

THE UNIVERSITY OF MANITOBA

EFFECTS OF VARIOUS SUGAR AND HONEY TREATMENTS
ON THE FORAGING ACTIVITY OF HONEY BEES

by

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ABSTRACT

During the summers of 1971 and 1972 honey bee colonies were treated with two concentrations of either sugar or honey syrup at two times during the day. Total forager entrance counts, pollen forager entrance counts, and pollen trap collections were used as test criteria to determine if any change in the activity of the bees at the colony entrance occurred following the above treatments. It was concluded that no change in the entrance activity occurred due to these treatments.

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1.0 INTRODUCTION

The foraging activity of a honey bee colony is influenced by many factors, e.g., population, size, environmental factors, attractiveness of crop, and management; each of these is continually changing over time. Many Manitoba beekeepers have reported that when they exchanged freshly extracted honey supers for the ones on a colony, the activity of the bees at the hive entrance increased. They also believe that the foraging activity was increased.

Any method of increasing the foraging activity of a honey bee colony, at a specific time, would be a valuable beekeeping practice. Such a method would allow the beekeeper to stimulate the foraging activity of the honey bee colony in order to increase the pollinating efficiency of that colony or to increase nectar collection at a specific time to better take advantage of a nectar source.

This study was designed to simulate, in as simple a way as possible, the effect of a freshly extracted super through the use of honey and sugar syrups and to determine if treatment with these syrups has any effect upon foraging activity. Entrance counts of total foragers and pollen foragers, as well as pollen trap collections were used to measure foraging activity. In 1971 the effect of late season honey syrup treatments was investigated and in 1972 the effect of honey and sugar syrups was investigated throughout the season.

2.0 LITERATURE REVIEW

2.1 General

The literature contains relatively little information about management practices designed to act as short term "switching" mechanisms which would allow the beekeeper to exert some control over the number of foragers of a colony or the proportion of nectar to pollen foragers in a colony at a given time.

Ribbands (1954) showed that after bees had been trained to a scented sugar syrup feeder the introduction of that scent into the hive stimulated the bees to visit the feeder more often. Later Free (1965A) established that the scent of the stores in a colony stimulates the foragers to search for crops of that scent. It is this principle that scented sugar syrup feeding is based upon.

There are numerous Eastern European and Russian papers, (Antsiferova 1957; Barskii 1956; Blinov 1959; Cumakou, et al. 1959; Kemianowicz 1957; Elagin 1953; Firssov 1951; Gubin et al. 1956; Hansson 1960; Kashkovski 1954; Morozov 1959; Nevkryta 1953; Nikitina 1965; Pritsch 1959; Ragim-Zade 1966; Rakhmankolov 1957; Rhein 1952; 1957; Shemetkov 1957; Skrebtsova 1957; Sovoleva 1952) that deal with the use of scented sugar syrup feedings to stimulate honey bees to forage a particular crop preferentially. These authors all used a similar method to test the effect of scented sugar syrups. They "steeped" the blooms of the target crop in sugar syrup and fed this syrup to the experimental colonies. The

results of these experiments all indicate an increase in foraging activity on the target crop and an increase in seed set on that crop. Some authors (Leuchenko et al. 1954; Valyoshkevich et al. 1958; Voskkestenkaya 1957) have used this method in conjunction with a simultaneous feeding of calcium chloride in which the bloom of a competing crop had been steeped. Success was recorded with this method in each of these cases.

Fragrant oils have also been used to stimulate honey bees. Taranov (1961) sprayed colonies with a fragrant oil and recorded better weight gains in these colonies than in colonies fed scented sugar syrup. Kurennoi and Barabash (1966) used sawdust scented with oils of nutmeg, sage and peppermint to attract foraging honey bees to areas of a vineyard that required pollination.

Only three authors (Blagoveshchenskaya 1955; Free 1965A; 1958; Stapel 1960) were unable to develop successful techniques and so concluded that, at least for increasing pollination, the feeding of scented sugar syrup was of little value.

Free (1965A) established that sugar syrup, sprayed on a target crop, would attract bees to that crop but the honey bees, so attracted, only collected the sugar syrup from the leaves of the crop and fruit set therefore was reduced. Roberts (1956) reported increasing the foraging honey bees on plum from 6 per hour to 300 per hour after one spraying of sugar syrup, followed by a further increase to 500 per hour

after a second spraying of sugar syrup.

Cooper (1959), Crane (1950) and Free (in most of his papers) (1965B, 1965C, 1965D, 1961) agree that the feeding of sugar syrup discourages the collection of nectar and increases the collection of pollen.

2.2 Entrance Activity

Ribbands (1953) stated that the proportion of foragers carrying pollen or nectar loads varies, and largely depends upon the availability of forage and the requirements of the colony. Filmer (1932) showed that the proportion of pollen gatherers increased with increase in the quantity of brood.

The number of bees flying from developing colonies is proportional to colony size (Free, 1960). Lundie (1925) noted that strong colonies tend to fly at somewhat lower temperatures than do weak ones.

3.0 GENERAL METHODS

3.1 Colony Selection

In the springs of 1971 and 1972 apiaries consisting of 26 and 41 colonies, respectively, were established at the University of Manitoba using Langstroth equipment and Starline¹ hybrid bees. Experimental and control colonies were selected for all experiments from these apiaries; prior to this, adult populations and stores of honey and pollen were equalized as far as possible.

3.2 Treatment

All experimental colonies received a similar treatment as follows: after the lid was removed from a colony it was smoked lightly and 100 millilitres of a sugar or honey syrup solution was sprayed into the top super of each experimental colony by means of a compressed air sprayer.² The lids of the control colonies were removed, and after the bees had been smoked lightly the lids were replaced.

All experimental colonies were treated with either a sugar or honey syrup solution of either high or low sugar concentration (see Table 1).

¹ A hybrid line of bees from Weaver Apiaries, Nevasato, Texas.

² A three gallon compressed air sprayer, calibrated to deliver 100 millilitres of sugar or honey syrup solution in 13 seconds, was used in all experiments.

TABLE 1
 Sugar and Honey Syrup Solutions Used in the Experiments
 (1971, 1972)

	Ratio of Sugar or Honey to Water by Volume	% Sugar	Designation
Sugar Syrup (S.S.)	1:1	47.0	High (H)
	1:5	14.5	Low (L)
Honey Syrup (H.S.)	1:1	46.0	High (H)
	1:7	13.5	Low (L)

These treatments, of either sugar syrup or honey syrup, were sprayed into the top super of each experimental colony at one of two different times during the day. In 1971, experimental colonies were treated at either 900 hours or 1200 hours. An analysis of the data showed that it was too early to treat the experimental colonies at 900 hours because there was little bee flight activity at this time. Therefore in 1972, experimental colonies were treated at 1000 hours or 1200 hours. Using this method eight different combinations of treatments and time were tested (see Table II).

TABLE II

Treatment:Time
 Combinations Investigated in Experiments
 (1972)

Syrup Type	Treatment Sugar Concentration	Time When Colonies Were Treated	
		1000 Hours	1200 Hours
Sugar Syrup (S.S.)	47.0% High (H)	SS H ₁₀ *	SS H ₁₂
	14.5% Low (L)	SS L ₁₀	SS L ₁₂
Honey Syrup (H.S.)	46.0% High (H)	HS H ₁₀	HS H ₁₂
	13.5% Low (L)	HS L ₁₀	HS L ₁₂

* Sugar Syrup, High sugar concentration (47.0%), colonies treated at 1000 hours.

3.3 Entrance Counts

Because of the difficulty of monitoring the entrance activity of a honey bee colony some device which would separate incoming bees from the outgoing ones was basic to this study. Wire entrance trap cages were tested and found to be unsatisfactory because incoming honey bees often entered the trap but would not remain there for the entire sampling period. Various devices designed to guide the incoming bees

through a narrow entrance, and yet prevent them from intermingling with the outgoing bees, were tested and modified until the glass-topped entrance device, shown in Figure 1, was developed. This device separated the incoming bees from the outgoing bees at the colony entrance effectively, and funnelled the incoming bees through a narrow port where they could be counted accurately. During the summer of 1971 all experimental and control colonies were fitted with this type of entrance device mounted on a standard "bottom board".³ During the summer of 1972 all experimental and control colonies were also mounted on an O.A.C.⁴ type pollen trap, which had an entrance device similar to that described above mounted at the front; thus all incoming bees were forced to pass through the entrance device first and then the pollen trap in order to enter the hive itself.

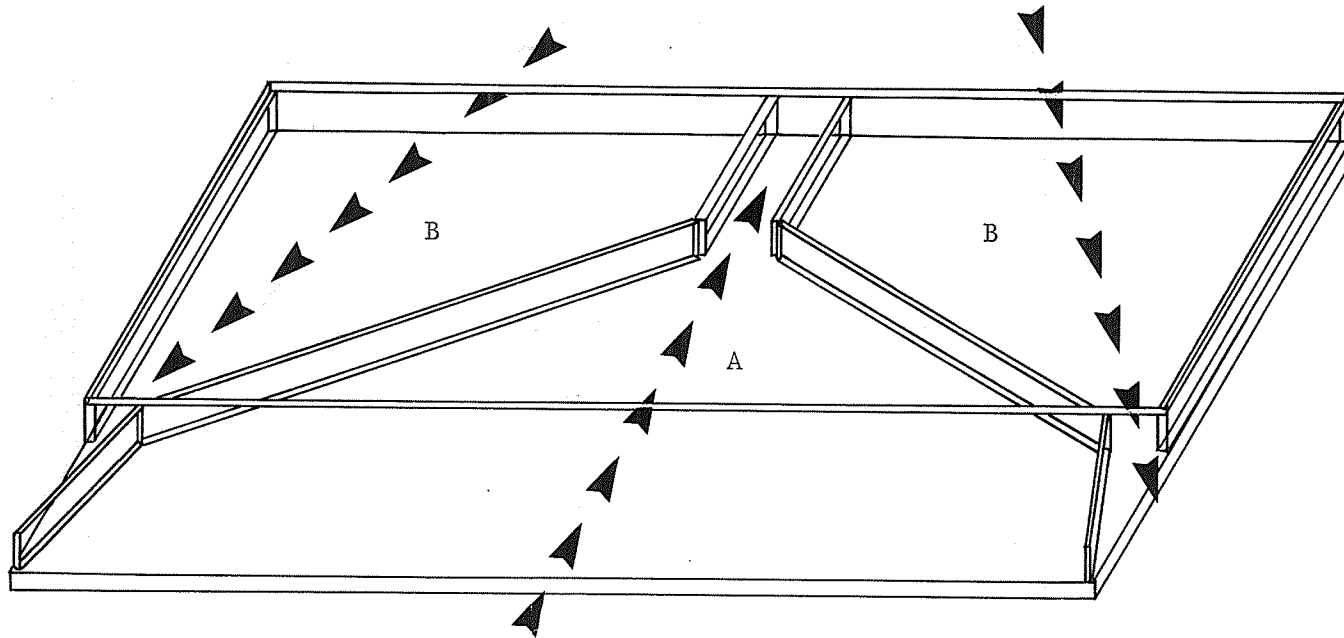
This entrance device allowed one person, using a stop watch and a hand counter, to count the total number of incoming foragers and to separate them from the number of incoming pollen foragers.⁵ These counts were made once each hour throughout each day that experiments were conducted. In 1971 it was possible to make three thirty second counts of

³ A floor with raised edges which acts as a bottom for Langstroth equipment.

⁴ O.A.C. - Ontario Agricultural College.

⁵ Pollen gatherers were distinguished from nectar gatherers by the pollen loads they carried in their "pollen baskets" (corbiculae) located on their third pair of legs.

FIGURE I. Glass Topped Entrance Device.



A. Incoming Honey Bees.

B. Outgoing Honey Bees.

Specifications:

Width: 5 1/2 inches.

Length: 15 1/8 inches.

Height: 7/8 inches.

Materials:

Top: 1/8" Glass.

Funnel and
Sidewalls: 1/8" Plexiglass or
1/4" Plywood.

Bottom: 1/4" Plywood.

incoming bees per colony per hour as well as to make the necessary pollen trap collections (see below). During the summer of 1972, because of the increased numbers of experimental colonies being used, it was necessary to reduce the number of thirty second counts of incoming bees to two per hour per colony.

3.4 Pollen Trap Collections

During the summers of 1971 and 1972 experimental and control colonies were fitted with O.A.C. pollen traps. In 1971 the group of experimental and control colonies fitted with O.A.C. pollen traps was in addition to the group of experimental and control colonies fitted with the entrance device mounted on a standard "bottom board." In 1972 all experimental and control colonies were fitted with both O.A.C. pollen traps and entrance devices.

These pollen traps were used as an additional indicator of foraging activity. When an experiment was being conducted the pollen traps were emptied each hour throughout the day. The pollen from each hive was bagged, labeled and stored for later analysis.

3.5 Analysis of Data

3.5.1 1971

The three thirty second hourly counts, of total incoming honey bees, were meaned for each experimental colony. These hourly means were then totaled to give a group mean total. Each hourly mean was then converted to a proportion of the group mean total. A Chi-square test was

used to determine if there was a significant difference between the hourly proportions of the mean total for each treatment group.

This procedure was also followed for the three thirty second hourly counts of incoming pollen foragers.

The hourly pollen trap collections were weighed and the hourly weights of pollen collected, in grams, were converted to hourly proportions of the group total weight of pollen collected. A Chi-square test was used to determine if there was a significant difference between the hourly proportions, of the total weight of pollen collected, for each treatment group.

3.5.2 1972

The two thirty second hourly counts, of total incoming honey bees, were meaned for each experimental colony. The hourly means were then totaled to give a daily mean total. Each hourly mean was then converted to a proportion of the daily mean total. For each experiment a one way analysis of variance (f test) was used to determine if there was a significant difference between the hourly proportions of the mean total of each treatment group.

If the f test showed a significant difference at the P 0.05 level a Duncan's Test was then used to determine which of the differences between the treatment groups was significant.

This procedure was also followed for the two thirty second hourly counts of incoming pollen foragers.

The hourly pollen trap collections were weighed and the hourly weights of pollen collected, in grams, were converted to hourly proportions of the daily total weight of pollen collected. Analysis of this data was done as described above.

4.0 EXPERIMENTS (1971)

In Manitoba there is a three to four week period in mid-summer when most of the nectar yielding plants bloom. At this time the honey bee colony gathers nectar rapidly and produces a large surplus of honey. This period is called the "honey flow". Previous to this time there are relatively few nectar yielding plants in bloom and so the honey bee colony is collecting only a very small surplus of honey. This is the "pre-flow" period. After the honey flow period there are again relatively few nectar producing plants in bloom and there is relatively little, if any, honey produced. This period is called the "post flow" period.

4.1 Comparisons of Large and Small Colonies

An attempt was made to determine if honey bees of a colony housed in only one Langstroth brood chamber (Small Colony), would forage in the same manner as honey bees housed in two Langstroth brood chambers (Standard Colony). If small colonies were to yield certain data similar to that of standard colonies, less equipment would be required and data collection would be simplified because of the reduced numbers of honey bees per colony.

4.1.1 Experiment I (Honey Flow Period)

On 30 July, 1971, four standard colonies (Group I) and two small colonies (Group II) were selected. From 900 hours to 1600 hours entrance

counts were made as described in Section 4.3. Three standard colonies (Group III) and one small colony (Group IV), mounted on O.A.C. pollen traps, were also selected. From 1000 hours to 1600 hours pollen trap collections were made as described in Section 3.4.

The data were analyzed as outlined in Section 3.5.1.

4.1.1.1 Results of Total Forager Counts. The data are found in Appendix I, Table 1A and Figure IIA. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

4.1.1.2 Results of Pollen Forager Counts. The data are found in Appendix I, Table 1B and Figure IIB. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

4.1.1.3 Results of Pollen Collections. The data are found in Appendix I, Table 1C and Figure IIC. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

4.1.2 Experiment II (Honey Flow Period)

On 5 August, 1971, three standard colonies (Group I) and three small colonies (Group II) were selected. From 1000 hours to 1600 hours, on 5, 6, 9 August, 1971, entrance counts were made as described in Section 3.3.

The data were analyzed as outlined in Section 3.5.1.

4.1.2.1 Results of Total Forager Counts. The data are found in Appendix I, Table 2A and 2B and Figure IIIA. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

4.1.2.2 Results of Pollen Forager Counts. The data are found in Appendix I, Tables 2C and 2D and Figure IIIB. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

4.1.3 Experiment III (Honey Flow Period)

On 19 August, 1971, three standard colonies (Group I) and three small colonies (Group II) fitted with O.A.C. pollen traps were selected. From 1000 hours to 1600 hours, on 19, 20, 23 August, 1971, pollen trap collections were made as described in Section 3.4.

The data were analyzed as outlined in Section 3.5.1.

4.1.3.1 Results of Pollen Collections. The data are found in Appendix I, Table 3A and 3B and Figure IV. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

4.1.4 Experiment IV (Honey Flow Period)

On 19, 20, 23 August, 1971, three standard colonies and three

small colonies were selected. At 900 hours two standard colonies (Group I) and two small colonies (Group II) were treated with a high concentration honey syrup (HS H₉). One standard colony (Group III) and one small colony (Group IV) were designated as control groups.

All treatments were conducted as outlined in Section 3.2

At each hour from 1000 hours to 1500 hours entrance counts were made as described in Section 3.3.

The data were analyzed as outlined in Section 3.5.1.

4.1.4.1 Results of Total Forager Counts. The data are found in Appendix I, Table 4A and 4B and Figure VA and VB. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

4.1.4.2 Results of Pollen Forager Counts. The data are found in Appendix I, Table 4C and 4D and Figure VC and VD. The only significant differences between hourly proportions for the various treatments groups occurred at 1300 hours and 1500 hours ($P < 0.01$). The 1300 hours and 1500 hours proportions for Group IV (C) were significantly different from the 1300 hours and 1500 hours proportions for all other treatment groups (see Table III).

TABLE III

Statistically Different Hourly Proportions for Honey Syrup Treatments

(19, 20, 23 August 1971)

Time ¹	Significantly Different Treatments		P value ²	Chi-square
1300	Group IV	Group I	6.63	12.21
1300	Group IV	Group II	6.63	14.83
1300	Group IV	Group III	6.63	22.35
1500	Group IV	Group I	6.63	14.42
1500	Group IV	Group II	6.63	38.01
1500	Group IV	Group III	6.63	28.06

¹ Time proportions found to differ significantly.

² P value for P = 0.01 and 1 degree of freedom.

4.2 Honey Syrup Experiment (Experiment V Post Flow Period)

On 2 and 7, September 1971, four standard colonies were divided into two groups of two colonies each. At 1200 hours the first group (Group I) was treated with a high concentration Honey Syrup (HS H₁₂), and the second group (Group II) was designated as a control group.

All treatments were conducted as outlined in Section 3.2.

At each hour from 1100 hours to 1500 hours entrance counts were made as described in Section 3.3.

The data were analyzed as outlined in Section 3.5.1.

4.2.1 Results of Total Forager Counts

The data are found in Appendix I, Table 5A and 5B and Figure VIA and VIB. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

4.2.3 Results of Pollen Forager Counts

The data are found in Appendix I, Table 5C and 5D and Figure VIC and VID. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

Discussion and Conclusions

These occur at the end of the 1972 results.

FIGURE II. A Comparison of the Number of Foragers and Pollen Collected by Standard and Small Colonies (30 July 1971, Honey Flow Period).

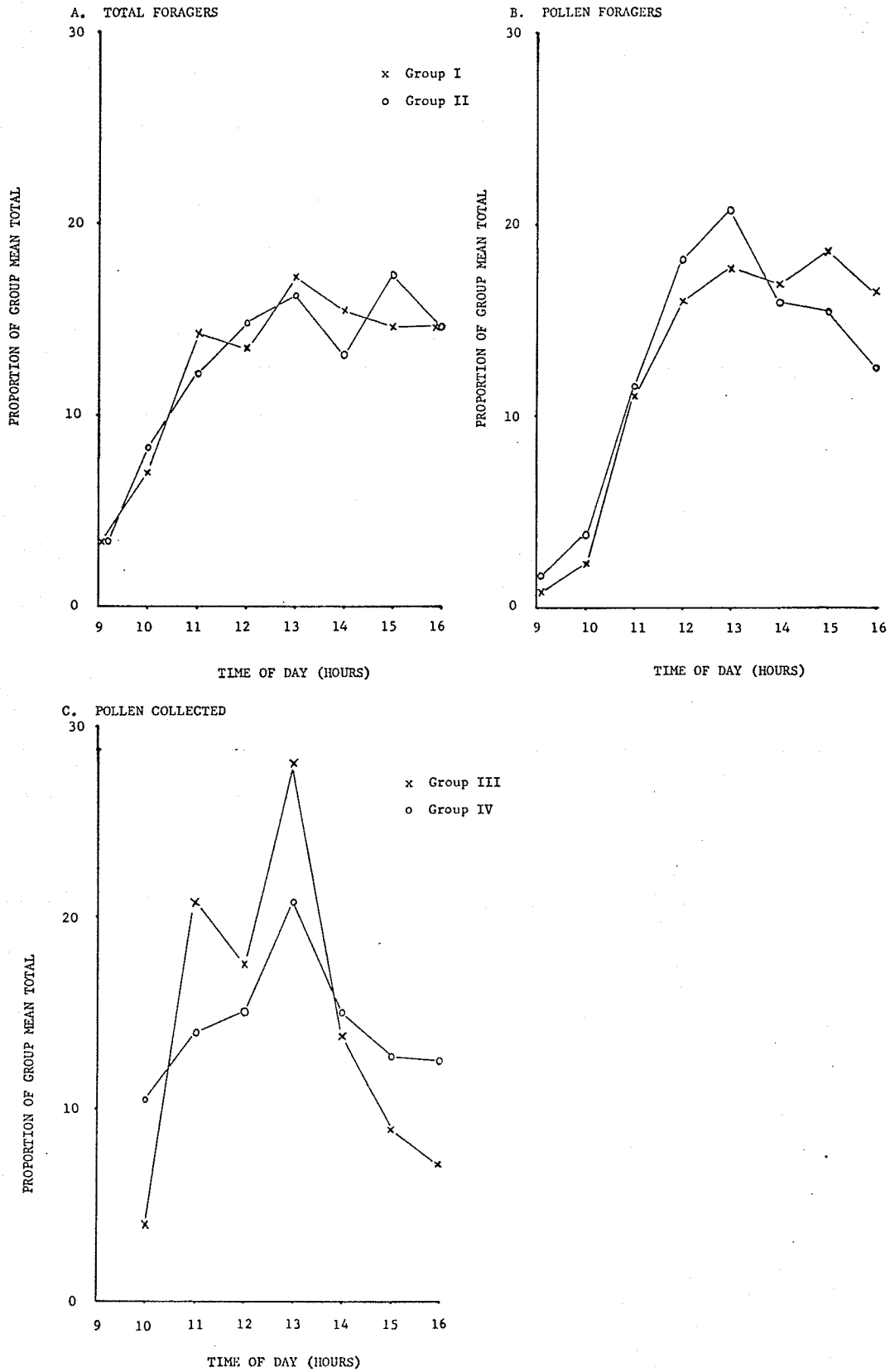


FIGURE III. A Comparison of the Three Day Mean Number of Foragers from Standard and Small Colonies (5, 6, 9 August, 1971, Honey Flow Period).

