DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

BEE DIVISION

INTERIM REPORT OF THE DOMINION APIARIST

C. B. GOODERHAM, B.S.A.,

FOR THE YEAR 1921

View of Apiary, Central Experimental Farm

OTTAWA
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PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1922

41682—1

DIVISION OF BEES

Report of the Dominion Apiarist, C. B. Gooderham, B.S.A.

The Bee Division suffered a severe loss during the year 1921 in the death of its former chief, Mr. F. W. L. Sladen, who had been in charge of the bee work of the Experimental Farms for the past nine years. During this time beekeeping had been started at many of the Branch Farms and a mating station established at Duck Island, in the eastern end of lake Ontario. It was while conducting experiments in queen breeding at this station that Mr. Sladen met his death, on September 10 last.

The work of the Bee Division during the summer of 1921 was under the direct supervision of the late Mr. Sladen, assisted by the writer. The report of this work is herewith submitted.

Although the past summer was very hot and dry, the season of 1921 was exceptionally good for honey production in many parts of Canada, especially in Manitoba and parts of Ontario, and large crops of first-class white honey were produced, while in a few localities only a small crop was obtained, due to the extreme drought. In sections where buckwheat secreted nectar, good crops were obtained from this source.

In spite of the fact that a considerable amount of unwholesome honey was stored by the bees in the fall of 1920 and that feeding was checked by the abnormal price of sugar, there was little mortality among the bees during the winter of 1920-21 and the colonies came through the winter in very good condition.

Bees were kept at sixteen of the Experimental Farms, as follows: Charlottetown, P.E.I., Nappan, N.S., Kentville, N.S., Fredericton, N.B., St. Anne de la Pocatière, Que., Lennoxville, Que., Kapuskasing, Ont, Morden, Man., Fort Vermilion, Alta., Lethbridge, Alta., Lacombe, Alta., Invermere, B.C., Summerland, B.C., Agassiz, B.C., Sidney, B.C., and the Central Experimental Farm, Ottawa. The keeping of bees was discontinued at Cap Rouge, Que., and Brandon, Man.

The work with bees at the Branch Farms has continued to be hampered by the difficulty in obtaining properly trained beekeepers. There are now trained men at Charlottetown, P.E.I., Kentville, N.S., Fredericton, N.B., and St. Anne de la Pocatière, Que.

The apiary at the Central Experimental Farm at Ottawa continues to lead in the annual average production per colony, with 155 pounds to the colony, spring count, for the past five years, 1917-21. This lead is attributed to the fact that eastern Ontario is one of the best sections of the clover honey region, and also to the favourable spring conditions enabling the colonies to build up rapidly to maximum strength in time for the main flow from clover. The total production of the whole apiary for 1921 was 9,410 pounds 8 ounces, or an average of 200 pounds 3 ounces per colony; 1,010 pounds of sugar, valued at $86.86, and 488 pounds of honey, valued at $121.94, were fed to the bees for the winter. The following table shows the average crops obtained from the bees at the different Experimental Farms for 1921 and for the past five years, or since bees have been kept:—

HONEY YIELDS

Farm at	No. of Colonies, Spring Count, 1921	Average Crop per colony, Spring Count, 1921	Average yield for past five years	Period
		lbs.	lbs.	
Charlottetown, P.E.I.	8	40·9	37·4	1917–21
Nappan, N.S.	14	52·1	61·5	1917–21
Kentville, N.S.	43	39·1	55·6	1917–21
Fredericton, N.B.	7	72·8	65·8	1917–21
Lennoxville, Que.	1	66·0	34·0	1919–21
Ste. Anne de la Pocatiere, Que.	16	89·3	89·3	1921
Kapuskasing, Ont.	2	200·0	127·5	1920–21
Ottawa, Ont.	47	200·2	155·0	1917–21
Morden, Man.	6	98·0	71·5	1917 & 18 & 21
Fort Vermilion, Alta.	1	12·0	12·0	1921
Lethbridge, Alta.	6	150·3	115·0	1917–21
Lacombe, Alta.	5	55·2	61·3	1917–21
Invermere, B.C.	8	40·2	69·1	1917–21
Summerland, B.C.	2	80·0	75·8	1917–21
Agassiz, B.C.	3	73·3	34·3	1917–21
Sidney, B.C.	5	56·0	63·1	1917–21

