BEES

FOR THE HORTICULTURIST

BULLETIN

of the

KANSAS STATE HORTICULTURAL SOCIETY

O. F. WHITNEY, Secretary

TOPEKA, KANSAS

June, 1922

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BEEKEEPING IN KANSAS.

[DR. J. H. MERRILL, assistant professor of entomology at Kansas State Agricultural College, Manhattan, who is also state apiarist, has prepared the following papers, which are of much interest to those who keep bees.]

RACES OF BEES IN KANSAS.

There are several races of bees found in Kansas. They are principally the Black or German bees, Caucasians, Carniolans, Italians, Goldens, and last but not least, the hybrids. Each one of these different races has individual characteristics, some good and some bad. With some of the races the bad points overbalance the good, thus making that race unsuitable for honey production in our state.

The Black (or German) bee has probably been in this country longer than any of the other races. It is commonly spoken of as the native bee, although this is not true, as honeybees are not natives of this country. They were introduced into New England in 1638, and on account of their long stay here have come to be known as native bees. In spite of having been here for so long, they are not particularly well adapted to this country. They are less prolific than the Italian bees, are very cross, build a great many queen cells, and therefore swarm often. They are not very good at cleaning their hives or resisting moths. They are not resistant to European foul brood, which is one of the worst brood diseases of bees. They are very excitable, and run wildly about on the combs when the hive is opened. This, together with the fact that the queen is not marked differently from the workers, makes it very difficult to locate her on the frame. Their good points, however, are that they cap their honey white, making a very fine-looking product, and are said to stand the winter well. The fact that they have been here since 1638 would seem to bear out this point.

The Caucasian bee varies in color, but closely resembles the black bee. It is said that some of them show yellow bands on the abdomen somewhat similar to the Italians, but most of them are dark gray with a metallic blue cast in the drones. This race of bees has a great many good points. They have not been in this country very long and have not been tested as thoroughly as the black bees. They were introduced into New York in the year 1880. They are the gentlest race of bees known. They cap their honey white, are good workers, defend their hives well against robbers, winter well, and, generally speaking, are very desirable bees. The disadvantage of this race of bees is that they use an abundance of propolis in their hives, sometimes almost closing entire entrances. In addition to their habit of propolizing the hive, they use burr and brace combs lavishly. As they closely resemble the black bees in color, it is very hard to tell when they are purely mated, and hybrids from this race are not as gentle as the pure bees. A great many beekeepers are loud in their praise of the Caucasian race, and it may come to find a more prominent place than it now occupies.

The Carniolans, like the Caucasians, are very gentle bees; and like them also, they have not been tested here long enough for us to know just how valuable they are. These bees are dark colored, and when seen in a group appear to have a bluish color. However, when examined closely this bluish color is accounted for by the fact that the wings are iridescent. The body

of the Carniolans is more definitely gray than the Caucasians. These be are very prolific, the queen continuing to lay even after the honey flow h ceased. On account of their prolificness they swarm excessively. They a very good workers, cap their honey white, and pass the winter well. They d not run about on the combs when the hive is opened as do the black bee The most serious facts against them are that they swarm excessively and th they resemble the black bee so closely that it is hard to tell when the matin are pure.

The most popular and most successful race of bees in this country is th Italian. They combine a great many of the good points of the other race while many of the faults of the others are lacking to a very large extent i this popular race of bees. The typical color is for the abdomen to b marked with three transverse yellow bands, and are usually spoken of a being leather-colored Italians. The workers are the best indication as to th purity of the race, as the drones and queens are apt to vary a great dea in their color markings. The Italian bees do not cap their honey as whit as do the three first-named bees, nor are they as prolific as the Caucasian and the Carniolans, but they are much more so than the German bees They are ordinarily gentle, but even in this respect they do not equal th Caucasians or Carniolans. However, they are good workers. They defen their hives against robbers and against moths. They are very resistant t European foul brood. In fact, whenever this disease occurs the treatmen recommended is to replace the queen in the diseased colony with an Italian queen. The Italian queen will cease brood rearing when there is a dearth of nectar, which fact is often valuable, as she will stop producing bees that will not take part in any of the work, but merely be consumers. The fact that these bees winter well, are of such a good disposition, protect their hives from enemies, and especially that they are resistant to foul brood, makes them the most satisfactory race of bees that we have in this country, and the ones to be recommended generally.

The Goldens are Italian bees, which are distinguished by having five bright yellow bands on the abdomen instead of three. These bees have a great many characteristics of the regular Italian, and resemble them so closely that it would be hard to distinguish them from the characteristics of the regular three-banded Italian bees. Reports as to their value vary, some reporting that they have exceptionally good results from the use of these bees, while some claim that their disposition is not pleasant and that they are not good workers. Until these bees have been more thoroughly tested it will be well to use the standard three-banded Italian bees.

The so-called hybrid bee may be a cross between any two races, but in this country it usually refers to a cross of the black and the Italian. It is the one most commonly found in the timber, box hives, or other places where the strain has been allowed to deteriorate. These are very variable in characters, but mostly they combine a few bad traits of the others, and then add a few more bad ones of their own.

The fortunate thing about beekeeping is that the race of bees in any colony can be changed in a short time by killing the original queen and introducing another of the desired race. Before long, then, the colony will be of the same race as the new queen.

PLANT CROPS FOR THE BENEFIT OF THE BEES.

When the owner of a cow wishes to provide sufficient pasturage for this animal he can estimate the amount of land that will be required to raise the amount of food necessary to provide that cow with nourishment throughout the season. Having made this estimate, he can then plant whatever crop he decides, put a fence around the pasture, and everything has been provided for in the line of food. The fence will keep the cow in the pasture, and at the same time will prevent other animals from getting in and taking that which was not originally intended for them. However, in the case of providing pasturage for bees the question is not so easily solved, for several reasons. First, it would be impossible to estimate the exact amount of acreage which should be planted in order to provide enough food for any given number of bees; second, bees are no respecters of fences, and not only would the bees for which the pasturage was intended avail themselves of the opportunity of feeding there, but it would be equally open to all other bees in the community. In other words, it would not pay to plant crops with the sole idea in mind of their serving as sources for honey. It would be much better in locating an apiary to select, if possible, a location which is already provided with plants which furnish both nectar and pollen, for it must be borne in mind that not only nectar-producing plants are necessary, but we must also have pollen-producing plants. In choosing this location one should be careful to see that there is a continuation of food supply throughout the summer. If there are only one or two honey plants which furnish nectar in any great amount it might be that the period between the flows of honey would be so long and the honey flows might be so short that the bees would consume during the period of drought all of the honey which they stored during the honey flow. It is always possible, however, to improve any location in the matter of honey plants, and probably the best way to do this would be to join with the farmers in that community and encourage them to plant forage-crop plants that will at the same time furnish nectar. Prominent among this class of plants would be alfalfa, clover, sweet clover, alsike and buckwheat, because plants should serve a dual purpose of being both forage and honey plants. The beekeeper who would contribute toward the purchase of seed to encourage his neighbors in the planting of these dual-purpose crops would be well paid for his investment.