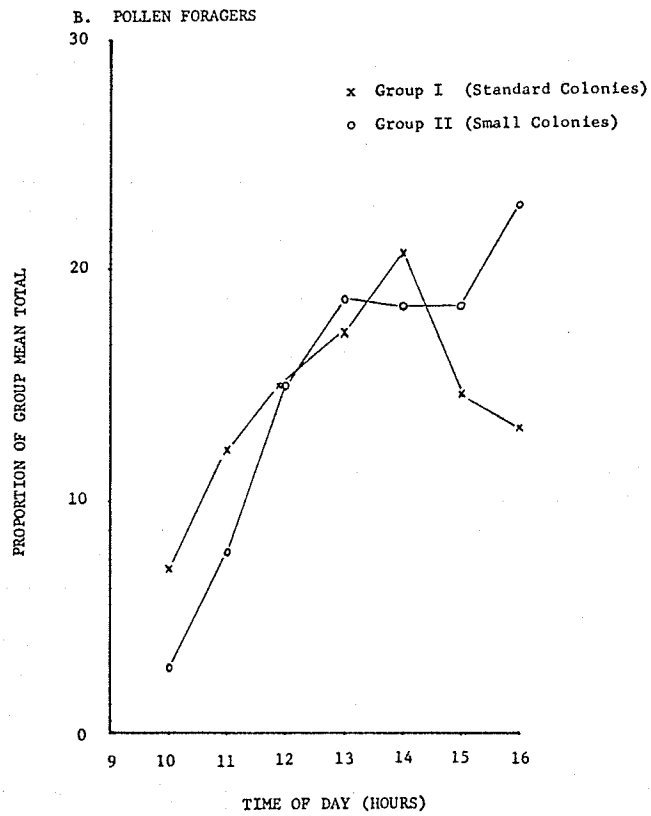
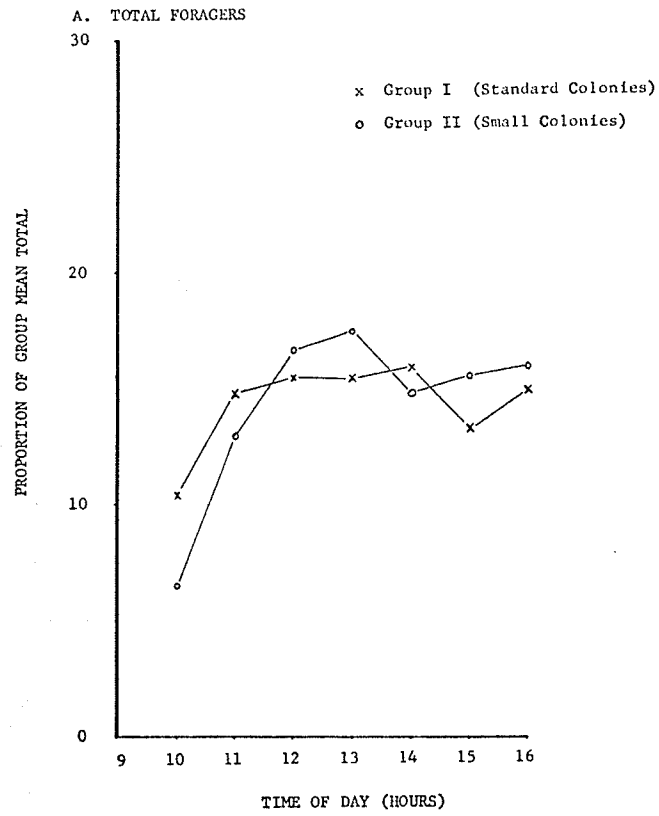


FIGURE IV. A Comparison of the Three Day Mean Weights of Pollen Collected by Standard and Small Colonies (19, 20, 23 August 1971, Honey Flow Period).

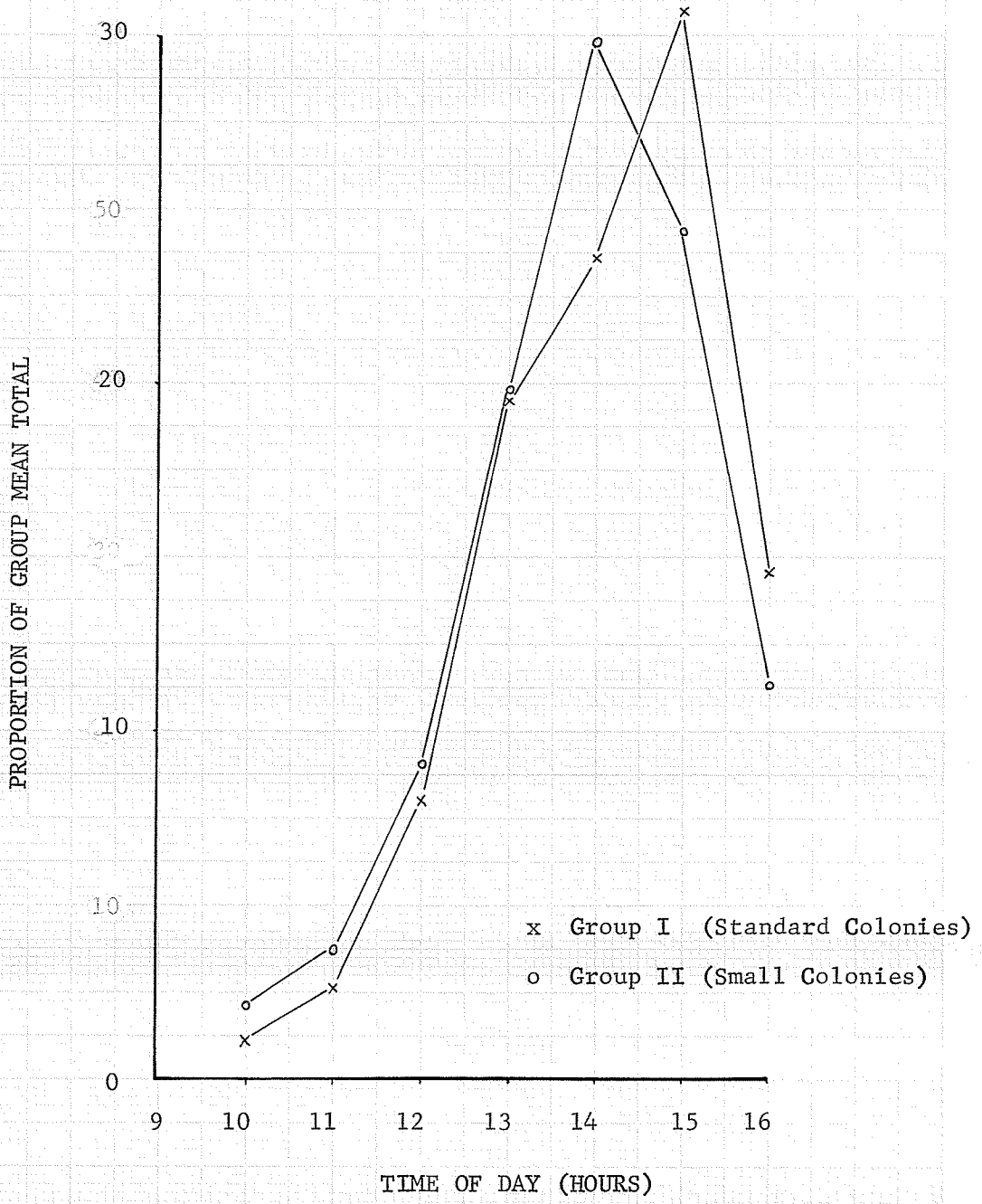
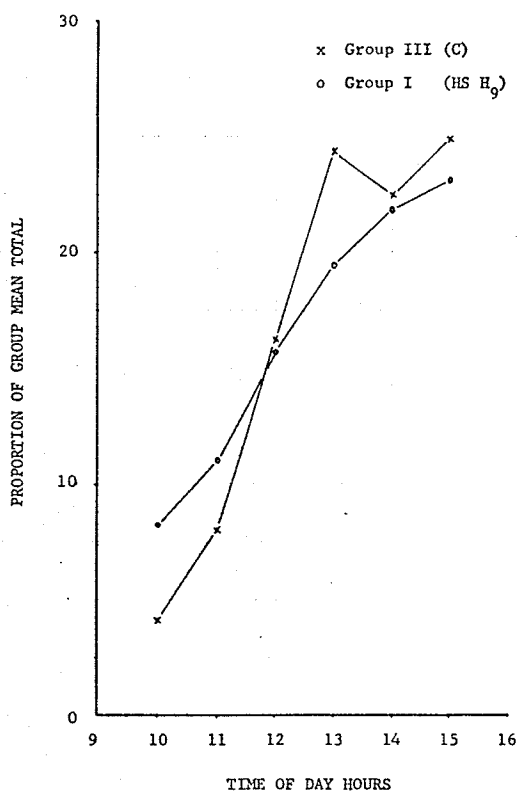
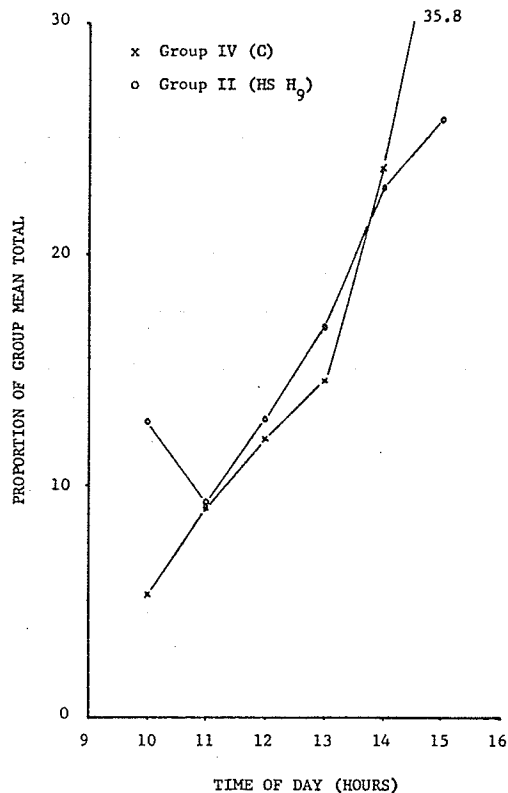


FIGURE V. A Comparison of the Three Day Mean Number of Foragers from Standard and Small Colonies Treated With High Concentration Honey Syrup at 900 Hours (19, 20, 23 August 1971, Honey Flow Period).

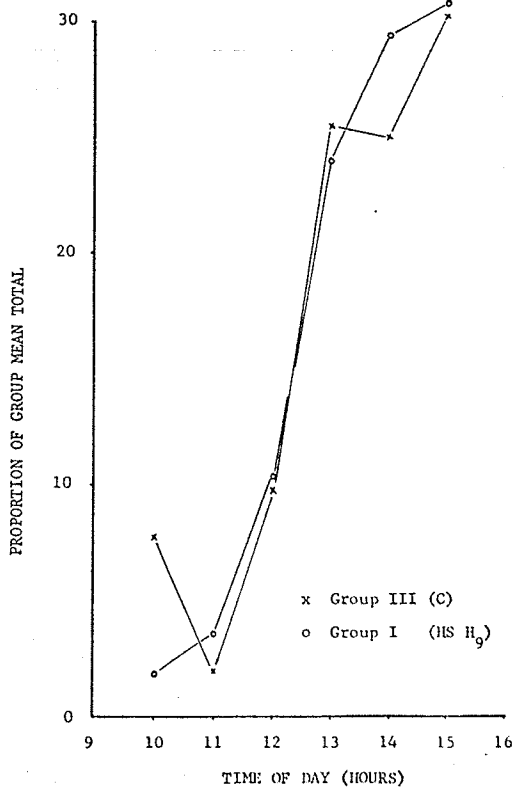
A. TOTAL FORAGERS STANDARD COLONIES



B. TOTAL FORAGERS SMALL COLONIES



C. POLLEN FORAGERS STANDARD COLONIES



D. POLLEN FORAGERS SMALL COLONIES

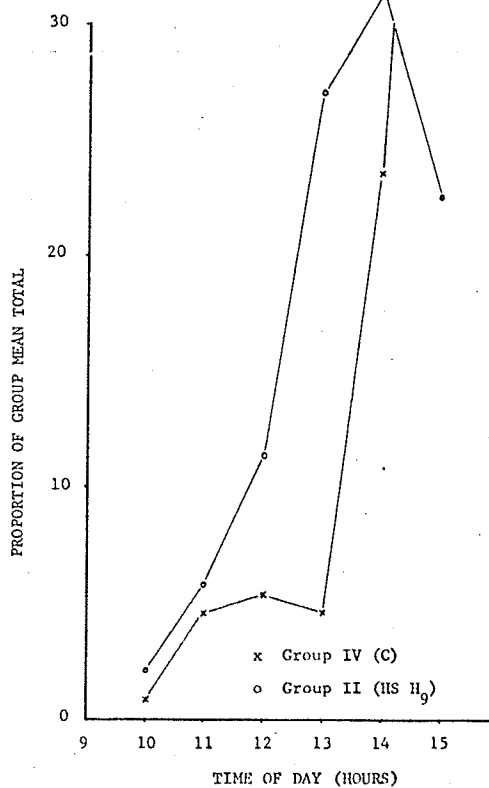
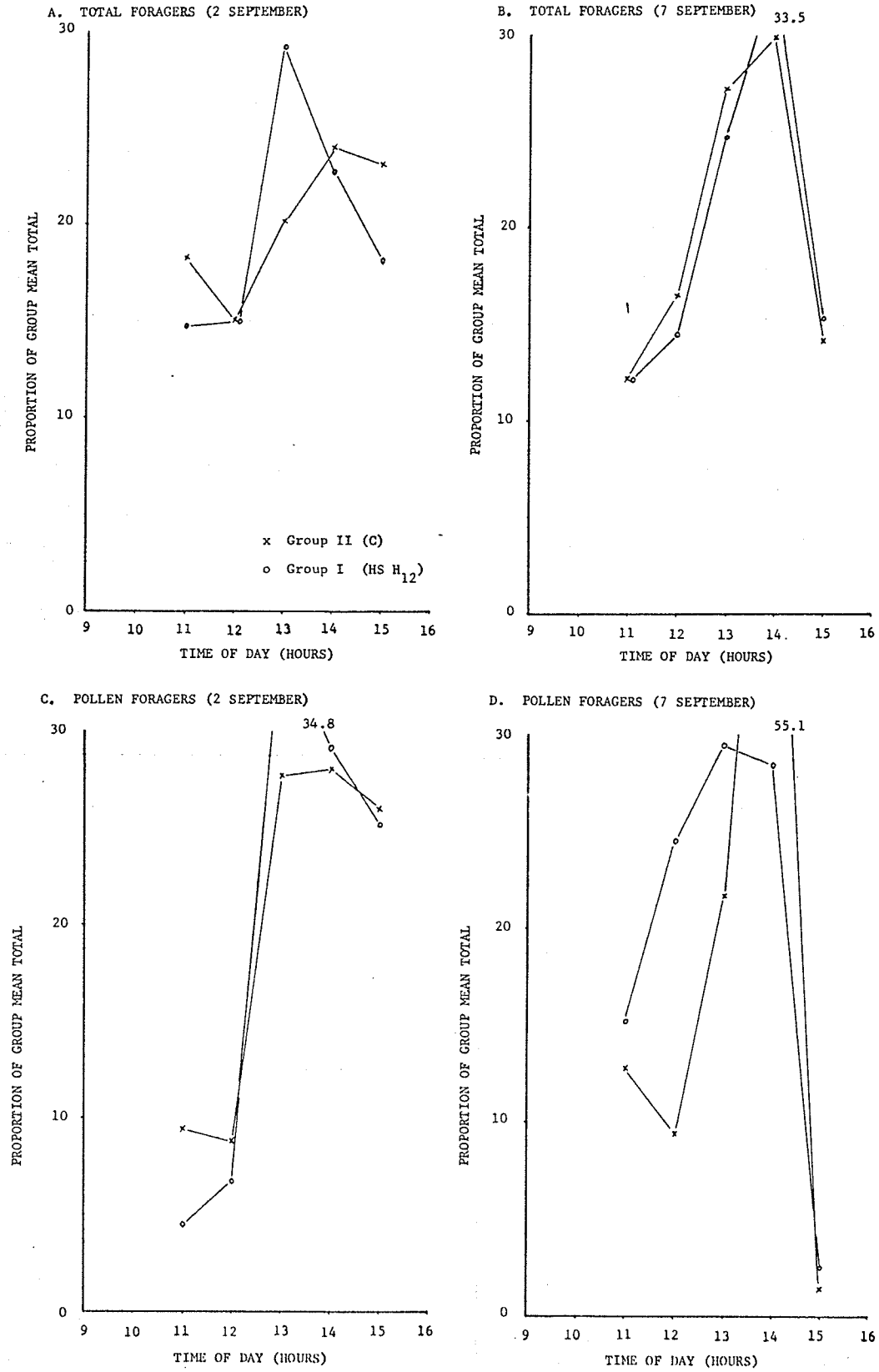


FIGURE VI. A Comparison of the Numbers of Foragers from Standard Colonies Treated with High Concentration Honey Syrup at 1200 Hours (2, 7 September 1971, Post Flow Period).



5.0 EXPERIMENTS 1972

In 1972 experiments were conducted during the three main beekeeping periods the "Prewflow" period, "Honey Flow" period, and the "Post Flow" period (see Section 5.1). During each of these periods sugar and honey syrups of two different concentrations were tested at two different times of the day.

5.1 Prewflow Period

5.1.1 Sugar Syrup Experiment

On 12 July, 1972, fifteen colonies were divided into five groups of three colonies each. At 1000 hours the first group (Group I) was treated with a high concentration sugar syrup (SS H₁₀) and the second group (Group II) was treated with a low concentration sugar syrup (SS L₁₀). The third group (Group III) was designated as a control group. At 1200 hours the fourth group (Group IV) was treated with a high concentration sugar syrup (SS H₁₂) and the fifth group (Group V) was treated with a low concentration sugar syrup (SS L₁₂).

All treatments were conducted as described in Section 3.2.

At each hour from 900 hours until 1600 hours entrance counts were made as described in Section 3.3 and pollen trap collections were made as described in Section 3.4.

The data were analyzed as outlined in Section 3.5.2.

5.1.1.1 Results of Total Forager Counts. The data are found in Appendix II, Table 1A and Figure VIIA. Comparison of the hourly

proportions for each time during the day showed no significant differences between groups.

5.1.1.2 Results of Pollen Forager Counts. The data are found in Appendix II, Table 1B and Figure VII B. The only significant differences between the hourly proportions for the various treatments occurred at 1100 hours ($P < 0.05$). A Duncan's test of the 1100 hour proportions revealed that the hourly proportion for Group II was significantly different from the 1100 hour proportions for all other treatment groups (see Table IV).

TABLE IV

Statistically Different Hourly Proportions for Sugar Syrup Treatments
(12 July, 1972)

Time ¹	Significantly Different Treatments		Difference in Means ²	Least Significant Range ³
1100 hours	H ₁₀	C	4.82	4.51
1100 hours	H ₁₀	L ₁₀	7.72	4.91
1100 hours	H ₁₀	H ₁₂	6.40	4.82
1100 hours	H ₁₀	L ₁₂	6.24	4.72

¹ Time when proportions were found to differ significantly.

² Difference between treatment means.

³ Least significant range ($P < 0.05$) calculated by Duncan's test.

5.1.1.3 Results of Pollen Collections. The data are found in Appendix II, Table 1C and Figure VIC. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

5.1.2 Honey Syrup Experiment

On 17 July, 1972, fifteen colonies were divided into five groups of three colonies each. At 1000 hours the first group (Group I) was treated with a high concentration honey syrup (HS H₁₀) and the second group (Group II) was treated with a low concentration honey syrup (HS L₁₀). The third group (Group III) was designated as a control group. At 1200 hours the fourth group (Group IV) was treated with a high concentration honey syrup (HS H₁₂) and the fifth group (Group V) was treated with a low concentration honey syrup (HS L₁₂).

All treatments were conducted as described in Section 3.2.

At each hour from 900 hours until 1600 hours entrance counts were made, as described in Section 3.3, and pollen trap collections were made as described in Section 3.4.

The data were analyzed as outlined in Section 3.5.2.

5.1.2.1 Results of Total Forager Counts. The data are found in Appendix II, Table 2A, and Figure VIIIA. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

5.1.2.2 Results of Pollen Forager Counts. The data are found in Appendix II, Table 2B, and Figure VIIIB. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

5.1.2.3 Results of Pollen Collections. The data are found in Appendix II, Table 2C and Figure VIIIC. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

5.2 Honey Flow Period

5.2.1 Sugar Syrup Experiment

On 11 August, 1972, fifteen colonies were divided into five groups of three colonies each. At 1000 hours the first group (Group I) was treated with a high concentration sugar syrup (SS H₁₀) and the second group (Group II) was treated with a low concentration sugar syrup (SS L₁₀). The third group (Group III) was designated as a control group (C). At 1200 hours the fourth group (Group IV) was treated with a high concentration sugar syrup (SS H₁₂) and the fifth group (Group V) was treated with a low concentration sugar syrup (SS L₁₂).

All treatments were conducted as described in Section 3.2.

At each hour from 900 hours until 1600 hours entrance counts were made as described in Section 3.3 and pollen trap collections were made as described in Section 3.4.

The data were analyzed as outlined in Section 3.5.2.

5.2.1.1 Results of Total Forager Counts. The data are found in Appendix II, Table 3A and Figure IXA. The only significant differences between the hourly proportions for the various treatments occurred at 1600 hours ($P < 0.05$). A Duncan's test of the 1600 hour proportions showed that the hourly proportions of Group IV ($SS H_{12}$) were significantly different from the 1600 hour proportions of Group II and Group V ($SS L_{12}$), but were not significantly different from the proportions of Group III (C) (see Table V).

TABLE V

Statistically Different Hourly Proportions for Sugar Syrup Treatments

(11, August 1972)

Time ¹	Significantly Different Treatments		Difference in Means ²	Least Significant Range ³
1600 hours	H_{12}	L_{10}	3.43	2.06
1600 hours	H_{12}	L_{12}	2.06	1.98

¹ Time when proportions were found to differ significantly.

² Difference between treatment means.

³ Least significant range ($P < 0.05$) calculated by Duncan's test.

