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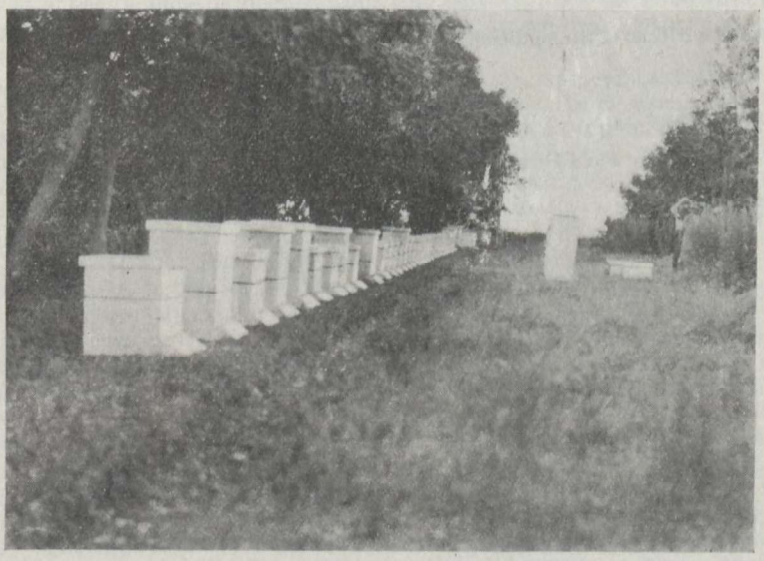
DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

BEE DIVISION

REPORT OF THE DOMINION APIARIST

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

FOR THE YEAR 1926



A well-placed apiary in Saskatchewan.

Printed by Authority of the Hon. W. R. Motherwell, Minister of Agriculture
Ottawa, 1927

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BEE DIVISION

REPORT OF THE DOMINION APIARIST, C. B. GOODERHAM, B.S.A. FOR THE YEAR 1926

GENERAL NOTES

The past season of 1925-26 was a very trying one for the beekeepers of Eastern and Central Canada. Heavy winter losses, followed by unfavourable weather conditions during the spring and summer, resulted in extremely light crops of honey. In the three most western provinces, especially in Saskatchewan and Alberta, the exact opposite prevailed; the bees wintered well, summer conditions were favourable for the secretion and gathering of nectar and good crops were harvested.

East of Saskatchewan, the weather conditions during the fall of 1925 were decidedly unfavourable, both for brood rearing and the preparing of the bees for the winter. With the exception of a few localities, little or no fall honey was gathered and brood rearing was seriously retarded—in some cases ceasing altogether earlier than usual. The feeding and general preparation of the bees for winter were, in most cases, carried out under adverse conditions, so that the colonies when placed in winter quarters were rather weak in young bees and not too well supplied with stores. In certain localities, especially in Nova Scotia, there was a heavy flow of nectar from fall flowers, such as Goldenrod, and in these localities the bees were put away with an abundance of this late-gathered honey with fatal results.

The winter of 1925-26, while not extremely cold, was very severe on bee life. The weather became too cold for flying much earlier than usual and the bees were confined to their hives that much earlier. This confinement was continued throughout the winter and far into the following spring. In the East, it is not an uncommon occurrence to get one or more good flying days during the month of February, while in March it is very rare not to have suitable weather for general flying. No such opportunity, however, was afforded during the past spring, as the first good flight that occurred at Ottawa was on April 20, while in many other places it was even later than this. This abnormally long confinement to the hives caused an increased consumption of stores and, where the colonies were scantily fed the previous fall, resulted in heavy losses from starvation. In Nova Scotia, where the colonies went into winter quarters on late-gathered honey only, many colonies died of starvation, not because the stores were exhausted, but because they granulated so hard the bees were unable to use them. In addition to the colonies that actually perished during the winter, many more were so weakened that they also perished during the spring.

The spring of 1926 was cool and very backward and the bees were unable to take early cleansing flights that are so necessary for the well-being of the colonies. The first sources of nectar that are of great aid in the early building-up of the colonies were also late and even while they were in bloom the weather conditions were so bad that the bees were unable to take advantage of them. During this period there was a general dwindling of bees because of their lowered vitality. Many colonies that survived the winter perished at this time, while those that did live were very slow in recuperating their strength.

The past summer also was very unfavourable, especially in Quebec and Ontario. Cool weather retarded nectar-secretion and the gathering of the same. The main honey flow from clovers was a failure and the hope for a fall flow from sweet clover and buckwheat did not materialize.

In Manitoba the winter losses were not so heavy as they were in the provinces east, although in some localities they ranged as high as fifty per cent. The weather conditions in the spring and early summer were also bad but during the late summer the weather improved and a fair crop was harvested.

In Saskatchewan, Alberta and British Columbia, the winter was comparatively short and mild and the bees wintered well. The spring opened early and there was a plentiful supply of early nectar and pollen. The colonies built up rapidly and were strong by the time the main sources of nectar were ready. In most localities within these provinces the weather during the summer was ideal for nectar-secretion and gathering. Thus, good crops of honey were harvested chiefly in the two Prairie Provinces, but more especially in Alberta.

