DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

BEE DIVISION

REPORT OF THE DOMINION APIARIST

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

FOR THE YEAR 1923

Group of colonies on scales. The weights of these colonies are taken daily at 7 a.m. throughout the active season.

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OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1924

DIVISION OF BEES

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

THE SEASON

The winter of 1922-23 was one of the worst on record for the beekeepers of Canada and thousands of colonies of bees perished from starvation, unwholesome stores, and insufficient protection from the extreme cold. Both cellar and outdoor wintered bees were affected. The high mortality of last winter certainly demonstrates the necessity of giving the bees an abundance of wholesome stores and adequate protection during the long winter months. In the Maritime Provinces much of the loss was caused through long confinement of the bees to the hives on poor stores gathered late in the fall. In the central and western provinces the losses were chiefly due to lack of stores and improper protection. Many of the colonies were living until early in the spring, but were in such a weakened condition that they died before new nectar was coming in. The actual death of colonies was not the only loss, for many that did survive were so weak that they failed to build up to maximum strength for the harvest.

The spring was also cool and backward and the bees were unable to take early flights or to gather nectar and pollen as early as usual, with the results that the colonies did not build up very rapidly. In many localities wet, cool weather prevented the bees from gathering much nectar from the clovers, and light crops were gathered, especially in the eastern part of Quebec, the Maritime Provinces and British Columbia. In the other parts of Canada the crops were good, especially in the western part of Quebec, Ontario, parts of Manitoba and Alberta.

The weather during the fall was fine and open, and the bees were able to gather small amounts of nectar until quite late; this stimulated late brood production so that the colonies were in good condition as to strength for the winter. The weather was also exceptionally good for feeding and preparing the colonies for the winter of 1923-24, and there is no excuse for any bees being put into winter quarters under any but the best conditions.

During the past season two small apiaries were started, one at Scott and the other at Rosthern in Saskatchewan. Two out-apiaries were started in Nova Scotia and managed from the Experimental Farm at Kentville, N.S. Three other small out-apiaries were started at different points on Vancouver island, B.C., and managed from the Experimental Farm at Saanichton, B.C. Bees are now kept at twenty of the Experimental Farms, as follows: Charlottetown, P.E.I.; Nappan, N.S.; Kentville, N.S.; Fredericton, N.B.; Lennoxville, Que.; Ste. Anne de la Pocatiere, Que.; La Ferme, Que.; Kapuskasing, Ont.; Morden, Man.; Scott, Sask.; Rosthern, Sask.; Lethbridge, Alta.; Lacombe, Alta.; Beaverlodge, Alta.; Fort Vermilion, Alta.; Invermere, B.C.; Summerland, B.C.; Agassiz, B.C.; Saanichton, B.C., and at the Central Experimental Farm at Ottawa. Some of these apiaries are yet too small to carry out any experimental work, but will demonstrate the advantage of beekeeping, modern methods of handling, and equipment.

The following table shows the yearly average crop per colony, spring count, for the past six years or for the number of years that bees have been kept, also the number of colonies, spring count, in 1923.

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YEARLY AVERAGE CROP PER COLONY AND NUMBER OF COLONIES IN SPRING OF 1923

Location of Branch Farm	Yearly Average in Pounds						Spring Count 1923	Remarks
	1918	1919	1920	1921	1922	1923		
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.		
Charlottetown, P.E.I.	18·0	10·0	70·6	40·9	29·1	9·8	10	1923 apiary run for increase.
Nappan, N.S.	63·8	85·6	81·8	52·2	165·3	114·8	20	
Kentville, N. S.	40·7	122·8	36·5	39·1	41·1	51·0	36	
Fredericton, N.B.	72·5	79·2	41·3	72·8	—	6·0	25	1922 increase only.
Lennoxville, Que.	—	—	70·0	66·0	22·5	43·0	3	
Ste. Anne de la Pocatière, Que.	—	—	—	89·3	17·0	11·2	37	1922 apiary run for increase.
La Ferme, Que.	—	—	—	—	—	22·8	4	
Kapuskasing, Ont.	—	—	55·0	200·0	32·0	39·8	4	
Ottawa, Ont.	196·5	190·0	64·1	200·2	57·7	159·7	78	
Morden, Man.	—	—	—	98·0	272·6	65·4	9	1923 all colonies treated for A.F.B.
Rosthern, Sask.	—	—	—	—	—	63·0	2	Apiary started 1923.
Scott, Sask.	—	—	—	—	—	30·0	2	Apiary started 1923.
Lethbridge, Alta.	86·5	213·0	101·4	150·3	127·7	189·9	8	
Lacombe, Alta.	84·9	64·2	67·6	55·2	55·5	62·0	13	
Beaverlodge, Alta.	—	—	—	—	45·0	0	1	Colony weak in spring but increased to 3 by fall.
Fort Vermilion, Alta.	—	—	—	12·0	5·0	3·0	3	
Invermere, B.C.	118·9	126·4	90·0	40·0	93·0	83·7	6	
Summerland, B.C.	97·5	76·3	16·0	80·0	165·0	90·4	8	
Agassiz, B. C.	38·2	31·3	23·3	73·6	194·0	182·1	4	
Saanichton, B.C.	62·4	109·0	41·5	56·0	62·9	13·2	8	Heavy increase made 1923.

HONEY PRODUCTION AT OTTAWA

In spite of the backward spring and the slowness with which the colonies built up, a good crop of honey was obtained at Ottawa, as the summer was very favourable for honey production. Owing to cool, damp weather the bees were unable to work the early sources of nectar and pollen freely and brood production was slow, resulting in colonies below normal strength at the beginning of the harvest. The length of the flow offset this disadvantage to a large extent. The first pollen was seen coming into the hives on April 25 and bees were seen working on the maples. Willow began yielding on April 27. The flow from dandelion and fruit bloom was later than usual, not starting until May 27, and then lasting only for a comparatively short time; it, however, stimulated brood production to a high degree. From the time of the first flow the weather was favourable for nectar secretion and bee flight and the colonies were able to strengthen up somewhat by the time the main flow from clover started. The total amount of honey extracted from 78 colonies, spring count, was 12,455½ pounds, an average per colony of 159·7 pounds. A large amount of new comb was also drawn; in fact 6,541 pounds of the honey was stored in combs built while the flow was on. Five colonies placed at Britannia Heights produced 501 pounds, an average of 100 pounds 3 ounces. One of these colonies, however, suffered badly from paralysis and did not yield a surplus.

The following table shows time, length and density of the first honey flow for the past seven years:—

HONEY FLOW FROM DANDELION AND FRUIT BLOOM

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
		days		pounds	days
1917	May 16	29	June 13	4¾	13
1918	" 17	15	May 31	3½	0
1919	" 24	13	June 5	2¾	0
1920	" 15	20	" 3	4½	2
1921	" 18	5	May 22	1	0
1922	" 18	11	" 29	3¼	4
1923	" 27	8	June 4	3½	0

It will be seen from the above table that the colonies on scales did not show a gain from the first flow until several days later than in previous years and with the exception of 1921 the flow was much shorter. No gains were registered on the scales from June 4 until June 17, a period of thirteen days, twelve days less than in the previous year. The period of dearth is a common one in Ontario, Quebec, and the Maritime Provinces, and if extending for three weeks or more is a serious matter, especially for strong colonies, which may die of starvation unless fed. Alsike and White Dutch clovers were first observed in bloom on June 11 and bees were seen working on them June 17. White sweet clover was first observed in bloom on July 7. The colonies on scales showed the first gain on June 17, when a gain of 6 ounces was made. The peak of the flow was reached on July 17, when the highest individual gain was 14 pounds and the average for five colonies was 9 pounds 5 ounces. The accompanying table shows the time, length and density of the clover flow for the past seven years:—