5.2.1.2 Results of Pollen Forager Counts. The data are found in Appendix II, Table 3B and Figure IXB. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

5.2.1.3 Results of Pollen Collections. The data are found in Appendix II, Table 3C and Figure IXC. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

5.2.2 Honey Syrup Experiment

On 12 August, 1972, fifteen colonies were divided into five groups of three colonies each. At 1000 hours the first group (Group I) was treated with a high concentration honey syrup (HS H₁₀) and the second group (Group II) was treated with a low concentration honey syrup (HS L₁₀). The third group (Group III) was designated as a control group. At 1200 hours the fourth group (Group IV) was treated with a high concentration honey syrup (HS H₁₂) and the fifth group (Group V) was treated with a low concentration honey syrup (HS L₁₂).

All treatments were conducted as described in Section 3.2.

At each hour, from 900 hours until 1500 hours, entrance counts were made as described in Section 3.3 and pollen trap collections were made as described in Section 3.4.

The data were analyzed as outlined in Section 3.5.2.

5.2.2.1 Results of Total Forager Counts. The data are found in Appendix II, Table 4A and Figure XA. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

5.2.2.2 Results of Pollen Forager Counts. The data are found in Appendix II, Table 4B and Figure XB. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

5.2.2.3 Results of Pollen Collections. The data are found in Appendix II, Table 4C and Figure XC. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

5.2.3 Two Day Honey Syrup Experiment

This experiment was designed to determine if experimental treatment had any effect upon the foraging activity of a honey bee colony on the day subsequent to treatment.

Heavy cloud cover, which cleared off by 1000 hours prevented the experiment from starting at 900 hours.

On 17 August 1972, the first day of the two day experiment (Day I) nine colonies were divided into three groups of three colonies each. At 1200 hours the first group (Group I) was treated with a high concentration honey syrup (HS H₁₂) and the second group (Group II) was treated

with a low concentration honey syrup (HS L₁₂). The third group (Group III) was designated a control group.

All treatments were conducted as described in Section 3.2.

On 18 August 1972, the second day of the two day experiment (Day II), entrance counts and pollen trap collections were made for each group of colonies from 1100 hours until 1600 hours.

At each hour from 1100 hours until 1600 hours entrance counts were made as described in Section 3.3 and pollen trap collections were made as described in Section 3.4.

The data were analyzed as outlined in Section 3.5.2.

5.2.3.1 Results of Total Forager Counts (Day I). The data are found in Appendix II, Table 5A and Figure XIA. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

5.2.3.2 Results of Pollen Forager Counts (Day I). The data are found in Appendix II, Table 5B and Figure XIB. The only significant differences between the hourly proportions of the various treatments occurred at 1400 hours ($P < 0.05$). A Duncan's test of the 1400 hour proportions showed that the hourly proportions of Group III (HS L₁₂) were significantly different from the 1400 hour proportions for Group I (C) and Group II (HS H₁₂) (see Table VI).

TABLE VI

Statistically Different Hourly Proportions for Honey Syrup Treatments
(17 August 1972)

Time ¹	Significantly Different Treatments		Differences in Means ²	Least Significant Range ³
1400	L ₁₂	C	5.19	3.89
1400	L ₁₂	H ₁₂	5.13	3.78

¹ Time when proportions were found to differ significantly.

² Difference between treatment means.

³ Least Significant Range ($P < 0.05$) calculated by Duncan's test.

5.2.3.3 Results of Pollen Collections (Day I). The data are found in Appendix II, Table 5C and Figure XIC. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

5.2.3.4 Results of Total Forager Counts (Day II). The data are found in Appendix II, Table 6A and Figure XIIA. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

5.2.3.5 Results of Pollen Forager Counts (Day II). The data are found in Appendix II, Table 6B and Figure XIIB. Comparison of the hourly

proportions for each time during the day showed no significant differences between groups.

5.2.3.6 Results of Pollen Collections (Day II). The data are found in Appendix II, Table 6C and Figure XIIC. The only significant differences between the hourly proportions for the various treatments occurred at 1300 hours ($P < 0.05$). A Duncan's test of the 1300 hour proportions showed that the hourly proportions of Group III (C) were significantly different from the 1300 hour proportions of Group I (HS H_{12}) and Group II (HS L_{12}) (see Table VII).

TABLE VII
Statistically Different Hourly Proportions
for Honey Syrup Treatments Day II
(18 August 1972)

Time ¹	Significantly Different Treatments	Difference in Means ²	Least Significant Range ³
1300	C H_{12}	2.32	1.26
1300	C L_{12}	1.54	1.37

¹ Time when proportions were found to differ significantly.

² Difference between treatment means.

³ Least significant range ($P < 0.05$) calculated by Duncan's test.

5.3 Post-flow Period

5.3.1 Sugar Syrup Experiment

On 14 September 1972, fifteen colonies were divided into five groups of three colonies each. At 1000 hours the first group (Group I) was treated with a high concentration sugar syrup (SS H₁₀) and the second group (Group II) was treated with a low concentration sugar syrup (SS L₁₀). The third group (Group III) was designated as a control group (C). At 1200 hours the fourth group (Group IV) was treated with a high concentration sugar syrup (SS H₁₂) and the fifth group (Group V) was treated with a low concentration sugar syrup (SS L₁₂).

All treatments were conducted as described in Section 3.2.

At each hour from 900 hours until 1500 hours entrance counts were made as described in Section 3.3 and pollen trap collections were made from 1100 hours until 1400 hours as described in Section 3.4.

The data were analyzed as outlined in Section 3.5.2.

5.3.1.1 Results of Total Forager Count. The data are found in Appendix II, Table 7A and Figure XIII A. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

5.3.1.2. Results of Pollen Forager Count. The data are found in Appendix II, Table 7B and Figure XIII B. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

5.3.1.3 Results of Pollen Collections. The data are found in Appendix II, Table 7C and Figure XIII C. Comparison of the hourly proportions for each time during the day showed no significant differences between groups.

5.3.2 Honey Syrup Experiment

Unfavourable weather, occurring late in the season, prevented completion of this experiment.

FIGURE VII. A Comparison of the Numbers of Foragers and Pollen Collected by Colonies Treated with Two Different Concentrations of Sugar Syrup at Two Different Times During the Day (12 July 1972, Preflow Period).

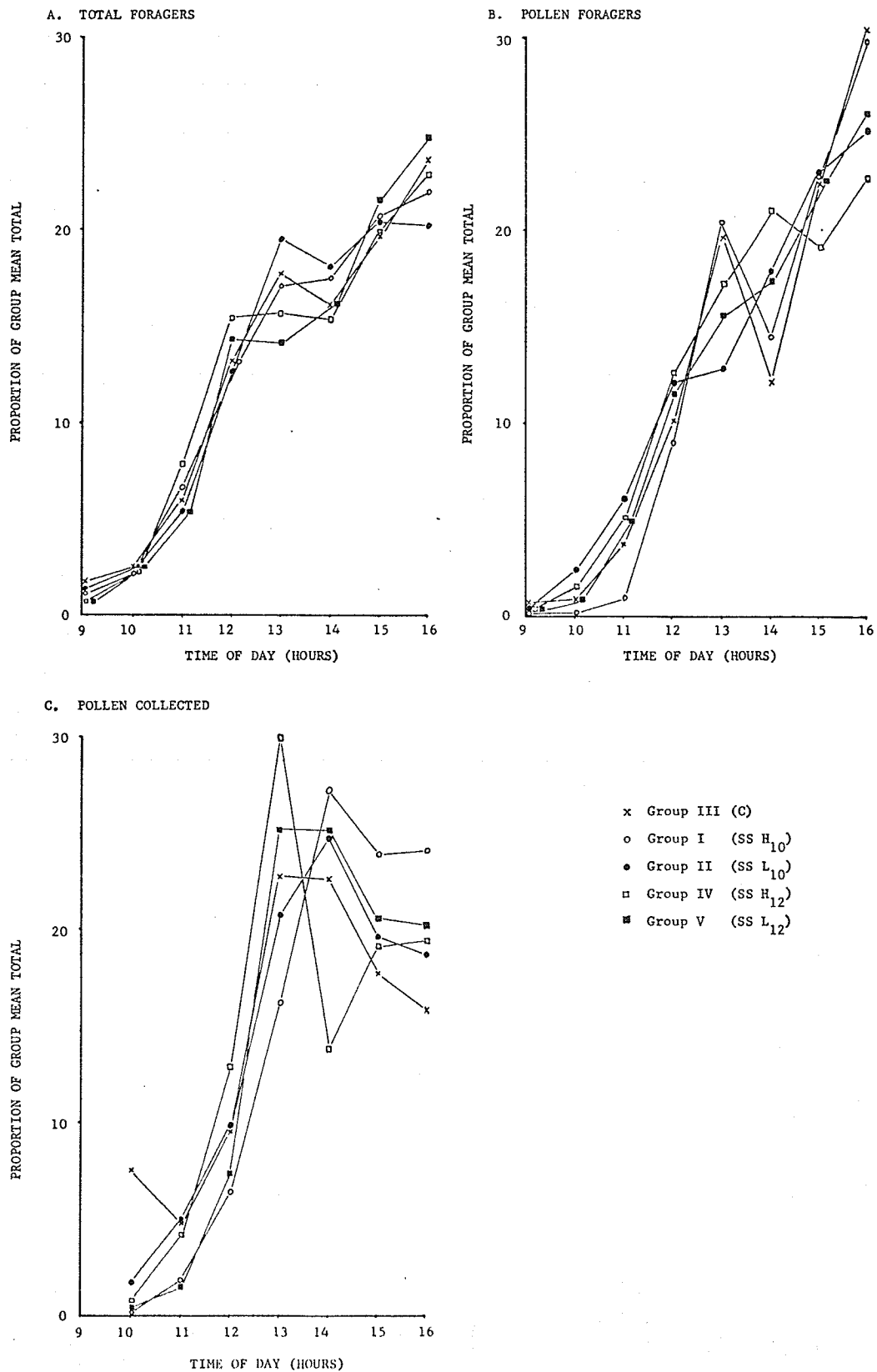


FIGURE VIII. A Comparison of the Number of Foragers and Pollen Collected by Colonies Treated with Two Different Concentrations of Honey Syrup at Two Different Times During the Day (17 July 1972, Preflow Period).

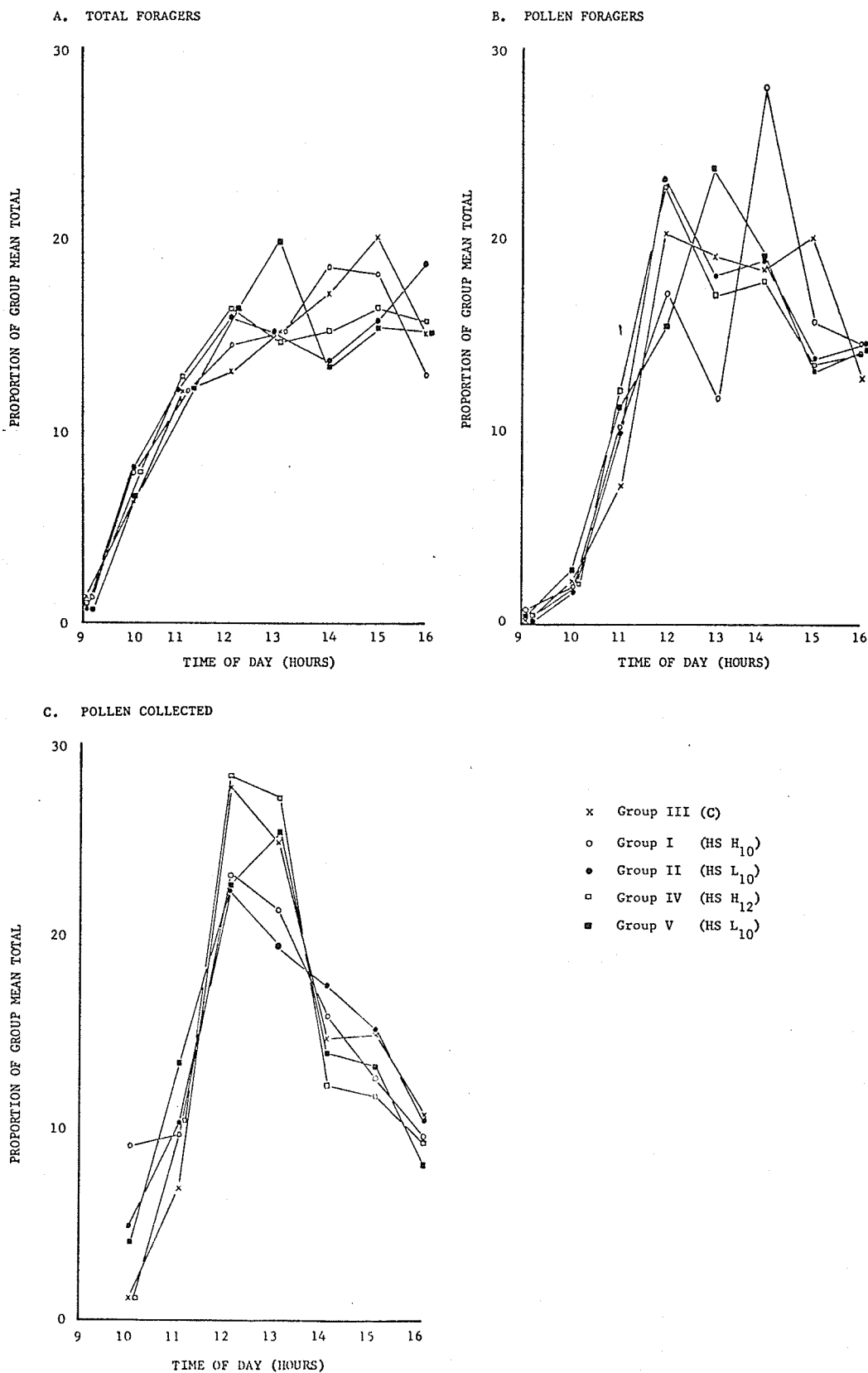


FIGURE IX. A Comparison of the Number of Foragers and Pollen Collected by Colonies Treated with Two Different Concentrations of Sugar Syrup at Two Different Times During the Day (11 August 1972, Honey Flow Period).

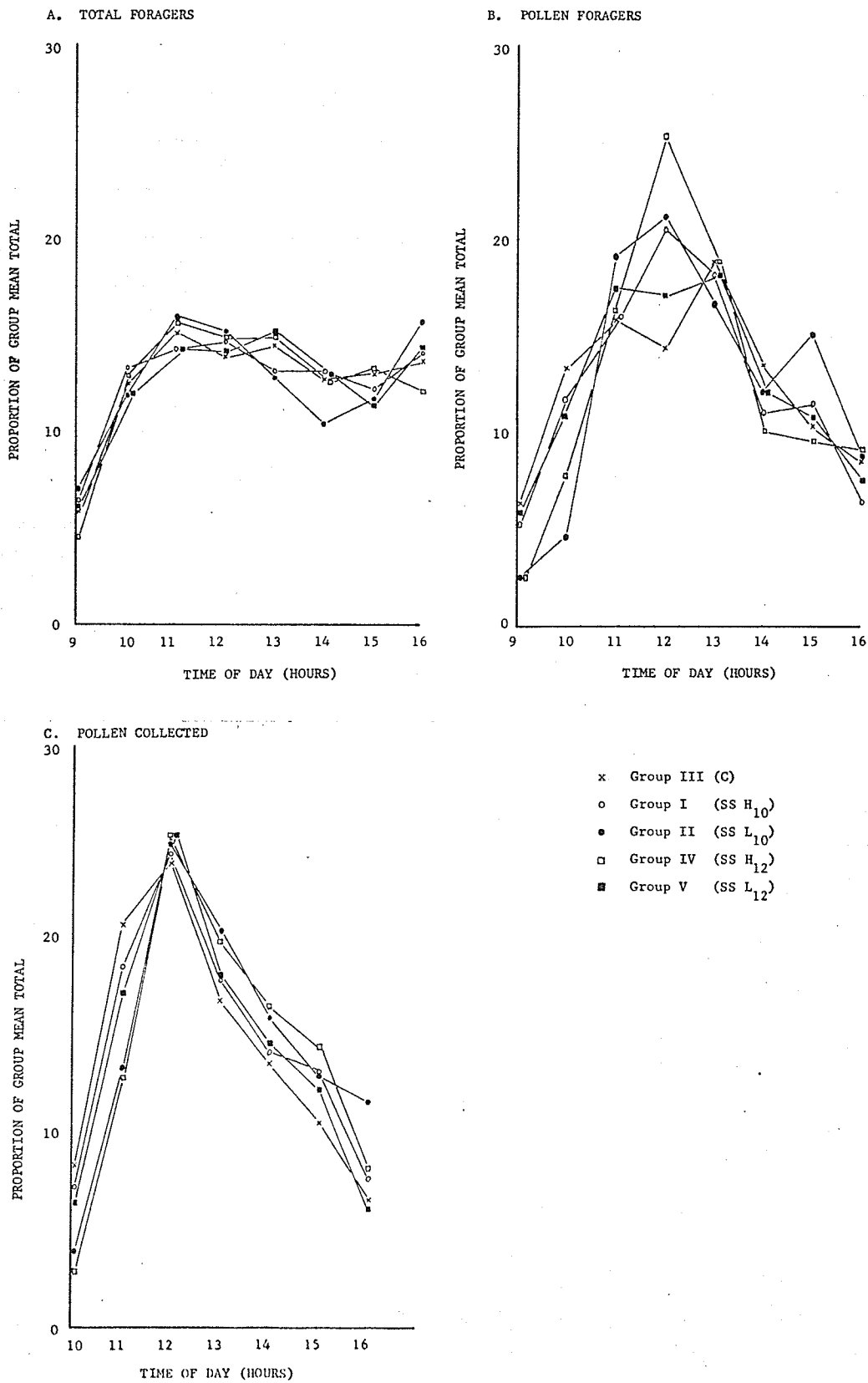


FIGURE X. A Comparison of the Number of Foragers and Pollen Collected by Colonies Treated with Two Different Concentrations of Honey Syrup at Two Different Times During the Day (12 August 1972, Honey Flow Period).

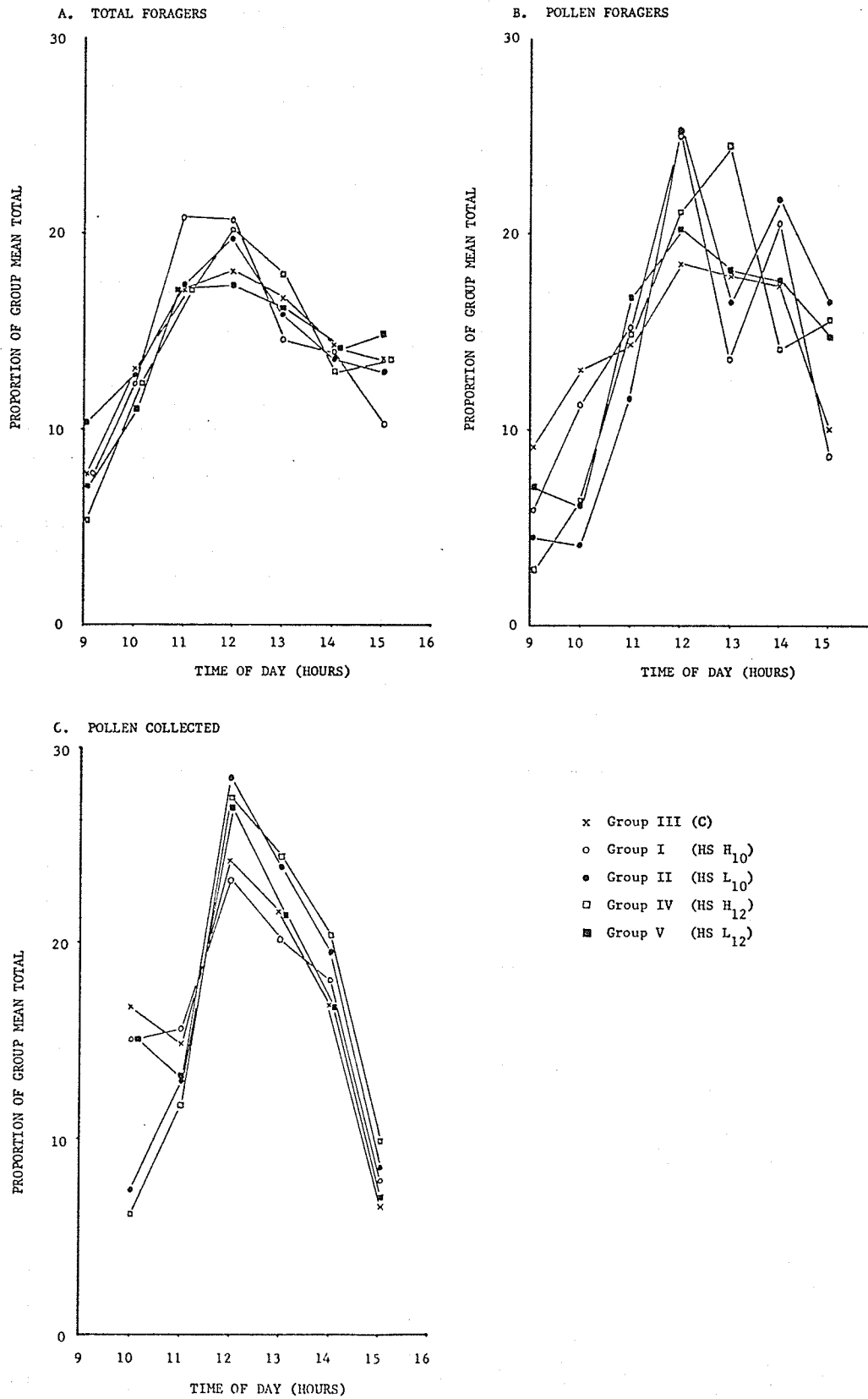


FIGURE XI. A Comparison of the Number of Foragers and Pollen Collected by Colonies Treated with Two Different Concentrations of Honey Syrup at 1200 Hours (17 August 1972, Honey Flow Period).