Some of the sources of honey which particularly apply to Kansas are, in the early spring, the elm trees, which furnish pollen, while the soft maples furnish both nectar and pollen. These are followed by the dandelion, which is one of the most valuable plants from the beekeepers' standpoint that we have, because it blooms so early in the spring and furnishes an abundance of pollen, which is so necessary for brood rearing. The fruit bloom in those sections of the state where fruit is produced furnishes nectar for brood rearing. Most of the nectar furnished by this class of flowers is consumed in rearing brood, and it is rare that any surplus is stored from this source. After the fruit bloom comes the white clover bloom in those parts of the state where clover is found. This is a very valuable source of nectar, and it is at this time that the beekeeper should put on his supers, so as to allow the bees to store the large surplus which they should gather from white clover. Of the sweet

clovers, the yellow sweet clover blooms about three weeks earlier than the white sweet clover, and in a great many parts of the state there is a dearth of bloom between the time of the appearing of the fruit bloom and the white sweet-clover bloom. Those sections, however, where the yellow sweet clover is found do not suffer from this dearth. Consequently, beekeepers should urge and assist in seeing that all the waste places in their neighborhood are sowed to yellow sweet clover seed. It is possible to purchase this seed individually, or, better still, to secure the seed through your local beekeepers' association; then at the meeting of the association plans can be made for sowing different portions of the country, that the seed may be wisely distributed. The white sweet clover which is found so plentiful along the roadsides and waste places throughout the state is valuable, if not the most valuable honey plant that we have. As white sweet clover has proved to be a valuable forage plant, everything possible should be done to encourage its wider and more abundant distribution. Alfalfa does not produce honey everywhere that it is grown. In the drier sections of the country, and especially irrigated portions, it is an abundant producer of nectar. However, in the more humid sections it does not yield any nectar. Wherever alfalfa will not yield nectar, alsike clover should be grown and will be found valuable both as a forage plant and as a nectar-producing plant. Corn, although it probably does not produce any nectar, is very valuable as a pollen-producing plant.

The foregoing plants are the ones from which our chief source of light honey is produced. In the fall of the year heartsease, asters and other fall-blooming plants usually produce an abundance of nectar. The amount that will be secured from a fall flow cannot be securely counted on because of the danger of an early frost. The heartsease honey varies in color in various parts of the country. In some places it is light, while in other places it is very dark. Heartsease does not need to be planted, neither do asters, as they will appear themselves in sufficiently large quantities to be of use if the season is at all favorable.

It has been estimated that in order to produce one pound of honey it is necessary for a bee to make several hundred thousand trips to the field. This, of course, means that a large number of plants must be visited in order to bring in a single pound of honey, and it will be seen that it would not be profitable to sow crops solely for the nectar which they would produce. However, as stated above, if the nectar-producing plants can also be used as forage crops, then they will be useful to both the stockman and the beekeeper.

MAKING MILK OUT OF HONEY.

What would be thought of a cow that could be bought for $40 which would provide two quarts of milk daily and two quarts extra for every Sunday in the year? In addition to providing this milk, it must be put into glass jars and delivered at the door. I do not own such a cow, nor do I believe anyone else does. However, I do own four colonies of bees valued at $40, which produced enough honey to purchase the amount of milk above named. The comparison might be carried still further and mention made of the fact that the bees went to pasture and returned unattended; there was no pasture rent to pay for them, and instead of it being necessary to purchase expensive grain for their winter feed, they brought home and put away

enough food themselves to last them all winter, besides storing a surplus for my benefit. A man may capture a stray swarm of bees, put them in a hive, and call them his own, but he could not do the same with stray cattle and still be a law-abiding citi en.

These four colonies of bees had nothing to boast of in the line of ancestors. In fact, two of them were stray swarms which were caught and hived, while the other two were purchased at $6.50 per colony. The fact that I valued them at $10 per colony in the spring is not because they had cost me that much, but because that would probably have been the selling price at that time.

Early in August all four of the old queens were removed and young, untested queens—so called because they were so young their progeny had never been tested as to the purity of their race—were introduced. The reason for requeening at this time of the year was because the two queens in the purchased colonies were of uncertain age, while I knew that the queens in the colonies which were caught as swarms must have been old queens, as it is always the old queen that leaves with a swarm. Consequently I wanted to have queens all of the same age, and August was the most desirable time of the year to do this requeening. A young queen introduced into a colony at this time would insure a large number of young bees before the colony went into winter quarters. No honey was removed from these colonies during the first year, as the honey flow that year was not particularly heavy and I wanted to be sure that each colony of bees had enough honey left them to last until the next honey flow began. Accordingly, forty to forty-five pounds of stores were left in each hive for the bees to consume during the winter.

When choosing a location for my bees I selected the south side of a dense hedge windbreak, as I considered such a windbreak would be better than a solid board fence. Immediately after the first frost I began to pack them for the winter. The reason for putting on the packing was because bees are like storage batteries, having just so much energy to expend, after which they die. During the winter the bees form a hollow cluster in the hive as soon as the temperature falls to 57 degrees. On the inside of this cluster will be found a number of bees fanning the air and performing other muscular exertions so as to raise the temperature of the hive. From time to time they go to the outside of the cluster and other bees come in and take up the work of maintaining the high temperature. The more of this work they have to do the quicker they wear out. The young bees which I secured in such large numbers by introducing young queens in August had the advantage over old bees in that they had enough energy to maintain the proper temperature of the hive and still be able to take part in the heavy work of spring brood rearing. The reason for the insulation was to help the bees retain this desired temperature with a minimum expenditure of energy. The hives were placed on hive stands about seven inches high, which had been previously packed with leaves. As this was a good, strong colony of bees and I wanted them to have plenty of room for spring brood rearing, two hive bodies were provided for each colony. On top of each upper hive body a queen excluder was placed, and on this a super with burlap tacked over the bottom. This super was then filled with dry forest leaves. Next a two-foot poultry netting with two-inch mesh was placed around the hive, which extended out eight

inches from it, and leaves were pushed down between the poultry netting and the hive and packed in firmly. Of course I left an opening in the front for the bees to come out whenever they desired to take a flight. After these preparations were finished I felt quite satisfied and had no fears as to whether my bees would successfully winter. I knew there was an abundance of bees in each hive and that each had forty to forty-five pounds of stores left, that they were wintered in two stories, so they had plenty of room for spring brood rearing, and that they were protected not only by being well packed but by being placed in the shelter of a dense windbreak.