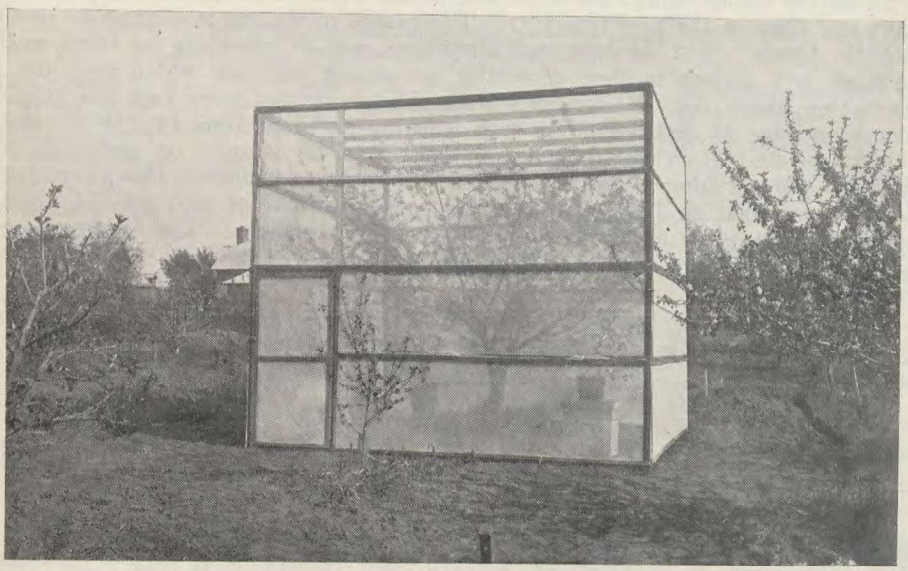
TIME AND LENGTH OF CLOVER HONEY FLOW

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
		days		lbs.	oz.	days
1917	June 25	39	Aug. 2	9	4	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
1922	" 23	28	" 21	8	5	4
1923	" 17	57	Aug. 12	9	5	9

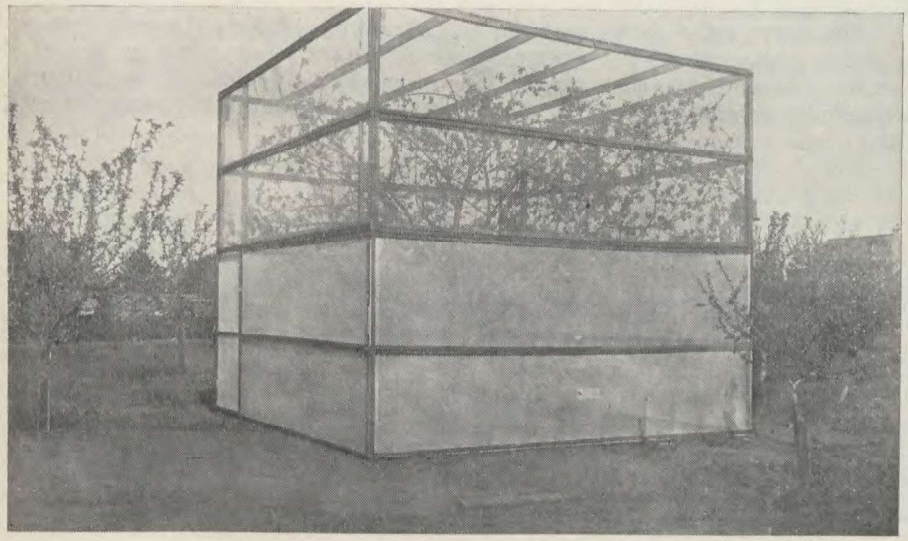
The above table shows that the actual number of days the bees were able to gather nectar was forty-eight days, or five days longer than in any of the previous six years, but the average daily gain was rather low. From August 12 the colonies on scales showed a slight loss every day until they were fed in the fall.

COLONY INCREASE

One hundred colonies were placed in winter quarters in the fall of 1922-23. Of these, four died during the winter, five were so weak they were united to other colonies and eight were sent to branch farms. This left a spring count of 83 colonies, five of these were taken to Britannia, just outside of Ottawa. The 83 colonies were increased to 108 during the season; 10 colonies that wintered through with two queens were divided; 13 nuclei made from colonies that made preparations for swarming; and 2 with bees and brood from the mating boxes during the fall, or a total increase of 25 colonies.



Tent constructed of cheesecloth and containing colony of bees.



Tent constructed partly of cheesecloth and partly of wire screening. This tent allows access of insects smaller than honey bees.

EXPERIMENTAL WORK

BEES AS AGENTS IN CROSS POLLENATION

Experimental work in determining the value of honey bees as agents in the cross pollenation of fruit was begun during the past season in conjunction with the Horticultural Division, and their phase of the work will be found in the report of the Dominion Horticulturist for 1923.

For the first season's work, apple trees only were used. In the spring 4 McIntosh apple trees were selected, and just before the blooming period, tents were erected around three of them, the fourth tree being used as a check. The trees were selected for performance records, which had been similar for the past three years. The trees used were rather large, and the tents were 15 feet square by 12 feet high. Two of the tents were constructed of cheesecloth so that no insects could get through. The third tent was made partly of galvanized wire meshing, six strands to the inch, and cheesecloth. The upper six feet of the tent was of the wire meshing while the bottom six feet and the top was of cheesecloth.

In one of the tents, impervious to insects, a colony of bees was placed and left there until all blossoms had fallen. During the time the trees were in bloom, branches of bloom were taken from other trees and placed in the three tents. In the tent containing the bees the branches were placed in tubs of water, this being to provide an outside source of pollen for the bees to work on, as the McIntosh apple is considered to be self sterile. In the other tents, the branches were suspended from the roof of the tents, and changed daily, the object being to see if wind played any part in distributing the pollen. The bees in the tent worked the blossoms on the tree fairly freely, but their source of foreign pollen was limited to the cut branches of bloom placed in the tent, this would tend to reduce the quantity of fruit set as they worked this bloom very little.

In the tent built of wire screening large numbers of the smaller wild bees and flower flies were seen on the blossoms, these coming in from the outside were able to bring in outside pollen and thus would tend to fertilize more blossoms.

In the third tent no insects were found during the blooming period and the only chance the blossoms had of becoming fertilized was by pollen carried by wind from the branches that were placed in the cage.

Between May 24 and 29, from 233 to 248 blossom clusters were tagged on each of the trees in the tents and 250 clusters were tagged on June 3 on the check tree. The blooming period was from May 28 to June 7, when the bees were removed from the tent, as all petals had then fallen.

The following table shows the age of the 4 trees used in the experiment, also the crops produced by them for the past 3 years.

RECORD OF TREES USED.

——	Trees	Age	Crop in 1921	Crop in 1922	Crop in 1923 (Year of Experiment)
Wire Tent	McIntosh (5–9)	19	43 gal.	5½ gal.	45 gal.
Bee Tent	McIntosh	13	11 "	29½ "	13 "
Impervious Tent	"	13	9½ "	23 "	2 "
Check Tree	"	27	18 "	24 "	46 "

The set of fruit was counted on June 25 after allowing time for imperfect fruit to fall. The results are summarized in the following table.

TABLE SHOWING NUMBER OF CLUSTERS TAGGED, AVERAGE NUMBER OF BLOSSOMS TO EACH CLUSTER AND THE NUMBER AND PERCENTAGE OF FRUIT SET

Location	Ext. Avg. Number of blossoms per cluster	Number of clusters tagged	Possible Number of blossoms to set	Actual Number of blossoms set	Percentage set
					%
Wire Tent	5¾	233	1339·75	256	19·1
Bee Tent	5½	247	1358·5	139	10·2
Impervious	5½	248	1364·0	24	1·7
Check tree	5½	250	1375·0	300	21·8

The highest percentage set was on the check trees open to the visits of wild and honey bees alike. The second highest was in the cage impervious to honey bees but which allowed insects smaller than honey bees to enter, and only 1·7 per cent set on the tree in the tent impervious to all insects. The set on this tree was evidently caused by pollen from the cut branches of bloom that were hung in this tent. As cut branches of bloom were also hung in the tent in which insects were allowed to visit, and not hung in the bee tent, 1·7 should be deducted from the percentage set of the tree in this cage, as this amount of set could be produced by the same causes as in the impervious tent.