The fall of 1926 was, from a general standpoint, favourable for the preparation of bees for the present winter 1926-27. Colonies appeared to be in fairly good condition as far as strength was concerned. And conditions for feeding were quite good. It is true that in a few localities, especially in Southern Ontario, wet weather impeded feeding operations to some extent.

FIG. 1.—An apiary in Central British Columbia. These colonies are all in Kootenay cases.

HONEY PRODUCTION AT OTTAWA AND OUT-APIARY

The two apiaries at Ottawa were not immune to the general unfavourable conditions of winter, spring and summer. While the bees came through the winter in fairly good condition (see "Wintering 1925-26") there was a general weakening of the colonies during the spring and they failed to build up well during this period. The first good cleansing flight which usually occurs during February or March did not occur this year until April 20, about two months later than the previous year. The first pollen was observed coming in on May 1, twenty days later than in 1925. The bees, however, were only able to work the early sources of nectar spasmodically because of inclement weather.

Dandelion and fruit bloom were also late but abundant and, although considerable nectar is usually obtained from these sources, very little was gathered this year. The colonies on scales showed only a slight gain in weight for ten days. These colonies registered loss in weight every day from June 15 to June 28 when the alsike and white clovers began to yield slightly. This source of nectar also proved a failure for the highest average daily gain recorded was only 2 pounds 3 ounces. On July 13, the sweet clover began to yield and the highest average gain from this source was 4½ pounds, as compared with 15 pounds 3 ounces the previous year from the same source, and which is the lowest daily gain on record for Ottawa. What surplus was stored was mainly from sweet clover.

The total amount of honey produced by eighty-seven colonies at the main Ottawa apiary was 3,233 pounds, or an average of 37 pounds 5 ounces per colony, as compared with an average of 115¾ pounds last year. The out-apiary, consisting of eight colonies, produced a total of 709½ pounds or an average of 88 pounds 11 ounces per colony. Last year, the average for this apiary was 215 pounds 10 ounces per colony. All colonies that were lost or united during the season were replaced by making increase and the apiary enlarged by three colonies.

BEES AND POLLINATION

The study of the part honey-bees play as agents in the cross-pollination of fruit was continued in co-operation with the Horticultural Division. The same trees of the common red plum (*Prunus nigra*) as were used in 1925 were again tented for the 1926 experiment, as follows:—

Tent No. 1: Three trees inclosed and all insects excluded.
Tent No. 2: Six trees inclosed and all insects excluded. A strong colony of bees was placed in this tent when the trees began to bloom.
Tent No. 3: Three trees inclosed. This tent was constructed of wire gauze that excluded honey-bees but permitted insects smaller than honey-bees to enter it.
Tent No. 4: One tree inclosed and no insects permitted to enter.
Tent No. 5: One tree inclosed and no insects permitted to enter. A colony of bees placed in this tent when tree began to bloom.
In addition, two trees standing in the open were used as checks.

In Tent No. 1, from which all insects were excluded, the trees were very close together. In fact, some of the branches of each tree were intertwined with those of the others and a good opportunity was afforded for wind-pollination.

The tents were all erected before the trees began to bloom and immediately after the number of blossoms on one hundred and twenty-five blossom-spurs on each tree were counted and tagged. Two trees were tagged in Tents Nos. 1, 2 and 3, and also the two check trees. The trees in Tents Nos. 4 and 5 were also tagged.

The blooming period of the trees lasted approximately ten days but most of the pollen was liberated before the sixth day. The bees were left in the tents for the ten days of bloom, after which they were removed and the tents taken down. During the blossoming period the weather was rather cool, and also dull on six out of the ten days, so that the insects could not work the bloom continuously or to the fullest extent Particularly was this true of the check trees, as the bees were found working in the tents when no insects were seen on the check trees, due, possibly, to the extra protection from wind afforded by the tents. It was again noticed that very little odour could be detected from the trees until they were practically in full bloom and it was also noted that insect visitors were far more numerous when the strong odour was emanated.

The trees were visited once daily for the purpose of noting the condition of the bloom and how it was being worked by insects.

A few blossoms started to open on May 25 and by May 30 all blossoms were open. On May 26 the bees were placed in the tent and in a short time were working on the flowers. Bees and other insects were present on the check trees. No insects were seen in Tent No. 3.

May 28: Light wind, weather fair. Bees working well in tents and on check trees. Wild bees in Tent No. 3 and also abundant on check trees. Some trees with 100 per cent of blossoms open.

May 29: Bright and clear, light wind. Bees working well in tents and outside. Many wild bees in Tent No. 3. Some pollen shed in No. 2. Most of blossoms open.

May 31: Dull all day. Most of pollen liberated and petals beginning to fall rapidly. No bees working in Tents Nos. 2 and 5; but few on checks. Wild bees in No. 3.

June 1: Rain all day, no insects working.

June 2: Petals nearly all gone. No insects working and pollen all shed.

June 4: Petals all fallen. Bees removed from tents which were later taken down.