HONEY PRODUCTION

The bees were first seen bringing in pollen on April 15 from alder. Willow was in bloom on April 18 and yielded nectar and pollen in small amounts until May 3. A few early species of maple also yielded nectar at the same time and aided greatly in stimulating brood production early in the season. Dandelion and fruit bloom yielded from May 18 to May 22 and the bees worked on these readily when the weather permitted. Owing to very dry weather during the time these plants were in bloom, very little nectar was secreted and no surplus honey was obtained. The bees, however, obtained enough to stimulate brood production to the maximum and the colonies became strong in good time for the main flow from clover. The following table shows the time and length of the early flow and how unfavourable for honey production 1921 was as compared with the four previous years:—

TIME AND LENGTH OF EARLY NECTAR FLOW

Year	Date flow started	Length of flow	Date flow ended	Highest Yield in one day	No. of days during flow on which no gains were made
1917	May 16	29 days	June 13	4½ pounds	13
1918	" 17	15 "	May 31	3½ "	0
1919	" 24	13 "	June 5	2½ "	0
1920	" 15	20 "	" 3	4½ "	2
1921	" 18	5 "	May 22	1 "	0

Very little nectar was brought in from May 22 to June 5, when the flow from alsike clover and white dutch clover commenced. Sweet clover began to yield on June 12. This flow continued until July 18. The peak of the flow was reached on July 2, when the average gain for five colonies on scales was 11 pounds 4 ounces.

The accompanying table shows the time and length of honey flow from clover for the past five years; also the earliness of the flow and favourable weather for gathering the same in 1921 as compared with the four previous years:—

TIME AND DURATION OF CLOVER HONEY FLOW FOR PAST FIVE YEARS.

Year	Date flow started	Length of flow	Date flow ended	Highest Average Yield in one day	No. of days during flow on which no gains were made
1917	June 25	39 days	August 2	9 lbs. 4 oz	4
1918	" 25	36 "	July 30	15 " 0 "	11
1919	" 14	42 "	" 25	13 " 4 "	7
1920	" 10	51 "	" 30	5 " 12 "	17
1921	" 5	44 "	" 18	11 " 4 "	1

No surplus honey was secured from the fall flowers such as golden rod and wild aster. Enough nectar was obtained, however, to keep the colonies from starving and to stimulate late breeding so that the colonies were strong with young bees for the winter.

INCREASE

During the summer the colonies were increased from forty-seven to seventy-four an increase of twenty-seven colonies. The increase was made by dividing the colonies as follows: (1) Six colonies that wintered over with two queens were divided on May 3 and May 14. Each part contained a laying queen; this made an increase of six colonies. (2) As soon as a colony was found making preparations for swarming by having larvæ in queen cells, the old queen with two frames of emerging brood and one frame of honey was taken from the colony and placed in a new hive on a new stand. Empty combs were given to these new colonies as required during the season. Twenty-nine of these divisions were made between June 23 and July 25. By the latter end of September, twenty-one of these colonies were in good condition for the winter; the remaining eight were weak and were united to other colonies. On September 28, the old queens were destroyed in the new colonies and young queens of selected parentage, mated at Duck Island, were introduced. The colonies were further strengthened by adding the bees from the mating boxes.

EXPERIMENTAL WORK

For the advancement of beekeeping in Canada, it is necessary to educate the beekeepers to replace, with modern methods of management, the old, neglectful methods that continue to cause such heavy annual losses, particularly (1) from poor wintering, (2) from brood diseases, (3) from old and failing queens, and (4) from swarming. This work is being advanced by demonstrations in the Farm apiaries and by the distribution of bulletins and press articles.

During the year, special attention has been given to the swarming problem, which is one of the most important in Canadian beekeeping. Experiments started in previous years were continued; these experiments fall under two heads; (1) Management and (2) Breeding. They were conducted mainly in the apiary at the Central Farm where the conditions are most suitable for this work.

PREVENTION OF SWARMING BY MANAGEMENT

Investigations in previous years have indicated that the method of dequeening, and requeening at the commencement of the main honey flow, was the most promising one for experiment. No entirely successful method of manipulation when the old queen was left in the hive could be found. In addition to the prevention of swarming, the greater productivity of the young queen supplies one of the essential factors for successful wintering, namely a strong colony, consisting mainly of young bees, and it

also makes the colony more valuable the following year. The young queens should be reared from selected stock, for in this way the strain of bees can be gradually improved. The queens should also be reared early so as to start laying before the end of the swarming season in order to produce abundance of young bees for the winter.