Check tree in pollenation experiment.

The tree in the bee tent, while giving a fair set of fruit, was at a disadvantage because the bees did not have a sufficient outside source of pollen with which to pollenate the blossoms as the insects entering the wire cage, nor did they work as well because of being confined. It would also appear that in the bee tent 53 per cent of the blossom clusters were borne on short non-fruiting spurs while only 28·7 per cent were borne on this type of spur in the wire tent. Such spurs bloosom, but do not normally set fruit.

From their record of performance for the past three years the check tree and those in the tents where honey bees were enclosed, and in which other insects were allowed to visit, yielded according to expectations if left under normal conditions.

FOUNDATION EXPERIMENT

An experiment with various weights of foundation from different makers was started in 1923. Twelve brands of foundation were obtained from four different makers and tested out under the following conditions:—

1. In the brood chamber of colonies that made no preparations for swarming.

2. In the brood chamber of colonies that made preparations for swarming and the colony shook swarmed.

3. In supers over colonies that made no preparations for swarming, and during the light flow.

4. In supers over colonies that made no preparations for swarming, but during the heavy flow.

5. In supers over the shook swarms, and during the heavy flow.

In Nos. 1 and 2 the foundation was given on July 5, when the average daily gain from five colonies was 8½ pounds.

In No. 3 the foundation was given on June 19, when the average daily gain was 2 pounds and was slowly increasing.

In Nos. 4 and 5 the foundation was given on July 12, when the average daily gain was 5¼ pounds.

The foundation used was as follows:—

A. Medium brood foundation from Chrysler & Son, Chatham, Ont.

B. Light brood foundation from Chrysler & Son, Chatham, Ont.

C. Medium brood foundation, single ply, from Ruddy Manufacturing Company, Brantford, Ont.

D. Light brood foundation, single ply, from Ruddy Manufacturing Company, Brantford, Ont.

E. Extra light brood foundation, single ply, from Ruddy Manufacturing Company, Brantford, Ont.

F. Medium brood foundation, single ply, from Root Company, Medina, Ohio, U.S.A.

G. Light brood foundation, single ply, from Root Company, Medina, Ohio, U.S.A.

H. Medium brood foundation, three ply, from Root Company, Medina, Ohio, U.S.A.

I. Medium brood foundation, old style, from Dadant & Sons, Hamilton, Ill., U.S.A.

J. Light brood foundation, old style, from Dadant & Sons, Hamilton, Ill., U.S.A.

K. Medium brood foundation, vertically wired, from Dadant & Sons, Hamilton, Ill., U.S.A.

L. Light brood foundation, vertically wired, from Dadant & Sons, Hamilton, Ill., U.S.A.

The colonies chosen for drawing out this foundation were as near to equal and average strength in the spring as could be arranged. Four colonies were used for the supers in the light flow and eight for the brood-chamber and heavy flow foundation.

FOUNDATION EXPERIMENT

Designating letter of foundation used.	No. of days from time foundation was given until the first sheet was found started.					No. of days from time foundation was given until the last sheet was found started.					No. of days from time foundation was given until the first sheet was found finished.					No. of days from time foundation was given until the last sheet was found finished.				
	Light flow Super	Heavy flow Super (Normal)	Heavy flow Super (Swarm)	Brood Chamber (Normal)	Brood Chamber (Swarm)	Light flow Super	Heavy flow Super (Normal)	Heavy flow Super (Swarm)	Brood Chamber (Normal)	Brood Chamber (Swarm)	Light flow Super	Heavy flow Super (Normal)	Heavy flow Super (Swarm)	Brood Chamber (Normal)	Brood Chamber (Swarm)	Light flow Super	Heavy flow Super (Normal)	Heavy flow Super (Swarm)	Brood Chamber (Normal)	Brood Chamber (Swarm)
A	2	5	5	2	7	27	24	5	2	12	16	20	N F	7	12	N F	N F	N F	12	21
B	6	5	5	2	7	23	5	23	2	7	23	20	N F	12	12	N F	20	N F	12	12
C	6	5	5	2	7	23	5	14	2	7	16	5	N F	7	12	43	20	N F	12	21
D	2	5	6	2	2	2	5	14	2	2	16	14	23	7	13	28	14	N F	12	13
E	2	5	6	2	2	2	5	14	2	7	16	14	23	7	13	23	14	N F	12	13
F	2	5	6	2	2	2	5	14	2	7	16	14	23	7	13	16	14	N F	7	13
G	2	5	6	2	2	2	5	6	2	2	16	11	14	7	7	23	11	23	12	13
H	2	5	6	2	2	6	5	6	2	2	16	11	14	7	7	16	11	14	12	13
I	2	5	6	2	2	2	5	6	2	2	16	11	6	7	7	16	11	14	12	7
J	10	5	1	2	7	16	11	1	2	7	N F	N F	7	12	14	N F	N F	7	12	14
K	2	5	1	2	7	2	5	1	2	7	N F	N F	7	7	12	N F	N F	11	12	14
L	2	5	1	2	2	16	5	1	2	2	N F	N F	7	7	14	N F	N F	11	12	18

Note—N F = Not finished.

In all the supers nine sheets of experimental foundation were placed, three sheets of each brand and one filler. In the brood chambers six sheets of foundation were used, two of each brand, and normal chambers were filled up with combs of brood so placed that at least one sheet of each brand of foundation was next to one of the frames of brood. Swarms had two frames brood and two fillers.

The season was an excellent one for drawing out foundation as the main honey flow started on June 17 and lasted for a period of fifty-seven days. During this period there were only nine days on which no gains were made and the highest individual gain for one day was 14 pounds. The highest shade temperature during this period was 89° F. and the lowest 62° F.

The colonies were examined every few days to watch the progress made, but it is impossible to give the exact dates as to when each sheet was begun and when finished. One colony in the light flow experiment fell down in its work through the failure and supersedure of its queen during the flow, thus three of the brands of foundation over this colony were never finished.

The accompanying table gives the number of days from the time the foundation was given until the first and last sheets of each brand were begun and finished.

There is a great variation in the time from when the foundation was given until all sheets were started and finished under the different conditions under which it was given. With the exception of J, K, and L, in the heavy flow super over a shook swarm, all brands of foundation with the exception of B and J were finished in the normal brood chamber in the shortest time. With few exceptions every brand was started just as quickly in the shook swarms and the light flow supers, but were not finished in quite as short a time in the shook swarms and not nearly so quickly in the supers. Very little difference occurred in the time of starting in the heavy flow supers, but there was a wide variation in the time taken for finishing them. There appeared to be, however, no preference shown by the bees for any particular make or weight of foundation as all brands were worked quite readily.

The best finished combs were produced in the supers in every case, as they were drawn out and attached to the frames on all four sides, whereas in the brood chambers, with the exception of K and L, no combs were attached to the bottom bars, and seldom all the way down at the two ends.

There was also little difference in the area of abnormal shaped cells beneath the top bars in any of the foundation used. The abnormal cells seldom extended beyond the first row of cells, and this was not due to stretching but to the irregularity of the foundation where fastened to the top bar.

With the exception of K and L there was practically no buckling of the foundation in the frames, but in these two brands the buckling was distinctly noticeable in all combs.

The medium brood foundation apparently gave the strongest combs, as these showed the least amount of breaking in extracting. Of the combs built on medium brood foundation, 21·95 per cent were found cracked; of those built on light brood foundation, 29·0 per cent; and those from extra light foundation, 44·44 per cent were broken.