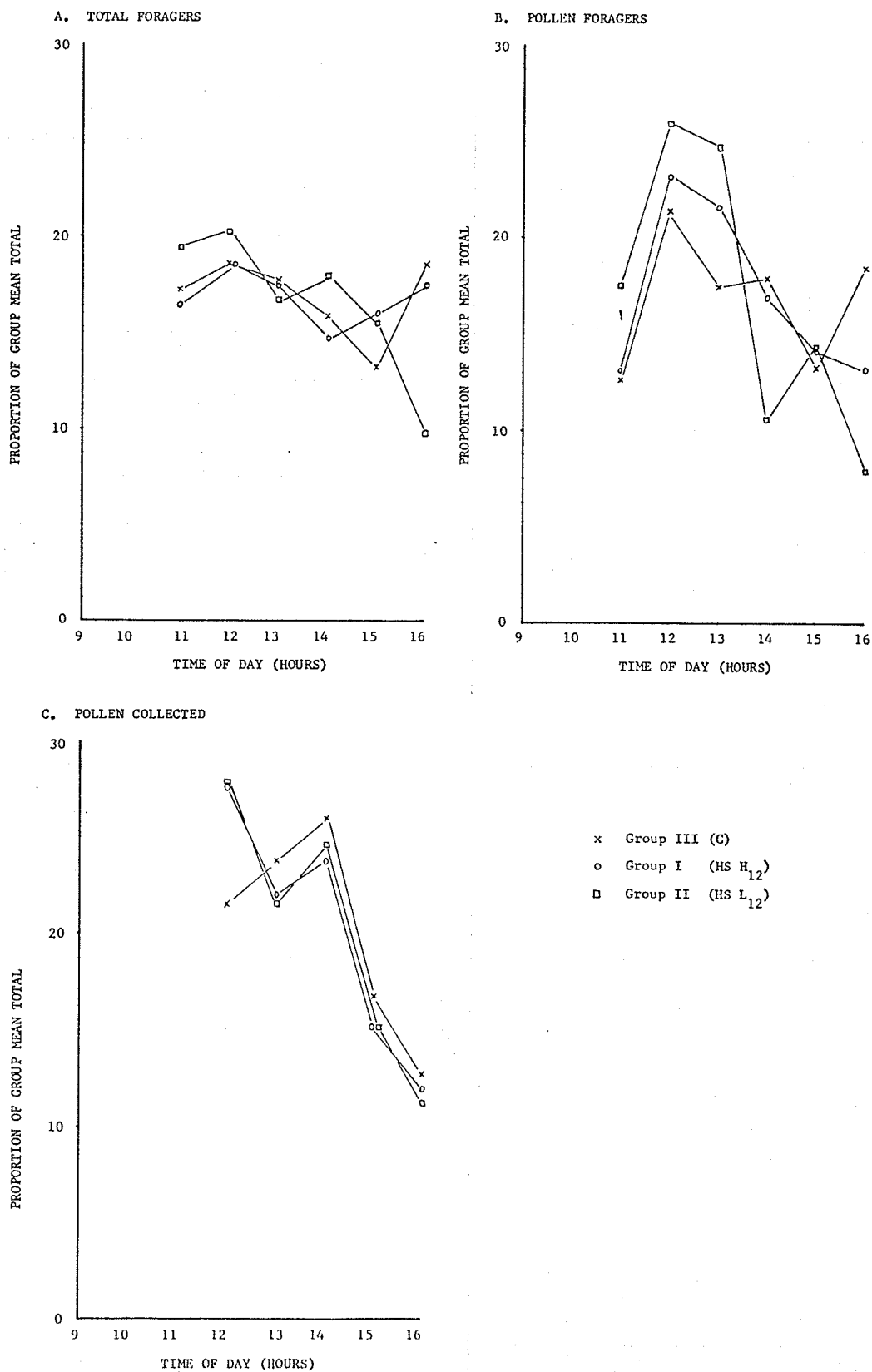


FIGURE XII. A Comparison of the Number of Foragers and Pollen Collected the Day After Colonies were Treated with Two Different Concentrations of Honey Syrup at 1200 Hours (18 August 1972, Honey Flow Period).

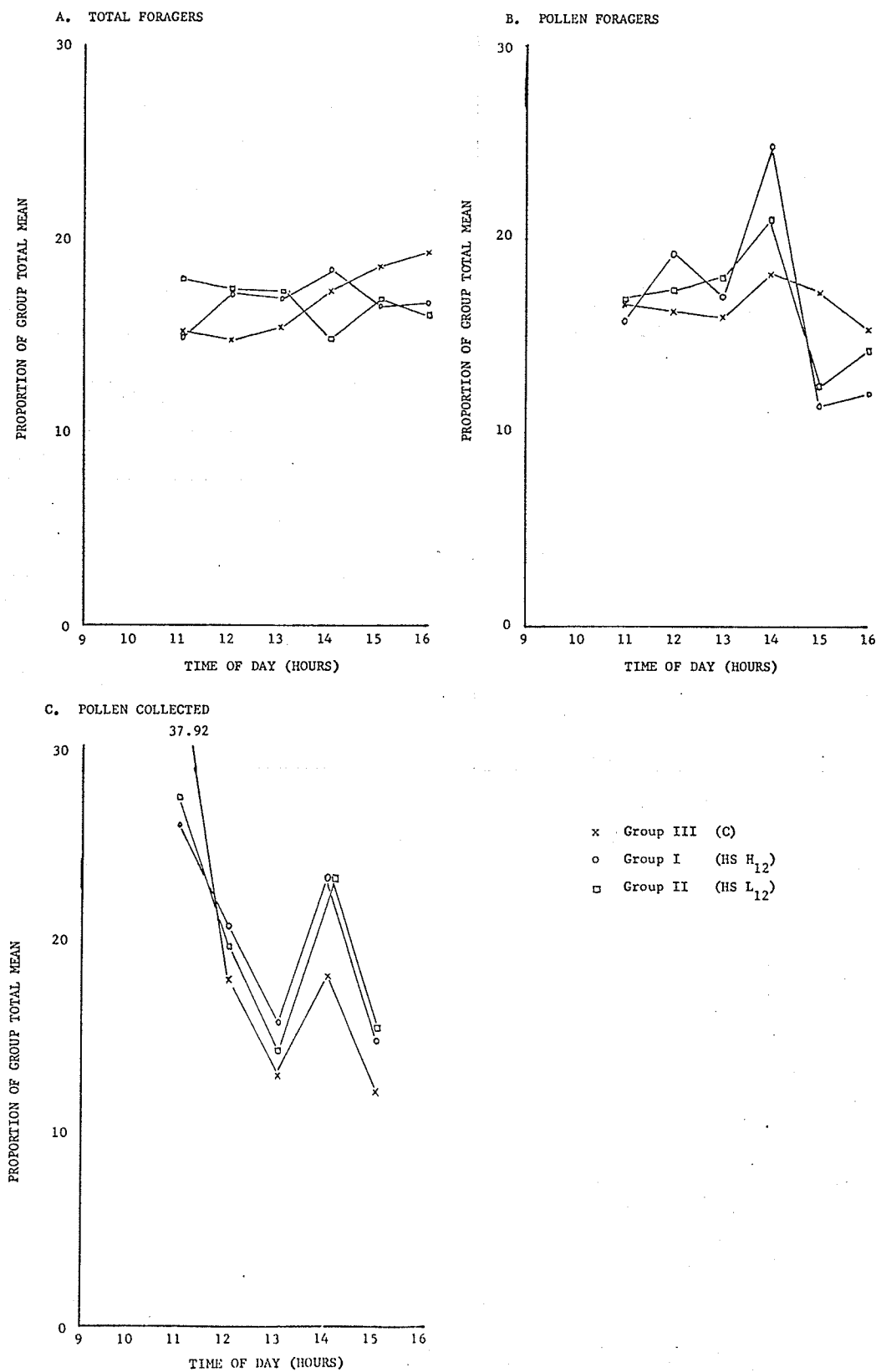
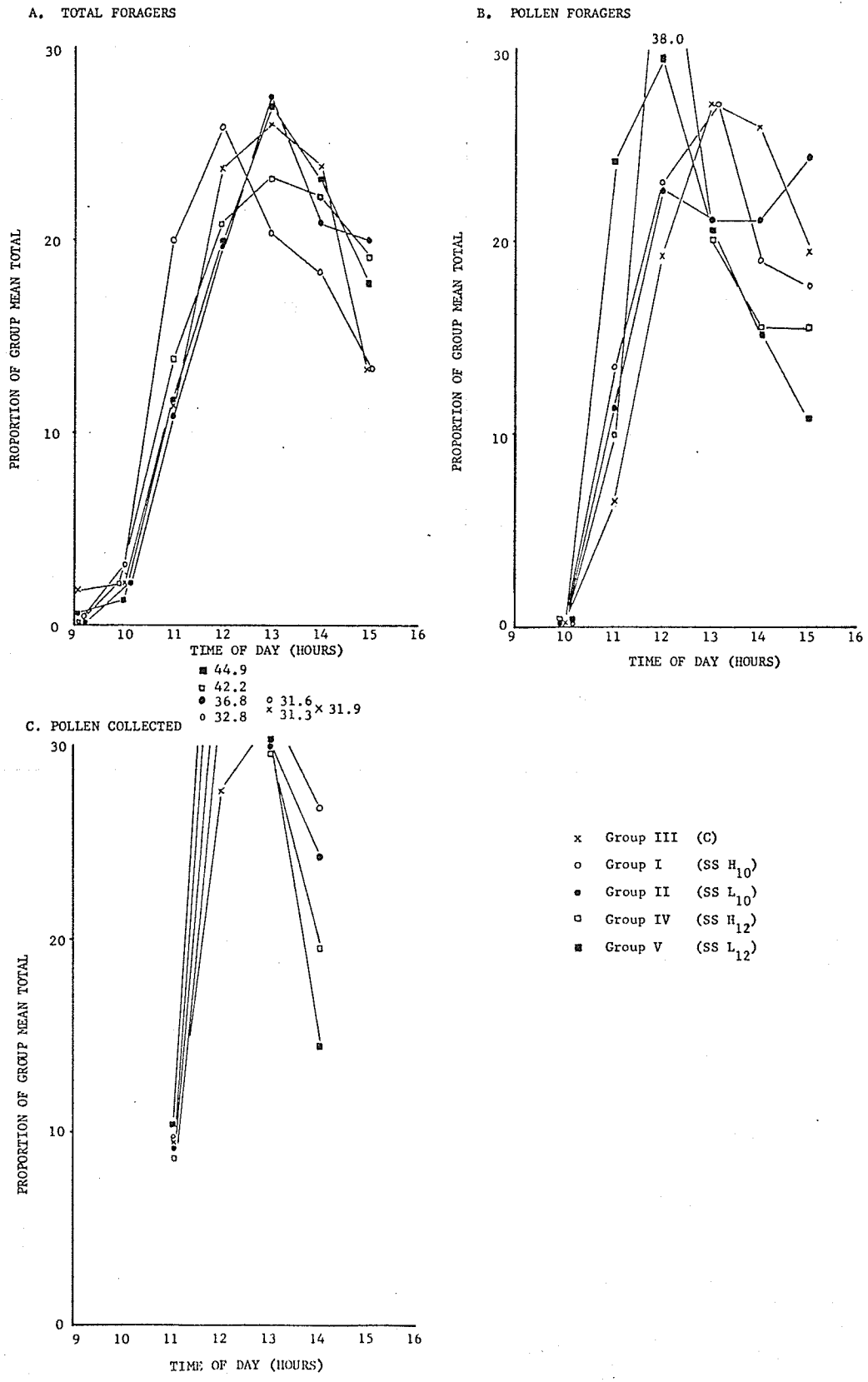


FIGURE XIII. A Comparison of Number of Foragers and Pollen Collected by Colonies Treated with Two Different Concentrations of Sugar Syrup at Two Different Times During the Day (14 September 1972, Post Flow Period).



6.0 DISCUSSION AND CONCLUSIONS

6.1 1971

The results of the pollen forager counts (Section 4.1.4.2) for Experiment IV showed that significant differences occurred between the 1300 and 1500 hours proportions for Group IV and the 1300 and 1500 hours proportions for all other groups. Because the significant differences occurred at only two times and because no corresponding significant differences occurred in the total forager counts (Section 4.1.4.1) these are considered to have occurred by chance.

The experiments (I, II, III, IV), comparing standard and small colonies, showed that the results obtained from both the entrance counts and the pollen collections, were quite similar.

Although the experimental data did not show any significant differences between the standard and small colonies it was decided, at the conclusion of the experiment, that small colonies would not be used in future experiments because too much additional maintenance was required to prevent overcrowding of the small colonies, to prevent swarming, and to allow the queen to continue egg laying at a high rate throughout the summer.

Small colonies could be used very effectively, however, in certain types of experiments such as drifting, division of labor, and pollination experiments where convenience of handling the smaller numbers of bees would outweigh any disadvantages of additional maintenance.

Although Experiment V (Section 2.4) showed no significant differences between control and treatment groups the treatment groups showed peak entrance activity at 1300 hours while the peak entrance activity of the controls occurred at 1400 hours. If this trend could be duplicated and magnified it would provide a very useful beekeeping management practice (see Introduction).

6.2 1972

Regardless of the time of season, or type of experiment, significant differences, between the hourly proportions of the various treatments, never occurred at more than one time during the day and in no case were there corresponding significant differences between the groups when the other test criteria were analyzed. Because of this the significant differences which did occur are considered to have occurred by chance.

When the data for the experiments were graphed there were no distinguishable trends. It must therefore be concluded that the treatment of honey bee colonies with sugar or honey syrups, as described in Section 3.2, has no effect on the foraging activity of the treated colonies.

6.3 General

The purpose of this study was to determine if sugar or honey syrups, used to simulate a wet super, could be used as a practical, quick, and inexpensive artificial method of stimulating the foraging activity of a honey bee colony.

The increased activity of the bees at the hive entrance, which beekeepers have observed, is probably a short term "flurry" of activity following stimulation by the smell and/or taste of honey when the super is restored or a "flurry" of activity due to the physical disturbance of the colony by the beekeeper. It is quite possible that if there is a lasting effect on the foraging activity of a colony, it would have shown up in at least one of the experiments in which artificial techniques were used. Numerous Eastern European and Russian authors (see Section 2.1) used scented sugar syrups while others (Leuchenko et al. 1954, Valyoshkevich et al. 1958, Voskkestenkaya 1957) used scented sugar syrups in conjunction with simultaneous feedings of scented calcium chloride to increase or direct the foraging activity of the treated colonies.

Even when brief shifts in peak foraging activity did occur after treatment (Figure VI A, B, C) the group hourly mean totals (Appendix I, Table 5 A, B, C) were very similar and therefore showed no increase in the total number of bees foraging on those days.

During the "Honey Flow" when beekeepers are extracting honey they often spend a great deal of time and effort in restoring "wet" supers to the hives as quickly as possible. They probably need not spend this time and effort returning these supers, so quickly, if that time and effort could be better spent in other ways.

Finally, this study indicates that a large scale field trial to test the effect of "wet" vs. "dry" supers is not warranted.

7.0 GENERAL SUMMARY

This study was undertaken to ascertain if honey bee colonies could be stimulated to forage by using a simple method of treating the colonies with a sugar or honey syrup.

Chapter 3.0

In 1971 total forager entrance counts, pollen forager entrance counts, and pollen trap collections were used as criteria to compare standard and small colonies. These criteria were also used to compare colonies treated with either a high or a low concentration sugar or honey syrup at one of two different times during the day (1971, 1972).

Chapter 4.0

After analysis of the above data it was decided to use only standard colonies in the experiments. Although the data showed no significant differences between the treated and the control colonies (using total forager entrance counts, pollen forager entrance counts, and pollen trap collections as test criteria) there was a trend towards earlier peaks in foraging activity in those colonies treated at 1200 hours.

Chapter 5.0

Experiments were conducted during the "Preflow", "Honey Flow", and "Post Flow" periods and seldom did statistical differences occur in total forager entrance counts, pollen forager entrance counts and pollen trap collections.

It is concluded that treating honey bee colonies with two different concentrations of sugar or honey syrup at two different times during the day does not significantly affect the foraging activity of the treated colonies.

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A P P E N D I X I

TABLE 1A. TOTAL FORAGER DATA FROM EXPERIMENT I, 30 JULY 1971.

Time of Day	Group I						Group II			
	#1	#2	#3	#4			#5	#6		
	M ¹	M	M	M	GHM ²	GHP ³	M	M	GHM	GHP
9:00	11.6	8.0	33.3	28.3	20.3	3.2	16.3	11.0	13.6	3.3
10:00	40.0	31.3	51.3	56.0	44.7	7.0	43.3	24.0	33.6	8.2
11:00	71.3	89.6	114.1	89.0	91.0	14.2	53.6	48.0	50.8	12.4
12:00	66.6	72.6	112.0	96.6	87.0	13.6	52.6	68.6	60.6	14.8
13:00	111.3	122.0	115.3	91.3	110.0	17.2	73.3	58.0	65.6	16.1
14:00	⁴ 101.3	112.6	84.6	99.5	15.5	60.0	49.3	54.6	13.4	
15:00	⁴ 104.6	⁴ 84.0	94.3	14.7	80.6	60.0	70.3	17.2		
16:00	⁴ 88.0	⁴ 99.6	93.8	14.6	50.0	68.6	59.3	14.5		
TOTAL					640.6	100.0		408.4	99.9	

TABLE 1B. POLLEN FORAGER DATA FROM EXPERIMENT I, 30 July 1971.

Time of Day	Group I						Group II			
	#1	#2	#3	#4			#5	#6		
	M	M	M	M	GHM	GHP	M	M	GHM	GHP
9:00	0.0	1.3	3.0	3.6	2.0	0.9	3.0	0.0	1.5	1.3
10:00	1.0	5.6	5.3	7.0	4.7	2.1	9.3	0.0	4.6	3.9
11:00	12.6	39.6	36.0	9.6	24.7	11.0	20.6	6.6	13.6	11.5
12:00	28.6	30.6	42.0	42.6	35.9	16.0	21.3	21.3	21.3	18.1
13:00	38.0	50.0	52.6	19.3	39.9	17.8	18.6	30.6	24.6	20.9
14:00	⁴ 28.0	48.0	38.0	38.0	16.9	21.3	17.3	19.3	16.4	
15:00	⁴ 52.0	⁴ 32.0	42.0	18.7	14.0	22.0	18.0	15.3		
16:00	⁴ 43.0	⁴ 31.3	37.1	16.5	14.0	16.0	15.0	12.7		
TOTAL					224.3	99.9			117.9	100.1

TABLE 1C. POLLEN COLLECTION DATA FOR EXPERIMENT I, 30 JULY 1971.

Time of Day	Group III						Group IV			
	#1	#2	#3	#4			#5	#6		
	M	M	M	M	GHM	GHP	M	M	GHM	GHP
9:00										
10:00	5.16	3.54	4.91		4.53	4.0	2.72	10.5	2.72	10.5
11:00	18.03	22.63	29.57		23.41	20.7	3.64	14.0	3.64	14.0
12:00	21.37	15.06	24.05		20.16	17.9	3.91	15.0	3.91	15.0
13:00	39.08	23.01	33.19		31.76	28.2	5.37	20.7	5.37	20.7
14:00	18.46	12.03	16.36		15.62	13.9	3.96	15.0	3.96	15.0
15:00	11.11	7.62	10.55		9.76	8.6	3.31	12.7	3.31	12.7
16:00	8.82	6.44	7.66		7.64	6.7	3.11	12.0	3.11	12.0
TOTAL					112.88	100.0	26.02	99.9	26.02	99.9

¹ Mean of three hourly thirty second entrance counts.

² Group hourly mean - mean of hourly colony means.

³ Group hourly proportion - group hourly mean as a proportion of group hourly mean total.

⁴ Bees clustered on entrance making counts impossible.

TABLE 2A. STANDARD COLONY (GROUP I) TOTAL FORAGER DATA FOR EXPERIMENT II, 5, 6, 9 AUGUST, 1971.

Time of Day	August 5					August 6					August 9						
	#1	#2	#3			#1	#2	#3			#1	#2	#3				
	M	M	M	DHM	DHP	M	M	M	DHM	DHP	M	M	M	DHM	DHP	GHM	GHP
9:00																	
10:00	41.3	23.3	26.7	30.4	5.3	58.3	64.3	63.7	62.1	8.8	112.3	108.3	114.3	111.6	17.9	10.7	10.1
11:00	69.3	44.3	113.0	75.5	13.1	96.3	99.3	114.7	103.4	14.7	108.0	111.0	134.0	117.7	18.8	15.5	14.7
12:00	73.7	52.7	111.0	79.1	13.7	107.0	119.0	127.3	117.8	16.7	103.3	121.3	122.3	115.5	18.5	16.3	15.5
13:00	90.7	116.3	116.0	107.7	18.7	87.0	121.3	125.7	111.3	15.8	83.7	118.3	72.7	91.6	14.7	16.4	15.6
14:00	74.0	111.3	90.7	92.0	15.9	93.7	97.3	111.3	100.8	14.3	136.7	91.7	147.7	125.4	20.1	16.8	15.9
15:00	78.7	101.3	112.0	97.3	16.9	87.3	105.3	116.7	103.1	14.6	62.7	64.3	62.3	63.1	10.1	13.9	13.2
16:00	78.3	97.3	111.3	95.6	16.6	86.0	118.0	116.3	106.8	15.1	4	4	4			15.9	15.1
TOTAL				577.6	100.2				705.3	100.0				624.9	100.1	105.5	100.1

TABLE 2B. SMALL COLONY (GROUP II) TOTAL FORAGER DATA FOR EXPERIMENT II, 5, 6, 9 AUGUST 1971.

Time of Day	August 5					August 6					August 9						
	#1	#2	#3			#1	#2	#3			#1	#2	#3				
	M	M	M	DHM	DHP	M	M	M	DHM	DHP	M	M	M	DHM	DHP	GHM	GHP
9:00																	
10:00	7.3	20.3	19.3	15.6	4.3	11.0	16.0	15.0	14.0	3.7	23.0	4	35.3	29.2	12.6	6.9	6.5
11:00	22.3	63.7	69.0	51.7	14.1	20.0	54.3	49.7	41.3	11.0	24.7	38.0	46.0	26.2	15.6	13.6	12.8
12:00	20.7	68.3	84.7	57.9	15.8	30.3	70.7	99.0	66.7	17.8	35.0	49.3	51.3	45.2	19.4	17.7	16.7
13:00	25.7	71.0	80.3	59.0	16.1	41.3	74.3	90.3	68.6	18.3	28.7	67.3	50.3	48.8	21.0	18.5	17.5
14:00	22.7	68.7	75.3	55.6	15.2	38.7	64.0	62.3	55.0	14.6	24.3	48.7	48.7	40.6	17.5	15.8	14.9
15:00	31.3	85.0	104.3	75.5	20.0	36.3	55.3	82.3	58.0	15.4	19.3	38.7	39.7	32.6	14.0	16.5	15.6
16:00	29.3	56.0	75.3	53.5	14.6	49.0	68.3	99.0	72.1	19.2	4	4	4			16.9	16.0
TOTAL				366.8	100.1				375.7	100.0				232.6	100.1	105.9	100.0

TABLE 2C. STANDARD COLONY (GROUP I) POLLEN FORAGER DATA FOR EXPERIMENT II, 5, 6, 9 AUGUST 1971.