The colonies were examined every eight, nine or ten days after the commencement of the honey flow from clover, and those found to contain larvæ in queen cells, a practically sure sign that the colony will swarm, were treated by removing the queen and destroying all occupied queen cells. At the next examination, nine days later, all occupied queen cells were again destroyed and a young queen of select parentage was introduced to each treated colony. It was found that a nine or ten day period between the removal of the queen and the second destruction of queen cells was better than an eight day period, as the bees occasionally built cells over drone larvæ after the eight days, while if left for eleven days a swarm might issue. This method requires but two manipulations to prevent swarming and at the same time requeen the apiary.

None of the twenty-nine colonies at the Central Farm treated by the dequeening and requeening method made any further preparations for swarming and the method was effective in controlling swarming.

The method of introducing a young laying queen nine days after the removal of the old queen shortened up the loafing period that was experienced in former years when ripe cells were given at the last destruction of queen cells. It also did away with the possibility of the colony becoming queenless through the loss of the young queen during her mating flight.

The experiments in simplifying the discovery of colonies preparing to swarm were continued from 1920, as follows:—

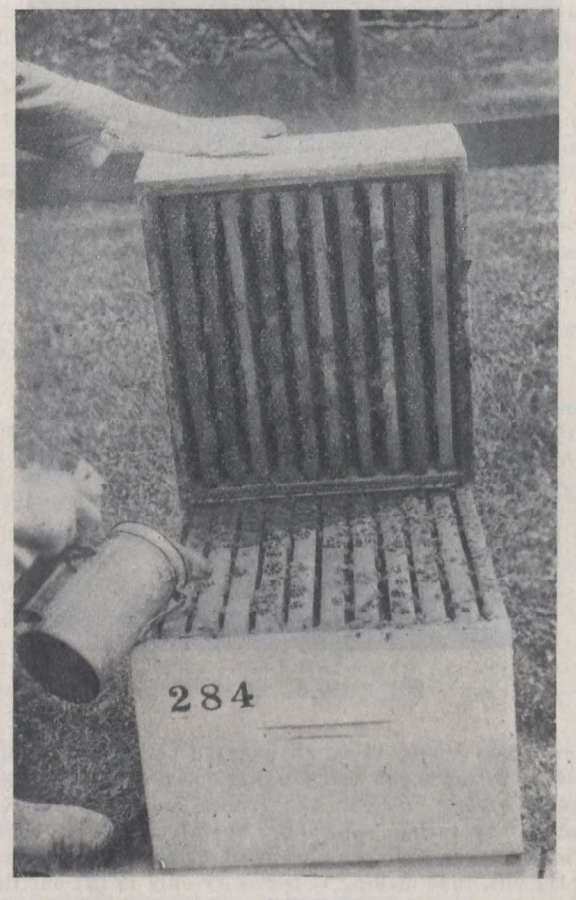
(1) The queen was allowed to breed in a shallow super in addition to the regular ten-frame Langstroth brood chamber. The shallow super was given in the spring as soon as the bees of the colony were covering nine combs in the regular brood chamber—May 10 to June 8.

The experiment conducted in 1920 indicated that a high percentage of the first queen cells are built along the lower edges of the combs in the shallow super and that by tipping this super the first preparations for swarming could be detected without having to examine any of the combs in the brood chamber.

Shallow supers were placed over thirty-nine colonies. These colonies were examined by tipping the supers every nine or ten days from the time the supers were given. Ten of the colonies made no preparations for swarming during the season. Four colonies had nothing more than eggs and twenty-five developed larvæ in queen cells. The four colonies that had eggs only, destroyed them as soon as extra room for surplus was given.

In twenty-two of the twenty-five colonies that had larvæ in queen cells, practically all the cells were built in the shallow supers and most of these could be seen between the bottom bars of the frames when the super was tipped. Of the remaining three colonies one superseded its queen from a cell in the lower chamber without swarming and two developed larvæ in queen cells in the lower chamber but later destroyed them. A summary of the results of this experiment for the past two years is given in the following table:—

Year	No. of colonies	No. of colonies that did not build queen cells	No. of colonies with eggs only	No. of colonies with larvæ in queen cells	No. of colonies with cells in super	No. of colonies with cells in brood chamber only	Percentage of colonies in which the first preparation for swarming were detected by tipping super
1920.....	37	8	7	22	19	3	86·36%
1921.....	39	10	4	25	22	3	88 %



Tipping shallow super to detect swarming. Note queen cells on lower edges of shallow combs.

By the above method of tipping supers the first preparations for swarming can easily be seen without handling any of the combs of the brood chamber. No colony in which queen cells could not be seen in super was treated and none of the colonies swarmed.