Having taken all of these precautions in the fall, the question of spring management of my bees was reduced to a minimum. I knew they had honey enough and room enough, and I could tell from the number of young bees flying in front of the hives that each one must have a queen, consequently I was able to postpone the first examination until very late in the spring, thus eliminating a lot of needless and really harmful manipulation.

Just before the honey flow began these colonies were examined carefully and several frames of brood were found in each colony. As young bees were emerging very rapidly, they were beginning to crowd the brood chambers, thus bringing about a condition which would ordinarily cause swarming. In order to prevent this the queen was located in each colony, placed on one frame of brood, and confined to the lower brood chamber by a queen excluder. The rest of the brood was placed in the upper story above the excluder. The queen was now confined to the lower story with only one frame of brood and had plenty of room for egg laying. The fact that the brood chamber was no longer crowded by young bees stimulated the field bees to become more active. When the weather became warm the hives were blocked up so that they might be more easily ventilated, which also had a tendency to prevent swarming. As the queens were very vigorous and filled the frames in the brood chamber with brood, it was necessary to repeat this plan of separating the queen from the brood several times during the summer. Our main honey flow in the vicinity of Manhattan comes from alfalfa and sweet clover, and the honey from these two sources is light in color, good in quality and commands a good price. During the fall heartsease blooms abundantly. Heartsease honey is a very satisfactory honey for the bees to pass the winter on, but in this locality it is dark colored and strong to the taste; consequently it will not bring as good a price as either alfalfa or sweet-clover honey. During the summer I removed the alfalfa and sweet-clover honey and sold it, and left the bees all of the heartsease honey which they had stored. The total crop from these four colonies of bees was over 400 pounds, which sold for $125. This sum of money invested in milk at 15 cents a quart would purchase the amount of milk mentioned in the opening paragraph.

SPRING CARE OF BEES.

The proper time to begin preparing for the spring care of bees is in August of the preceding year, because it is then that a new queen should be introduced in order to insure a large number of young bees to successfully pass the winter. Young bees are able to undergo the hardships of winter and still retain enough energy to carry on the heavy duties of spring brood rearing.

During the month of September, or just after the first frost, it is the duty

of the beekeeper to see that the bees have plenty of stores. By plenty of stores is not meant only sufficient food to carry them through until the elms and maples bloom in the spring, but enough to last until the honey flow begins. This means, for Kansas, about forty pounds of honey to each colony. It may be objected here that it is too late now to do these things. This is very true, but now is a very good time to call attention to the fact that the spring care of bees would have been much simplified had these things been attended to last year, and in planning next year's work these things should be done.

Those who have not followed the above suggestions should examine their colonies on the first warm day, with two purposes in mind: first, to see if they are queenless; and second, to ascertain the amount of stores in the hive. If the colony is queenless it would be better to unite it with a queen-right colony, because, although it is possible to purchase queens from the South at this time of the year, their delivery is apt to be delayed, and the colony grow weaker while you are waiting for the queens. If the stores are found to be insufficient, then a thick syrup made of two parts of sugar to one part of water, by measure, should be fed to the bees.

Great quantities of food are necessary during brood rearing, and not only food, but water; therefore, watering places should be provided near every bee yard. These are of many patterns, the chief requisite being that the bees get water from them without drowning. A tub or vessel filled with water, with a lot of chips or pieces of broken cork floating on the surface will make a suitable drinking place.

If some of the colonies are found to be weak, even though they may have a queen, it will be best to unite the weak colonies, but always combine a weak one with a stronger one. It is practically impossible for the weak colony to become strong in time to materially assist in the gathering of the honey crop. However, if the weak colony is added to the strong colony it will increase the honey-gathering force of the latter that it may increase the surplus yield. Later, after the honey flow is over, the colonies may be divided if you wish to keep the same number of colonies that you had in the spring. Those who have had plenty of stores in their hives and were sure that their queens were good in the fall, and have their bees packed well for the winter, need be in no hurry to remove the packing, provided they have left sufficient room for spring brood rearing, because the packing material will protect the colonies during the cold nights which are apt to come between now and the beginning of the honey flow.

THE NECESSITY OF WINTER PROTECTION FOR BEES.

In order to obtain large crops of honey it is necessary to have large colonies ready to go to the field at the beginning of the nectar flow. It is essential in order to secure those large colonies that they pass through the winter with as little loss in their working force as possible. Bees, like storage batteries, have a certain amount of energy, which when once expended means the death of the bees. In order to have a large working force in the spring all precautions should be taken that will enable the bees to pass through the winter with a minimum expenditure of energy. This energy is used by the bees in the winter in maintaining the proper temperature in the hive. As bees are

cold-blooded insects and do not give off heat, they maintain the proper temperature by consuming honey and by muscular exertions. Both of these processes consume energy and shorten the life of the bees.

Winter protection reduces the work necessary to maintain the proper temperature, and therefore will result in a larger colony of bees in the spring, which will possess a much more unexpended energy to carry on the spring work of brood rearing, that there may be a large working force ready for the nectar flow when it starts.

In order to ascertain whether or not winter protection is valuable, experiments have been carried on at the Kansas State Agricultural College in which two sets of three hives each are used. One set of these hives is placed out in the open where it is not protected by any windbreak, while the other set is protected by a dense windbreak of shrubbery. In each set of the three hives, each hive is wintered under different conditions. There is one one-story hive, one two-story hive, and one packed hive in each set. All of these hives are placed on scales and daily readings are taken of the change in weights. In the fall of the year when the bees are placed in winter quarters the amount of honey in each hive is ascertained, also the exact weight of the bees in each hive. As the number of bees in a pound is variously estimated at about 5,000, for the purpose of this experiment this will be the number used. As the number of bees in the hive ready for work on the day that the nectar flow starts is a good test of how they have wintered, the weight of the bees is again taken in the spring of the year on the date when the nectar flow begins. As a result of these weighings it was found that the one-story hive which was unprotected had in the spring 11,718 bees, while the two-story hive, under similar conditions, had 16,406, and the packed hive had 36,718, or 25,000 more bees than were in the one-story hive. As bees are now selling for $2.50 a pound, this would make a difference of $12.50 between the packed hive and the unpacked hive. The same was found to be true in those bees which were protected by a windbreak. The one-story hive had 14,063 bees, while the two-story hive had 20,936 and the packed hive had 36,594. A comparison of the number of bees in the hives protected by the windbreak and those not protected shows a difference of about 2,500 bees in the one-story hive and over 4,000 in the two-story hive, which gives a very good indication of the value of a windbreak over no windbreak. In the packed hive the value of the windbreak is not as striking as that in the unpacked hive, which was reasonably to be expected. A theory which has long been held and frequently preached in Kansas is that there is no need of winter protection in this state, because we have open winters. The winter of 1917-'18 was called a severe winter, while that of 1918-'19 was known as an open winter. The following facts will show very clearly that this theory of not needing packing on account of an open winter is a myth and a dangerous one at that, as the open winter is much more severe on bees than a severe winter. A comparison between the number of bees in the hives in the spring with the number in the fall shows that in 1917-'18, which was a severe winter, there were 332 less bees in the one-story hive which was not protected by the windbreak, while in the hive similarly placed during the open winter of 1918-'19 there were 3,282, or about ten times as many. In 1917-'18 the two-story hive without a windbreak gained 2,806 bees, while in the open winter there were 469 less bees