Time of Day	August 5					August 6					August 9						
	#1	#2	#3			#1	#2	#3			#1	#2	#3				
	M	M	M	DHM	DHP	M	M	M	DHM	DHP	M	M	M	DHM	DHP	GHM	GHP
9:00																	
10:00	3.0	1.3	4.7	3.0	2.9	4.7	4.7	11.0	6.8	6.4	7.0	7.3	4.3	6.2	11.9	7.1	6.8
11:00	10.3	8.3	20.0	12.9	12.4	7.3	13.3	16.0	12.2	11.5	8.7	5.3	8.7	7.6	14.6	12.8	12.2
12:00	6.6	9.7	13.7	10.0	9.6	8.7	27.0	14.3	16.7	15.8	11.7	13.3	9.0	11.3	21.7	15.7	15.0
13:00	15.7	22.0	21.3	19.7	18.9	13.0	24.3	16.7	18.0	17.0	8.0	14.0	6.0	9.3	17.9	17.9	17.1
14:00	12.0	37.7	16.3	22.0	21.1	12.0	26.0	25.7	21.2	20.0	7.3	7.7	23.3	12.8	24.6	21.9	20.9
15:00	10.0	26.0	19.7	18.6	17.9	16.3	26.3	19.7	20.8	19.7	2.7	2.3	9.3	4.8	9.2	15.6	14.9
16:00	11.3	22.3	20.3	18.0	17.3	8.0	14.0	8.3	10.1	10.0	4	4	4			13.7	13.1
TOTAL				104.2	100.1				105.8	100.4				52.0	99.9	104.7	100.0

TABLE 2D. SMALL COLONY (GROUP II) POLLEN FORAGER DATA FOR EXPERIMENT II, 5, 6, 9 AUGUST 1971.

Time of Day	August 5					August 6					August 9						
	#1	#2	#3			#1	#2	#3			#1	#2	#3				
	M	M	M	DHM	DHP	M	M	M	DHM	DHP	M	M	M	DHM	DHP	GHM	GHP
9:00																	
10:00	0.0	0.0	2.3	0.8	1.1	0.3	0.3	6.7	2.4	3.2	2.0	4	2.3	2.2	9.7	1.8	2.9
11:00	1.7	4.3	12.3	6.1	8.5	1.0	2.7	11.7	5.1	6.8	2.3	1.0	5.3	2.9	12.8	4.7	7.7
12:00	0.7	5.0	24.3	10.0	14.0	4.7	7.0	27.0	12.9	17.1	3.7	3.3	6.7	4.6	20.4	9.2	15.0
13:00	3.0	7.7	30.3	13.7	19.2	6.3	11.0	26.3	14.5	19.3	2.7	7.3	7.7	5.9	26.1	11.4	18.6
14:00	1.3	10.3	24.7	12.1	16.9	4.7	11.0	23.3	13.0	17.3	4.0	4.7	6.7	5.1	22.6	10.1	16.5
15:00	3.0	8.0	27.0	12.7	17.8	3.7	10.0	33.7	15.8	21.0	2.3	1.0	2.3	1.9	8.4	10.1	16.5
16:00	2.3	10.0	36.0	16.1	22.5	2.7	10.0	22.0	11.6	15.4	4	4	4			13.9	22.7
TOTAL				71.5	100.0				75.3	100.1				22.6	100.1	61.2	99.9

ABLE 3A. STANDARD COLONY (GROUP I) POLLEN COLLECTION DATA FOR EXPERIMENT III, 19, 20, 23 AUGUST 1971.

Time of Day	August 19					August 20					August 23						
	#1	#2	#3			#1	#2	#3			#1	#2	#3				
	M	M	M	DHM ⁵	DHP ⁶	M	M	M	DHM	DHP	M	M	M	DHM	DHP	GHM	GHP
9:00																	
10:00	0.80	0.80	1.60	1.06	1.5	0.25	0.20	0.45	0.30	0.5	0.00	1.25	0.55	0.60	1.5	0.65	1.1
11:00	3.85	1.45	2.40	2.56	3.7	1.85	1.00	0.15	1.45	2.2	0.60	0.45	1.30	0.78	2.0	1.60	2.6
12:00	7.65	4.10	3.25	5.00	7.2	14.30	5.35	2.45	7.96	11.9	2.60	1.00	2.12	1.90	4.8	4.95	8.0
13:00	15.65	11.10	8.80	11.85	17.1	30.20	12.75	10.15	17.70	26.4	12.35	3.85	3.25	6.48	16.3	12.01	19.5
14:00	22.80	14.55	13.90	17.08	24.7	30.30	15.45	16.65	20.80	31.0	3.25	7.08	6.88	5.73	14.4	14.54	23.6
15:00	29.45	17.40	19.55	22.13	32.0	26.15	16.15	14.50	18.90	28.2	19.88	12.48	15.08	15.81	39.8	18.95	30.7
16:00	14.95	7.25	6.50	9.56	13.8						9.68	7.18	8.53	8.46	21.3	9.01	14.6
TOTAL				69.24	100.0				67.11	100.2				39.76	100.1	61.71	100.1

ABLE 3B. SMALL COLONY (GROUP II) POLLEN COLLECTION DATA FOR EXPERIMENT III, 19, 20, 23 AUGUST 1971.

Time of Day	August 19					August 20					August 23						
	#1	#2	#3			#1	#2	#3			#1	#2	#3				
	M	M	M	DHM	DHP	M	M	M	DHM	DHP	M	M	M	DHM	DHP	GHM	GHP
9:00																	
10:00	0.30	0.40	0.75	0.48	3.6	0.25	0.15	0.35	0.25	1.4	0.25	0.20	0.55	0.33	1.9	0.35	2.1
11:00	0.65	0.55	1.20	0.80	6.1	0.40	0.40	0.75	0.51	2.9	0.75	0.35	0.55	0.55	3.1	0.62	3.7
12:00	1.05	0.60	1.50	1.05	8.0	2.10	1.20	4.40	2.56	14.4	1.25	0.45	1.20	0.96	5.4	1.52	9.0
13:00	0.80	1.20	2.45	1.48	11.2	4.35	2.65	9.30	5.43	30.5	2.30	0.85	3.05	3.06	17.3	3.32	19.7
14:00	2.65	1.75	5.15	3.18	24.1	4.80	2.40	7.27	4.82	27.1	16.15	0.98	4.23	7.12	40.2	5.04	29.9
15:00	4.15	2.05	6.85	4.35	33.0	3.13	1.95	7.55	4.21	23.7	4.13	1.63	5.38	3.71	21.0	4.09	24.3
16:00	1.85	1.05	2.65	1.85	14.0						2.18	0.87	2.88	1.97	11.1	1.91	11.3
TOTAL				13.19	100.0				17.78	100.0				17.70	100.0	16.85	100.0

Daily hourly mean.

Daily hourly proportion.

TABLE 4A. STANDARD COLONY TOTAL FORAGER DATA FOR EXPERIMENT IV, 19, 20, 23 AUGUST 1971.

Time of Day	GROUP III (C)					GROUP I (HS H ₉)							
	19	20	23			Aug. 19		Aug. 20		Aug. 23			
	#1					#2	#3	#2	#3	#2	#3		
	M	M	M	GHM	GHP	M	M	M	M	M	M	GHM	GHP
9:00													
10:00	29.7	9.3	3.7	14.2	4.1	43.3	44.7	27.0	33.7	12.0	12.0	28.8	8.2
11:00	19.7	48.7	14.0	27.5	8.0	47.7	66.7	33.0	44.3	15.7	26.0	38.9	11.0
12:00	77.0	60.0	30.0	55.7	16.2	70.7	65.0	54.7	74.3	34.0	53.7	58.7	16.6
13:00	92.7	113.7	43.7	83.4	24.3	74.3	52.7	108.7	78.7	46.0	50.7	68.5	19.4
14:00	77.0	86.7	68.7	77.5	22.5	80.3	92.0	92.7	75.3	65.3	54.7	76.7	21.7
15:00	106.3	93.3	57.3	85.6	24.9	98.0	98.0	78.3	83.0	69.0	63.3	81.6	23.1
16:00													
				343.9	100.0							353.2	100.0

TABLE 4B. SMALL COLONY TOTAL FORAGER DATA FOR EXPERIMENT IV, 19, 20, 23 AUGUST 1971.

Time of Day	GROUP IV (C)					GROUP II (HS H ₉)							
	19	20	23			Aug. 19		Aug. 20		Aug. 21			
	#1					#2	#3	#2	#3	#2	#3		
	M	M	M	GHM	GHP	M	M	M	M	M	M	GHM	GHP
9:00													
10:00	12.7	3.7	1.3	5.9	5.3	20.3	18.7	14.7	20.0	7.3	16.7	16.3	12.7
11:00	15.3	8.7	6.3	10.1	9.0	18.7	11.7	11.7	18.3	7.0	2.3	11.6	9.1
12:00	12.0	16.7	11.3	13.3	12.0	15.0	11.7	12.0	38.0	17.0	5.0	16.5	12.9
13:00	14.3	21.0	13.3	16.2	14.5	17.3	20.7	24.0	47.7	30.3	13.3	21.6	16.9
14:00	35.3	27.0	17.0	26.4	23.6	17.7	33.0	33.7	47.7	30.0	13.0	29.2	22.8
15:00	45.3	53.7	21.0	40.0	35.8	23.0	45.3	36.7	34.7	43.3	14.3	32.9	25.7
16:00													
				111.9	100.2							128.1	100.1

TABLE 4C. STANDARD COLONY POLLEN FORAGER DATA FOR EXPERIMENT IV, 19, 20, 23 AUGUST 1971.

Time of Day	GROUP I (C)					GROUP II (HS H ₉)							
	19	20	23			Aug. 19		Aug. 20		Aug. 23			
	#1					#2	#3	#2	#3	#2	#3		
	M	M	M	GHM	GHP	M	M	M	M	M	M	GHM	GHP
9:00													
10:00	0.3	0.7	0.3	4.3	7.7	1.3	2.3	0.7	0.3	0.3	0.7	0.9	1.9
11:00	1.7	0.7	1.0	1.1	2.0	1.7	4.3	2.0	1.3	0.3	0.3	1.7	3.6
12:00	4.7	7.7	3.7	5.4	9.7	5.3	6.3	7.0	7.3	2.0	1.3	4.9	10.4
13:00	11.0	23.7	8.0	14.2	25.4	8.0	6.0	28.0	16.3	3.0	6.7	11.3	24.0
14:00	15.7	14.7	11.7	14.0	25.0	12.3	9.7	25.0	19.3	9.3	7.3	13.8	29.3
15:00	22.7	18.7	9.3	16.9	30.2	22.0	13.3	14.0	14.5	13.7	9.3	14.5	30.8
16:00													
				55.9	100.0							47.1	100.0

TABLE 4D. SMALL COLONY POLLEN FORAGER DATA FOR EXPERIMENT IV, 19, 20, 23 AUGUST 1971.

Time of Day	GROUP I (C)					GROUP II (HS H ₉)							
	19	20	23			Aug. 19		Aug. 20		Aug. 23			
	#1					#2	#3	#2	#3	#2	#3		
	M	M	M	GHM	GHP	M	M	M	M	M	M	GHM	GHP
9:00													
10:00	0.3	0.0	0.0	0.1	0.8	1.0	1.3	0.3	0.7	0.0	0.0	0.6	2.1
11:00	1.3	0.3	0.3	0.6	4.6	1.7	2.0	2.0	3.7	0.7	0.3	1.7	5.8
12:00	0.7	0.7	0.7	0.7	5.3	3.0	3.3	3.0	8.3	1.0	1.3	3.3	11.3
13:00	0.3	1.3	0.3	0.6	4.6	3.0	6.0	7.3	20.0	6.3	4.7	7.9	27.0
14:00	5.3	3.0	1.0	3.1	23.7	6.0	11.0	4.3	18.3	5.3	10.3	9.2	31.4
15:00	3.7	18.3	2.0	8.0	61.1	4.3	12.0	4.3	3.3	4.7	11.0	6.6	22.5
16:00													
				13.1	100.1							29.3	100.1

TABLE 5A. TOTAL FORAGER DATA FOR EXPERIMENT V, 2 SEPTEMBER 1971.

Time of Day	GROUP I (C)				GROUP II (HS H ₁₂)			
	#1	#2			#3	#4		
	M ¹	M	GHM ²	GHP ³	M	M	GHM	GHP
11:00	57.3	36.3	46.8	18.3	42.0	34.0	38.0	14.7
12:00	⁴	38.6	38.6	15.1	41.3	36.0	38.7	15.0
13:00	51.3	52.3	51.8	20.2	94.6	57.0	75.8	29.3
14:00	59.6	63.3	61.5	24.0	74.6	43.3	59.0	22.8
15:00	63.3	55.3	59.3	23.2	56.3	38.3	48.3	18.3
TOTALS			256.2	100.8			258.8	100.1

TABLE 5B. TOTAL FORAGER DATA FOR EXPERIMENT V, 7 SEPTEMBER 1971.

Time of Day	GROUP I (C)				GROUP II (HS H ₁₂)			
	#1	#2			#3	#4		
	M	M	GHM	GHP	M	M	GHM	GHP
11:00	29.0	26.3	27.2	12.2	24.0	28.0	26.0	12.1
12:00	47.3	27.0	37.2	16.4	26.6	35.6	31.1	14.4
13:00	40.0	84.0	62.0	27.3	48.3	58.0	53.2	24.7
14:00	87.0	49.0	68.0	29.9	95.0	49.3	72.2	33.5
15:00	42.0	22.3	32.2	14.2	26.0	40.0	33.0	15.3
TOTALS			227.1	100.0			215.5	100.0

TABLE 5C. POLLEN FORAGER DATA FOR EXPERIMENT V, 2 SEPTEMBER 1971.

Time of Day	GROUP I				GROUP II			
	#1	#2			#3	#4		
	M	M	GHM	GHP	M	M	GHM	GHP
11:00	4.0	1.6	2.8	9.5	2.0	0.3	1.2	4.5
12:00	4	2.6	2.6	8.8	2.3	1.3	1.8	6.7
13:00	7.0	9.3	8.2	27.7	11.6	7.0	9.3	34.8
14:00	8.6	8.0	8.3	28.0	7.6	7.8	7.7	28.8
15:00	9.3	6.0	7.7	26.0	10.0	3.3	6.7	25.1
TOTALS			29.6	100.0			26.7	99.9

TABLE 5D. POLLEN FORAGER DATA FOR EXPERIMENT VI, 7 SEPTEMBER 1971.

Time of Day	GROUP I (C)				GROUP II (HS H ₁₂)			
	#1	#2			#3	#4		
	M	M	GHM	GHP	M	M	GHM	GHP
11:00	6.6	3.3	5.0	12.7	4.0	5.6	4.8	15.2
12:00	5.0	2.3	3.7	9.4	4.0	11.3	7.7	24.4
13:00	11.0	6.0	8.5	21.6	9.0	9.6	9.3	29.4
14:00	24.3	19.0	21.7	55.1	14.0	4.0	9.0	28.5
15:00	0.3	0.6	0.5	1.3	1.6	0.0	0.8	2.5
TOTALS			39.4	100.1			31.6	100.0

A P P E N D I X I I

TABLE 1A. TOTAL FORAGER DATA FROM PREFLOW SUGAR SYRUP EXPERIMENT, 12 JULY 1972.

Time of Day	GROUP III (C)								GROUP I (SS H ₁₀)								
	#1		#2		#3				#4		#5		#6				
	M ¹	P ²	M	P	M	P	GHM ³	GHP ⁴	M	P	M	P	M	P	GHM	GHP	M
9:00	8.5	2.0	4.0	1.0	8.0	2.1	6.8	1.7	2.0	0.8	7.5	1.7	1.5	0.4	3.7	1.1	2.0
10:00	12.0	2.8	7.0	1.7	11.5	3.0	10.2	2.5	6.0	2.5	14.5	3.4	3.0	0.8	7.8	2.2	6.0
11:00	25.0	5.8	31.0	7.5	16.5	4.3	24.2	5.9	22.0	9.2	37.0	8.6	10.0	2.6	23.0	6.6	17.0
12:00	43.0	10.0	53.5	13.0	66.0	17.1	54.2	13.2	36.5	15.3	58.0	13.5	44.5	11.7	46.3	13.2	18.0
13:00	73.5	17.1	75.0	18.1	69.5	18.0	72.7	17.7	44.5	18.6	59.5	13.8	74.5	19.6	59.5	17.0	51.0
14:00	83.5	19.4	64.0	15.5	49.0	12.7	65.5	16.0	38.0	15.9	65.5	15.2	79.0	20.8	60.8	17.4	44.0
15:00	92.5	21.5	74.5	18.0	74.0	19.1	80.3	19.6	47.0	19.7	91.0	21.1	78.0	20.6	72.0	20.6	53.0
16:00	93.0	21.6	104.5	25.3	92.5	24.0	96.7	23.6	43.0	18.0	98.0	22.7	89.0	23.5	76.7	21.9	48.0
TOTALS	431.0	100.2	413.5	100.1	387.0	100.3	410.6	100.2	239.0	100.0	431.0	100.0	379.5	100.0	349.8	100.0	242.0

TABLE 1B. POLLEN FORAGER DATA FROM PREFLOW SUGAR SYRUP EXPERIMENT, 12 JULY 1972.

Time of Day	GROUP III (C)								GROUP II (SS H ₁₀)								
	#1		#2		#3				#4		#5		#6				
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M
9:00	0.0	0.0	0.0	0.0	1.5	1.6	0.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10:00	0.0	0.0	0.5	0.6	2.0	2.1	0.8	0.9	0.5	0.9	0.0	0.0	0.0	0.0	0.2	0.3	0.0
11:00	2.0	2.4	5.0	5.7	3.0	3.2	3.3	3.8	1.0	1.8	1.0	1.4	0.5	0.5	0.8	1.0	2.0
12:00	1.0	1.2	8.0	9.2	18.5	19.7	9.0	10.2	7.0	12.3	5.5	7.6	8.5	8.8	7.0	9.0	1.0
13:00	17.5	21.1	15.0	17.2	19.0	20.2	17.2	19.6	13.5	23.7	6.5	9.0	27.5	28.4	15.8	20.4	11.0
14:00	10.5	12.7	10.0	11.5	11.5	12.2	10.7	12.2	8.0	14.0	11.5	15.9	14.0	14.4	11.2	14.5	8.0
15:00	24.5	29.5	17.5	20.1	17.0	18.1	19.7	22.4	14.0	24.6	23.5	32.4	15.0	15.5	17.5	22.6	14.0
16:00	27.5	33.1	31.0	35.6	21.5	22.9	26.7	30.4	13.0	22.8	24.5	33.8	31.5	32.5	23.0	29.7	9.0
TOTALS	83.0	100.0	87.0	99.9	94.0	100.0	87.9	100.1	57.0	100.1	72.5	100.1	97.0	100.1	75.5	97.5	47.0

TABLE 1C. POLLEN COLLECTION DATA FROM PREFLOW SUGAR SYRUP EXPERIMENT, 12 JULY 1972.

Time of Day	GROUP III (C)								GROUP I (SS H ₁₀)								
	#1		#2		#3				#4		#5		#6				
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M
9:00																	
10:00	0.00	0.0	0.10	0.6	0.14	2.2	0.80	7.5	0.08	0.5	0.02	0.1	0.00	0.0	0.03	0.2	0.0
11:00	0.33	4.6	0.90	5.6	0.26	4.1	0.50	4.7	0.50	3.0	0.28	1.4	0.12	0.8	0.30	1.8	0.0
12:00	0.42	5.8	2.00	12.3	0.53	8.3	1.00	9.4	1.83	11.1	1.01	5.0	0.50	3.2	1.11	6.4	0.0
13:00	1.89	26.3	3.33	20.7	2.00	31.4	2.41	22.6	2.86	17.4	3.66	18.2	2.35	14.9	2.96	16.2	0.0
14:00	2.06	28.6	3.67	22.8	1.48	23.3	2.40	22.5	4.01	24.4	5.53	27.5	4.69	29.7	4.74	27.2	0.0
15:00	1.45	20.1	3.00	18.6	1.22	19.2	1.89	17.7	3.85	23.4	4.74	23.5	3.82	24.2	4.14	23.7	0.0
16:00	1.05	14.6	3.21	19.9	0.73	11.5	1.66	15.6	3.29	20.0	4.90	24.3	4.32	27.3	4.17	23.9	0.0
TOTALS	7.20	100.0	16.21	100.5	6.36	100.0	10.66	100.0	16.42	99.8	20.14	100.0	15.82	100.1	17.45	99.4	0.0

- 1 Mean of two hourly thirty second entrance counts or hourly weights of pollen trap collection.
- 2 Hourly mean as a proportion of mean total.
- 3 Group hourly mean. Mean of hourly colony means.
- 4 Group hourly proportion - group hourly mean as a proportion of group hourly mean total.

TABLE 2A. TOTAL FORAGER DATA FROM PREFLOW HONEY SYRUP EXPERIMENT, 17 JULY 1972.

Time of Day	GROUP III (C)								GROUP I (HS H ₁₀)								GROUP II (HS L ₁₀)								GROUP IV (HS H ₁₂)								GROUP V (HS L ₁₂)							
	#1		#2		#3				#4		#5		#6				#7		#8		#9				#10		#11		#12				#13		#14		#15			
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP
9:00	16.0	2.5	2.5	0.5	4.0	0.9	7.5	1.4	4.0	1.3	4.0	0.8	12.5	2.1	6.8	1.4	8.0	2.6	1.0	0.2	1.0	1.0	3.3	0.8	3.0	0.6	7.0	1.5	8.0	1.2	6.0	1.1	3.0	1.0	3.0	0.7			3.0	0.8
10:00	43.5	6.9	30.0	6.2	29.0	6.3	34.2	6.3	17.5	5.9	44.5	8.5	49.5	8.2	37.2	7.8	25.0	8.2	49.0	9.3	32.5	7.5	35.5	8.1	25.5	5.4	37.0	7.9	61.5	9.2	41.3	7.7	15.0	4.8	34.5	8.1			24.8	6.7
11:00	81.0	12.8	56.5	11.7	56.5	12.2	65.3	12.0	39.0	13.1	67.5	12.8	66.0	10.9	57.5	12.1	46.5	15.3	59.5	11.2	53.5	12.3	53.2	12.2	64.0	13.5	63.0	13.4	79.0	11.8	68.7	12.8	32.5	10.3	58.5	13.7			45.5	12.3
12:00	81.0	12.8	61.0	12.6	72.0	15.6	71.3	13.1	47.5	16.0	75.0	14.3	84.0	13.9	68.3	14.4	36.0	11.8	100.5	19.2	72.0	16.6	69.5	15.9	84.0	17.7	76.0	16.1	106.5	15.8	88.5	16.4	47.5	15.1	74.5	17.4			61.0	16.4
13:00	88.5	14.0	75.0	15.5	82.5	17.9	82.0	15.1	41.0	13.8	68.5	13.0	105.5	17.5	71.7	15.1	40.5	13.3	79.0	15.0	76.0	17.5	66.2	15.1	82.0	17.3	57.5	12.2	98.0	14.6	79.2	14.7	54.5	17.3	93.5	21.9			74.0	19.9
14:00	130.0	20.5	64.0	13.2	84.5	18.3	92.8	17.1	45.5	15.3	92.5	17.6	126.0	20.9	60.8	12.8	45.5	15.0	66.0	12.5	46.5	10.7	59.3	13.6	66.5	14.0	73.5	15.6	107.0	15.9	82.3	15.3	38.0	12.0	61.5	14.4			49.8	13.4
15:00	108.0	17.1	98.0	20.2	71.0	15.4	109.0	20.0	57.0	19.2	105.5	20.1	92.0	15.2	84.8	18.1	47.0	15.5	87.5	16.5	61.5	14.1	68.7	15.7	75.0	15.8	84.5	17.9	106.0	15.8	88.5	16.4	63.0	20.0	52.0	12.2			57.5	15.5
16:00	85.0	13.4	97.5	20.1	62.5	13.5	81.7	15.0	46.0	15.5	68.5	13.0	68.0	11.3	60.8	12.8	55.5	18.3	86.5	16.4	92.0	21.1	81.3	18.6	73.5	15.5	72.5	15.4	106.0	15.8	84.0	15.6	62.0	19.7	50.0	11.7			56.0	15.1
TOTALS	633.0	100.0	484.5	100.0	462.0	100.1	543.8	100.0	297.5	100.1	526.0	100.1	603.5	100.1	475.1	100.2	304.4	100.0	529.0	100.1	435.0	100.0	437.0	100.0	473.5	99.8	471.0	100.0	672.0	100.1	538.5	100.0	315.5	100.2	427.5	100.1			371.6	100.1

TABLE 2B. POLLEN FORAGER DATA FROM PREFLOW HONEY SYRUP EXPERIMENT, 17 JULY 1972.