Nuclei ready for Duck Island.

(2) In the ten-frame Jumbo brood chambers a horizontal slit was made in two of the combs in which it was hoped that the first queen cells would be built. The slit was made by cutting a piece of comb four inches long by half inch wide from the centre of the comb. The frames containing these combs were marked on the top bar. This plan is also very promising as most of the colonies developed the first queen cells along the slit, thus making it necessary only to lift out the marked combs to find the first preparations for swarming. The results are summarized in the following table:—

No. of colonies	No. of colonies that did not produce queen cells	No. of colonies with 1st cells along slit	No. of colonies with eggs only	No. of colonies with larvæ in queen cells	No. of colonies that produced cells other than in slit
7	2	4	1	3	1 supersedure

BEE BREEDING EXPERIMENTS

The experimental work in breeding of bees at Ottawa and isolated mating of queens at Duck Island, in the eastern end of lake Ontario, was continued on a larger scale during the season of 1921. Three queens were purchased from prominent beekeepers; these and three desirable queens of the Farm's own raising were used as breeding stock. Two of the queens showing desirable characteristics were encouraged to produce large numbers of drones throughout the season by giving several drone combs in the brood chamber and by feeding a mixture of one-third honey and two-thirds water when no nectar was being gathered from the fields. The other four were used for queen production.

On July 8 the first batch of queen cells for Duck Island was started. These cells were ripe on July 18 and the young queens began to emerge on the evening of the same day. Thirty-six three-frame nuclei in twin mating boxes were made up on July 18, as follows: One comb of emerging brood with adhering bees and one of sealed honey were taken from the regular colonies and placed in each mating box. An empty comb was also given. About 200 drones picked from the drone breeding colonies were also placed in each box and a ripe queen cell fastened to the frame containing the brood. The entrances to each box were closed with wire screening to prevent the bees from flying and all boxes were placed in a cool, shady spot. Early next morning, July 19, each box was examined to see if the queen had emerged safely. All queens were found in good condition and the boxes were again fastened up and sent to Duck Island.

The bees arrived at Duck Island on July 20 and were immediately released. Thirty of the queens mated quickly and perfectly and produced large patches of worker brood.

On August 8, nine nuclei containing nine virgin queens were taken to the island and on August 24 ten more were taken. These nuclei were made up in the same manner as the first lot and contained large numbers of drones and several combs of capped drone brood. A number of ripe queen cells were also taken in a special carrier; these were to replace lost queens, and mated queens of the first batch taken from the mating boxes. In all 69 virgin queens were taken to the island for mating; 63 of these mated perfectly, the others were lost during mating flights. Of the 63 mated queens, 25 were introduced to colonies at Ottawa, 16 were sent to different branch Farms, 10 to private beekeepers and 12 were lost in travelling and introduction.

It is planned to test out these island mated queens for non-swarming and honey-gathering qualities in 1922, and from the best of them to rear queens and drones for further breeding work.

During the season from June 15 to September 5, 289 queens of select parentage were reared at Ottawa. Of these, 125 virgins were sent to private beekeepers, 69 virgins to Duck Island for isolated mating, 51 mated at Ottawa and introduced to colonies in our own apiary, 20 mated at Ottawa and sent to branch Farms and private beekeepers, and 24 were either lost during their mating flight or were killed when being introduced to colonies.

In sending out virgin queens to beekeepers it was expected that it would be possible to raise drones from these queens the following year to mate any further virgins they may obtain. The heavy loss in sending out these queens, through the queens arriving dead in the mails and many being lost in introducing them to colonies, was rather discouraging, but it is hoped that this may be overcome and that it may be possible to continue sending them out next year.

METHODS USED IN QUEEN REARING

All queens were reared in artificial queen cups by the swarm box method. No natural cells were used.

The swarm box used was made from an eight-frame Langstroth hive by cutting it down so as to hold only six frames and covering the bottom with wire screening.

A hole three inches in diameter was made in the centre of the cover to take a large funnel into which the bees were shaken when filling the box.

Two days previous to the time everything was in readiness to graft cells, four or five frames of brood—preferably emerging brood—were raised from the brood chamber to a super over each of three strong queen-right colonies. The super was filled up with combs of honey. If only a light flow of nectar was coming in at this time the colonies were given two pounds of honey diluted with three parts water every evening until the cells to be given them later were finished.