COMPARISON BETWEEN RACES OF BEES

As the claim is made by some breeders that Carniolan bees are more hardy than Italians and that they will gather nectar at a lower temperature, an effort was made to begin a test between these two races last summer and a number of tested queens were ordered from two prominent breeders in the Southern States. Five colonies of Italian bees were taken to an out-apiary, and it was intended to take an equal number of colonies headed with Carniolan queens, but, owing to delay in shipping, the queens did not arrive until too late in the season for the honey crop.

SWARM CONTROL

The work on the prevention and control of natural swarming was continued under two heads (1) management, and (2) breeding. Weather conditions and length of honey flow tended to favour swarming, still only 15·6 per cent of the colonies made preparations for swarming and were treated. Only three natural swarms issued from any of the colonies, and these were expected and allowed. This would indicate that the continued breeding from colonies that do not make any preparations for swarming is tending towards the reduction of the desire for swarming, and also that the methods adopted for treating colonies that make preparations for swarming are successful.

PREVENTION OF SWARMING BY MANAGEMENT

By the separation of brood and queen.—This method consisted of removing all combs containing brood from the brood chamber at the first appearance of queen cells containing larvæ. The brood chamber was then filled up with empty drawn combs, and the queen, with the bees shaken from one of the brood combs, left in this chamber. A queen excluder was placed over the chamber containing the queen, and at least one extracting super put over it. All the combs containing brood were then placed in a super after first destroying all queen cells. Seven days later these combs were again examined and any queen cell that had been built since the first examination was destroyed. No further attempts to swarm were made by any of the colonies treated.

A modification of the above method was also tried. This consisted of first destroying all queen cells, and then raising to the upper super one frame of brood and the queen, instead of raising the brood and leaving the queen below. A ripe queen cell was given to the bees in the lower chamber at the time the

queen was raised. One of the colonies reared its young queen, and nineteen days after treatment the super containing the old queen and brood was removed to a new stand. The other colony swarmed seventeen days after treatment. This method does not appear to be satisfactory for the control of swarming.

Dequeening and Requeening.—Two colonies that made preparations for swarming were treated as follows: As soon as larvæ were found in queen cells, the old queen with one frame of brood was removed from the hive and placed in a new hive on another stand. All queen cells were destroyed at the time the queen was taken away, and a ripe queen cell given. Both colonies swarmed within nineteen days. The giving of a ripe queen cell at the time the old queen is removed cannot be recommended for the control of swarming.

Best Method.—Four other colonies had their queen removed and queen cells destroyed as in the last method, but instead of giving a ripe cell at the time of the removing the queen, the colonies were left queenless for nine days, when all the queen cells were again destroyed, and a young laying queen introduced. This method of first removing the queen and destroying all queen cells, and after a period of nine or ten days again destroying all queen cells and giving a young laying queen, appears to be the most satisfactory, for no colony treated by this method during the past three years has made any further attempts at swarming.

METHODS USED FOR DETECTING SWARMING

The queens in forty 10-frame Langstroth and seven Jumbo hives were allowed to rear brood in shallow supers in addition to the regular brood chamber. These supers were given in the spring as soon as the regular brood chamber became well filled with bees, just previous to the first flow from dandelion and fruit bloom. These supers remained as part of the brood chambers until the queens voluntarily abandoned them or until after the main flow. The colonies were examined every nine or ten days. At each examination the super was first tipped from the rear and the lower edges of the combs were examined for queen cells. If none were found all the combs were examined to see if queen cells were being built elsewhere. If such cells were found they were carefully noted, but not destroyed, and the colony closed in order to ascertain whether the cells were for supersedure or swarming. If cells containing larvæ were seen on the lower edges of the shallow combs when the super was tipped, the colony containing them was treated for swarming. Of the 40 Langstroth colonies, 24 made no preparations for swarming, 3 developed eggs only, and 13 had larvæ in queen cells.

In 9 of the 13 colonies that developed larvæ in queen cells, the first cells were found along the lower edges of the shallow combs when the supers were tipped, the other four had the first queen cells in the lower part of the brood chamber. These four, however, were all cases of supersedure, as a young laying queen was later found in each of the colonies, and none of them had swarmed.

The following table summarizes the results obtained from the tipping method:—

DETECTING SWARMING BY TIPPING METHOD

Year	Number of colonies	Number of colonies that did not build queen cells	Number of colonies with eggs only	Number of colonies with larvæ in queen cells	Number of colonies with cells in super	Number of colonies with cells in brood chamber only	Percentage of colonies in which the first active queen cells were detected by tipping super
							%
1920.....	37	8	7	22	19	3	86·36
1921.....	39	10	4	25	22	3	88·0
1922.....	40	29	1	10	8	2	80·0
1923.....	40	24	3	13	9	4	69·2

The above table indicates that the number of colonies that did not make any preparations for swarming increased more than 100 per cent during the past two years, and that the colonies having larvæ in queen cells decreased proportionally. Although four colonies built queen cells other than in the super, these cells were all supersedure cells only, and the colonies did not swarm. In fact, during the four years, no colony in which cells were built in the brood chamber and not in the shallow super made any attempt at swarming. This would indicate that where 10-frame Langstroth hives are used, and shallow supers are given to increase the size of the brood chamber, the tipping of the super is the only examination necessary to detect preparations for swarming.

Of the seven Jumbo colonies that were given shallow supers in addition to the regular brood chamber, only one of the queens produced brood in the super, and then only a small amount, this would indicate that a Jumbo hive, if filled with good combs of worker sized cells, contains sufficient room for the queen. No queen cells were started in any one of these hives.

BREEDING EXPERIMENTS

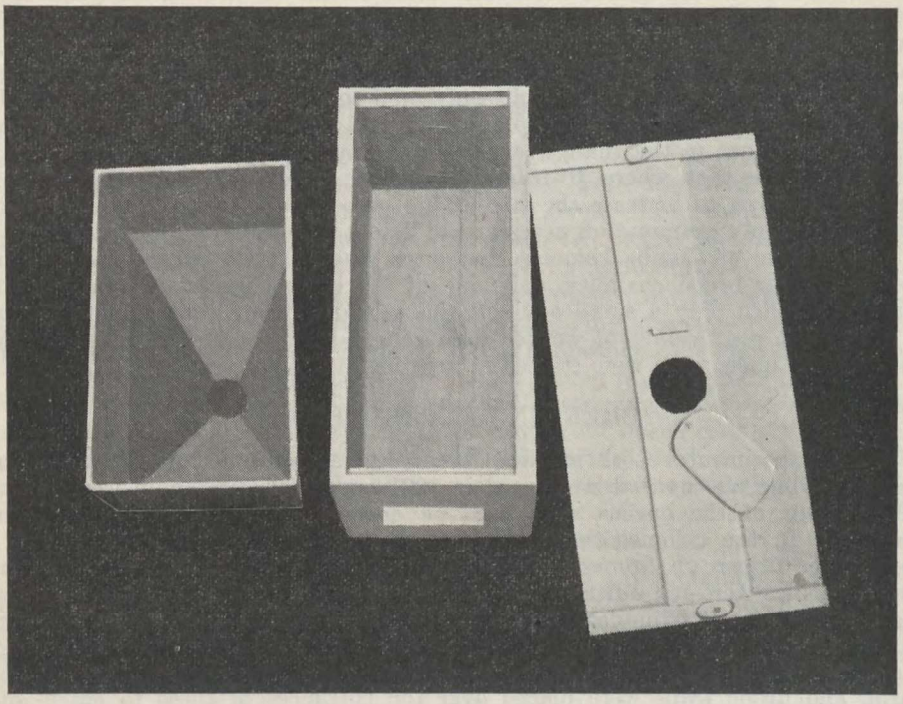
The experimental work in queen breeding was continued at Ottawa. The same breeding queens that were used in 1921 and 1922 were again used during 1923. Four of the queens were used as queen mothers, and two as drone mothers. In the colonies that contained the queens for drone production, a few combs drawn on drone foundation were placed early in the season, and these colonies were fed during the periods when only a small amount of nectar was coming in to stimulate egg production. Early in the summer, a queen mating apiary was established at the branch Farm at Kapuskasing, in northern Ontario. No other bees are kept in this locality except a few colonies at the farm, and drone traps were placed over the entrances of these to catch and destroy all drones produced by them. Drone brood was also all destroyed. On June 5, queen rearing was started at Ottawa, and on July 3 the two drone breeding colonies and 20 mating boxes each containing a young virgin queen were shipped to Kapuskasing. Two weeks later 20 more mating boxes containing virgin queens were sent. These virgins could only mate with the drones from the drone breeding colonies sent.