Time of Day	GROUP III (C)								GROUP I (HS H ₁₀)								GROUP II (HS L ₁₀)								GROUP IV (HS H ₁₂)								GROUP V (HS L ₁₂)							
	#1		#2		#3				#4		#5		#6				#7		#8		#9				#10		#11		#12				#13		#14		#15			
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP
9:00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.3	0.7	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.1	1.5	0.7	0.8	0.6	0.0	0.0	0.5	0.5			0.3	0.3
10:00	3.5	3.0	0.5	0.5	3.5	3.0	2.5	2.3	1.0	1.5	2.5	2.4	3.0	2.0	2.2	2.0	1.0	1.0	2.0	1.5	3.5	2.7	2.2	1.8	1.0	0.7	4.5	5.0	4.5	2.1	3.3	2.3	1.0	2.2	3.5	2.9			2.3	2.8
11:00	2.0	1.7	8.0	8.0	13.5	11.7	7.8	7.2	6.0	9.0	15.5	15.0	12.0	8.0	11.2	10.3	13.0	13.5	14.5	10.7	8.0	6.2	11.8	10.0	17.5	12.5	10.5	11.7	26.0	12.4	18.0	12.3	0.5	1.1	18.0	15.0			9.3	11.3
12:00	19.0	16.3	20.0	19.9	28.0	24.3	22.3	20.4	6.0	9.0	24.5	23.8	20.5	13.7	18.7	17.3	21.0	21.8	30.0	22.1	31.5	24.4	27.5	23.2	37.5	26.7	24.0	26.7	38.0	18.1	33.2	22.7	5.5	12.4	20.0	16.7			12.8	15.6
13:00	21.5	18.5	20.5	20.4	20.5	17.8	20.8	19.1	8.0	11.9	6.5	6.3	23.5	15.7	12.7	11.7	13.0	13.5	20.0	14.7	31.5	24.4	21.5	18.1	30.0	21.4	11.0	12.2	34.5	16.4	25.2	17.2	13.0	29.2	26.0	21.7			19.5	23.9
14:00	22.0	18.9	18.5	18.4	24.0	20.9	20.2	18.4	17.0	25.4	34.5	33.5	39.0	26.1	30.2	27.9	23.0	23.8	33.0	24.3	15.5	12.0	22.2	18.7	25.5	18.1	15.0	16.7	37.0	17.6	25.8	17.7	9.0	20.2	21.0	17.5			15.5	19.0
15:00	30.5	26.2	21.0	20.9	14.0	12.2	21.8	20.0	15.0	22.4	12.0	11.7	24.0	16.1	17.0	15.7	18.5	19.2	17.5	12.9	13.0	10.1	16.3	13.7	16.5	11.7	10.0	11.1	30.0	14.3	19.5	13.4	10.0	22.5	16.5	13.8			10.8	13.2
16:00	18.0	15.5	12.0	11.9	11.5	10.0	13.8	12.7	14.0	20.9	7.5	7.3	25.5	17.1	15.7	14.5	7.0	7.3	19.0	14.0	26.0	20.2	17.3	14.6	12.5	8.9	14.0	15.6	34.0	16.2	20.2	13.8	5.5	12.4	14.5	12.1			11.5	14.1
TOTALS	116.5	100.1	100.5	100.0	115.0	99.9	109.2	100.1	67.0	100.1	103.0	100.0	199.5	100.0	108.4	100.0	96.5	100.1	136.0	100.2	129.0	100.0	118.8	100.0	140.5	100.0	90.0	100.1	210.0	97.8	146.0	100.0	44.5	100.0	120.0	100.1			82.0	100.2

TABLE 2C. POLLEN COLLECTION DATA FROM PREFLOW HONEY SYRUP EXPERIMENT, 17 JULY 1972.

Time of Day	GROUP III (C)								GROUP I (HS H ₁₀)								GROUP II (HS L ₁₀)								GROUP IV (HS H ₁₂)								GROUP V (HS L ₁₂)										
	#1		#2		#3				#4		#5		#6				#7		#8		#9				#10		#11		#12				#13		#14		#15						
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	M	P	M	P	M	P	GHM	GHP					
9:00																																											
10:00	0.00	0.0	0.06	0.7	0.10	2.7	0.05	1.1	0.00	0.0	1.15	11.6	0.97	7.3	0.71	9.0	0.20	1.6	1.30	9.7	0.06	1.0	0.52	4.9	0.00	0.0	0.00	0.0	0.31	3.1	0.10	1.1	0.00	0.0	0.35	5.6			0.18	4.0			
11:00	0.12	8.4	0.45	5.0	0.38	10.1	0.32	6.8	0.00	0.0	1.06	10.7	1.22	9.1	0.76	9.6	1.62	12.1	1.35	10.1	0.30	5.0	1.09	10.3	0.62	4.5	0.22	6.7	1.95	19.4	0.93	10.3	0.02	0.7	1.18	18.8			0.60	13.3			
12:00	0.55	38.5	2.27	25.0	1.10	29.3	1.31	27.7	0.15	34.1	2.26	22.7	2.95	22.1	1.79	22.6	2.90	23.5	3.03	22.7	1.12	18.8	2.35	22.2	4.80	35.1	0.54	16.4	2.30	22.8	2.55	28.3	0.30	10.9	1.72	27.5			1.01	22.4			
13:00	0.13	9.1	2.41	26.7	0.98	26.1	1.17	24.7	0.17	38.6	1.88	18.9	2.99	22.4	1.68	21.2	2.32	18.8	2.21	16.5	1.61	27.1	2.05	19.4	3.77	27.5	0.65	19.8	2.92	29.0	2.45	27.2	0.90	32.8	1.39	22.2			1.15	25.4			
14:00	0.20	14.0	1.30	14.4	0.57	15.2	0.69	14.6	0.10	22.7	1.40	14.1	2.22	16.6	1.24	15.7	2.50	20.2	2.15	16.1	0.86	14.5	1.84	17.4	1.72	12.6	0.50	15.2	1.08	10.7	1.10	12.2	0.25	9.1	1.00	16.0			0.63	13.9			
15:00	0.40	28.0	1.30	14.4	0.40	10.7	0.70	14.8	0.00	0.0	1.33	13.4	1.64	12.3	0.99	12.5	1.78	14.4	1.97	14.7	1.04	17.5	1.60	15.1	1.56	11.4	0.52	15.8	1.07	10.6	1.05	11.6	0.80	29.2	0.37	5.9			0.59	13.1			
16:00	0.03	2.1	1.23	13.6	0.22	5.9	0.49	10.4	0.02	4.5	0.87	8.7	1.36	10.2	0.75	9.5	1.04	8.4	1.35	10.1	0.96	16.1	1.12	10.6	1.22	8.9	0.86	26.1	0.44	4.4	0.84	9.3	0.47	17.4	0.25	4.0			0.36	8.0			
TOTALS	1.43	100.1	9.02	100.0	3.75	100.0	4.73	100.1	0.44	99.9	9.95	100.1	13.35	100.0	7.92	100.1	12.36	100.0	13.36	99.9	5.95	100.0	10.56	99.9	13.69	100.0	3.29	100.0	10.07	100.0	9.02	100.0	2.74	100.1	6.26	100.0			4.52	100.1			

TABLE 2A. TOTAL FORAGER DATA FROM PREFLOW HONEY SYRUP EXPERIMENT, 17 JULY 1972.

Time of Day	GROUP III (C)								GROUP I (HS H ₁₀)								#7
	#1		#2		#3				#4		#5		#6				
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	
9:00	16.0	2.5	2.5	0.5	4.0	0.9	7.5	1.4	4.0	1.3	4.0	0.8	12.5	2.1	6.8	1.4	8.0
10:00	43.5	6.9	30.0	6.2	29.0	6.3	34.2	6.3	17.5	5.9	44.5	8.5	49.5	8.2	37.2	7.8	25.0
11:00	81.0	12.8	56.5	11.7	56.5	12.2	65.3	12.0	39.0	13.1	67.5	12.8	66.0	10.9	57.5	12.1	46.5
12:00	81.0	12.8	61.0	12.6	72.0	15.6	71.3	13.1	47.5	16.0	75.0	14.3	84.0	13.9	68.3	14.4	36.0
13:00	88.5	14.0	75.0	15.5	82.5	17.9	82.0	15.1	41.0	13.8	68.5	13.0	105.5	17.5	71.7	15.1	40.5
14:00	130.0	20.5	64.0	13.2	84.5	18.3	92.8	17.1	45.5	15.3	92.5	17.6	126.0	20.9	60.8	12.8	45.5
15:00	108.0	17.1	98.0	20.2	71.0	15.4	109.0	20.0	57.0	19.2	105.5	20.1	92.0	15.2	84.8	18.1	47.0
16:00	85.0	13.4	97.5	20.1	62.5	13.5	81.7	15.0	46.0	15.5	68.5	13.0	68.0	11.3	60.8	12.8	55.5
TOTALS	533.0	100.0	484.5	100.0	462.0	100.1	543.8	100.0	297.5	100.1	526.0	100.1	603.5	100.1	475.1	100.2	304.4

TABLE 2B. POLLEN FORAGER DATA FROM PREFLOW HONEY SYRUP EXPERIMENT, 17 JULY 1972.

Time of Day	GROUP III (C)								GROUP I (HS H ₁₀)								#7
	#1		#2		#3				#4		#5		#6				
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	
9:00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.3	0.7	0.6	0.0
10:00	3.5	3.0	0.5	0.5	3.5	3.0	2.5	2.3	1.0	1.5	2.5	2.4	3.0	2.0	2.2	2.0	1.0
11:00	2.0	1.7	8.0	8.0	13.5	11.7	7.8	7.2	6.0	9.0	15.5	15.0	12.0	8.0	11.2	10.3	13.0
12:00	19.0	16.3	20.0	19.9	28.0	24.3	22.3	20.4	6.0	9.0	24.5	23.8	20.5	13.7	18.7	17.3	21.0
13:00	21.5	18.5	20.5	20.4	20.5	17.8	20.8	19.1	8.0	11.9	6.5	6.3	23.5	15.7	12.7	11.7	13.0
14:00	22.0	18.9	18.5	18.4	24.0	20.9	20.2	18.4	17.0	25.4	34.5	33.5	39.0	26.1	30.2	27.9	23.0
15:00	30.5	26.2	21.0	20.9	14.0	12.2	21.8	20.0	15.0	22.4	12.0	11.7	24.0	16.1	17.0	15.7	18.5
16:00	18.0	15.5	12.0	11.9	11.5	10.0	13.8	12.7	14.0	20.9	7.5	7.3	25.5	17.1	15.7	14.5	7.0
TOTALS	116.5	100.1	100.5	100.0	115.0	99.9	109.2	100.1	67.0	100.1	103.0	100.0	199.5	100.0	108.4	100.0	96.5

TABLE 2C. POLLEN COLLECTION DATA FROM PREFLOW HONEY SYRUP EXPERIMENT, 17 JULY 1972.

Time of Day	GROUP III (C)								GROUP I (HS H ₁₀)								#7
	#1		#2		#3				#4		#5		#6				
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	
9:00																	
10:00	0.00	0.0	0.06	0.7	0.10	2.7	0.05	1.1	0.00	0.0	1.15	11.6	0.97	7.3	0.71	9.0	0.20
11:00	0.12	8.4	0.45	5.0	0.38	10.1	0.32	6.8	0.00	0.0	1.06	10.7	1.22	9.1	0.76	9.6	1.62
12:00	0.55	38.5	2.27	25.0	1.10	29.3	1.31	27.7	0.15	34.1	2.26	22.7	2.95	22.1	1.79	22.6	2.90
13:00	0.13	9.1	2.41	26.7	0.98	26.1	1.17	24.7	0.17	38.6	1.88	18.9	2.99	22.4	1.68	21.2	2.32
14:00	0.20	14.0	1.30	14.4	0.57	15.2	0.69	14.6	0.10	22.7	1.40	14.1	2.22	16.6	1.24	15.7	2.50
15:00	0.40	28.0	1.30	14.4	0.40	10.7	0.70	14.8	0.00	0.0	1.33	13.4	1.64	12.3	0.99	12.5	1.78
16:00	0.03	2.1	1.23	13.6	0.22	5.9	0.49	10.4	0.02	4.5	0.87	8.7	1.36	10.2	0.75	9.5	1.04
TOTALS	1.43	100.1	9.02	100.0	3.75	100.0	4.73	100.1	0.44	99.9	9.95	100.1	13.35	100.0	7.92	100.1	12.36

TABLE 3A. TOTAL FORAGER DATA FROM FLOW SUGAR SYRUP EXPERIMENT, 11 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP I (SS H ₁₀)								GROUP II (SS L ₁₀)								GROUP IV (SS H ₁₂)								GROUP V (SS L ₁₂)							
	#1		#2		#3				#4		#5		#6				#7		#8		#9				#10		#11		#12				#13		#14		#15			
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	GHM	GHP		
9:00	12.5	2.1	53.5	8.3	47.0	6.3	37.7	5.7	36.5	5.6	48.5	7.1	5	5	42.5	6.4	40.0	8.2	19.5	8.2	28.0	5.4	29.0	7.0	24.5	4.9	15.0	3.6	31.5	4.7	23.7	4.5	33.5	5.9	24.5	5.4	39.0	7.1	32.3	6.2
10:00	72.5	12.1	86.5	13.4	86.5	11.6	81.8	12.4	86.0	13.3	89.5	13.0			87.8	13.2	64.0	13.1	23.5	9.9	59.0	11.5	48.8	11.8	66.5	13.2	43.5	10.5	91.5	13.5	67.2	12.7	74.5	13.1	48.5	10.7	63.5	11.6	62.2	11.9
11:00	91.0	15.2	104.0	16.1	104.0	13.9	99.7	15.0	92.5	14.3	95.0	13.8			93.8	14.1	69.5	14.2	44.0	18.6	82.5	16.0	65.3	15.8	84.0	16.7	66.0	15.9	103.0	15.3	82.7	15.6	74.0	13.0	63.0	13.9	88.5	16.2	75.2	14.3
12:00	87.0	14.6	90.0	14.0	95.5	12.8	90.8	13.7	90.0	13.9	103.0	15.0			96.5	14.5	74.5	15.2	29.5	12.4	83.0	16.1	62.3	15.1	68.0	13.5	75.0	18.1	92.0	13.6	78.3	14.8	78.5	13.8	61.0	13.4	80.0	14.6	73.5	14.0
13:00	109.5	18.3	73.5	11.4	101.0	13.5	94.7	14.3	81.0	12.5	91.5	13.3			86.3	13.0	54.0	11.0	24.0	10.1	79.5	15.4	52.5	12.7	70.0	13.9	60.0	14.5	106.0	15.7	78.7	14.9	90.0	15.8	72.5	16.0	75.5	13.8	79.3	15.1
14:00	67.0	11.2	81.0	12.6	102.0	13.7	83.3	12.6	91.0	14.0	82.0	12.0			86.5	13.0	54.0	11.0	26.5	11.2	47.5	9.2	42.7	10.3	67.5	13.4	44.0	10.6	87.5	12.9	66.3	12.5	68.5	12.0	70.0	15.4	63.0	11.5	67.2	12.8
15:00	79.0	13.2	65.0	10.1	112.0	15.0	85.2	12.9	75.5	11.6	87.0	12.7			81.2	12.2	48.5	9.9	31.0	13.1	64.5	12.5	48.0	11.6	69.5	13.8	63.0	15.2	76.0	11.2	69.5	13.1	71.5	13.0	54.0	11.9	54.5	10.0	60.0	11.5
16:00	78.5	13.1	91.0	14.1	98.0	13.1	89.5	13.5	96.0	14.8	89.5	13.0			92.8	14.0	85.0	17.4	39.0	16.5	71.0	13.8	65.0	15.7	54.0	10.7	47.5	11.5	88.5	13.1	63.3	12.0	79.0	13.9	61.0	13.4	83.0	15.2	74.5	14.3
TOTALS	597.0	99.8	644.5	100.0	746.0	99.9	662.8	100.1	648.5	100.0	686.0	99.9			667.5	100.4	489.5	100.0	237.0	100.0	515.0	99.9	413.6	100.0	504.0	100.1	414.0	99.9	676.0	100.0	529.7	100.1	569.5	100.5	454.5	100.1	547.0	100.0	524.2	100.1

TABLE 3B. POLLEN FORAGER DATA FROM FLOW SUGAR SYRUP EXPERIMENT, 11 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP I (SS H ₁₀)								GROUP II (SS L ₁₀)								GROUP IV (SS H ₁₂)								GROUP V (SS L ₁₂)							
	#1		#2		#3				#4		#5		#6				#7		#8		#9				#10		#11		#12				#13		#14		#15			
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	GHM	GHP		
9:00	0.0	0.0	8.0	4.9	22.0	10.0	10.0	6.1	7.0	3.9	10.5	6.7	5	5	8.8	5.2	3.0	2.8	3.0	4.0	1.0	1.0	2.3	2.5	2.5	3.4	1.5	1.3	5.5	2.8	3.2	2.5	7.0	5.8	4.5	3.7	10.0	7.9	7.2	5.8
10:00	4.5	4.5	25.5	15.6	35.5	16.1	21.8	13.4	16.5	9.2	23.0	14.6			19.8	11.7	5.5	5.1	3.0	4.0	4.5	4.4	4.3	4.6	11.5	15.8	6.5	5.8	11.5	6.0	9.8	7.8	19.5	16.0	8.0	6.6	12.5	9.9	13.3	10.9
11:00	6.5	6.5	28.5	17.4	37.5	17.0	25.8	15.8	30.0	16.7	23.5	14.9			26.8	15.9	17.0	15.7	15.0	20.1	22.5	22.2	18.2	19.1	11.5	15.8	17.0	15.2	33.5	17.4	20.7	16.4	23.0	18.9	14.5	12.0	27.0	21.4	21.5	17.5
12:00	22.0	22.0	23.5	14.4	25.0	11.3	23.5	14.4	37.0	20.7	32.0	20.3			34.5	20.5	24.5	22.7	10.5	14.1	25.5	25.1	20.2	21.2	24.0	32.9	30.5	27.4	41.5	21.5	32.0	25.4	20.5	16.9	20.5	16.9	22.0	17.5	21.0	17.1
13:00	31.0	31.0	23.5	14.4	35.5	16.1	30.0	18.4	35.0	19.5	26.0	16.5			30.5	18.1	16.0	14.8	11.0	14.8	20.5	20.2	15.8	16.7	10.5	14.4	21.5	19.3	39.0	20.2	23.7	18.8	23.5	19.3	26.0	21.5	17.5	13.9	22.3	18.2
14:00	18.5	18.5	20.0	12.2	26.5	12.0	21.7	13.3	25.0	13.9	12.0	7.6			18.5	11.0	17.0	15.7	6.5	8.7	10.5	10.3	11.7	12.3	2.0	2.7	15.0	13.5	21.5	11.1	12.8	10.2	9.5	7.8	22.0	18.2	13.5	10.7	15.0	12.2
15:00	11.5	11.5	17.5	10.7	21.5	9.7	16.8	10.3	20.5	11.4	17.5	11.1			19.0	11.3	17.5	16.2	15.5	20.8	10.0	9.9	14.4	15.1	6.5	8.9	9.5	8.5	20.5	10.6	12.2	9.7	10.0	8.2	17.0	14.1	13.0	10.3	13.3	10.9
16:00	6.5	6.5	17.0	10.4	17.5	7.9	13.7	8.4	8.5	4.7	13.0	8.2			10.8	6.4	7.5	6.9	10.0	13.4	7.0	6.9	8.2	8.6	4.5	6.2	10.0	9.0	20.0	10.4	11.5	9.1	8.5	7.0	8.5	7.0	10.5	8.3	9.2	7.5
TOTALS	100.5	100.5	163.5	100.0	221.0	100.1	163.3	100.1	179.5	100.0	157.5	99.9			168.7	100.2	108.0	99.9	74.5	99.9	101.5	100.0	95.1	100.1	73.0	100.1	111.5	100.0	193.0	100.0	125.9	99.9	121.5	99.9	121.0	100.0	126.0	99.9	122.8	100.1

TABLE 3C. POLLEN COLLECTION DATA FROM FLOW SUGAR SYRUP EXPERIMENT, 11 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP I (SS H ₁₀)								GROUP II (SS L ₁₀)								GROUP IV (SS H ₁₂)								GROUP V (SS L ₁₂)									
	#1		#2		#3				#4		#4		#6				#7		#8		#9				#10		#11		#12				#13		#14		#15					
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	GHM	GHP				
9:00													5	5																												
10:00	0.93	1.9	13.75	8.0	23.57	10.1	12.75	8.4	5.61	6.1	18.42	7.8			12.02	7.3	2.52	3.5	2.67	5.0	1.76	3.2	2.32	3.8	2.63	3.8	6.54	5.2	2.05	1.1	3.74	2.9	15.93	9.8	4.71	5.2	4.10	3.1	8.25	6.5		
11:00	4.42	8.9	34.69	20.1	55.75	23.8	31.62	20.8	15.75	19.1	42.69	18.0			30.22	18.3	8.61	11.8	7.38	13.8	8.23	14.8	8.07	13.3	11.60	16.6	17.49	13.9	19.41	10.6	16.17	12.8	29.50	18.2	10.58	11.7	26.45	20.2	22.18	17.3		
12:00	11.48	23.2	41.56	24.1	55.76	23.8	36.27	23.9	22.65	24.4	49.67	20.9			36.16	21.9	17.67	24.2	11.79	22.1	15.70	28.2	15.05	24.8	15.75	22.5	35.61	28.3	44.63	24.3	32.00	25.3	40.33	24.8	22.66	25.2	33.96	25.9	32.32	25.3		
13:00	11.74	23.7	28.70	16.6	35.70	15.3	25.38	16.7	18.36	19.8	40.29	16.9			29.33	17.7	15.60	21.4	10.60	19.9	10.64	19.1	12.28	20.2	13.71	19.6	23.41	18.6	39.69	21.0	25.25	19.9	26.00	16.0	17.81	19.8	25.51	19.4	23.11	18.1		
14:00	9.71	19.6	23.90	13.9	28.59	12.2	20.73	13.6	13.13	14.2	33.55	14.1			23.34	14.1	12.43	17.0	7.86	14.7	8.56	15.4	9.62	15.9	9.76	13.9	19.64	15.6	33.55	18.2	20.98	16.6	21.60	13.3	14.20	15.8	19.99	15.2	18.60	14.5		
15:00	7.57	15.3	17.52	10.2	22.07	9.4	15.73	10.3	9.72	10.5	33.63	14.1			21.68	13.1	9.54	13.1	7.53	14.1	6.66	12.0	7.91	13.0	9.53	13.6	17.64	14.0	27.55	15.0	18.24	14.4	18.46	11.4	12.57	14.0	15.77	12.0	15.60	12.2		
16:00	3.64	7.4	12.40	7.2	12.50	5.3	9.51	6.3	5.56	6.0	19.53	8.2			12.55	7.6	6.56	9.0	5.54	10.4	4.19	7.5	5.43	9.0	7.03	10.0	5.55	4.4	18.14	9.9	10.24	8.1	10.53	6.5	7.58	8.4	5.48	4.2	7.86	6.1		
TOTALS	49.49	100.0	172.52	100.0	233.94	99.9	151.98	100.0	92.78	100.1	237.78	100.0			165.30	100.0	72.94	100.0	53.37	100.0	55.74	100.2	60.68	100.0	70.01	100.0	125.81	100.0	184.03	100.1	126.62	100.0	162.36	100.0	90.11	100.1	131.26	100.0	127.92	100.0		

⁵ Bees Clustered on entrance making counts impossible.