In order to allow sufficient time for all imperfect fruit to fall, the count of fruit set was not made until July 6. When making this count, it was found that a few of the tags had fallen from the trees. As it was impossible to identify the spurs from which they had fallen, these were not included in the final count. The results of the experiment are summarized in the following table:—

TABLE SHOWING NUMBER OF FRUIT SPURS TAGGED, THE NUMBER OF BLOSSOMS COUNTED AND THE NUMBER AND PERCENTAGE OF FRUIT SET

Tent No.	Tree No.	Number of spurs tagged	Number of spurs on which tags were found	Number of blossoms counted	Number of fruit set	Percentage of fruit set
						%
No. 1	1	125	124	956	2	0·2
	2	125	123	957	0	0·0
No. 2	1	125	125	970	293	30·2
	2	125	120	872	135	15·4
No. 3	1	125	125	1,591	208	13·0
	2	125	123	1,516	118	7·7
No. 4	.....	125	120	1,233	11	0·9
No. 5	.....	125	122	1,191	0	0·0
Check Trees	1	125	123	1,592	182	11·4
	2	125	125	1,693	262	15·4

It will be remembered that Tent No. 1 excluded all insect visitors and that the branches of the trees were interlaced. As the trees were of different varieties and wind could circulate through the tent easily, there was ample opportunity for wind-pollination. The set of fruit in this tent, however, was practically nil, as one tree set no fruit while only two plums set on the other. These results are identical with those obtained in 1925.

The trees in Tent No. 2, in which the bees were placed, gave a very high set of fruit. In fact, the average set for this group was higher than any other group in the experiment. As *Prunus nigra* is apparently self-sterile and wind evidently plays no part in the cross-pollination of this plum, the bees were the only agents responsible for the distribution of pollen in this tent.

A good set was also obtained on both trees in No. 3, from which all insects larger than and including honey-bees were excluded.

In Nos. 4 and 5, in which single trees were enclosed, the flowers were shut off from all sources of pollen other than their own. Although the bees worked the tree in No. 5 quite freely, no fruit set on this tree, while in No. 4 0.9 per cent set. This would indicate that the varieties *Prunus nigra* are practically sterile to their own pollen.

A good set was obtained on the check trees that were open to the visits of all insects. This group came second in average set.

With the exception of a slight variation in yields from individual trees, the results of the experiment are practically the same as obtained in 1925 (see report for 1925) and would indicate:—

1. That each variety of the red plum (*Prunus nigra*) is sterile to its own pollen, but fertile to pollen of other varieties.
2. That wind plays no part in disseminating the pollen from one variety to another.
3. That both wild and honey-bees are important and efficient agents in the cross-pollination of *Prunus nigra*.

Although wild bees may be equally as efficient as honey-bees as agents in cross-pollination, it is impossible to control their numbers and in some seasons, especially after a severe winter, they may not be present in sufficient numbers to ensure maximum results being obtained. On the other hand, however, honey-bees living through the winter under different conditions can be controlled and placed in or near an orchard in sufficient numbers to ensure complete cross-pollination.

QUEEN BREEDING

This work was continued both at Ottawa and Kapuskasing. At the latter Station, however, the unfavourable weather conditions during spring and summer proved to be a serious handicap. Not only was it difficult to get the bees to accept the grafted cells, even with extensive feeding, but the young queens were slow in getting mated; in some cases they were confined to the mating-boxes for approximately three weeks before taking the mating flight. The main difficulty experienced at Ottawa was in getting the queens mated.

FIG. 2.—Queen-mating yard at Central Experimental Farm, Ottawa.

The young queens were reared in both queenless and broodless colonies and swarm-boxes, the bees being fed heavily before and after giving them the cells, but even with this the percentage of cells accepted in each batch at Kapuskasing was very small, while at Ottawa the acceptance was fairly good.

At Kapuskasing only 61 queens were reared. Of these 40 were successfully mated. Three of these were later killed as being undesirable and the remainder used in some of the branch Farm apiaries.

At Ottawa 58 queens were successfully mated; 38 of these were used at Ottawa, 18 sent to branch Farm apiaries, and 2 to private beekeepers.

WINTERING TWO QUEENS IN ONE COLONY

Fourteen colonies each containing two queens were placed in winter quarters for the winter of 1925-26. These colonies wintered well and in the spring twelve of them still contained the two queens, but one queen was lost in each of the other two. This method of wintering weak colonies is an excellent one, as it not only saves the bees, but also the queens, and a few surplus queens early in the spring to replace lost or failing queens in single colonies are a means of saving these colonies.

CARNIOLAN VERSUS ITALIAN BEES

The test between these two races of bees was continued for the third year in the out-apiary at Britannia Heights. All the colonies were wintered in two full-depth brood chambers and packed in 4-colony cases. At the first examination in the spring (May 5) it was found that one colony in each group had perished. These, however, were immediately replaced. At this examination, the Carniolan colonies had an average of 9.2 combs covered with bees, while the Italians covered approximately 8.8 combs. At the second examination, however, the Italian colonies appeared to be stronger in bees and brood and practically maintained this lead throughout the season. The apiary was visited and the colonies examined once every ten days throughout the season.

During the summer two of the Italian colonies contained queen cells. These, however, superseded their queens and did not swarm. The others made no preparations for swarming. One colony of Carniolans swarmed but returned, two others made repeated preparations for swarming, while the fourth made no attempt.