in the spring than in the fall. In those hives protected by a windbreak the one-story hive in the winter of 1917-'18 gained 4,538, and only 313 during the open winter. The two-story hive protected by the windbreak gained 13,346 during the severe winter, while a hive similarly placed gained only 5,936 during the open winter.

The figures given above show very conclusively three things: First, that a windbreak is of great value in properly protecting bees for the winter; second, that the open winter causes a greater loss in the bees than does a severe winter; and third, it shows above all things that packing is most essential to good wintering conditions, and proves clearly that winter protection is necessary in order to have a strong colony of bees ready for the nectar flow in the spring.

METHODS FOR WINTERING BEES.

There are several essentials to good wintering, among which the most important are: First, to have plenty of young bees in the hive in the fall of the year; second, to have plenty of stores; third, to have the bees protected by a good windbreak; fourth, to have the hive well packed with an insulating material; and fifth, to have plenty of room for spring brood rearing. If these essentials are attended to the colony should winter in good shape to be ready to take an active part in spring brood rearing, and to insure a good, strong colony of bees to take advantage of the nectar flow when it starts. The necessity of having a large number of bees is that they will be able to maintain the proper temperature of the hive by muscular exertion during the winter and yet have enough energy in the spring to take up the spring duties in the colony. In order to have a large number of young bees in the hive, one of the best ways to be certain of this is to requeen during the month of August with a young queen. Such a queen will be more apt to raise a lot of young bees than an older queen, and another thing in her favor is that she will be less likely to swarm during the following season.

The proper amount of stores per colony for Kansas is about thirty-five to forty pounds. Sufficient stores should be left to feed the colony until the nectar flow actually starts in the spring. It is not enough just to leave sufficient honey to feed them until the maples and elms bloom in the spring, because this time is very apt to be followed by a period of bad weather or a dearth in honey, and although a colony may be strong at this time, a shortage of stores may cause their death before the real nectar flow begins. If at the time of putting colonies into winter they do not have a sufficient amount of stores they should be fed sugar syrup made at the rate of two parts of sugar to one of water, by measure. Enough of this sugar syrup should be fed to bring their stores to the required amount.

For a protection from the wind a good hedge or some shrubs will furnish the ideal conditions. A solid windbreak is to be avoided at all times. If the bees are placed near a solid board fence or a solid board windbreak, better results will be obtained if every other board is removed. When a solid windbreak is used a current of air passes over its top and then down directly to the hive.

The single-walled hives which are commonly used do not give sufficient protection from the cold, and these should be packed with some insulating

material. A hive may be placed singly in a packing box, or they may be put in groups of four, with two of the entrances facing to the east and two to the west. Four inches of packing should be placed beneath the hives, six inches on the sides, and eight inches on the top. Tunnels should be made to the exterior so that the bees can pass out for flight. Packing should be put on after the first frost, and a good insulating material will be ground cork, leaves, chaff, shavings or sawdust, packed tightly around the hives. Another method of packing is to place poultry netting with two-inch mesh around the hive, allowing it to protrude about six inches all the way round, and pack between this and the hives with leaves. More leaves should be stuffed beneath the hive, and a super filled with leaves placed on top. This last form of packing gives good winter protection, is easy to prepare, and costs but little.

Plenty of room for spring brood rearing may be given by using a two-story hive for wintering purposes, as the queen will then have much more room than if confined to a single story. However, two-story hives are not always satisfactory, and it really would be better to winter bees in one of the larger hives, such as the Dadant hive or the Jumbo hive, because instead of having a break between the upper and lower hive bodies there would be one continuous sheet of comb between the bottom bar and the top bar, which would give more ideal conditions for brood rearing than if the queen were obliged to pass over the obstructions which would be found in going from one hive to the other. She would pass up from the lower hive body to the upper much quicker than she would go back down. The obstructions in the way of her passing would act as a natural queen excluder.

To sum up, a young queen should be introduced in August to insure plenty of young bees, then winter packing should be applied immediately after the first killing frost, and if the hives are so placed that they are protected from the wind, with plenty of stores and plenty of room for spring brood rearing, there is no reason why large colonies of bees should not result from this practice. In order to get more honey from a colony we must have more bees in it, and every effort of the beekeeper which produces more bees at the right time means more money in his pocket.

THE IMPORTANCE OF WINTER STORES.

The Kansas State Agricultural College is conducting at the Experiment Station a test to determine the best form of a winter protection for bees.

The value of a windbreak, the superiority of a two-story over a one-story hive for wintering and the value of packing are clearly shown. During the winter of 1919-'20 this experiment was continued, and when on the 19th of May the bees were weighed to determine which form of wintering had been best for them, some additional factors were found to have entered into the experiment that were not present in the first two years' work. These bees were placed in winter quarters on October 4, 1919, with a known amount of honey and a known number of bees in each hive. Sufficient stores were left in each colony to feed them through any ordinary winter and to the beginning of the nectar flow. On the 5th of April the temperature at Manhattan dropped to five degrees above zero. This low temperature was accompanied by a heavy snowstorm. As a consequence of this unseasonable weather the flowers on which the bees would ordinarily depend for spring food were

killed, consequently they were forced to exist on the stores which were left in the hives in the fall. One colony between October 4 and May 19 consumed 52⅜ pounds of honey, after which it was fed two half-filled frames of honey and six pounds of sugar. This will explain why some of the colonies became short on stores before they were weighed in the spring.