Two days after raising the brood, three combs well filled with honey, but not capped over, were placed in the swarm box, leaving space between the combs for cell carriers. At 10 a.m. three to four pounds of bees were shaken into the swarm box from a strong colony. The queen of the colony was first found and placed to one side on a comb of brood and the bees from the other combs were taken. The reason for taking the bees from the brood chamber is to get a large proportion of young nurse bees, which are the best for taking care of the new queen cells. As soon as the swarm box is filled, the queen is returned to the colony and the hive closed. The swarm box is placed in the bee cellar, which is dark and where the temperature is about 60° F. Six hours later (4 p.m.) sixty cells on three carriers are grafted with worker larvæ from the colony containing the breeding queen. The larvæ taken are two days old, older larvæ produce inferior queens. As soon as the cells are grafted they are given to the swarm box in the cellar. Care must be taken when grafting the cells that the young larvæ do not get chilled or become dried. The grafting should not be done at a temperature below 75° F. and must be done quickly and the cells placed in the swarm box at once.

The cells used are small wood cups three-eighths of an inch in diameter and lined with beeswax. This is done by pouring hot wax into the cup and then pouring it out again at once. This leaves a thin film of wax lining the cup. Twenty of these cells are placed on a carrier and at the time of grafting are primed with a small drop of royal jelly from natural queen cells, which may be found in any colony making preparations for swarming. The cells are then ready for the larvæ.

The cells are left in the swarm box for about eighteen hours when the box is taken to the apiary and placed near the hive from which the bees in the box were taken the previous day. The bees are carefully brushed from the three cell carriers, one of which is placed between the brood in each of the supers over the colonies that were prepared two days previous. The bees in the swarm box are then returned to their hive.

Ten days from the date of grafting, the cells are ripe and are distributed to the mating boxes.

COMPARISON BETWEEN HIVES

The experiments with the various sizes of hives have narrowed down to the ten-frame Langstroth and the ten-frame Jumbo hives.

The investigations carried on show, however, that after allowing for the fact that the outside combs are never entirely filled with brood and that a certain amount of space is lost due to the thick top bar now in general use and for certain stretchings of the cells that often take place in the upper two inches of the comb, the ten-frame Langstroth hive is not large enough to accommodate a prolific queen. The Jumbo hive, however, appears to be large enough for a good queen, and also makes for better wintering, besides giving stronger colonies. The smaller brood chamber, however, can be deepened by placing another hive over it without a queen excluder between. Where colonies are examined every nine or ten days there is a disadvantage in having a double number of combs to handle at every examination when the double brood chamber is used. The comparison between these hives is being continued.

The following table shows the comparison in strength, brood production and honey crop of the Jumbo hive and the ten-frame Langstroth hives with the shallow super:—

Size of hive	No. of combs covered with bees at 1st examination	Amount of Capped Brood in square inches				Average Honey Crop produced	No. of combs covered by bees at last examination
		April 18	May 3	May 18	June 7		
Ten-frame Jumbo..	6·4	530	1,150	1,830	1,950	246 lbs. 13 oz.	8
Ten-frame Langstroth with shallow super....	6·6	400	890	1,740	1,590	191 " 7 "	8

In the above table it must be noted that the Jumbo hives are two inches deeper than the Langstroth hives, and although the same number of combs were covered with bees in both cases the cluster would be deeper in the Jumbo, therefore these hives would contain a larger force of bees. It will also be noted that far more brood was produced in the Jumbo hives during May and early June than in the Langstroth hives with the shallow super, thus giving a larger working force for the clover flow which is indicated in the larger average crop produced by the Jumbo hive.

WINTERING TWO QUEENS IN A HIVE

This experiment was continued during 1921 with favourable results; more bees were raised in time for the main honey flow, and larger crops of honey were produced. The colonies were divided into groups, as follows:—

Group 1, in which half of the colonies were wintered with two queens and half with only one queen. Each double colony was strengthened with two frames of brood from the single colonies during the dandelion flow; this was after the double colonies were divided. This group gave 75 per cent increase in colonies and an average crop of 288 pounds 8 ounces of honey per colony, spring count.

Group 2, in which one-third of the colonies were wintered over with two queens in one hive and two-thirds with only one queen. Each double colony was helped with one frame of brood from the single colonies at the time of the flow from dandelion. This group gave 75 per cent increase and an average honey crop of 229 pounds 15 ounces per colony, spring count.

Group 3.—The colonies were all wintered over with two queens in each hive, and were not strengthened with brood from other colonies. The average crop of honey from this group was 264 pounds, and there was 125 per cent increase.