The amount of honey extracted from the two groups for the past three years is shown in the following table:—

COMPARISON OF HONEY CROP FROM CARNIOLAN AND ITALIAN BEES

Race of bees	Number of colonies in group	1924		1925		1926	
		Total crop	Average crop	Total crop	Average crop	Total crop	Average crop
		lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.
Italians	4	765 4	191 5	900 0	225 0	417 0	104 4
Carniolans	4	348 0	87 0	825 4	206 5	292 8	73 2

As in previous years, the Carniolans showed more inclination to swarm than did the Italians and, therefore, required more careful manipulations. The table also shows that the Carniolan colonies gave smaller crops than did the Italians for each year the experiment has been conducted. The results of this experiment so far indicate that the Italian bee is the best for locations with conditions similar to those at Ottawa.

During the past season a test was made with the Italian, Carniolan and Caucasian bees at the branch Farm apiary at Lacombe, Alberta, and the results are given in the following table:—

COMPARISON OF DIFFERENT RACES OF BEES

Race of bees	Number of colonies in group	Number of combs drawn	Total honey produced	Average per colony
			lb.	lb. oz.
Italians	4	87	220	55 0
Carniolans	4	46	50	12 8
Caucasians	4	50	80	20 0

The bees for this test were obtained in 2-pound packages early in the season and established on comb foundation. It will be noticed that the Italians led in number of combs drawn and honey produced. Although this is only the first year of the test at Lacombe, the results coincide with those at Ottawa.

EGG-LAYING CAPACITY OF QUEENS

The project to determine the daily average egg-laying of queen bees by making periodical counts of the brood was continued during the past season. The three colonies used in this project were all in 10-frame Langstroth brood-chambers plus a shallow super over each and were all wintered outside in packing cases. Colony No. 295 was headed with a queen less than one year old. No. 275 contained a queen in her second year ,while No. 208 had a queen in her third year. The old queen in No. 208, however, was superseded early in the season and brood-counts in this colony were discontinued. The brood-counts were made every ten or twelve days from May 12 to September 7. No counts were made after September 7, because of cold weather and fear of chilling the brood. A hasty examination made on September 25, however, showed that some brood was still present in both colonies.

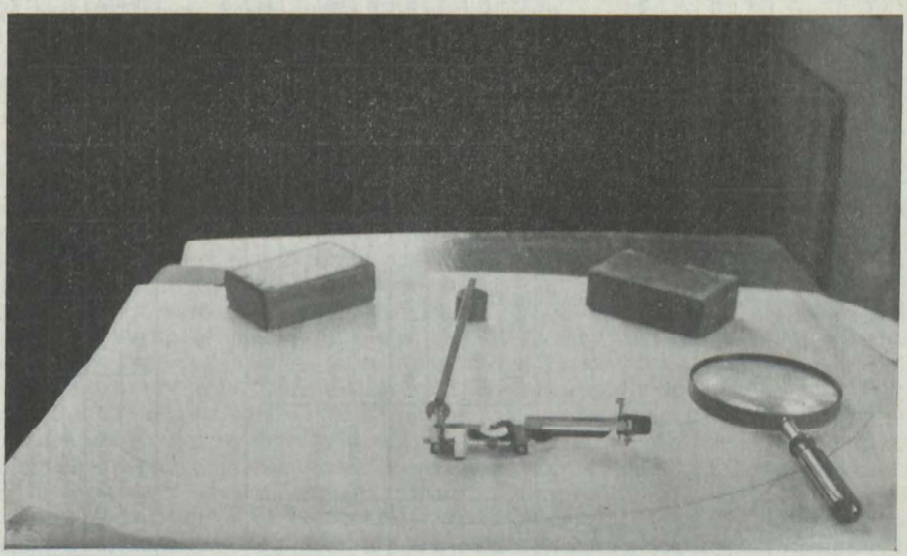

FIG. 3.—Planimeter. An instrument for measuring areas and used in making the brood counts.

The method of taking the counts was the same as in previous years, namely, first tracing on glass the areas of comb containing brood, transferring this tracing to paper and then measuring with a planimeter, thus obtaining the total area of brood in each colony in square inches and deducting from this the number of cells occupied with eggs and brood at each count.

The dates on which the counts were made and the average daily production for the 21-day period just prior to each count are shown in the accompanying table:—

TABLE OF DAILY AVERAGE EGG PRODUCTION FOR 21-DAY PERIODS

Colony Number	Age of Queen	1924						
No. 111	1 year	Date of Counts	June 11	June 20	July 2	July 14	July 23	Aug. 2
		Daily average	2,049	1,992	1,900	1,604	1,282	1,170
No. 104	2 years	Date of Counts	June 2	June 24	July 3	July 15	July 24	Aug. 11
		Daily average	1,264	1,318	1,520	1,644	1,831	1,662

1925

No. 239	1 year	Date of counts	May 15	May 26	June 2	June 9	June 16	June 23	July 2	July 14	July 25	.....
		Daily average	1,448	1,829	2,000	1,916	2,006	2,024	2,234	1,968	1,473	.....
No. 232	2 years	Date of counts	May 15	May 26	June 2	June 9	June 16	June 23	July 2	July 14	July 25	Aug. 7
		Daily average	1,147	1,346	1,409	1,504	1,587	1,759	1,904	1,918	1,724	1,530
No. 211	2 years	Date of counts	May 15	May 26	June 2	June 9	June 16	June 23	.....	.....	.....	.....
		Daily average	1,178	1,367	1,367	1,438	1,436	1,223	.....	.....	.....	.....
No. 263	1 year	Date of counts	May 15	May 26	June 2	June 9	June 16	June 23	July 2	July 14	July 25	Aug. 7
		Daily average	996	1,161	1,252	1,311	1,383	1,510	1,783	1,884	1,718	1,669