During the winter daily weights were taken and recorded. On the 19th of May, 1920, the number of bees, the amount of brood and the amount of honey were again determined. This date is two weeks later than the one on which the bees were weighed in 1918-'19, and each colony should have shown several thousand more bees this year on the 19th of May than it did last year on the 4th of May. In 1918-'19 the one-story unpacked hive in the windbreak gained 313 bees, while the packed hive in the windbreak gained 24,844; but during 1919-'20 the one-story unpacked hive in the windbreak gained 10,000, while the packed hive, similarly placed, gained only 3,700. In 1918-'19 the two-story hive in the windbreak gained 5,936, whereas in 1920 it gained 8,125. These results would seem to overthrow any evidence that we may have had in the past as to the value of winter protection, especially when we consider the fact that the packed hive in 1918-'19 had 24,331 more bees than the unpacked hive, while in 1919-'20 it had 6,300 less. This would seem to indicate that the packing had not been of any great value to it, especially when the unpacked one-story hive had five frames of brood, while the packed hive had only three frames. Had it not been for the fact that daily records of the changes of weights were kept, those results would have been very disconcerting, and extremely hard to account for, but upon turning to the daily record we found that on April 20 the packed hive reached its lowest weight. From then until the 19th of May the gains and losses ranged from nothing up to an eighth of a pound, showing that on April 20 the winter stores were exhausted in that colony, and from that time forward they were barely able to secure enough nectar from the field to even maintain the existence of the colony. On the 19th of May, when the colony was weighed, no honey at all was found in the packed hive, while in the one-story unpacked hive there remained three and one-half pounds of unconsumed stores. The unpacked hive had five frames of brood, whereas the packed hive had only about three. To all ordinary appearances the packed hive was a good, strong colony of bees on the 19th of May, and anyone would have been justified in thinking that it had wintered well. However, when the fact is taken into consideration that during the previous year this colony gained 24,844 bees between the fall and spring, and this year only gained 3,700, we can see that something was radically wrong. As the one-story unpacked hive contained five frames of brood, while the packed hive only had three frames, we can understand why this weakened condition was brought about. On the 19th of April, when the stores were exhausted, the queen in the packed hive did not lay as many eggs as the one in the unpacked hive. To all appearances this colony had wintered well, yet when we consider that the date of weighing was two weeks later than the previous year, and that during these two weeks the queen should have deposited from 30,000 to 40,000 eggs, which would have filled six to eight frames of brood, when as a matter of fact it only had three frames, it showed plainly that the queen was seriously affected by the shortage of stores. Had we not the daily records of the changes in weights

in these colonies we would never have known why this colony did so poorly. Although in this article I have spoken of one colony, the same fact holds true for the rest of the colonies which became low in stores.

When the one-story unpacked hive in the windbreak is compared with the one-story unpacked hive in the open, the odds in the number of bees gained and in the amount of brood are largely in favor of the one protected by a windbreak. Both of these hives had unconsumed stores when the spring weighing was made, but the hive in the windbreak had consumed nine pounds more than the one in the open, which it had used in brood rearing. The one in the windbreak had five frames of brood and gained 10,000 bees, while the one in the open only had 3⅔ frames of brood and gained 575. The fact that the packed hive in the open gained more than the unpacked hive in the open, both in number of bees and the amount of brood, demonstrated that, with other things being equal, packing was of a distinct advantage. Here again was shown the value of a windbreak over no windbreak, and, as in the open, the two-story unpacked hive gained 8,000 more bees than the one-story unpacked hive, the superiority of the large hive over the small one for wintering was shown. The superiority of the packed hive over the unpacked hive in the open again showed the value of winter protection.

Some valuable deductions can be made from these results, some of which are: When a colony has insufficient stores, even though it may apparently winter well, yet the queen will so far slow down in her work as to seriously weaken the colony far below the strength that it would have been had it been supplied with sufficient stores. Mr. Crane's statement that if bees are supplied with plenty of honey "they can stand almost any cold for a time," and also his contention that without stores winter packing will not save them, are both strikingly borne out by the above-named figures. When considering the question of wintering bees too much emphasis should not be placed on any one feature of wintering. We know that we must have a large number of the young bees, that we must have plenty of winter stores, and also that if we can give our bees the added value of a windbreak and winter protection it will well repay us; but no beekeeper should rely on any one of these factors alone and expect to get the very best results. They are all necessary.

REMOVING THE HONEY CROP.

Honey is ordinarily produced either in the form known as comb honey or extracted honey, and the method to be followed in removing the crop will depend upon which kind of honey is being produced.

The proper time to remove comb honey from the hive is when all of the cells are sealed over, or when the honey flow is over for the season.

As comb honey depends largely upon its fine appearance, great care should be taken to prepare this honey for the market is as pleasing a manner as possible. First, the propolis and other foreign materials should be scraped from the sections, after which their appearance will be greatly improved if they are rubbed lightly with sandpaper. After the sections have been thoroughly cleaned they should be graded and packed in the shipping cases for market. The sections may be graded according to the rules adopted either by the National Beekeepers' Association or by the Colorado rules. Whichever system of grading is used, care should be taken to make sure that

all of the sections in one case are of one grade, and that that grade is the one under which they are to be sold.

Extracted honey may be removed from the hive when the cells in the extracting frame are two-thirds capped over, because at this time the honey will be sufficiently ripened to be removed from the hive. It formerly was a custom to cut out the wax and squeeze it through a strainer of some sort, the product being called "strained honey." Now, however, since the invention of the honey extractor, the cappings are cut from the cells with a sharp knife, and the frames are placed in the basket of the extractor and whirled rapidly, the honey being thrown out of the cells by the action of centrifugal force. The cappings which have been removed from the cells may be placed in a wire basket and allowed to drain, as considerable honey will be found to have adhered to them, or they may be cut off directly into a capping melter, which is so arranged that the cappings melt and pass out at the front of the melter, together with the honey. The combination of melted honey and wax is caught in a container and allowed to remain until cool, when it will be found that the wax has risen to the top and the honey may be drawn off and sold.

Extracted honey appears on the market in various-sized containers, from the small-sized glass jar to the 60-pound can. The beekeeper will have to decide for himself which size he will use, and this will depend upon the market to which he caters.

COMB HONEY.

Frank Hill, Sabetha.

My first attempt at honey production was a try for comb honey. In fact, I did not know that there was such a thing as extracted honey. I had seen but few bees, just scattered little apiaries of a few colonies each, and all that the owners of them attempted was the getting of a little comb honey. The first colony of bees I owned was a swarm that lit on a peach tree in our yard, and I furnished a hive and a neighbor hived them for me. I had been interested in bees before, and the fact that I was now owner of a colony renewed that interest. I began to get literature on the subject, and most of it came from A. I. Root Company. The Root company at that time was booming the Danzenbaker hive for the production of comb honey, and after that first colony my bees were housed in the Dan-enbaker hive, which, by the way, seems to be obsolete now. You see that comb honey was my idea.

In the literature which I read I found that the big men of the bee business were writing on how to produce comb honey. The idea was to produce fine, fancy comb honey. The idea got hold of me that it required a good bee man with knowledge of the business to produce a fine article of comb honey. I had, of course, found out by this time that there was such a thing as extracted honey, but it did not appeal to me in the least. I therefore went in for comb honey, and did my best, as I have done every year since, to produce just as fine and fancy a crop of comb honey as I possibly could. Some years I have not produced a single section, but that has been the fault of the season more than my fault.