Group 4.—The colonies were all wintered with only one queen in each hive and were not strengthened with bees from other colonies. These colonies were examined every nine or ten days during the entire season and all queen cells were destroyed at each examination. This group gave an average honey crop of 165 pounds and 30 per cent increase.

Group 5.—Colonies were wintered over with one queen and were treated for swarming by the dequeening and requeening method. They gave an average of 201 pounds and 40 per cent increase.

Colonies in Jumbo hives gave an average of 246 pounds 13 ounces; while the average for all colonies, having only one queen, was 197 pounds 9 ounces. Colonies in groups 1, 2, and 3, were treated for swarming by the dequeening and requeening method.

The following table summaries the results obtained for the different groups:—

Group No.	Group consisting of	Average Yield of honey	Percentage of increase	Treatment
1	.50% double colonies	288 lbs. 8 oz.	75	Dequeening and requeening method.
	.50% single " .			
2	.33⅓% double "	229 " 15 "	75	" "
	.66⅔% single " .			
3	100% double "	264 "	125	" "
4	100% single "	165 "	30	Cells destroyed every 9 days
5	100% single "	201 "		Dequeening and requeening method.
Jumbo	100% single "	246 " 13 "	40	" "

The method of manipulation of the two-queen hives was as follows: The two queens were introduced into the hive at the time of treatment for swarming, between July 2 and August 3. Instead of giving one queen at the second destruction of queen cells the brood was equally divided, a close-fitting division board was placed in the middle of the hive, and a queen introduced on each side. A special portico was placed in front of the hive, thus providing two entrances. If no brood was found on one side at the time the white honey crop was removed, between July 6 and 26, another queen was introduced, or if no spare queens were on hand the colony reverted to a one-queen colony by removing the division board. The two parts of the colony were completely separated on the removal of the supers and queen excluder; in fact, there were two small colonies in one hive for the winter. In the spring, as soon as the bees in one side became strong enough to fill the compartment, they were transferred to a new hive placed alongside the original; each hive was then filled up with drawn combs. This was done on May 3 and 14, about one or two weeks before the flow from dandelion commenced. By this method early swarming is prevented, as the colonies are too weak to swarm.

So far, this method of wintering two queens in one hive has been confined to the ten frame Langstroth hive, with the exception of two Jumbo hives in 1920. The experiments indicate, however, that a larger hive such as the Jumbo would be more suitable for the system. The experiments also show that there is no difficulty in wintering two queens in one hive where the queens are accompanied by enough bees to cover four Langstroth frames and although several hives have been placed in winter quarters for the past three years, not one colony has yet been lost either in the cellar or in outside wintering cases.

Another method of bringing together two small queen-right colonies in one hive for the winter is being tried this year, as follows: Instead of uniting moderately weak colonies in the fall as usual, five frames were taken out of each of the weak colonies; the bees adhering to these combs were shaken into the hives and the bees were thus made to cluster on the remaining five frames in one side of the hive. Two or three days later, a tight-fitting division board was placed in the middle of one of the hives with the five frames and bees on one side. The five frames covered with bees from another weak hive were placed on the opposite side of the division board. A special portico is placed in front to provide a double entrance.

The great value of a few spare young queens in the spring for introduction into colonies that may have lost their queens or to replace weak and failing queens and the difficulty experienced in procuring and introducing them at this time, make any system by which a number of spare queens can be carried safely through the winter very desirable.

POLLINATION

The experiment to determine the actual value of bees in cross-pollination of fruit was continued at Kentville, N.S., and Morden, Man. The results obtained so far show conclusively that insects are important agents in cross-pollination of fruit and that honey bees are the most active agents in transferring the pollen.

Co-operative experiments with private beekeepers in localities having other conditions than those found at the branch Farms were also continued and valuable data on the sources of honey, time and length of the different flows, and the climatic conditions affecting the nectar secretion and gathering were obtained.

DISEASES

Twenty samples of diseased brood were received for diagnosis. These samples were carefully examined microscopically and the nature of the disease determined. The sender of each sample was notified which disease was present and the methods for treatment of the same.

EDUCATIONAL

During the year, circular No. 105, entitled "Bee Diseases," was issued. A number of press articles on different phases of beekeeping were also sent out from time to time. Addresses on beekeeping were given at the annual conventions of the Ontario and Manitoba Beekeepers' Associations, also at other county association meetings. A course of seven lectures on practical beekeeping was also given to the students of the Agricultural School, Kemptville, Ont.