1926

No. 295	1 year	Date of counts	May 12	May 26	June 5	June 15	June 25	July 5	July 15	July 25	Aug. 5	Aug. 16	Aug. 26	Sept. 7
		Daily average	721	1,611	1,833	1,790	1,442	1,796	2,167	1,947	1,695	1,709	1,655	1,038
No. 1275	2 years	Date of counts	May 12	May 26	June 5	June 15	June 25	July 5	July 15	July 25	Aug. 5	Aug. 16	Aug. 26	Sept. 7
		Daily average	1,098	2,037	2,405	2,362	1,972	2,174	2,211	2,017	1,727	1,993	1,926	1,394

In studying the table it will be noted that in 1924 the queen in No. 111 reached her highest average production during the 21 days just prior to June 11, which was just seven days before the main flow started. The queen in No. 104 did not reach her highest production until the early part of July, which was after the peak of the flow had been reached. Consequently, this latter colony did not have as strong a force of bees to gather the harvest as did No. 111.

For 1925, the queens in colonies Nos. 239, 232 and 263 reached their highest egg laying during the latter part of June and early July, which was during the early part of the main flow but before the peak of the flow. This year the flow was somewhat later than in 1924, the greatest yields being after July 19. The queen in No. 211 was superseded just before the flow.

For 1926, the queen in No. 275 produced her greatest number of eggs during the 21 days previous to June 5 or during the early flow from dandelion and fruit bloom, but made another spurt during the early part of July at the beginning of the clover flow. The queen in No. 295 reached her highest production during the early part of July at the beginning of the main flow. This colony was not at all satisfactory for making brood-counts, as it continually made preparations for swarming throughout the season.

It will be seen that the highest daily average egg-laying for a period of 21 days did not exceed 2,405 eggs and this in colony No. 275 during the 21 days just prior to June 5, 1926. The highest daily averages for 21-day periods in 1924 and 1925 were 2,049 and 2,234, respectively.

PACKAGE BEES AS A MEANS OF STRENGTHENING WEAK COLONIES IN THE SPRING

An experiment was started to test the economy of uniting package bees to weak colonies in the spring as a means of increasing the power of the colonies to produce more brood during the spring and early summer and thus increase the working force by the time the main honey flow started.

For this purpose, five 2-pound packages of bees were obtained from a well-known breeder in Alabama. The bees arrived on April 23 during a very cold spell, but they were in excellent condition. Upon arrival, the bees were fed with a thin syrup of sugar and water and after they had quietened down the queens were removed and the bees were united to the weak colonies. As the weather was very cold, the uniting was done as rapidly as possible, by first removing four empty combs from each of the colonies and then removing the cap from the packages, shaking a few of the bees down into the hive and then setting the package in the space from which the combs had been removed. Two or three days later the empty cages were removed and the combs returned.

The package bees united readily with those of the colony without the least disturbance and thus increased the strength of the colony by approximately 10,000 bees.

Five colonies of as near equal strength were left unstrengthened as checks.

For approximately two months after the arrival of the bees the weather was wet and cool and, as stated elsewhere in this report, the bees were confined to their hives for most of that time with little opportunity of working the early sources of nectar. Feeding had to be resorted to in order to provide the bees with sufficient stores to continue brood-rearing.

The results obtained are summarized in the following table:—

STRENGTHENED VERSUS UNSTRENGTHENED COLONIES

Strengthened Colonies						Unstrengthened Colonies					
Colony No.	Number of combs covered by bees	Weight of bees added	Number of combs covered by bees at beginning of flow	Number of combs containing brood	Crop	Colony No.	Number of combs covered by bees	Weight of bees added	Number of combs covered by bees at beginning of flow	Number of combs containing brood	Crop
		lb.			lb. oz.						lb. oz.
129	1	2	9	6	22 8	104	1	0	3	3	0 0
128	1	2	8	8	38 0	113	2	0	6	5	7 8
257	2·5	2	10·5	8	76 0	237	3	0	2	2	0 0
278	2	2	9·5	8	70 8	247	2	0	4	4	16 0
256	4	2	9·5	8·5	41 0	239	4·5	0	6·5	6·5	27 0
Averages...	2·1	.....	9·3	7·7	49 9	.....	2·5	.....	4·3	4·1	10 2

It will be seen in the table that both groups of colonies were very weak on April 23, the date on which the package bees arrived, as the average number of combs covered by bees was 2.1 and 2.5, respectively. The group with the lower average was the one chosen to receive the package bees. It is also very evident that the adding of extra bees enabled these colonies to build up more rapidly than those to which no bees were added for, by the time the main flow started, they had more than doubled the force of bees and almost doubled the amount of brood. The average crop produced by the strengthened colonies was 49 pounds 9 ounces, as against 10 pounds 2 ounces for the unstrengthened colonies. This experiment is to be continued.