TABLE 3A. TOTAL FORAGER DATA FROM FLOW SUGAR SYRUP EXPERIMENT, 11 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP I (SS H ₁₀)								#7
	#1		#2		#3				#4		#5		#6				
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	
9:00	12.5	2.1	53.5	8.3	47.0	6.3	37.7	5.7	36.5	5.6	48.5	7.1	5	5	42.5	6.4	40.0
10:00	72.5	12.1	86.5	13.4	86.5	11.6	81.8	12.4	86.0	13.3	89.5	13.0			87.8	13.2	64.0
11:00	91.0	15.2	104.0	16.1	104.0	13.9	99.7	15.0	92.5	14.3	95.0	13.8			93.8	14.1	69.5
12:00	87.0	14.6	90.0	14.0	95.5	12.8	90.8	13.7	90.0	13.9	103.0	15.0			96.5	14.5	74.5
13:00	109.5	18.3	73.5	11.4	101.0	13.5	94.7	14.3	81.0	12.5	91.5	13.3			86.3	13.0	54.0
14:00	67.0	11.2	81.0	12.6	102.0	13.7	83.3	12.6	91.0	14.0	82.0	12.0			86.5	13.0	54.0
15:00	79.0	13.2	65.0	10.1	112.0	15.0	85.2	12.9	75.5	11.6	87.0	12.7			81.2	12.2	48.5
16:00	78.5	13.1	91.0	14.1	98.0	13.1	89.5	13.5	96.0	14.8	89.5	13.0			92.8	14.0	85.0
TOTALS	597.0	99.8	644.5	100.0	746.0	99.9	662.8	100.1	648.5	100.0	686.0	99.9			667.5	100.4	489.5

TABLE 3B. POLLEN FORAGER DATA FROM FLOW SUGAR SYRUP EXPERIMENT, 11 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP I (SS H ₁₀)								#7
	#1		#2		#3				#4		#5		#6				
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	
9:00	0.0	0.0	8.0	4.9	22.0	10.0	10.0	6.1	7.0	3.9	10.5	6.7	5	5	8.8	5.2	3.0
10:00	4.5	4.5	25.5	15.6	35.5	16.1	21.8	13.4	16.5	9.2	23.0	14.6			19.8	11.7	5.5
11:00	6.5	6.5	28.5	17.4	37.5	17.0	25.8	15.8	30.0	16.7	23.5	14.9			26.8	15.9	17.0
12:00	22.0	22.0	23.5	14.4	25.0	11.3	23.5	14.4	37.0	20.7	32.0	20.3			34.5	20.5	24.5
13:00	31.0	31.0	23.5	14.4	35.5	16.1	30.0	18.4	35.0	19.5	26.0	16.5			30.5	18.1	16.0
14:00	18.5	18.5	20.0	12.2	26.5	12.0	21.7	13.3	25.0	13.9	12.0	7.6			18.5	11.0	17.0
15:00	11.5	11.5	17.5	10.7	21.5	9.7	16.8	10.3	20.5	11.4	17.5	11.1			19.0	11.3	17.5
16:00	6.5	6.5	17.0	10.4	17.5	7.9	13.7	8.4	8.5	4.7	13.0	8.2			10.8	6.4	7.5
TOTALS	100.5	100.5	163.5	100.0	221.0	100.1	163.3	100.1	179.5	100.0	157.5	99.9			168.7	100.2	108.0

TABLE 3C. POLLEN COLLECTION DATA FROM FLOW SUGAR SYRUP EXPERIMENT, 11 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP (SS H ₁₀)								#7
	#1		#2		#3				#4		#4		#6				
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	
9:00													5	5			
10:00	0.93	1.9	13.75	8.0	23.57	10.1	12.75	8.4	5.61	6.1	18.42	7.8			12.02	7.3	2.52
11:00	4.42	8.9	34.69	20.1	55.75	23.8	31.62	20.8	15.75	19.1	42.69	18.0			30.22	18.3	8.61
12:00	11.48	23.2	41.56	24.1	55.76	23.8	36.27	23.9	22.65	24.4	49.67	20.9			36.16	21.9	17.67
13:00	11.74	23.7	28.70	16.6	35.70	15.3	25.38	16.7	18.36	19.8	40.29	16.9			29.33	17.7	15.60
14:00	9.71	19.6	23.90	13.9	28.59	12.2	20.73	13.6	13.13	14.2	33.55	14.1			23.34	14.1	12.43
15:00	7.57	15.3	17.52	10.2	22.07	9.4	15.73	10.3	9.72	10.5	33.63	14.1			21.68	13.1	9.54
16:00	3.64	7.4	12.40	7.2	12.50	5.3	9.51	6.3	5.56	6.0	19.53	8.2			12.55	7.6	6.56
TOTALS	49.49	100.0	172.52	100.0	233.94	99.9	151.98	100.0	92.78	100.1	237.78	100.0			165.30	100.0	72.94

⁵ Bees Clustered on entrance making counts impossible.

TABLE 4A. TOTAL FORAGER DATA FROM FLOW HONEY SYRUP EXPERIMENT, 12 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP I (HS H ₁₀)								GROUP II (HS L ₁₀)								GROUP IV (HS H ₁₂)								GROUP V (HS L ₁₂)							
	#1		#2		#3				#4		#5		#6				#7		#8		#9				#10		#11		#12				#13		#14		#15			
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	GHM	GHP		
9:00	12.0	3.2	53.5	9.2	48.0	9.2	37.8	7.7	38.0	7.2	42.5	8.1	5	5	40.3	7.7	32.5	7.9	46.5	19.7	34.5	7.8	37.8	10.4	21.5	5.7	16.0	5.7	24.5	4.9	20.7	5.4	33.5	8.5	24.5	7.6	20.0	5.2	26.0	7.1
10:00	44.0	11.9	76.5	13.1	73.5	14.0	64.7	13.1	52.5	9.9	78.0	14.9			65.3	12.4	60.5	14.7	17.0	7.2	64.0	14.4	47.2	12.9	52.5	13.9	30.0	10.6	61.0	12.2	47.8	12.4	50.5	12.8	26.0	8.1	44.5	11.6	40.3	11.0
11:00	74.5	20.1	99.5	17.0	78.5	15.0	84.2	17.1	102.0	19.3	111.0	22.2			109.0	20.7	75.5	18.3	39.0	16.5	75.5	17.0	63.3	17.4	57.0	15.1	45.0	15.9	98.5	19.7	66.8	17.3	56.0	14.2	54.5	16.9	80.0	20.8	63.5	17.3
12:00	78.5	21.2	94.0	16.1	93.5	17.8	88.7	18.0	103.0	19.5	114.0	21.8			108.5	20.6	78.5	19.1	34.5	14.6	77.5	17.4	63.5	17.4	75.5	20.0	68.0	24.0	95.0	19.0	79.5	20.1	69.5	17.6	66.5	20.7	78.5	20.4	71.5	19.5
13:00	51.5	13.9	94.5	16.2	99.0	18.9	81.7	16.6	104.5	19.7	47.5	9.1			76.0	14.5	63.5	15.4	18.5	7.8	89.0	20.0	57.0	15.7	75.0	19.9	30.5	10.8	102.0	20.4	69.2	17.9	54.0	13.7	56.5	17.6	66.5	17.3	59.0	16.1
14:00	64.5	17.4	81.0	13.9	64.5	12.3	70.0	14.2	87.5	16.5	59.0	11.3			73.3	13.9	51.5	12.5	90.0	16.9	55.5	12.5	49.0	13.5	45.5	12.1	51.0	18.0	53.5	10.7	50.0	12.9	64.0	16.2	44.0	13.7	47.0	12.2	51.7	14.1
15:00	46.0	12.4	85.0	14.6	67.5	12.9	66.2	13.4	42.0	7.9	65.0	12.5			53.5	10.2	50.0	12.1	41.0	17.3	48.5	10.9	46.5	12.8	50.0	13.3	42.5	15.0	64.5	12.9	52.3	13.6	66.5	16.9	50.0	15.5	47.5	12.4	54.7	14.9
16:00																																								
TOTALS	371.0	100.1	584.0	100.1	524.5	100.1	493.3	100.1	529.5	100.0	522.0	99.9			525.9	100.0	412.0	100.0	236.5	100.0	444.5	100.0	364.3	100.1	377.0	100.0	283.0	100.0	499.0	99.8	386.3	99.6	394.0	99.9	322.0	100.1	384.0	99.9	366.7	100.0

TABLE 4B. POLLEN FORAGER DATA FROM FLOW HONEY SYRUP EXPERIMENT, 12 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP I (HS H ₁₀)								GROUP II (HS L ₁₀)								GROUP IV (HS H ₁₂)								GROUP V (HS L ₁₂)							
	#1		#2		#3				#4		#5		#6				#7		#8		#9				#10		#11		#12				#13		#14		#15			
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	GHM	GHP		
9:00	0.0	0.0	9.0	6.8	23.0	14.7	10.7	9.2	7.0	4.9	8.5	6.8	5	5	7.8	5.9	5.5	6.3	4.5	8.5	1.0	1.1	3.7	4.5	1.5	2.3	2.5	3.6	5.0	3.0	3.0	2.9	8.0	9.3	5.5	5.2	8.0	7.6	7.2	7.1
10:00	1.5	2.6	23.5	17.7	20.0	12.8	15.0	13.0	14.0	9.8	15.5	12.3			14.8	11.2	4.0	4.6	3.0	5.7	3.0	3.3	3.3	4.1	7.5	11.4	5.0	7.2	7.0	4.2	6.5	6.4	3.5	4.1	4.5	4.3	11.0	10.4	6.3	6.3
11:00	5.5	9.5	18.0	13.6	26.0	16.7	16.5	14.3	21.0	14.7	24.0	19.1			20.0	15.2	11.5	13.2	4.5	8.5	12.5	13.7	9.5	11.6	8.5	12.9	3.5	5.0	34.0	20.5	15.3	15.0	16.5	19.2	18.0	17.1	11.5	10.9	17.0	16.9
12:00	13.5	23.3	25.0	18.9	25.5	16.4	21.3	18.5	32.5	22.7	33.5	26.6			33.0	25.0	25.0	28.7	11.5	21.7	20.5	22.4	20.7	25.2	15.5	23.5	11.5	16.6	32.5	19.6	21.5	21.1	17.5	20.4	22.0	20.9	22.0	20.8	20.5	20.3
13:00	12.0	20.7	22.5	17.0	27.0	17.3	20.5	17.8	22.5	15.7	13.5	10.7			18.0	13.6	14.5	16.7	5.0	9.4	21.0	23.0	13.5	16.5	18.0	27.3	15.5	22.3	41.5	25.1	25.0	24.5	11.5	13.4	22.5	21.3	21.0	19.8	18.3	18.2
14:00	15.0	25.9	22.5	17.0	22.5	14.4	20.0	17.3	36.5	25.5	17.5	13.9			27.0	20.5	13.0	14.9	11.5	21.7	19.0	20.8	17.8	21.8	9.0	13.6	14.0	20.1	20.5	12.4	14.5	14.2	17.0	19.8	18.5	17.5	17.5	16.5	17.7	17.5
15:00	10.5	18.1	12.0	9.1	12.0	7.7	11.5	10.0	9.5	6.6	13.5	10.7			11.5	8.7	13.5	15.5	13.0	24.5	14.5	15.9	13.5	16.5	6.0	9.1	17.5	25.2	25.0	15.1	16.2	15.8	12.0	14.0	14.5	13.7	15.0	14.2	13.8	14.7
16:00																																								
TOTALS	58.0	100.1	132.5	99.1	156.0	100.0	115.4	100.1	143.0	99.9	126.0	100.1			132.0	100.1	87.0	99.9	53.0	100.1	91.5	100.2	82.0	100.2	66.0	100.1	69.5	100.0	165.5	99.9	102.0	99.9	86.0	100.2	105.5	100.0	106.0	100.2	100.8	100.9

TABLE 4C. POLLEN COLLECTION DATA FROM FLOW HONEY SYRUP EXPERIMENT, 12 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP I (HS H ₁₀)								GROUP II (HS L ₁₀)								GROUP IV (HS H ₁₂)								GROUP V (HS L ₁₂)							
	#1		#2		#3				#4		#5		#6				#7		#8		#9				#10		#11		#12				#13		#14		#15			
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	GHM	GHP		
9:00													5	5	21.78	15.0	4.44	7.1	5.17	11.6	1.68	3.7	3.76	7.4	7.50	10.2	8.24	7.6	5.45	3.3	7.06	6.1	23.20	19.6	3.57	9.4	20.57	17.9	15.78	15.0
10:00	0.68	1.5	22.73	15.1	41.75	21.3	21.72	16.6	11.36	13.9	32.19	15.4			22.56	15.5	6.91	11.0	6.92	15.5	5.51	12.3	6.45	12.7	11.16	15.1	12.10	11.1	17.65	10.6	13.64	11.7	18.40	15.6	7.86	9.6	14.89	13.0	13.72	13.1
11:00	4.91	10.7	20.72	13.7	32.72	16.7	19.45	14.8	11.94	14.6	33.17	15.9			33.62	23.1	16.55	26.3	12.49	27.9	14.18	31.6	14.41	28.3	16.69	22.6	32.53	29.8	46.73	28.0	31.98	27.4	29.54	25.0	24.47	29.8	30.37	26.5	28.13	26.8
12:00	13.40	29.3	34.89	23.1	46.67	23.8	31.65	24.2	19.63	24.0	47.60	22.8			29.85	20.1	16.21	25.8	8.98	20.1	11.09	24.7	12.09	23.8	16.71	22.6	25.76	23.6	42.66	25.6	28.38	24.3	21.35	18.1	21.18	25.8	24.71	21.5	22.41	21.3
13:00	12.92	28.3	32.23	21.4	38.89	19.8	28.01	21.4	18.61	22.8	41.09	19.7			26.16	18.0	12.95	20.6	7.94	17.7	8.98	19.5	9.89	19.5	15.13	20.5	21.65	19.8	35.34	21.2	24.04	20.6	18.03	15.3	17.33	21.1	17.37	15.1	17.58	16.7
14:00	10.06	22.0	28.68	19.0	26.69	13.6	21.81	16.6	13.69	16.7	39.62	18.5			11.39	7.8	5.78	9.2	3.25	7.3	3.69	8.2	4.24	8.3	6.12	9.1	8.84	8.1	19.02	11.4	11.53	9.9	7.64	6.5	7.67	9.3	6.86	6.0	7.38	7.0
15:00	3.75	8.2	11.71	7.8	9.74	5.0	8.40	6.4	6.53	8.0	16.25	7.8																												
16:00																																								
TOTALS	45.72	100.0	150.96	100.1	196.46	100.2	131.04	100.0	81.76	100.0	208.92	100.1			145.36	99.5	62.84	100.0	44.75	100.1	44.93	100.0	50.84	100.0	73.92	100.1	109.12	100.0	166.85	100.1	116.63	100.0	118.16	100.1	82.08	102.0	114.77	100.0	105.00	99.9

TABLE 4A. TOTAL FORAGER DATA FROM FLOW HONEY SYRUP EXPERIMENT, 12 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP I (HS H ₁₀)								#7
	#1		#2		#3		GHM	GHP	#4		#5		#6		GHM	GHP	
	M	P	M	P	M	P			M	P	M	P	M	P			
9:00	12.0	3.2	53.5	9.2	48.0	9.2	37.8	7.7	38.0	7.2	42.5	8.1	5	5	40.3	7.7	32.5
10:00	44.0	11.9	76.5	13.1	73.5	14.0	64.7	13.1	52.5	9.9	78.0	14.9			65.3	12.4	60.5
11:00	74.5	20.1	99.5	17.0	78.5	15.0	84.2	17.1	102.0	19.3	111.0	22.2			109.0	20.7	75.5
12:00	78.5	21.2	94.0	16.1	93.5	17.8	88.7	18.0	103.0	19.5	114.0	21.8			108.5	20.6	78.5
13:00	51.5	13.9	94.5	16.2	99.0	18.9	81.7	16.6	104.5	19.7	47.5	9.1			76.0	14.5	63.5
14:00	64.5	17.4	81.0	13.9	64.5	12.3	70.0	14.2	87.5	16.5	59.0	11.3			73.3	13.9	51.5
15:00	46.0	12.4	85.0	14.6	67.5	12.9	66.2	13.4	42.0	7.9	65.0	12.5			53.5	10.2	50.0
16:00																	
TOTALS	371.0	100.1	584.0	100.1	524.5	100.1	493.3	100.1	529.5	100.0	522.0	99.9			525.9	100.0	412.0

TABLE 4B. POLLEN FORAGER DATA FROM FLOW HONEY SYRUP EXPERIMENT, 12 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP (HS H ₁₀)								#7
	#1		#2		#3		GHM	GHP	#4		#5		#6		GHM	GHP	
	M	P	M	P	M	P			M	P	M	P	M	P			
9:00	0.0	0.0	9.0	6.8	23.0	14.7	10.7	9.2	7.0	4.9	8.5	6.8	5	5	7.8	5.9	5.5
10:00	1.5	2.6	23.5	17.7	20.0	12.8	15.0	13.0	14.0	9.8	15.5	12.3			14.8	11.2	4.0
11:00	5.5	9.5	18.0	13.6	26.0	16.7	16.5	14.3	21.0	14.7	24.0	19.1			20.0	15.2	11.5
12:00	13.5	23.3	25.0	18.9	25.5	16.4	21.3	18.5	32.5	22.7	33.5	26.6			33.0	25.0	25.0
13:00	12.0	20.7	22.5	17.0	27.0	17.3	20.5	17.8	22.5	15.7	13.5	10.7			18.0	13.6	14.5
14:00	15.0	25.9	22.5	17.0	22.5	14.4	20.0	17.3	36.5	25.5	17.5	13.9			27.0	20.5	13.0
15:00	10.5	18.1	12.0	9.1	12.0	7.7	11.5	10.0	9.5	6.6	13.5	10.7			11.5	8.7	13.5
16:00																	
TOTALS	58.0	100.1	132.5	99.1	156.0	100.0	115.4	100.1	143.0	99.9	126.0	100.1			132.0	100.1	87.0

TABLE 4C. POLLEN COLLECTION DATA FROM FLOW HONEY SYRUP EXPERIMENT, 12 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP I (HS H ₁₀)								#7
	#1		#2		#3		GHM	GHP	#4		#5		#6		GHM	GHP	
	M	P	M	P	M	P			M	P	M	P	M	P			
9:00																	
10:00	0.68	1.5	22.73	15.1	41.75	21.3	21.72	16.6	11.36	13.9	32.19	15.4	5	5	21.78	15.0	4.44
11:00	4.91	10.7	20.72	13.7	32.72	16.7	19.45	14.8	11.94	14.6	33.17	15.9			22.56	15.5	6.91
12:00	13.40	29.3	34.89	23.1	46.67	23.8	31.65	24.2	19.63	24.0	47.60	22.8			33.62	23.1	16.55
13:00	12.92	28.3	32.23	21.4	38.89	19.8	28.01	21.4	18.61	22.8	41.09	19.7			29.85	20.1	16.21
14:00	10.06	22.0	28.68	19.0	26.69	13.6	21.81	16.6	13.69	16.7	39.62	18.5			26.16	18.0	12.95
15:00	3.75	8.2	11.71	7.8	9.74	5.0	8.40	6.4	6.53	8.0	16.25	7.8			11.39	7.8	5.78
16:00																	
TOTALS	45.72	100.0	150.96	100.1	196.46	100.2	131.04	100.0	81.76	100.0	208.92	100.1			145.36	99.5	62.84

TABLE 5A. FIRST DAY TOTAL FORAGER DATA FROM FLOW TWO-DAY HONEY SYRUP EXPERIMENT, 17 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP I (HS H ₁₂)								GROUP II (HS L ₁₂)								
	#1		#2		#3		GHM	GHP	#4		#5		#6		GHM	GHP	#7		#8		#9		GHM	GHP	
	M	P	M	P	M	P			M	P	M	P	M	P			M	P	M	P	M	P			
9:00																									
10:00																					5	5			
11:00	76.5	13.5	83.0	19.0	78.0	17.8	79.2	17.1	47.5	11.3	99.0	17.0	87.0	20.2	77.8	16.3	80.0	17.2	106.5	18.9			93.3	19.4	
12:00	106.0	18.7	74.5	17.1	84.5	19.3	88.3	18.5	77.0	18.3	106.5	18.3	79.5	18.5	88.3	18.4	87.5	18.8	112.0	19.8			99.8	20.1	
13:00	105.0	18.5	69.5	15.9	77.5	17.7	84.0	17.6	85.0	20.2	94.0	16.1	71.5	16.6	83.5	17.4	67.0	14.4	93.5	16.6			80.3	16.7	
14:00	95.5	16.8	68.5	15.7	60.5	13.8	74.8	15.7	61.0	14.5	90.0	15.4	59.0	13.5	69.7	14.6	76.5	16.4	94.5	16.7			85.5	17.8	
15:00	69.0	12.1	74.5	17.0	58.5	13.4	62.3	13.1	69.0	16.4	95.5	16.4	64.5	15.0	76.3	15.9	65.0	14.0	83.0	14.7			74.0	15.4	
16:00	116.5	20.5	67.5	15.4	79.0	18.0	87.7	18.4	81.5	19.4	98.0	16.8	70.0	16.3	83.2	17.4	89.5	19.2	75.0	13.3			48.3	9.8	
TOTALS	568.5	100.1	437.5	100.1	438.0	100.0	476.3	100.4	421.0	100.1	583.0	100.0	430.5	100.1	478.8	100.0	465.5	100.0	564.5	100.0			480.2	99.2	