During the year Mr. Sladen visited the various branch Farms in the eastern and western provinces for the purpose of supervising the bee work there. Many private beekeepers were also visited in these provinces. He also spent a considerable amount of time in conducting the queen breeding experiments at Duck Island, and in continuing his investigations of the honey producing plants of Canada, studying the effect of climatic conditions affecting nectar secretion.

WINTERING AT OTTAWA, 1920-21

Fifty colonies were prepared for the winter of 1920-21. All feeding was done between October 2 and 19. An average of 44 pounds 6 ounces of syrup was given to each colony. The syrup as usual consisted of two parts of granulated sugar to one part water. The syrup was made by bringing the water to the boiling point and then removing it from the fire. The required amount of sugar was then added to the water and stirred until every crystal had dissolved. The syrup was given to the bees in the evening so as to avoid causing excitement among them, which might lead to robbing. Miller feeders and ten-pound honey pails with perforated covers were used as feeders. The pail feeders proved the more satisfactory as the syrup was nearer to the cluster and the bees were able to take the syrup down much faster than from the Miller feeders.

Sixteen colonies were packed in quadruple wintering cases on October 12 and 13. Planer shavings were used as packing material. In three cases, three inches of packing was used on the bottom and all four sides and eight inches on top. In the fourth case six inches of packing was used on the sides and bottom with twelve inches on top. The colonies were all fed after being placed in the cases and before the top packing was given.

On November 13 twenty-five single and nine double colonies were placed in the bee cellar shortly after the last good cleansing flight. The temperature of the bee cellar varied between 46°F. and 49°F. during the greater part of the winter. No signs of uneasiness occurred and very few bees died while in the cellar.

The bees were removed from the cellar on April 12 and were examined on April 18. One colony was found queenless and another to contain a drone-producing queen; these were united to other colonies of medium strength. All other colonies were in good condition with plenty of stores and young brood. The bees covered an average of 5·7 combs.

The bees that wintered outside were examined on April 19 and found to be in good condition with plenty of stores, brood and emerging bees. An average of 5·6 combs were covered by bees, but more brood was present in these hives than in the cellar-wintered colonies. Again no advantage was gained by the extra thick packing. At the next examination, ten days later, one of the queens was found to be injured and although fertilized, was unable to produce eggs. The queen was destroyed and the colony united to another colony.

The following table compares the loss in weight of outside and cellar wintered colonies:—

Groups of colonies	Weight before feeding		Average amount of syrup given		Weight after feeding		Weight when removed from winter quarters		Date when weighed	Average loss	
	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.		lbs.	oz.
Ten-frame Langstroth hives containing one queen wintered in cellar	40	9	38	4	65	1	49	10	April 12	16	1
Ten-frame Langstroth hives containing two queens wintered in cellar	40	0	38	7	65	15	49	15	April 12	16	3
Ten-frame Langstroth hives with one queen wintered outside	42	8	50	3	73	13	51	5	May 10	21	12
Ten-frame Jumbo hives with one queen wintered outside	48	10	42	5	78	0	55	9	May 10	22	8

The cellar-wintered colonies were again weighed on May 10 and were found to have lost from the time of feeding 19 pounds 12½ ounces, or 1 pound 9 ounces less than the outside wintered colonies during the same length of time.

WINTERING AT OTTAWA 1921-22.

Seventy-four colonies were prepared for the winter of 1921-22. Sixty-three of the colonies were fed an average of 24.8 pounds of sugar syrup to bring their stores up to sufficient weight for the winter. Six colonies were each given a shallow super containing combs of clover honey in addition to the stores already in the regular brood chamber. No syrup was given to these colonies. The remaining five colonies had sufficient natural stores in the hive and were not fed. The sugar syrup was made in the usual manner and consisted of two parts best white granulated sugar to one part water. Miller feeders and ten-pound honey pail feeders were used. Feeding was commenced on October 6 and finished on October 25. Owing to the very cool weather during October the bees were unable to take the syrup down very quickly and feeding was very slow. All colonies were weighed immediately before and after feeding.