ALUMINUM COMBS

The testing of metal combs both in extracting-supers and brood-chambers was again carried out during the past season.

During the main honey flow a number of colonies were each given supers containing five aluminum combs and four wax combs. As the season was a very poor one, little honey was stored in the supers; therefore, nothing can be said regarding the manner in which the combs were accepted by the bees.

In the spring of 1925, five colonies gradually had the wax combs in their brood-chambers replaced with aluminum combs that had been drawn out in extracting supers the previous year (1924). As the 10-frame Langstroth hive is not large enough as a brood-chamber each of these colonies was supplied with a shallow super of wax combs in addition to the brood-chamber containing the metal combs. Five other colonies of equal strength but entirely on wax combs were used as checks. These also had shallow supers added to enlarge the brood-chamber. During the summer of 1925 the average amount of brood in the two groups was exactly the same, but in the group on aluminum combs there was more brood in the wax combs in the shallow supers than there was in the supers over those colonies supplied with wax combs below. The difference, however, was not great.

All the colonies were wintered outside in packing cases during the winter of 1925-26 and all had a shallow food chamber over the 10-frame Langstroth brood-chamber. All the colonies passed through the winter successfully and were in a fair condition at the first examination in the spring (April 22), but

owing to poor weather conditions brood-rearing was retarded and the bees died faster than they could be replaced, so that the colonies dwindled down somewhat during the early spring.

During the spring building-up period, the bees on aluminum combs favoured the wax combs in the shallow supers as only two of the colonies showed brood in the metal combs early in the season. In these two colonies the queens were possibly drawn down by the presence of two wax combs that had by mistake been placed in the lower chambers. Two other colonies did not have brood in the metal combs until July 3, while the fifth colony did not have brood in the lower chamber at any time during the season. The queens in the five check colonies on all wax combs worked quite freely in both chambers but having most of the brood in the lower chamber. They soon out-distanced the colonies on aluminum combs in amount of brood produced. The results are summarized in the following table:—

ALUMINUM VERSUS WAX COMBS

Number of colonies in group	Kind of combs	Average number of combs covered by bees April 22	Average number of combs containing brood, June 5	Average number of combs covered by bees July 3	Average number of combs containing brood July 3	Average crop per colony	
						lb.	oz.
4	All wax	8·0	4·2 in super 4·2 below	10·1	3·2 in super 5·7 below	47	6
5	Wax in super Metal below	8·2	5·6 in super 2·4 below	9·7	5·8 in super 3·0 below	29	8

The chief point to note in the above table is the position of the brood. It will be remembered that all the colonies were furnished with a shallow super of wax combs, as part of the brood-chamber. The combs in these shallow supers were only half the depth of those in the lower part of the brood-chamber. It will be noted that only the colonies on wax combs had at the first count an equal number of combs containing brood in both upper and lower chambers and at the second count more combs below than above. These combs being larger would contain the greatest amount of brood. The colonies with metal combs below, however, had the greatest number of combs containing brood in the upper chamber which contained the smaller combs, hence did not have near the amount of brood as the first group.

HIVES

The comparison between hives of different sizes as brood-chambers was also continued. The hives used were 10-frame Langstroth plus shallow super, 10-frame Jumbo, and modified Dadant.

As in the previous year, these colonies, eight in each type of hive, were wintered outside in four-colony packing cases. All cases were of the same construction and packed with planer shavings, 3 inches on bottom, 4 inches on all four sides, and approximately 6 inches on top. The colonies were packed on September 28 after feeding, so as to get full advantage of fall protection. The apiary was surrounded on all four sides with a good wind-break and the colonies were left in their cases until May 31, the following spring.

At the first examination on May 1 an estimate of the number of combs covered by bees was made and the average for each group was as follows:—

Average number of combs covered in Langstroth hives.. .. ..7.2
Average number of combs covered in Dadant hives.. .. ..6.2
Average number of combs coverel in Jumbo hives.. .. ..5.4

Owing to extremely unfavourable weather during the spring and early summer, the colonies were very slow in building up. This held true of all other colonies in the apiary. No difference was discerned in the rate of brood production in any of the groups. All colonies were examined once every ten days throughout the season to watch for preparations for swarming and to see that every colony had sufficient room for the storage of nectar. No preparations for swarming were made by any of the colonies. The results obtained for the past two years are summarized in the following table:—

COMPARISON OF HIVES—1925

Group	Number of colonies in group	How wintered	Combs covered at first examination	Number of colonies swarmed	Average crop per colony		Combs covered at last examination
					lb.	oz.	
Langstroth	8	Outside	8·0	0	138	0	9·0
Jumbo	8	"	6·9	0	130	4	9·2
Modified Dadant	8	"	6·6	1	106	11	9·7
1926							
Langstroth	8	Outside	7·2	0	49	3	9·4
Jumbo	8	"	5·4	0	39	4	9·2
Modified Dadant	8	"	6·2	0	42	8	9·9

NOTE.—As some of the colonies in large hives did not yield any suprlus, the results of only 5 colonies in each group are given in the table for 1926.