As soon as the queens in the mating boxes at Kapuskasing were mated and laying they were removed and sent either to Ottawa or the branch farms needing queens. All the colonies at Kapuskasing were requeened from this stock. All mated queens removed from the mating boxes were replaced with virgins reared at Ottawa. During the season 135 virgin queens were sent to Kapuskasing for mating, 93 were mated at Ottawa, and 25 virgins were sold to private beekeepers. A number of virgins were lost during mating flight or died in nursery cages in which they were held too long. Of the 135 sent to Kapuskasing, 92 were mated and sent out, the others were lost either in introducing to the mating boxes or on the mating flight. With the exception of 18 sent to private beekeepers, all mated queens were absorbed by the branch farms, and many more were required.

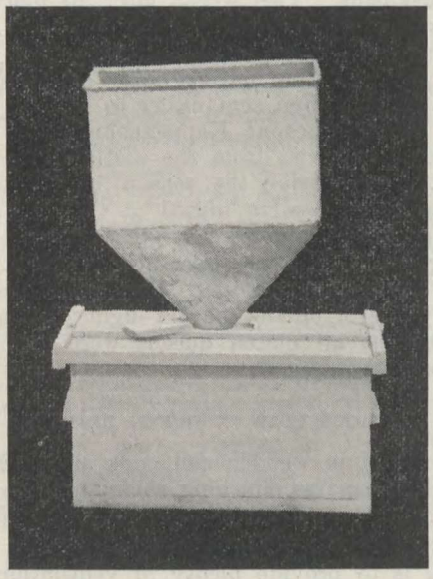
METHODS USED IN QUEEN REARING

All queens were reared in wooden cell cups and started in swarm boxes and finished in specially prepared finishing colonies.

The Swarm Box.—This was nothing more than a hive holding five Langstroth frames with the bottom covered with wire cloth such as is used for screen doors. This screening is to provide plenty of ventilation for the bees. The cover was made with a hole in the centre to take a large funnel, through which to shake the bees, and telescoped over the top of the hive. The hole in the cover could be closed with a revolving block.

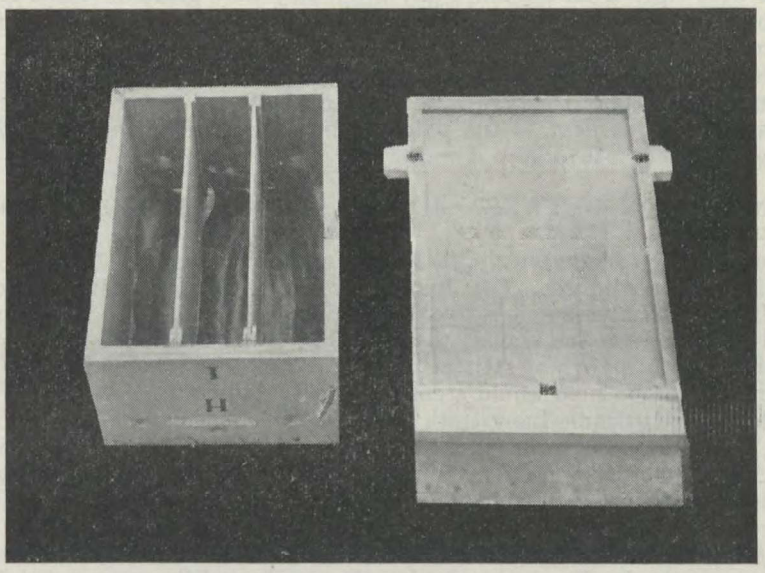


Funnel, Swarm Box, and Cover.



Swarm box with funnel ready for the bees.

The Finishing Colony.—Two or three strong colonies were chosen for this work, and two days before the cells were to be grafted, four or five frames of emerging brood with adhering bees were raised from the brood chamber to a super over a queen excluder, taking care that the queen was left below. Two spaces were left between the frames of brood for carriers of cells to be given later. If only a small quantity of nectar was coming in daily, these colonies were given a pint of thin syrup each evening until the cells to be given them later were finished.



Triple mating box made from an old 8-frame Langstroth hive. Also floor board showing the entrance to each compartment.

On the day cells were to be grafted two combs well filled with new honey but not capped over and one containing pollen were placed in the swarm box, the latter comb being in the centre. Spaces were left between the combs for carriers of cells to be given later. At 10 a.m. the box was taken to a colony that was inclined to build queen cells, and the bees from eight of the brood combs were shaken into it, taking care that the queen was not transferred to the box with the bees. The swarm box now containing the bees was placed in a dark cellar where the temperature was between 60 and 70 degrees F. Six hours later, at 4 p.m., 40 to 60 cell cups were primed with a small drop of royal jelly taken from a natural queen cell, and then grafted with worker larvæ from the colony that contained the breeding queen. *The larvæ used were not more than two days old.* The carriers of cells were then given to the bees in the swarm box in the cellar. The grafting was done as rapidly as possible, and care taken that the larvæ were not chilled or dried out in the process. The cells were left in the swarm box for eighteen hours or till 10 a.m. next morning, when the box was taken from the cellar and placed near the colony from which the bees were taken the day before. The carriers of cells were then removed, and the bees carefully brushed from them. As the cells were freed from bees, they were placed between the frames of brood in the super over the finishing colony, first destroying any natural queen cells that may have been started on the combs of brood. The bees from the swarm box were then shaken down in front of the hive from which they were taken. A fresh lot of bees were used for the

swarm box for each new batch of cells. On the tenth day from the date of grafting, the cells were ripe, and the queens ready to emerge; they were then placed in the mating boxes, when the queens were allowed to emerge and become mated. If the mating boxes were already full, the cells were placed in nursery cages, and left in the finishing colony until the young queens were required elsewhere.

The mating boxes used were chiefly double, carrying three full-sized Langstroth frames in each compartment. These boxes were made up the day before the cells were ripe, or on the ninth day after they were grafted. Each compartment contained one comb of emerging brood with adhering bees taken from strong colonies, an empty comb, and one containing a quantity of honey. These boxes were then placed in a cool spot for twenty-four hours with the bees confined, and the next day the bees were allowed to fly and a ripe cell given. The cell was fastened as near to the patch of brood as possible in order that the bees might cluster on it to keep it warm.

COMPARISON BETWEEN JUMBO AND LANGSTROTH HIVES

The comparison between the 10-frame Jumbo hive and the 10-frame Langstroth hive was continued. The Jumbo hive is of the same length and width as the Langstroth hive but it is two inches deeper. When the bees are properly fed and protected for the winter, there is little or no difference in the way the bees winter, both hives are satisfactory. For rapid building up in the spring, however, the Jumbo hive would seem to have the advantage, as will be seen in the table. The 10-frame Langstroth hive does not appear to be large enough for a good, prolific queen, even though it may be filled with perfect combs of worker cells, the queens need more room. To supply this need shallow supers were added to the brood chambers of the Langstroth hives during the latter part of May. This procedure was necessary not only from the standpoint of the size of the hive, but for the control of swarming. The Jumbo hive on the other hand appears to be large enough for the most prolific queen, and has the advantage of having the brood combs all in one chamber instead of a double set of combs, as in the Langstroth hive plus the shallow super. In 1921 and 1922 the Jumbo hives, starting off at equal strength in the spring as the Langstroth hives, maintained a lead in brood production throughout the season and produced the larger crops, but in 1923 the Jumbos started off much weaker than the Langstroth hives, but maintained a lead in brood production during April and May only, the Langstroth plus the shallow super then taking the lead and producing much the larger crop. The following table shows the average comparison in brood production, strength of colonies at first and last examinations, and the yield of surplus honey.