There are other reasons why I try for comb honey. The difficulty one contends with in its production makes it a sort of sporting proposition that appeals to me. If some one else can do a thing that I want to do, and he does it successfully, I want to do it or know just what that fellow knows that I do not know. I am not different in this from other men. The fact that an object is a little difficult to obtain makes most of us want it more. And there is no doubt about it being more difficult and that it requires a better informed bee man to produce marketable comb honey than it does to produce extracted honey.

I am also willing to agree with some men who say that there is a desirable flavor in comb honey that is not in extracted honey. I am unable to say why. And I am also convinced that there is some sort of a chemical difference. For instance, this winter while getting my comb-honey supers ready for the bees I found several half-filled sections of honey. Part were sealed and part unsealed. The sealed and the unsealed were both liquid, while that which was extracted last fall was long ago crystallized hard. Those partly filled sections were simply delicious and had a distinctly different flavor from the extracted honey made the same season and extracted last fall.

Then the beauty of the product appeals to me also. It is actually a pleasure to me to open supers of fine comb honey, scrape them clean, put them in the shipping case, stamp their net weight, nail them up and put them in tiers, glass side out, that I can see the whole tier. It looks good to other people also. I do not believe any person ever came into my shop while I had comb honey in sight who did not remark upon the beauty of the product. Now, I really enjoy doing anything with bees, with the possible exception of twisting an extractor or feeding a large number of robbing colonies in the late fall. I can work longer without getting tired, and enjoy about every minute of it, in working with or packing comb honey.

There is another reason why I produce comb honey if I can, and that is, it is easy to sell and has always sold for a good price. If one has, say, 100 cases of comb honey to sell in September it makes a nice bunch of money coming in at a time when I am likely to be broke or at the breaking point, and a check which that much comb honey brings in looks good to me at any time; but when one begins to feel as if something was wrong with one's finances, and a check for from $500 to $700 comes in it does something towards rolling the dark clouds away, believe me. For instance, last summer was a mighty poor honey year for me, but I managed to induce the bees to produce 260 cases of comb honey. One hundred cases were sold at $6 per case and the balance I got $6.25 for, delivered at the river. That brought $1,600, less the freight, and I had it all during the first week in September. There are dozens of people in my own little town who will not buy extracted honey, but do buy comb honey. They are people who do not think the extracted adulterated, either; they simply prefer comb honey. The cities are full of people who do not consider extracted honey at all, and a lot of them know nothing about any honey but comb honey, and as a rule they are people who are able and willing to pay more for it than they would for extracted honey. They should pay more, I think; as a general thing they should pay about twice as much per pound, considering a section a pound, as they should pay for extracted honey. Comb honey is the product of a specialist, in a way.

The very best colonies are required to produce it; it is produced from the best sources. In many places the crop is very uncertain, and it requires more work and material to get it ready for market.

The cost of producing comb honey compared with the cost of producing extracted honey is rather hard to compute. It has been estimated that a given colony of bees will produce something like twice as much extracted honey as it will comb honey. I doubt that, if the comb-honey producer does his duty. I am satisfied that more extracted honey will be produced, especially if the bees have combs already drawn. If the bees are placed on full sheets of foundation, the difference will be a little, but just a little, in favor of the extracted-honey bees; but given good, strong colonies and a good flow, with some drawn comb in the comb-honey supers, I believe that the difference will be very little. The difference, I think, will be that the bees will have to build up to the wood in the sections, and they usually leave a little depression where the combs join the wood, while the bees on Hoffman frames build solid, and of course will make the heaviest combs. In short, I think the bees will build nearly as rapidly in a properly prepared super as they will in a Hoffman frame, both being prepared with full sheets of foundation. A frame of solid honey will weigh more, of course, than will a section holder of four sections of the same dimensions, because the depression next the wood takes off a little and the wood where the sections join takes up a little space. But comb honey is not sold by the pound; it is sold by the one or two dozen sections. I have never had a buyer complain of honey that weighed as much as eleven ounces net. I have had them ask me if the honey was heavy before they bought, and of course heavy, well-filled sections are to be preferred, but I have never been asked to cut the price on account of the weight. I will say here that I believe the *average* section I produce will weight about 12½ ounces net. I have shipped considerable honey weighing ten ounces net, but have voluntarily taken one dollar per case off the price. I do not believe, as a matter of fact, that a cent was taken off the price when it was retailed. It costs more to produce comb honey than it does extracted honey, because of the sections and foundation that must be furnished every crop, and to this must be added the cost of shipping cases and crates in which the shipping cases are packed. Last fall it cost me for material for a case of comb honey as follows:

Shipping case	$0.35
Sections	.21½
Foundation	.11½
Crates (one-sixth of the cost of a crate holding 6 cases)	.20
Total	$0.88

The whole cost being 88 cents for the material to get a case of comb honey ready for market. Calling a section a pound would make the case of honey comparable to 24 pounds of extracted honey. To make the figures even we will say the case weighs 20 pounds, which it will weigh. To get 20 pounds of extracted honey ready to sell it must be packed in, say, the 5-pound pail. When cost and freight are added, a 5-pound pail will cost, or did cost me, about 9 cents each, four 5-pound pails costing 36 cents. Say one can sell the 5-pound pail for $1, making the 20 pounds bring $4. The difference is

that I sold the 20 pounds of comb honey at $6.25 with an expense of 88 cents, leaving a profit of $5.37 to me. You see I have a difference of $1.82 to pay me for the extra trouble in getting supers ready and the extra trouble it requires in working the bees. One thing to take into account in favor of comb honey is the taking care of extracting combs. They must be either put back on the bees or thoroughly treated to kill and prevent the wax moth from destroying them. It does not cost quite as much per pound to pack extracted honey in 60-pound cans, but the price per pound for it in that size package is nearly always less. It can be seen that even if the bees do not produce as much comb honey as they do extracted, the price averages, or has averaged with me, about two-thirds more. The prices I quote are the highest I received for both kinds this last year. The work of getting the supers ready, folding the sections, putting in the foundation, etc., comes in the winter when a little work is welcomed, and I would rather have it to do then than not. It is mighty bad business for a bee man who has as many as say 100 comb-honey supers to get ready to wait till he sees whether there is going to be a crop or not. It requires too much time, and the bees will not wait for anything, and it pays to have everything all ready.

Now, as to handling bees to produce honey, there are, I believe, almost as many systems as there are men. There are plenty of books, and good, well-written books, by men who have had experience and know the game. If I haven't read them all it is because I have not been able to get them. I am not going to attempt to tell you how it should be done. You can get books that will tell you that. I will try to tell you how I work, and the plan may or may not suit you.