The average yields were much lower in 1926 than in 1925 due to unfavourable weather conditions and the failure of the colonies to build up in time for the main flow. The average yield of the different groups was less variable in 1926 than in 1925, but in both years was in favour of the Langstroth hives plus shallow supers. There is no doubt that a larger hive than the 10-frame Langstroth is needed as a brood-chamber, but whether it is more convenient to use a divisible brood-chamber than a single brood-chamber of large size is debatable.

EXPERIMENT TO DETERMINE FIELD FORCE OF COLONY

This project was started in an attempt to determine the approximate number of field bees there are in a normal colony during the main honey flow. As no special apparatus was available to make an actual count of the number of bees leaving the hive an effort was made to divert the field force of the colony into another hive and arrive at the numbers by successive weighings.

Two tests were made during the month of July as follows: During the evening just prior to the day of the test a normal colony was placed on a finely adjusted set of silk scales. On top of the colony was placed a bee-escape board so that no bees could come up into the super from below, and over this a deep super. The queen of the colony with two frames of brood were raised to this super which was then filled up with drawn comb. Early on the following morning before any bees were flying, the scales with the colony on it were moved to a new location nearby, but with the hive entrance facing in a different direction. The super containing the queen, two frames of brood and empty combs from the top of the colony was now moved back to the old location and a super added so as to resemble the original colony. The weight of the colony on scales was then taken, no bees having yet flown from the colony. As the weather during the day was bright, clear and warm and nectar

coming in, it was now thought that the entire field force as it left the original colony would return to the nucleus on the old location and that the approximate number of this force could be arrived at by again weighing the colony on scales after the field bees had left it—the difference between the two weighings representing the approximate weight of the bees that had left. The second weighing was taken the following morning before flying again commenced. The difference between the two weighings was 6 pounds 10 ounces, which was taken as the weight of the bees that had left the colony on the previous day and returned to the nucleus. As there are approximately 5,000 bees to the pound, the above weight represents a working force of about 33,125 bees. A second test one week later gave a difference of 7 pounds 1 ounce, or a force of 35,312 bees. Two tests made in 1925 by slightly different methods gave a force of 31,250 bees.

As these figures are obtained from weights only and not by actually counting the bees, they can only be taken as representing the approximate field force of the colony. It was impossible to ascertain any loss in weight that might have occurred from evaporation or consumption of stores in the colony on scales

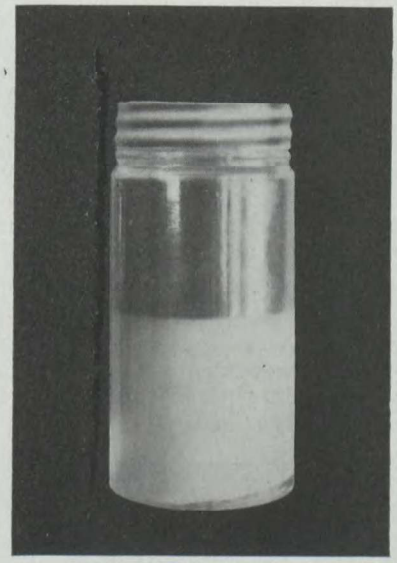

FIG. 4.—Separation of sugars in honey. An undesirable condition.

during the days on which the tests were made. It was thought, however, that this loss would be too small to affect the weight of the field force to any appreciable extent.

INSPECTION OF HONEY

As there is now a considerable amount of Canadian honey being exported to European markets, it is felt that some effort should be made to control as far as possible the quality of the honey intended for this trade, so that no inferior or improperly graded honey should be forwarded to these markets to the detriment of the Canadian product. By far, the greater part of the honey going to overseas markets is handled by the Ontario Honey Producers' Co-operative, Limited, and this company has established certain standards of grading that all its members are asked to follow. The actual grading of the honey, however, has been left in the hands of the producers themselves. It

was felt that such grading was not sufficient to guarantee that only honey of good quality and properly graded would be exported but that an inspection and regrading just prior to shipment was necessary. Consequently, on March 10, 1926, the Government appointed a temporary inspector to inspect all honey that had been forwarded through the above-mentioned company to certain warehouses in St. John, N.B., and Montreal, P.Q., for export. Two months were required to complete this work and during that time 990,000 pounds of honey were inspected, the results of which showed very clearly that such an inspection was justified from the standpoint of maintaining export markets for Canadian honey, as some of the honey had to be regraded and some withheld.

Because of the fact that there is still a considerable amount of last year's honey in these warehouses at St. John and Montreal, which may have deteriorated somewhat through long storage, and also because the crop of 1926 has been added to this, another temporary appointment was made on December 11, 1926, to re-inspect all honey carried over from the previous year and to inspect and re-grade where necessary all of the new crop at St. John, Montreal and Toronto. This work is not yet completed.

This inspection of honey for export trade cannot be considered as Government grading, as there is yet no Government standard of grades set for this purpose; it is, however, a preliminary step to such grading. Samples of honey are being obtained from various points throughout the Dominion for the purpose of ascertaining the range of colour and quality of honeys produced in Canada; and, at the same time, information regarding the type of honey demanded by the various markets is also being sought. When such information is obtained, it is hoped that standard grades and uniform grading rules may be worked out that will be suitable both from the standpoint of the consumer and producer and also be applicable to all Canadian honey.

