly screened and stapled for moving a distance.

Renting the Bees

To be of service to the fruit-grower for pollination, each colony should contain a minimum population of about three pounds, about 15,000 bees. Such a colony would not be considered strong by a beekeeper, May 1, and the average colony in commercial practice will have a greater population by fruit bloom time. Weak colonies require the services of the majority of the colony for hive duty, with the result that there are few bees remaining to fly out, even in favorable weather. Strong colonies not only provide many thousand more field bees, they will be active under weather conditions which might prevent flight from weaker colonies.

A fair price for the rental of a colony of bees during the blooming season depends on several factors. From the standpoint of the orchardist, a very strong colony may easily be worth twice as much as a weak one. From the beekeeper's standpoint, if there is danger of the bees becoming infected with foulbrood during their stay in the orchard, a rental price equal to the value of the bees and equipment might not be attractive because any labor involved in the transaction would be wasted, inasmuch as the law requires the destruction of foulbrood colonies by the inspector. If there were danger of loss of bees from spray poisoning, then the rental price should cover the value of the bees and the labor and moving charges.

If the beekeeper could be certain that the bees would collect enough nectar from fruit-bloom to appreciably strengthen the colonies, this factor would be an important consideration. Unfortunately, the weather is likely to be so variable at the blooming season that the amount of honey

stored from fruit blossoms may range from merely enough to maintain the daily needs of the hive, up to a maximum of 30 to 40 pounds per colony. Also, since dandelion is in bloom at the same period as fruit-bloom, it is often true that the beekeeper's prospect of securing honey from dandelion in his own locality is as good as is the prospect of securing fruit-bloom honey in an orchard. Therefore, it would seem that no definite estimates can be made on the probable benefit to the beekeeper from honey stored in orchards.

Fig. 4. Transferring rented hives of bees from the truck to a wagon for distribution at the rate of one colony to the acre throughout the orchard.

The disturbance produced by moving colonies may affect the progress of brood-rearing. When properly done, moving bees short distances is not likely to be harmful. However, there is some danger of losing the queen in an occasional colony from "balling," there is always a possibility of breaking combs from rough handling or accidents, and strong colonies which are not properly screened may be suffocated. All of these risks diminish in proportion to the knowledge and experience of the beekeeper, and, for that reason, it is probable that the fruit-grower will get better satisfaction from an experienced beekeeper who is in position to give "service" as well as full strength colonies.

Since the labor and expense of moving the bees to and from the orchard is a major item, and varies with the distance, and since, in many cases, the fruit-grower might prefer to use his own truck for moving rather than to hire the beekeeper to do the work, it is suggested that a fair basis for considering rental price for colonies is to make a definite charge for the use of the bees, per colony, plus the cost of moving.

This rental charge, per colony, varies widely. Some orchardists have been able to rent bees for one dollar per colony. No fruit-grower would expect much "service" from the beekeeper at that price. Several large lots of bees have been rented for two dollars per colony, plus the cost of moving. Considering the risks for the beekeeper, this is a better bargain for the fruit-grower than for the beekeeper unless a nice crop of honey is gathered from the fruit-bloom. In some other states, notably

New Jersey, rental prices for colonies range higher, from five to 10 dollars per colony, depending on the distance the bees are moved by the beekeeper himself. Naturally, the matter of rental price will adjust itself with the supply and demand. If future relations are marked by the same high degree of co-operation which has been evidenced thus far, the problem of a fair rental for colonies will be worked out to the mutual benefit of both orchardists and beekeepers.

Special Bulletin No. 135 (Revised), Seasonal Management for Commercial Apiaries, is available on request to the Director of the Experiment Station, Prof. V. R. Gardner, Mich. State College.