The following table summarizes the average weights of the colonies wintered in the cellar and those wintered outside, also the average loss of the colonies wintered inside from the time of feeding to the time they were removed from the cellar. The bees wintered outside are still in the cases and losses for these cannot yet be given:—

Groups of colonies	Average weight of colonies before feeding		Date of weighing	Average weight of colonies after feeding		Date of weighing	Average weight of colonies when removed from cellar		Average loss	
	lbs.	oz.		lbs.	oz.		lbs.	oz.	lbs.	oz.
Ten-frame Langstroth hives wintered in cellar.....	45	14	Oct. 6-18	62	7	Apr. 10-12	44	14	16	3
Ten-frame Langstroth hives wintered outside.....	48	15	"	67	5	Not yet weighed				
Ten-frame Jumbo hives wintered outside.....	53	11	"	72	6	May 3	48	8	23	14

WINTERING OUTSIDE

Twenty-one colonies containing one queen, and two colonies containing two queens were weighed and placed in packing cases between October 4 and 8, before feeding. After feeding they were again weighed and finally packed on October 17 to 21. The two colonies containing two queens each and fourteen colonies having one queen each were placed in four quadruple packing cases. In three of these cases the packing consisted of three inches of planer shavings underneath and about the sides and eight inches on top. In the fourth case the packing was six inches thick on sides and bottom and ten inches on top. The entrances of the cases were reduced to one inch high and three-eighth inch wide.

Four of the colonies were placed in double packing cases and packed in the same manner with three inches planer shavings underneath and about sides and eight inches on top.

One colony was also placed in a single Kootenay case and permanently packed with three inches planer shavings underneath and all four sides and six inches on top.

Another colony was packed in a Krouse case and the sides packed with four inches of shavings and eight inches on top. This case does not allow for underneath packing.

The last colony was transferred to a double walled hive having three inches permanent packing on the bottom and all four sides and allowing for six inches on top.

The winter yard is protected from the wind on all four sides by a board fence eight feet high.

The weather during the early part of the winter was fairly mild until about December 21, when it turned cold. Very little snow fell and the cases were not covered with snow at any time during the winter.

CELLAR WINTERING

On November 9, thirteen hives with two queens and thirty-eight with one queen were placed in the bee cellar, nine days after the last good cleansing flight. The average weight of the colonies when placed in the cellar was 61 pounds. Three colonies were kept on scales constantly and the weight recorded each week. The average loss per colony, per week, was 8⅜ ounces.

The bee cellar, which is under the bee building, is fairly dry, well ventilated and kept dark at all times. The temperature was maintained between 45° F. and 47° F.

throughout the winter. The bees were quiet from the time they were brought in until they were taken out in the spring. The bees were not disturbed at all during the winter and the cellar was visited only once each week to record temperature and weights.

The bees wintered outside were also very quiet during the winter and few dead bees were thrown out of the cases. A few bees were flying from the cases on sunny days during February and early March, but the first good cleansing flight occurred on March 4.

On April 10 the bees were bringing in the first pollen of the season, from alders.

The cellar-wintered bees were taken out on April 10 and 12, during dull weather to prevent flying and drifting. One colony was found dead from starvation and the bees from another had migrated to the adjoining hive. On April 13 these bees had their first good cleansing flight and started to gather pollen and nectar the same day.

On April 22 and 24 all colonies were examined for stores and brood. Of the 36 single colonies taken from the cellar, one colony contained a drone-producing queen; this queen was destroyed and the colony requeened with a mated queen from one of the double colonies. Another colony was queenless and was united. The remaining 34 colonies were in good condition, having plenty of stores and the bees covering an average of 5.2 combs. Of the 13 doubles put away in the fall, 8 were in good condition and still contained two queens, one was queenless on one side, and the other side contained a drone producer. The division board was removed from this hive and a queen from a double colony was introduced. In the remaining 4 hives the bees from one side had migrated to the other side so the division board was removed from the hive and the colonies reverted to singles.

The colonies wintered outside were in much better condition than the cellar wintered colonies, being stronger in bees and having a considerable amount more brood per colony. Those wintered in quadruple cases covered an average of 6.8 combs but were short of stores owing to heavy brood production, these colonies were given two shallow extracting combs of honey.

The colonies in the double cases did not winter quite so well, as two colonies were very weak, one of them having a drone-producing queen; this colony was united to another. The average number of combs covered by the bees was 6.2. The colonies had lots of brood but were short of stores and had to be fed.

The colony in the Kootenay case was very weak, covering only one and a half combs. Plenty of stores were present in the hive and small patches of brood.

The bees in the Krouse case were also very weak, covering only two frames. This colony had a drone-producing queen which was destroyed and the colony united to two other queenless colonies and a laying queen from a double colony was introduced.

The colony in the double walled hive was very strong, covering seven combs and having plenty of stores and brood.

On March 1, 1922, Mr. A. H. W. Birch, B.S.A., was appointed Apiarist.