DISEASES

During the past season, sixty-one samples of dead brood were received for microscopical examination. Of these twenty-two were found to be affected with American foul brood, twenty-eight with European foul brood, and the others showed no disease, the brood having died either from starvation or chilling.

WINTERING

One hundred and thirteen colonies were prepared for the winter of 1925-26. Of these, ninety-two were wintered outside in packing cases and twenty-one in the cellar beneath the Office Building. All colonies were weighed on September 19 and fed immediately. The feeding was done under adverse conditions, the weather being wet and cool. All feeding was finished by September 28 and the colonies weighed again to be sure they had sufficient stores for the winter.

WINTERING OUTSIDE, 1925-26

Of the colonies wintered outside, seventy-six were wintered in 4-colony cases, eight in 2-colony cases and three in single cases. These cases were all packed with planer shavings—3 inches on bottom, 4 inches on all four sides and approximately 6 inches on top. Besides these protected colonies, five others were placed in single cases that provided an air space all around the colonies instead of packing material.

Forty-seven of the colonies were given shallow supers of honey, eight had deep supers while the remaining thirty-seven colonies were fed honey syrup. No sugar was used for the outside colonies.

Cold weather set in early during the fall before feeding and the bees had little or no opportunity for flight. The winter, while not severe, remained fairly steady throughout, so much so that the bees were confined to their hives until

April 20 without the usual flights in February and March. At a preliminary examination on April 22, the colonies appeared to be in fair shape but practically all colonies showed signs of dysentery and during the cold, wet spring after the first examination the bees dwindled rapidly. The dysentery and dwindling were caused by the long confinement to the hives on honey alone which, in turn, caused a lowering of the vitality of the bees, so that they died faster than they could be replaced by young bees.

Three colonies only died outright in the packed hives but many more were seriously weakened. Four out of the five colonies in single cases without packing perished while the fifth was so weakened that it was practically valueless.

Little or no difference could be detected between the colonies fed on honey syrup and those supplied with shallow food-chambers in so far as strength was concerned. Those wintered on honey syrup covered an average of 5.8 combs

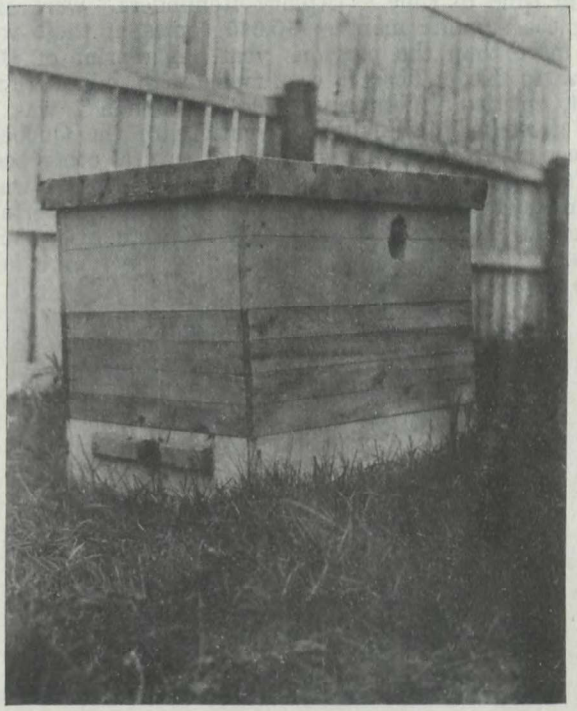

FIG. 5.—Rodents are enemies of bees. The above colony was destroyed by them. Note holes in side of case and between entrance blocks made by rats.

while those with the food-chamber covered an average of 6.1 combs, a difference of only 0.3 combs at the first examination in the spring. Both groups suffered equally from dysentery and spring dwindling.

WINTERING IN CELLAR, 1925-26

The twenty-one colonies wintered in the cellar were well supplied with sugar syrup and during their confinement were very quiet. The cellar temperature was maintained at an even temperature throughout the winter, as near to 45 degrees Fahrenheit as possible. No loss occurred in the cellar and at the

first examination in the spring (May 1) the bees covered an average of 5.4 combs, which was slightly lower than those that wintered on the outside. No dysentery was present in these colonies.

WINTERING, 1926-27

One hundred and sixteen colonies were put away for the winter of 1926-27. Of these, ninety-two are being wintered outside and twenty-four in the cellar. All colonies were in good condition and well supplied with stores when put away for the winter.

EDUCATIONAL

During the year, press articles dealing with different phases of beekeeping were issued from time to time. "Apiary Reminders" were also sent out at intervals during the summer months—15,645 copies of these were distributed, which is 2,212 more than the previous year. A reprint of Bulletin No. 33, "Bees and How to Keep Them" was made with minor revisions. A new bulletin, No. 74, entitled "Wintering Bees in Canada", was also published. Addresses were given at the annual conventions of the Quebec, Ontario and Manitoba Beekeepers' Associations and also at several other beekeepers' meetings and field days in different parts of Canada. Assistance was also given at Short Courses in Quebec, Manitoba, Saskatchewan and Alberta.

The apiaries at the various branch Farms were also visited during the summer and during these visits beekeepers' field days were held and several private apiaries were also visited.

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