TABLE 5B. FIRST DAY POLLEN FORAGER DATA FROM TWO-DAY HONEY SYRUP EXPERIMENT, 17 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP I (HS H ₁₂)								GROUP II (HS L ₁₂)								
	#1		#2		#3		GHM	GHP	#4		#5		#6		GHM	GHP	#7		#8		#9		GHM	GHP	
	M	P	M	P	M	P			M	P	M	P	M	P			M	P	M	P	M	P			
9:00																					5	5			
10:00																									
11:00	11.0	9.2	14.5	19.1	16.5	19.5	11.3	12.5	9.5	12.7	12.5	14.2	9.0	10.1	10.3	12.9	6.5	10.0	25.0	21.6			15.8	17.4	
12:00	22.0	18.5	16.5	21.7	19.0	22.5	19.2	21.2	17.0	22.7	22.0	25.0	19.0	21.2	19.3	23.0	16.5	25.4	30.0	25.9			23.3	25.7	
13:00	22.0	18.5	12.5	16.5	12.5	14.8	15.7	17.2	21.0	28.0	16.5	18.8	16.5	18.4	18.0	21.4	16.5	25.4	28.0	24.1			22.3	24.6	
14:00	21.5	18.1	11.0	14.5	15.5	18.3	16.0	17.7	13.5	18.0	12.5	14.2	16.5	18.4	14.2	16.8	7.5	11.5	11.5	9.9			9.5	10.5	
15:00	15.5	13.0	11.0	14.5	9.0	10.7	11.8	13.1	5.5	7.3	14.0	15.9	15.5	17.3	11.7	13.9	10.5	16.2	15.0	12.9			12.8	14.1	
16:00	27.0	22.7	10.5	13.8	12.0	14.2	16.5	18.2	8.5	11.3	10.5	11.9	13.0	14.5	10.7	13.0	7.5	11.5	6.5	5.6			7.0	7.7	
TOTALS	119.0	100.0	76.0	100.1	84.5	100.0	90.5	100.0	75.5	100.0	88.0	100.0	89.5	99.9	84.2	101.0	65.0	100.0	116.0	100.0			90.7	100.0	

TABLE 5C. FIRST DAY POLLEN COLLECTION DATA FROM TWO-DAY HONEY SYRUP EXPERIMENT, 17 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP I (HS H ₁₂)								GROUP III (HS L ₁₂)								
	#1		#2		#3		GHM	GHP	#4		#5		#6		GHM	GHP	#7		#8		#9		GHM	GHP	
	M	P	M	P	M	P			M	P	M	P	M	P			M	P	M	P	M	P			
9:00																									
10:00																									
11:00																									
12:00	16.38	23.8	12.08	14.7	17.84	27.3	15.43	21.4	23.89	29.4	24.54	28.1	25.25	25.7	24.56	27.6	10.25	23.9	50.81	28.6	5	5	30.53	27.7	
13:00	15.92	23.2	21.92	26.7	13.08	20.0	16.97	23.6	17.81	21.9	18.54	21.2	22.06	22.4	19.47	21.9	10.09	23.5	37.38	21.1			23.74	21.5	
14:00	17.40	25.3	23.04	28.1	15.45	23.7	18.63	25.9	18.67	23.0	20.43	23.4	23.81	24.2	20.97	23.6	11.20	26.1	43.09	24.3			27.15	24.6	
15:00	11.46	16.7	14.36	17.5	10.03	15.4	11.95	16.6	11.76	14.5	13.26	15.2	15.38	15.6	13.47	15.1	6.58	15.3	26.77	15.1			16.68	15.1	
16:00	7.57	11.0	10.72	13.1	8.90	13.6	9.06	12.6	9.07	11.2	10.52	12.1	11.85	12.1	10.48	11.8	4.94	11.5	19.44	11.0			12.19	11.4	
TOTALS	68.73	100.0	82.12	100.1	65.30	100.0	72.04	100.1	81.20	100.0	87.29	100.1	98.35	100.0	88.95	100.0	42.96	100.3	177.49	100.1			100.29	100.0	

TABLE 6A. SECOND DAY TOTAL FORAGER DATA FROM FLOW TWO-DAY HONEY SYRUP EXPERIMENT, 18 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP I (HS H ₁₂)								GROUP II (HS L ₁₂)							
	#1		#2		#3				#4		#5		#6				#7		#8		#9			
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP
9:00																					5	5		
10:00																								
11:00	69.5	15.8	53.0	14.1	43.5	15.3	55.3	15.1	47.0	12.1	75.5	15.1	61.5	17.8	61.3	14.9	67.0	18.9	74.5	19.2			70.8	17.7
12:00	77.0	17.5	43.0	11.4	42.0	14.8	54.0	14.7	57.0	14.7	97.0	19.4	55.0	15.9	69.7	17.0	61.5	17.3	22.0	5.7			69.5	17.4
13:00	76.0	17.3	49.5	13.1	43.0	15.1	56.2	15.3	59.5	15.4	94.0	18.8	54.5	15.7	69.3	16.9	61.5	17.3	77.0	19.8			69.3	17.3
14:00	64.0	14.6	71.0	18.8	55.5	19.5	63.5	17.3	83.5	21.6	79.5	15.9	63.0	18.2	75.3	18.3	51.0	14.4	67.0	17.3			64.0	16.0
15:00	77.0	17.5	79.0	21.0	47.5	16.7	67.8	18.5	68.5	17.7	77.5	15.5	55.5	16.0	67.2	16.3	57.5	16.2	77.0	19.8			67.3	16.8
16:00	76.5	17.4	81.5	21.6	53.0	18.6	70.3	19.2	71.5	18.5	76.0	15.2	57.0	16.5	68.2	16.6	57.0	16.1	71.0	18.3			64.0	16.0
TOTALS	440.0	100.1	377.0	100.0	284.5	100.0	367.1	100.1	387.0	100.0	499.5	99.9	346.5	100.1	411.0	100.0	355.0	100.2	388.5	100.1			399.9	99.9

TABLE 6B. SECOND DAY POLLEN FORAGER DATA FROM FLOW TWO-DAY HONEY SYRUP EXPERIMENT, 18 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP I (HS H ₁₂)								GROUP II (HS L ₁₂)							
	#1		#2		#3				#4		#5		#6				#7		#8		#9			
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP
9:00																								
10:00																					5	5	14.8	16.8
11:00	24.0	14.3	14.5	16.1	11.0	13.8	16.5	16.8	13.5	12.0	18.5	18.3	14.0	17.0	15.7	15.8	5.0	9.5	24.5	19.9			15.3	17.4
12:00	26.0	15.5	7.5	8.3	14.5	18.2	16.0	16.3	17.0	15.1	23.5	23.3	16.0	19.4	18.8	19.2	8.5	16.5	22.0	17.9			15.8	18.0
13:00	18.5	11.0	11.0	12.2	16.5	20.8	15.7	16.0	16.5	14.7	19.5	19.3	14.5	17.6	16.8	17.0	9.5	18.1	22.0	17.9			18.5	21.1
14:00	60.5	36.1	17.0	18.9	16.0	20.1	17.8	18.2	32.0	28.4	20.0	19.8	21.0	25.4	24.3	24.9	11.0	21.0	26.0	21.1			11.0	12.5
15:00	22.0	13.1	22.0	24.4	10.5	13.2	17.0	17.3	16.0	14.2	8.5	8.4	9.5	11.5	11.3	11.5	8.0	15.2	14.0	11.4			12.5	14.3
16:00	16.5	9.9	18.0	20.0	11.0	13.8	15.2	15.4	17.5	15.6	11.0	10.9	7.5	9.1	12.0	12.1	10.5	20.0	14.5	11.8			87.9	100.1
TOTALS	167.5	99.9	90.0	99.9	79.5	99.9	98.2	100.0	112.5	100.0	101.0	100.0	82.5	100.0	98.9	100.5	52.5	100.0	123.0	100.0				

TABLE 6C. SECOND DAY POLLEN COLLECTION DATA FROM FLOW TWO-DAY HONEY SYRUP EXPERIMENT, 18 AUGUST 1972.

Time of Day	GROUP III (C)								GROUP I (HS H ₁₂)								GROUP II (HS L ₁₂)							
	#1		#2		#3				#4		#5		#6				#7		#8		#9			
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP
9:00																								
10:00																					5	5	29.28	27.3
11:00	40.74	43.4	39.70	36.7	33.31	37.0	37.92	38.9	24.52	22.2	26.25	28.8	30.79	26.6	27.19	25.7	6.85	14.4	51.70	31.0			21.07	19.7
12:00	16.17	17.2	20.58	19.0	15.50	17.2	17.42	17.9	22.34	20.2	18.76	20.6	24.82	21.5	21.97	20.8	8.13	17.1	34.00	20.4			15.43	14.4
13:00	11.48	12.2	14.30	13.2	11.95	13.3	12.58	12.9	18.17	16.4	14.37	15.8	17.32	15.0	16.62	15.7	7.32	15.4	23.54	14.1			24.90	23.2
14:00	15.49	16.5	19.83	18.3	17.51	19.4	17.61	18.1	27.22	24.6	19.62	21.5	26.47	22.9	24.44	23.1	13.69	28.8	36.10	21.7			16.51	15.4
15:00	9.95	10.6	13.76	12.7	11.88	13.2	11.86	12.2	18.33	16.6	12.14	13.3	16.29	14.1	15.59	14.8	11.59	24.4	21.43	12.9				
TOTALS	93.83	99.9	108.17	99.9	90.15	100.1	97.39	100.0	110.58	100.0	91.14	100.0	115.69	100.1	105.81	100.0	47.58	100.1	166.77	100.1			107.19	100.0

TABLE 7A. TOTAL FORAGER DATA FROM POSTFLOW SUGAR SYRUP EXPERIMENT, 14 SEPTEMBER 1972.

Time of Day	GROUP III (C)								GROUP I (SS E ₁₀)								GROUP II (SS L ₁₀)								GROUP IV (SS H ₁₂)								GROUP V (SS L ₁₂)									
	#1		#2		#3				#4		#5		#6				#7		#8		#9				#10		#11		#12				#13		#14		#15					
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	GHM	GHP				
9:00	0.0	0.0	1.5	2.0	0.5	1.0	0.7	1.9	0.5	0.5	0.0	0.0	5	5	0.3	0.2	0.5	0.8	0.5	0.7	0.5	0.6	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.4	0.0	0.0	1.5	1.6	0.7	0.6
10:00	0.5	0.9	3.0	4.0	0.5	1.0	1.3	2.2	1.0	0.9	8.0	4.3			4.5	3.1	1.0	1.5	0.5	0.7	3.0	3.8	1.5	2.1	1.5	4.1	1.0	1.1	3.5	2.3	2.0	2.2	2.0	1.5	1.5	1.3	0.5	0.6	1.3	1.2		
11:00	4.5	7.7	12.0	15.9	3.5	6.7	6.8	11.3	13.5	12.4	45.0	24.4			29.3	19.9	7.0	10.8	7.5	10.5	8.5	10.6	7.7	10.7	5.0	13.5	6.0	6.5	27.5	17.7	12.8	13.8	19.0	14.2	8.0	7.1	12.5	13.7	13.2	11.5		
12:00	18.0	30.8	14.0	18.5	10.5	20.1	14.2	23.4	25.0	22.9	50.5	27.4			37.8	25.7	14.0	21.5	8.0	11.2	20.0	25.0	14.0	19.5	6.0	16.2	24.5	26.6	27.0	17.4	19.2	20.6	25.5	19.1	22.0	19.4	20.0	21.9	22.5	19.7		
13:00	19.0	32.5	24.0	31.8	8.5	16.4	15.5	25.6	27.5	25.2	31.5	17.1			29.5	20.1	19.0	29.2	19.0	26.6	20.5	25.6	19.5	27.2	8.0	21.6	19.5	21.2	41.0	26.4	21.2	22.7	41.5	31.1	32.0	28.2	19.0	20.8	30.8	26.9		
14:00	12.0	20.5	11.5	15.2	19.0	36.5	14.2	23.4	24.0	22.0	29.0	15.7			26.5	18.1	13.0	20.0	16.5	23.1	15.0	18.8	14.8	20.7	8.0	21.6	23.0	25.0	30.5	19.6	20.5	22.0	24.5	18.4	29.0	25.6	19.5	21.3	26.0	22.7		
15:00	4.5	7.7	9.5	12.6	9.5	18.3	7.8	13.0	17.5	16.1	20.5	11.1			19.0	13.0	10.5	16.2	19.5	27.3	12.5	15.6	14.2	19.7	8.5	23.0	18.0	19.6	26.0	16.7	17.5	18.8	20.5	15.4	21.0	18.5	18.5	20.2	20.0	17.5		
16:00																																										
TOTALS	58.5	100.1	75.5	100.0	52.0	100.0	60.5	100.8	109.0	100.0	234.5	100.0			146.9	100.0	65.0	100.0	71.5	100.1	80.0	100.0	71.9	100.1	37.0	100.0	92.0	100.0	155.5	100.1	93.2	100.1	133.5	100.1	113.5	100.1	91.5	100.1	114.5	100.1		

TABLE 7B. POLLEN FORAGER DATA FROM POSTFLOW SUGAR SYRUP EXPERIMENT, 14 SEPTEMBER 1972.

Time of Day	GROUP III (C)								GROUP I (SS E ₁₀)								GROUP II (SS L ₁₀)								GROUP IV (SS H ₁₂)								GROUP V (SS L ₁₂)							
	#1		#2		#3				#4		#5		#6				#7		#8		#9				#10		#11		#12				#13		#14		#15			
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	GHM	GHP		
9:00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10:00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11:00	0.0	0.0	1.0	14.2	0.0	0.0	0.3	6.4	2.0	14.8	3.0	12.8			2.5	13.5	1.0	14.3	0.5	5.0	2.0	13.3	1.2	11.3	0.0	0.0	0.5	5.0	2.0	13.3	0.8	10.0	10.5	53.9	0.5	2.4	2.5	15.6	4.5	24.1
12:00	1.5	37.5	0.5	7.1	0.5	12.5	1.0	19.3	1.5	11.1	7.0	29.8			4.3	23.0	0.5	7.1	1.5	15.0	5.0	33.3	2.3	22.6	0.0	0.0	6.0	60.0	3.5	23.3	3.2	38.0	4.0	20.5	6.5	31.7	6.0	37.5	5.5	29.5
13:00	1.0	25.0	3.0	42.9	0.5	12.5	1.5	27.1	4.0	29.6	6.0	25.5			5.0	27.0	2.0	28.6	3.0	30.0	2.5	16.7	2.2	21.0	0.0	0.0	1.0	10.0	4.0	26.7	1.7	20.0	3.5	18.0	5.5	26.8	2.5	15.6	3.8	20.5
14:00	0.5	12.5	1.0	14.3	2.5	62.5	1.3	25.8	2.5	18.5	4.5	19.2			3.5	18.9	1.5	21.4	2.5	25.0	2.5	16.7	2.2	21.0	0.0	0.0	0.5	5.0	3.5	23.3	1.3	16.0	1.0	5.1	4.5	22.0	3.0	18.8	2.8	15.2
15:00	1.0	25.0	1.5	21.4	0.5	12.5	1.0	19.4	3.5	25.9	3.0	12.8			3.3	17.6	2.0	28.6	2.5	25.0	3.0	20.0	2.5	24.3	0.0	0.0	2.0	20.0	2.0	13.3	1.3	16.0	0.5	2.6	3.5	17.1	2.0	12.5	2.0	10.7
16:00																																								
TOTALS	4.0	100.0	7.0	100.0	4.0	100.0	5.1	100.0	13.5	99.9	23.5	100.1			18.6	100.0	7.0	100.0	10.0	100.0	15.0	100.0	10.4	100.2	-0-	-0-	10.0	100.0	15.0	99.9	8.3	100.0	19.5	100.1	20.5	100.0	16.0	100.0	18.6	100.0

TABLE 7C. POLLEN COLLECTION DATA FROM POSTFLOW SUGAR SYRUP EXPERIMENT, 14 SEPTEMBER 1972.

Time of Day	GROUP III (C)								GROUP I (SS E ₁₀)								GROUP II (SS L ₁₀)								GROUP IV (SS H ₁₂)								GROUP V (SS L ₁₂)							
	#1		#2		#3				#4		#5		#6				#7		#8		#9				#10		#11		#12				#13		#14		#15			
	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	M	P	GHM	GHP	M	P	M	P	GHM	GHP		
9:00																																								
10:00													5	5																										
11:00	0.00	0.0	0.41	7.0	1.55	11.4	0.65	9.3	0.00	0.0	2.20	10.5			1.10	9.5	0.03	1.0	1.52	15.2	0.25	3.7	0.60	9.2	0.32	10.4	0.45	4.8	1.40	11.5	0.72	8.8	5.31	16.4	0.70	3.8	0.20	2.5	2.07	10.6
12:00	0.56	32.7	2.70	46.4	2.57	18.9	1.94	27.6	1.01	44.3	6.40	30.7			3.71	32.8	0.76	25.8	4.27	42.7	2.19	32.7	2.41	36.3	1.09	35.5	4.24	45.4	5.04	41.4	3.46	42.2	16.03	49.5	6.74	36.4	3.64	45.5	8.80	44.9
13:00	0.60	35.1	1.70	29.2	4.31	31.7	2.20	31.3	0.72	31.6	6.60	31.6			3.66	31.6	1.02	34.6	2.68	26.8	2.19	32.7	1.96	29.9	1.06	34.5	3.18	34.0	3.00	24.6	2.41	29.4	7.77	24.0	7.54	40.7	2.54	31.8	5.95	30.3
14:00	0.55	32.2	1.01	17.4	5.17	38.0	2.24	31.9	0.55	24.1	5.67	27.2			3.11	26.8	1.14	38.6	1.53	15.3	2.07	30.9	1.58	24.1	0.60	19.5	1.48	15.8	2.75	22.6	1.61	19.6	3.25	10.0	3.53	19.1	1.62	20.3	2.80	14.3
15:00																																								
16:00																																								
TOTALS	1.71	100.0	5.82	100.0	13.60	100.0	7.02	100.0	2.28	100.0	20.87	100.0			11.58	100.7	2.95	100.0	10.00	100.0	6.70	100.0	6.55	100.0	3.07	99.9	9.35	100.0	12.19	100.1	8.20	100.0	32.36	49.9	18.51	100.0	8.00	100.1	19.62	100.1

TABLE 7A. TOTAL FORAGER DATA FROM POSTFLOW SUGAR SYRUP EXPERIMENT, 14 SEPTEMBER 1972.

Time of Day	GROUP III (C)								GROUP I (SS E ₁₀)								M
	#1		#2		#3		GHM	GHP	#4		#5		#6		GHM	GHP	
	M	P	M	P	M	P			M	P	M	P	M	P			
9:00	0.0	0.0	1.5	2.0	0.5	1.0	0.7	1.9	0.5	0.5	0.0	0.0	5	5	0.3	0.2	0.5
10:00	0.5	0.9	3.0	4.0	0.5	1.0	1.3	2.2	1.0	0.9	8.0	4.3			4.5	3.1	1.0
11:00	4.5	7.7	12.0	15.9	3.5	6.7	6.8	11.3	13.5	12.4	45.0	24.4			29.3	19.9	7.0
12:00	18.0	30.8	14.0	18.5	10.5	20.1	14.2	23.4	25.0	22.9	50.5	27.4			37.8	25.7	14.0
13:00	19.0	32.5	24.0	31.8	8.5	16.4	15.5	25.6	27.5	25.2	31.5	17.1			29.5	20.1	19.0
14:00	12.0	20.5	11.5	15.2	19.0	36.5	14.2	23.4	24.0	22.0	29.0	15.7			26.5	18.1	13.0
15:00	4.5	7.7	9.5	12.6	9.5	18.3	7.8	13.0	17.5	16.1	20.5	11.1			19.0	13.0	10.5
16:00																	
TOTALS	58.5	100.1	75.5	100.0	52.0	100.0	60.5	100.8	109.0	100.0	134.5	100.0			146.9	100.0	65.0

TABLE 7B. POLLEN FORAGER DATA FROM POSTFLOW SUGAR SYRUP EXPERIMENT, 14 SEPTEMBER 1972.

Time of Day	GROUP III (C)								GROUP I (SS E ₁₀)								M
	#1		#2		#3		GHM	GHP	#4		#5		#6		GHM	GHP	
	M	P	M	P	M	P			M	P	M	P	M	P			
9:00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5	5	0.0	0.0	0.0
10:00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0
11:00	0.0	0.0	1.0	14.2	0.0	0.0	0.3	6.4	2.0	14.8	3.0	12.8			2.5	13.5	1.0
12:00	1.5	37.5	0.5	7.1	0.5	12.5	1.0	19.3	1.5	11.1	7.0	29.8			4.3	23.0	0.5
13:00	1.0	25.0	3.0	42.9	0.5	12.5	1.5	27.1	4.0	29.6	6.0	25.5			5.0	27.0	2.0
14:00	0.5	12.5	1.0	14.3	2.5	62.5	1.3	25.8	2.5	18.5	4.5	19.2			3.5	18.9	1.5
15:00	1.0	25.0	1.5	21.4	0.5	12.5	1.0	19.4	3.5	25.9	3.0	12.8			3.3	17.6	2.0
16:00																	
TOTALS	4.0	100.0	7.0	100.0	4.0	100.0	5.1	100.0	13.5	99.9	23.5	100.1			18.6	100.0	7.0

TABLE 7C. POLLEN COLLECTION DATA FROM POSTFLOW SUGAR SYRUP EXPERIMENT, 14 SEPTEMBER 1972.

Time of Day	GROUP III (C)								GROUP I (SS E ₁₀)								M
	#1		#2		#3		GHM	GHP	#4		#5		#6		GHM	GHP	
	M	P	M	P	M	P			M	P	M	P	M	P			
9:00																	
10:00													5	5			
11:00	0.00	0.0	0.41	7.0	1.55	11.4	0.65	9.3	0.00	0.0	2.20	10.5			1.10	9.5	0.03
12:00	0.56	32.7	2.70	46.4	2.57	18.9	1.94	27.6	1.01	44.3	6.40	30.7			3.71	32.8	0.76
13:00	0.60	35.1	1.70	29.2	4.31	31.7	2.20	31.3	0.72	31.6	6.60	31.6			3.66	31.6	1.02
14:00	0.55	32.2	1.01	17.4	5.17	38.0	2.24	31.9	0.55	24.1	5.67	27.2			3.11	26.8	1.14
15:00																	
16:00																	
TOTALS	1.71	100.0	5.82	100.0	13.60	100.0	7.02	100.0	2.28	100.0	20.87	100.0			11.58	100.7	2.95