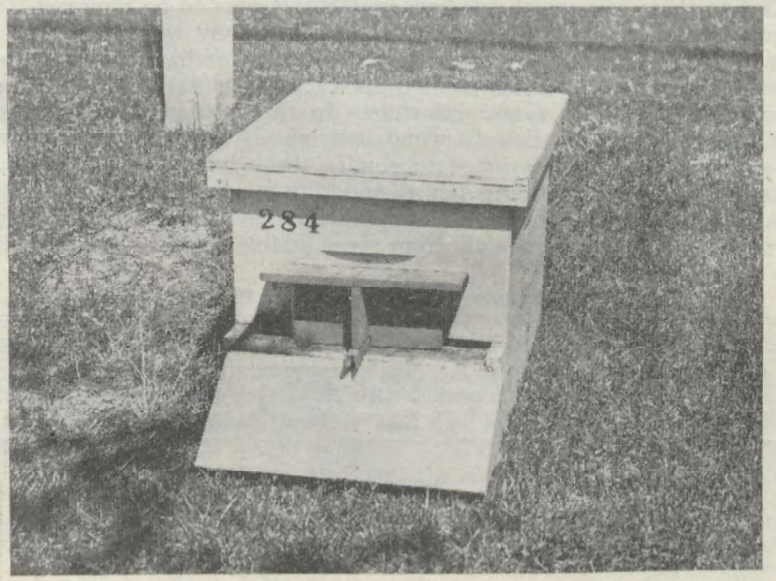
THE JUMBO HIVE VS. LANGSTROTH WITH SUPER

Size of Hive	Number of combs covered with bees at first examination	Amount of Capped Brood in square inches				Average honey crop produced		Number of combs covered by bees at last examination
		1921						
		April 15	May 3	May 18	June 7			
						lbs.	oz.	
Ten-frame Jumbo	6·4	530	1,150	1,830	1,950	246	13	8
Ten-frame Langstroth with shallow super	6·6	400	890	1,740	1,590	191	7	8
		1922						
		May 15	June 1	June 10	June 20			
Ten-frame Jumbo	6·5	1,528	2,138	2,076	2,080	83	10	9·0
Ten-frame Langstroth with shallow super	6·5	1,298	2,024	1,929	2,016	72	7	8·75
		1923						
		May 14	May 23	June 1	June 11			
Ten-frame Jumbo	5	809	1,064	1,166	1,221	168	0	8
Ten-frame Langstroth with shallow super	7	738	1,015	1,092	1,485	237	12	8

This table shows that, with the exception of the month of June in 1923, the Jumbo hives averaged the largest amount of capped brood, the Langstroth hives with the shallow super took the lead during this month and produced an average of 69¾ pounds more honey than the Jumbos for that year. It should also be noted that the Jumbo hives were much weaker on the average than the Langstroth hives at the first examination.

WINTERING TWO QUEENS IN ONE HIVE

This experiment was continued from 1922 as a straight test between single and double Langstroth and Jumbo colonies wintered both in the cellar and out-



Double colony before dividing in the spring.

side, also as a means of carrying over a surplus number of queens during the winter for use in the early spring.

The two following methods of getting the two queens into the double colonies were used:—

(1) The two queens were introduced into the hive at the time of treatment for swarming the previous year, 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. The hive entrance was closed in the centre, leaving a three-inch opening at opposite corners for each division. If no brood was found on one side at the time the white honey crop was removed, between August 6 and 26, another queen was introduced; or if no spare queens were on hand, the colony reverted to a single 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 other words the single colony was divided into two small ones in the one hive for the winter.

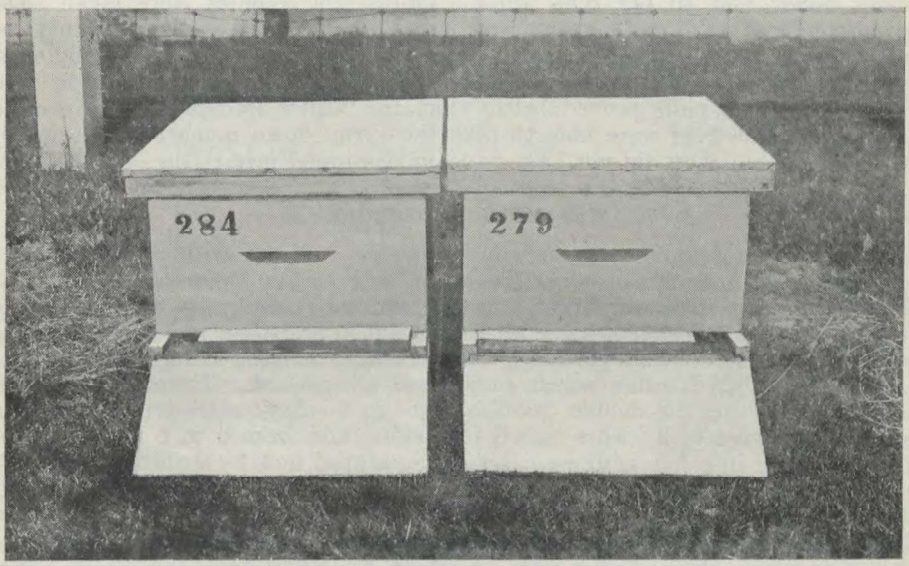
(2) Instead of uniting moderately weak colonies in the fall as usual, five frames were taken out of each of the weak colonies and the bees adhering to these combs were shaken into the hives; they were thus made to cluster on the remaining five frames in one side of the hive. Two or three days later, 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. The entrance of the hive was closed in the centre to provide a double entrance.

If any colony was found queenless or containing a drone-laying or failing queen at the first examination in the spring and was considered strong enough in bees, one queen was taken from one of the double hives and introduced to such colonies, thus saving them. The double colonies from which one queen was removed reverted to single colonies by removing the division board and giving only one entrance. All double colonies from which queens were not used for requeening were left double until the bees on one side of the division board filled their compartment, this varied from May 3 to 20. A new hive was then placed adjacent to the one containing the two queens, and on the side next to that from which the bees and queen were to be removed. The bees and queen from the stronger side of the double colony were then placed in the new hive and the division removed from the hive in which the two queens had wintered. Both hives were then filled up with drawn combs. Seventeen double colonies were placed in winter quarters. In the spring, 12 of them still contained two queens, the other five had lost one of their queens so reverted to singles. Two of the 12 reverted to singles through having one of the queens removed for requeening other colonies, and 10 remained as doubles. These were divided during the later part of May as described above. The following table gives the crop and increase made from these double colonies in comparison with single colonies.

WINTERING TWO QUEENS IN ONE HIVE.

Group consisting of	1922		1923	
	Average Yield of Honey	Percentage of Increase	Average Yield of Honey	Percentage of Increase
	lbs. oz.	%	lbs. oz.	%
Double Jumbo outside	119 10	100	203 7	133
Single " "	83 10	100	169 11	0
Single Langstroth "	72 7	62½	182 4	20
Double " inside	78 4	150	320 11	100
Single " "	49 11	40	136 14	10
Double Jumbo "	62 4	100	242 3	100
Single " "	43 12	50	194 6	0

The above table demonstrates that not only was the yield of honey much larger from the double colonies, but that the increase from them was never less than 100 per cent. In other words, the number of colonies was at least doubled. The crop from single colonies was much smaller, and only a small increase was obtained. Not only was there a material advantage gained in crop and increase from the colonies that wintered over with two queens, but other colonies that would have been lost in the early spring through loss of queen were saved by having a queen introduced from the surplus on hand.