My bees are all in outyards. I have more than 400 colonies, and they are all in the country, or will be in the spring, but a dozen or so that I keep at home to raise queens with and help with increase there. You see that any intensive plan such as you will find in Doctor Miller's "Fifty Years Among the Bees" is out of the question. First I will tell you why my bees are in small outyards. My location is a good one, providing it rains enough, which it does not often do. But very often one locality just a few miles away will get one or two rains in one season that another location will not get. I have had one or two yards give me a fair crop, while others in the same season had to be fed for winter. A rain makes a big difference. My bees are in eight yards of from thirty-four to sixty colonies each. My bees are wintered—or that is what I try to do—in two hive bodies. I use ten-frame hives. If they should be wintered on one set of combs I put another set on in the spring when I unpack them. They then have plenty of room for almost any kind of a queen. I clip all queens in the spring, and try to get it done during fruit bloom. Then an inventory of the hives is taken and the condition of the colonies is marked on the hives. One can devise any way to do this that suits. When I clip a queen I put an X on some part of the hive, with the date. When I find a clipped queen I put an O there. When I find no queen I put a QX there, so I know where to find them with a new queen. At that time a colony must have plenty of stores to sustain it until the flow. After the stores are supplied and the requeening is done, they are left till they begin to build up pretty strong. Then I inspect and see that

there are no queens confined in one hive body. Sometimes a queen may be in the upper body and never seems to find the lower one at all. All I do is to reverse the bodies, putting her below, and she is sure to go up. I usually see that the queen is in the top body in the spring, as it is warmer, hence this last manipulation. The bees are not disturbed till nectar begins to come in rather freely from white clover, and if that misses out, till sweet clover. When nectar is coming in and the best colonies have the combs well covered with bees, I put the queen below with three or four frames of brood, put the excluder on, and the rest of the brood on top. At this point I am differing from many others, I know, as we heard here last year. It has been advised to put the queen below with only one frame of brood. I believe that to be more or less of a backset to the bees. There are not enough bees on one frame to keep many bees downstairs where the queen is, and I am sure the queen curtails her laying till more are hatched and there are more young bees in the lower body. I have tried the one-comb method, with the result of losing part of the queens. I usually put below at least two frames of sealed brood and one frame of open brood. The bees are then left alone until they are working well in the supers. To get comb honey there must be a flow of at least three pounds per day—the more the better, but I have had a good crop with a flow that barely exceeded three pounds per day through the whole flow. When bees are going good in the supers I put on comb-honey supers. Previous to this time, at the time I put on excluders, I mark the colonies in this way: the best colonies, those with the more prolific queens and the most bees, I marked No. 1; the next best I marked No. 2. When I am ready for supers I know just where to put them. I go to the No. 1 colonies and take off the top body. I take what brood there is there and put it below till the lower body is full of brood of some kind. If there is not enough I go to one of the colonies not marked at all and get some, but seldom have to do that. I usually leave one empty or partly empty comb for the queen to lay in immediately. Then I put on supers, usually two. If the flow does not look good and it seems to me as if it would not last long, I put on just one. Even if the flow is short and not very strong I can get one super filled. As a rule there are two, and in the bottom super there are either two side combs drawn out—I mean extracting combs—or there are one or more drawn combs in the sections. If that condition prevails the bees will occupy the sections almost at once, and in a short time the super is filled. Before the super is filled I transpose the two and put the lower one on top. If the bees are producing heavily I put another on at that time on top. The next visit I will shift the lower one on top if it is finished, as it usually is, and keep supering as the bees need it till the flow stops. Sometimes I will find bees working in one side of the super. That super is turied around so the side worked on is opposite from where it was, which induces them to begin the other side. The bees must be watched as closely as possible during the flow. I make the different yards about once a week. The hive bodies I take off the comb-honey colonies are given to the bees I did not mark at all; and as there is usually a little brood in them, I frequently put it right down in with their own brood if the colony looks as if it needed help. If honey is coming in strong and the No. 2 colonies possibly need room, I have extra supers for them right in the yard. One must use judgment in supering, as

it is easy to overdo it and get a scattered lot of unfinished honey, or crowd them too much and not get the crop one should, and induce swarming.

The big question is, of course, swarming. I hereby admit that I know little about it. I have read a lot, all that I have found, and do not think that anyone has very much positive knowledge about it or how to prevent or stop it after the bees have the notion of swarming well established. I believe we do know what induces it, but if it is known how to keep a strong colony of bees working in a confined situation such as comb-honey supers, without swarming, I do not know who knows it. Some colonies will do that very thing; some will attempt to swarm at almost the first symptom of crowding. Why one colony should swarm and another not, under the same conditions, is what I do not know. After a colony has shown the intention of swarming, all my own attempts to prevent it have been failures. I have tried all the varieties of shaking I have ever heard of and invented a few of my own. I have shaken them on empty combs, on full combs—that is, combs of honey—on partly filled ones. I have shaken them twice and three times in the same day, and every time I have shaken a colony of bees that are getting ready to swarm, and shaken them with their own queen, I have failed without exception. Some one else may have a different movement than mine, but my own does not do the business. They will not go to work by that manipulation.

One way I have succeeded in making them work was to take their queen entirely away and leave just one queen cell without brood till the cell hatches, then giving it back to them after the queen has mated. They will then work in a sort of listless way till the young queen hatches, and then they are all right; but I have lost some valuable time, of course. I have also tried the following with success: Take the queen away with one or two frames of brood, shake out all the bees some distance from the hive, and set a weak colony on the stand that has a good queen. I put the old queen with one or two frames of brood on the stand I took the weak colony from. I destroy all queen cells in the old hive and let the bees return to this hive. I have had them go to work almost at once after that manipulation. The new queen seems to put a new sort of aspect on things, and being shaken and disorganized, they have always accepted the new one and have gone to work. At that time, if I still have more comb-honey supers to fill, and flow continues, I can then go to one of the colonies marked No. 2 and make the same manipulation before described, take their extracting super and put it on one of those not marked, and give them comb-honey supers. They will be by that time in condition to build sections, and just as good as the ones marked No. 1. It will be seen that I do not give any colony comb-honey supers until they have been well started working upstairs and have the storing habit established. I do not have many or a large per cent of colonies attempt to swarm when the plan is followed, but I do have some. In my largest yard last year, one of sixty colonies, I had five colonies try to swarm out of thirty that I had on comb-honey supers. That yard did not have the best flow. The one that had the best flow, a yard of fifty-three colonies, with thirty-five comb-honey colonies, did not have a single one attempt to swarm that I discovered; but of course I might have missed out on one or two. This is my best reason for clipping the queen.