Double colony after dividing in the spring.

ALUMINIUM COMBS

The results obtained from the use of metal combs in the brood chamber confirms the results obtained during the previous three years, namely, that the bees do not take to them readily, and even when the colony contained a young, prolific queen, brood rearing was restricted. The colony on these combs did not winter well, and at no time during the season did the bees cover more than eleven frames nor have more than five frames of brood. The honey production was also 73 pounds lower than the average of the whole apiary.

DISEASES

Brood Diseases.—During the season 50 samples of dead brood were received from various parts of Canada for diagnosis. Of the samples received, 25 were affected with American foul brood, 16 with European foul brood, the remaining 9 samples showed no signs of disease but had died either from chilling or starvation. The beekeepers from whom samples were received were at once notified as to the nature of the disease present, and the methods of treatment.

Adult Diseases.—Several samples of dead bees were received, but no indication of disease was found in any of them.

WINTERING AT OTTAWA, 1922-23

One hundred colonies were prepared for the winter of 1922-23; of these 83 contained only one queen, and 17 contained two queens—that is, in 17 of the hives the bees were separated into two parts with a tight-fitting division board between them and each part had its own queen. All colonies were of good strength on October 1. Feeding commenced on September 28 and was finished on October 9. Thirty-four of the colonies were each given a shallow super containing clover honey. Nine colonies were given a syrup made of 80 per cent clover honey and 20 per cent water. Thirty-five colonies were given sugar syrup made of two parts granulated sugar to one part water. Twenty-two colonies were given a mixture containing 50 per cent each of the honey and sugar syrups. Miller feeders, and ten-pound honey pails were used, and as in other years, the honey pails proved better than the Miller feeders and were easier to handle. The bees were able to take the syrup down much better from the honey pails, and they did not have to leave the brood nest to do so.

WINTERING OUTSIDE, 1922-23

Thirty-two colonies were wintered outside. Of these 28 contained only one queen and four two queens; the latter were in Jumbo hives. Four of the singles were also in Jumbo hives, and the remaining 24 were in 10-frame Langstroth hives. The colonies were all first weighed and then placed in the cases with four inches of bottom packing. The bees were then fed as rapidly as possible and again weighed, after which they were all packed. Twenty-four of the colonies, including the double colonies, were in 4-colony cases with 4 inches of packing underneath, 3 inches on all four sides, and from 6 to 8 inches on top. The entrances into five of these cases were reduced to 1 by $\frac{3}{8}$ inches during the coldest months of the year. In the sixth case, the entrances were left open 8 by 1 inches during the winter. Four of the colonies were in 2-colony wintering cases with four inches of packing on the bottom and all four sides, and six inches on top. Two colonies were in single Kootenay cases, one in a Krouse case, and one in a double walled hive. The covering over the frames in all cases consisted of a sheet of heavy oiled duck, which practically prevented all upward ventilation. The following table gives the average weight of the colonies before and after feeding.

WEIGHTS OF COLONIES—BEFORE AND AFTER FEEDING
(Wintering Outdoors).

Group of Colonies	Nature of Stores	Average weight before feeding	Average amount fed	Average weight after feeding	Remarks
		lbs. oz.	lbs. oz.	lbs. oz.	
Single Langstroth...	Shallow super of Honey.....	38 11	33 2	67 14	
" " ...	Honey Syrup.....	38 8	57 0	72 0	80% honey. 20% water.
" " ...	Sugar Syrup.....	44 13	45 0	71 5	2—1.
Double Jumbo.....	Sugar Syrup.....	51 6	38 4	70 14	"
Single Langstroth...	Sugar and honey....	46 1	44 14	73 5	(Mixture containing 50%
Single Jumbo.....	Sugar and honey....	46 14	43 15	73 8	of the above mixtures).

The outside temperatures during the early part of the winter were very variable causing considerable restlessness in the colonies, and many bees tempted out were lost on the snow. On the whole the winter was a very severe one with extremely low temperatures lasting for long periods. During the latter part of March, the entrances to the cases were shovelled clear of snow, but the bees were not examined until May 3. The following table summarizes the condition of the colonies at this first examination.

CONDITION OF COLONIES AT FIRST EXAMINATION

(Outside Wintering).

Group	Stores	Kind of Case	Number of combs covered at 1st examination	Date of Examination	Average weight when unpacked	Average Loss from Oct. 6-May 28
					lbs. oz.	lbs. oz.
Single colonies in 10-fr. Langstroth Hives	Shallow Supers of Clover Honey	4-colony	8·96	May 3	46 13	17 4
		2-colony	7·6	" 3	45 10	18 4
" "	Sugar and honey syrup	4-colony	7·35	" 3	44 15	28 6
" "	Sugar Syrup	4-colony	6·66	" 3	45 11	25 11
		1-colony	5·83	" 3	not weighed	
" "	Honey Syrup	1-colony	1·5	" 2	" "	
Single Jumbo	Sugar and honey syrup	4-colony	5·0	" 3	49 14	23 10
Double Jumbo	Sugar syrup	4-colony	6·0	" 3	48 10	22 4
						Between Oct. 6-May 18.

The above table shows that the colonies in the single cases were not weighed. This was because these colonies were permanently packed and never removed from the cases. In those that were weighed, the least loss was found where the shallow super of honey was given. These colonies were stronger in bees at the first examination. There was very little difference between the 2-colony and 4-colony cases.

CELLAR WINTERING, 1922-23

Sixty-eight colonies were placed in the cellar on November 21, eighteen days after the last good cleansing flight. The average weight of the colonies when placed in the cellar was 61·9 pounds. The outside temperature during the early part of the winter was very variable, and this affected the temperature of the cellar to a certain degree, making it difficult to maintain it at the right point, thus causing the bees to become restless in the hives. The main part of the winter, however, was very steady, and the bees remained quiet during this period. Five colonies were kept on scales during the entire winter, and the weights recorded each week. The temperature and humidity of the cellar were also taken each week, and also every time the outside temperature showed a decided change. The following table summarizes the average weights of the colonies before and after feeding:—

CELLAR WINTERING, 1922-23

Group of Colonies	Nature of Stores	Average weight before feeding	Average amount fed	Average weight after feeding	Remarks
		lbs. oz.	lbs. oz.	lbs. oz.	
Single Langstroth	Shallow super of honey	36 2	34 0	68 6	
" "	Honey syrup	41 7	28 8	59 7	(80 per cent honey, 20 per cent water).
Double Jumbos	"	43 0	28 8	68 0	
Double Langstroth	Sugar syrup	47 6	29 4	60 9	2 – 1.
Single Langstroth	"	44 5	33 4	60 10	
Double Jumbos	"	57 1	12 0	64 5	
Single Jumbos	"	52 0	18 0	64 0	
Single Langstroth	Sugar and honey	40 10	37 0	64 0	(Mixture containing 50 per cent of each of the above mixtures.
Double Langstroth	"	42 8	37 0	66 4	

The colonies were removed from the cellar on April 23 and were examined on May 2, when it was found that four colonies had died during the winter, and that five were so weak that they had to be united. Five of the double colonies had each lost one queen. The remaining colonies were in fair condition.

In all colonies that wintered in the cellar with a shallow super of honey over the regular brood chamber, brood rearing was very much restricted during the early spring, in fact, up to the time of the first flow from dandelion and fruit bloom. This was caused by the queen and bees remaining in the shallow super during this period. The queen occupied all the empty cells in the super and in all cases deposited several eggs in each cell rather than go down on the combs below. This evidently was due to the bees having too much space to keep warm. As the stores were practically all in the upper chamber the brood nest was started there, and as the lower chamber was the colder part of the hive the bees refused to go down. This condition did not occur in any of the colonies wintered outside with shallow supers, as they remained packed much later, and the hive was protected.