I make weekly visits during the flow. It is easy to discover a colony that

is making the attempt to swarm, if the queen is clipped. They may be clustered over the outside of the hive. They will not be in the supers when other colonies are. The queen may be in the grass with a bunch of bees with her. If the bees do not seem normal, are not working as they should, or as the others are, a look in the brood chamber will reveal whether they want to swarm or not. If the queens were not clipped they very likely would be gone when I got there, or hanging on some of those big trees on the highest limb they could find. Another good reason for clipping the queens is that I can keep a line on the age of the queens and look the combs over for disease. I do not requeen at any given time, as I have not seen fit to do that as yet; but I know where the poor queens are, and then when I find those good, big supersedure cells I know right where to put them.

Another thing in favor of comb-honey production is the fact that bees will not build in sections till the lower body is full of something, either honey or brood, and they keep it full. When fall comes you are quite sure to be well fixed with winter stores. It is very different in producing extracted honey. By putting brood upstairs bees will work up there whether there is anything below or not. I have, and no doubt you have, found a full hive body on top with nearly nothing below. I had that demonstrated to me this last season to my satisfaction. I had a poor year—two days of twenty-degree weather during fruit bloom—and those days were a week apart. One day it got down to fifteen degrees. Everything that ever produced a drop of nectar was killed—even the dandelions, and that is going some. The bees were short of stores on account of it. I, like most beekeepers, depended upon somewhat of a spring flow. I do not any more, but I did. I had to feed until white clover showed up. When it did show up it was a mighty poor showing. Nobody would sell a hoof of stock last winter or spring, and everybody had more stock than feed. As fast as a clover head would get in bloom it was eaten off. I got nothing from it at all, but just enough to keep the bees breeding till sweet clover came. I have no complaint to make on what the sweet clover did. I had a good flow for about four weeks. I harvested 260 cases of comb honey from the hives at that time, and about 9,500 pounds of extracted honey; and those colonies were in good shape. I sold the comb honey. Then dry weather came. Heartsease bloomed, but the weather was so dry that there was no nectar in any kind of bloom. It stayed dry till frost. Of that 9,500 pounds of extracted honey I had to give back to the bees 6,000 pounds or go out of the bee business. I did not need to feed the comb-honey colonies more than 500 pounds altogether, all of which seems to me to be a mighty good argument in favor of comb honey. I found colony after colony with not a pound of honey in the brood chamber and a full ten-frame body above, in which case I simply took out the excluder.

I would not advise anyone to attempt to produce comb honey if he will not take the time to attend to the bees during the nectar flow. If they are neglected and not properly supered one will not get the crop or there will be an unnecessary amount of swarming. If one has but little time I think extracted honey would be the kind to produce. There is little if any trouble about swarming, but if full-depth bodies are used for supers the supering is but little trouble, if one has them to put on when needed. It is not best to put on two or three and let them go. One might have to do that way and

get a good crop too; but if nice, fat combs are produced they will be produced where the bees have not too big a surface to cover. It is not advisable for anyone to attempt to produce comb honey alone. The flow is not always good enough for comb honey, and there are always colonies in any apiary that are not strong enough for comb honey but are strong enough to store extracted honey. It seems to me that the beekeeper should produce both. If one has the equipment and is ready for a big crop and the good big season we all look for every year, and gets all the comb-honey supers filled, he is far ahead financially of what he would be if producing only extracted honey.

About sections and filling sections with foundation: I have tried three arrangements that are supposed to fasten foundation to the top of the section by the hot-plate method. They have been a rank failure with me. There is not enough melted wax to do the job so they will stay. You know, as my bees are in the country, the supers have to be handled several times and then take some bumping on the road, and I want that foundation to stay put. I use full sheets, of course. I cut the foundation so it just fits inside the section, and then with melted wax, that stands on an oil stove near me, I fasten the foundation to the wood. I use a bristle brush with a long handle. They are what are sold as artists' bristles, and a flat one is better than a round one, and should be about a quarter of an inch wide. While fastening foundation that way is not the fastest way, it is much faster than the Van Dusen fastener, and the beauty of it is that it does the job, and a super has to have rougher handling than I ever gave one to loosen foundation from the section. I have tried half sheets of foundation, a short starter, and a sheet about four-fifths the depth of the section and then a bottom starter. I really think the latter is the very best method of putting foundation in sections, but it is troublesome, and I have been cutting my sheets so they will just go in the section and fastening them on three sides with wax as described. If one uses a short starter he will have many sections in a crop that are not fastened at the sides or bottom. He will have many built nearly full about half way down, and then quit. He will have a lot of chunk honey in sections, which is too expensive a way to produce chunk honey. If the flow is good and the bees are strong one can get good comb honey with short starters. If one uses full sheets the bees will begin sooner without crowding, will fill the sections quicker, there will be few half-built sections if properly supered, and there will be light sections instead of chunks reaching half way down, and the light sections will be straight and marketable.

When I see the crop coming I order shipping cases and get them nailed, and as fast as the supers are packed I fill the supers with new sections, having a large number ready and waiting for that time. The reason for that is that sometimes we get a big heartsease flow in August and September, and I want to be ready for that in case it does come. Another reason for getting the comb honey off as soon as it is done is to prevent the bees from getting it travel stained and injuring the color. In packing it I sometimes find a section or two that are not finished. I fill supers with these and give them back to the bees, as I always start packing before the flow is entirely over, if possible. If I have a quantity of these left after the flow is over, and they are too light to market, I extract them and save the combs and sections,

dividing them up in the supers for the next year. The foundation and the sections are not wasted, and the bees start much sooner in a super that has one or more of these combs in it.

In getting the honey ready for market I have a heavy work bench about waist high. I put the full supers on this, and with a stiff painter's putty knife, ground sharp on one side like a chisel, I scrape the top of the sections just as clean as possible while they are still in the super. When the tops are clean the rest is easy, as just a little cleaning finishes the job, the rest of the section being protected by the section holder. The net weight is stamped on the top, they are put in the cases, nailed up, and are ready for the crate. The crate is arranged to hold six cases with handles. Comb honey must be well packed for shipment, and these crates must be rightly planned and stiff enough to stand all likely strain. I will say that I have never had a damaged shipment of comb honey. I pack it so well that it will require a wreck or the limit in carelessness to damage it.

To you extracted-honey men I would suggest getting some comb-honey supers. You will find a quick market for all you can produce and more. Our honey is finished and can be made ready to sell before the cheaper western honey gets here, and that is the time to sell it. Early in the fall people begin to think about honey, and that is the time to get it on the market. I believe you will find it a most attractive branch of your business, and I wish you success.

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Beekeeping in Kansas.