CONDITIONS OF COLONIES AT THE FIRST EXAMINATION
Wintered in Cellar

Group	Stores	Number of combs covered by bees at first examination May 2nd	Average weight when removed from cellar		Average loss since feeding	
			lbs.	oz.	lbs.	oz.
Single Langstroth	Shallow Super of Honey	5·1	50	1	18	5
"	Sugar and Honey	4·8	47	14	16	2
"	Sugar Syrup	6·2	44	14	15	12
"	Honey Syrup	4·7	43	9	15	14
Double Langstroth	Sugar and Honey	4·0	53	0	13	4
" "	Sugar Syrup	6·3	50	6	10	3
Single Jumbo	"	6·3	47	8	16	8
Double Jumbo	"	7·0	49	7	14	14
" "	Honey Syrup	5·0	53	0	15	0

The above table shows that the greatest loss occurred in those colonies that were wintered on shallow supers of honey. This is just the opposite to what occurred in the outdoor wintered colonies. It will also be noticed that the strongest colonies were those that were wintered on sugar syrup. It should also be noted that the average loss was much less in the double colonies, that is those which were divided and contained two queens.

WINTERING, 1923-24

One hundred and eight colonies were prepared for the winter of 1923-24; 50 of these are being wintered outside in packing cases, and 58 in the cellar. All colonies were weighed on October 3 and feeding commenced on the same day and was finished on October 8. Those wintered outside were first weighed, placed in their cases, and packed on the bottom and sides before feeding. The top packing was given directly after feeding. All colonies were very strong in bees for the winter.

OUTSIDE WINTERED COLONIES

Of the 50 colonies wintered outside, 40 of them are in 4-colony cases with 4 inches of packing beneath and on all four sides and 6 to 8 inches on top. The cases are the same as have been used for the past number of years. Six of the colonies are in 2-colony cases, and 4 are in single cases with the same amount of packing as in the 4-colony cases. The packing material used in all

cases is planer shavings. The bees are wintering on the following stores, 23 colonies on shallow supers of clover honey, 4 on deep supers of clover honey, 4 on sugar syrup, 8 on honey syrup and 7 colonies were filled up with sealed combs of honey. Enough of each was given to bring the colonies up to the required weight. The following table summarizes the average strength and weight of colonies before feeding and the amount fed:—

AVERAGE STRENGTH AND WEIGHT OF OUTDOOR WINTERED COLONIES ON OCTOBER 3

Group	Stores	Average Number of combs covered by bees	Average weight before feeding		Average amount fed	
			lbs.	oz.	lbs.	oz.
Single Langstroth	Shallow supers of Clover Honey	7·7	53	11	37	12
"	Deep Supers of Clover Honey	8·5	69	10	29	8
"	Sugar Syrup	8·2	63	4	20	4
"	Combs of honey in brood chamber	7·9				
Double Langstroth	Honey Syrup	9·5	65	12	9	0
"	Fermented honey syrup	9·5	64	12	13	8
Single Jumbo	Shallow super of honey	8·3	75	4	38	6
"	Combs of honey in brood chamber	7·2	46	12	34	8
Double Jumbo	Honey Syrup	7·2	61	12	18	0
"	Fermented honey syrup	7·0	62	0	18	0

The colonies were not weighed after feeding as they were packed before feeding and it would have disturbed the colonies too much to have taken them from the cases for weighing. It will be noted that every colony was given enough food to bring the weight up to at least 70 pounds.

CELLAR WINTERING

On November 8, colonies numbering 58 were taken into the cellar three days after a good flight. All colonies were in good condition at the time of bringing them in. Five of the colonies are kept on scales and the weights recorded each week. Owing to high temperatures in the cellar and restlessness among the bees, the average weekly consumption has been rather high, 14·1 ounces as against 7·94 ounces during the previous year. The following table summarizes the average strength, weights before feeding and the amounts fed.

AVERAGE STRENGTH AND WEIGHTS OF CELLAR WINTERED COLONIES ON OCTOBER 3

Group	Stores	Average Number of combs covered by bees	Average weight before feeding		Average amount fed	
			lbs.	oz.	lbs.	oz.
Single Langstroth	Shallow supers of honey	8·4	49	6	37	11
"	Honey and sugar syrup	7·1	54	11	15	12
"	Sugar syrup	7·9	52	7	18	0
"	Combs of honey in brood chamber	7·5	46	3	22	7
Double Langstroth	Sugar syrup	9·0	59	0	18	0
"	Combs of honey in brood chamber	9·0	60	4	11	12
Single Jumbo	" " "	8·0	55	8	18	11
Double Jumbo	" " "	.....	73	8		

The weather during the early part of the winter was very mild, and it was found impossible to keep the temperature of the bee cellar low enough for the bees. This resulted in extreme restlessness, and the bees were clustering out-

side of the hive entrances in large numbers until the New Year when it was found necessary to put in a new ventilating shaft. The outdoor wintered bees were able to have several good flights during the months of November and December, and they were flying as late as December 23, which is very unusual.

EDUCATIONAL

During the year, Bulletin No. 26, "Bees and How to Keep Them," was revised and brought out as Bulletin No. 33 with the same title. Press articles on various phases of beekeeping were issued from time to time. Apiary Reminders were sent out to beekeepers all over the Dominion during the summer. There were seven numbers of these reminders suggesting the more important phases of apiary work that should be attended to at the time of issue; 2,870 copies of these reminders were sent out during the year 1923. Addresses on beekeeping were given at the annual conventions of the Ontario and Quebec Beekeepers' Associations and at other association meetings. Lectures were also given at a short course in beekeeping held at Macdonald College, Que.

The various branch Farms keeping bees were visited during the season for the purpose of outlining and supervising experimental work.

EXPERIMENTAL PROJECTS UNDER WAY IN THE BEE DIVISION, CENTRAL EXPERIMENTAL FARM, OTTAWA

Project No.	Title.
Ap. 1.	Control of swarming by dequeening and requeening.
Ap. 2.	Control of swarming by separation of brood and queen.
Ap. 5.	Methods of detecting preparations for swarming.
Ap. 6.	Comparing different methods of handling natural swarms for efficiency.
Ap. 7.	Wintering in cellar.
Ap. 8.	Wintering in 4-colony cases.
Ap. 9.	Wintering in 2-colony cases.
Ap. 10.	Wintering in single colony cases.
Ap. 11.	Comparison of different stores for wintering.
Ap. 12.	Two-queen system.
Ap. 13.	Controlled mating of queens.
Ap. 14.	Study of Alsike and Dutch Clover.
Ap. 15.	Study of Fireweed.
Ap. 16.	Study of minor honey plants.
Ap. 18.	Diseases affecting brood.
Ap. 19.	Diseases affecting adult bees.
Ap. 20.	Returns from apiaries.
Ap. 21.	Comparison of different sizes of hives.
Ap. 23.	Aluminium combs compared with others.
Ap. 26.	Study of nectar secretion.
Ap. 27.	The value of honey bees in cross pollenation.
Ap. 28.	Study of honey flows.
Ap. 30.	Outdoor versus cellar wintering.
Ap. 31.	Prevention of swarming by giving room.
Ap. 33.	Comparison of races of bees.
Ap. 34.	Queen rearing.
Ap. 36.	Relation of strength of colony in bees and brood to the honey crop.
Ap. 38.	Comparison of different methods for introducing queens.
Ap. 44.	Testing various weights and makes of foundation.
Ap. 45.	Methods of increase without natural swarming.
Ap. 49.	Wintering in double brood chamber.
Ap. 50.	Colony temperatures of outdoor wintered bees.