RESULTS AND DISCUSSION

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For studying the correspondence between honeybee hybrids and their activities in : brood rearing, queen rearing, royal jelly production, honey production, pollen gathering activity and some biometric characters of emerged queens and workers, the following points were recorded during 1993 and 1994.

The data recorded in **Table** (1, 2) and illustrated in **Fig.** (13) during the two seasons of the study (1993 and 1994).

1- BROOD REARING :

The data recorded in **Table** (1) through the year 1993 showed that the hybrid of Starline gave the highest amount of brood production, while the Buckfast gave the lowest amount . The results tabulated in **Table** (1) indicated that the amount of sealed brood areas produced by the three colonies from each hybrid of, Buckfast, Carnica, Midnite, and Starline hybrids during the first season were 18616.0, 19421.0, 18752.0 and 21074.0 $inch^2$, respectively with an average produced monthly were 1551.33, 1618.42, 1562.67 and 1756.17 $inch^2$, respectively. Form the data recorded in **Table** (1) it was also found that the highest amounts of brood areas appeared during April were 3375.0, 3251.0, 2933.0 and 3377.0 $inch^2$, respectively while the lowest amount s of brood are as appeared during December were 281.0, 369.0, 416.0 and 458.0 $inch^2$, respectively. It was also observed that the areas of sealed brood produced through the period from March to September were high, while they were low thorough the period from October to February that might be due to the fluctuations of the temperature and the relative humidity during the two periods, where it seemed more suitable for brood rearing through the

period from 1 March to September where its mean was (max. 30°C, min. 15.5°C and 63% R.H).

As for the second period from October to February, the mean of temperature and relative humidity was (max. 22.8°C, min.17.6°C and 68%R.H.) so it gave the lowest brood areas.

Table (1): Honey bee hybrids activities for sealed brood rearing areas (square inches) produced from January-December (1993).

Period or Dates	Sealed brood areas of honey bee hybrids				Mean		
					Temperature		R.H.
	Buckfast	Carnica	Midnite	Starline	Max.	Min.	%
January 9, 23	327	424	519	602	17.7	5.4	76
February 6, 20	938	1294	1317	1370	18.8	5.0	64
March 4, 17, 31	1640	1464	1378	1582	21.2	7.0	68
April 13, 26	3375	3251	2933	3377	28.0	10.5	60
May 9, 22	2072	2532	2358	2529	30.1	14.8	58
June 5, 19	3189	2766	2673	3132	34.4	18.3	56
July 3, 17, 31	1863	1826	1761	2078	34.5	20.4	64
August 14, 28	1554	1527	1426	1578	34.1	20.4	71
September 11, 23	1538	1649	1423	1645	32.4	17.4	69
October 6, 19	941	1243	1359	1600	31.7	17.0	70
November 1, 14, 27	898	1076	1135	1123	24.8	12.6	75
December 11, 25	281	369	416	458	21.3	9.5	82
Total	18616	19421	18698	21074	--	--	--
Mean	1551.33	1618.42	1558.17	1756.17	27.4	13.2	68
X	229.83	239.77	231.64	260.17	--	--	--

L.S.D. for	Hybrids	Date
at 0.05 =	47.97	18.46
at 0.01 =	63.04	24.26

The data recorded in **Table** (2) indicated that the amount of sealed brood produced monthly during the second season was: the Starline hybrid gave the highest area, while the Buckfast hybrid gave the lowest amount. The whale amount of sealed brood areas produced from Buckfast, Carnica, Midnite and Starline honey bee hybrids during the second season were, 18969, 20483, 19263 and 22434 $inch^2$, respectively with an average produced monthly were 1572.33, 1715.58, 1605.25 and 1870.67 $inch^2$, respectively. From the data in **Table** (2) it was found that the highest amounts of sealed brood produced during April were 3041.0, 3087.0, 2705.0 and 3661.0 $inch^2$, respectively while the lowest amount of sealed brood areas produced during the month of January were 404.0, 518.0, 574.0 and 581.0 $inch^2$, respectively. From the data tabulated in **Table** (2) appeared that the high amount of sealed brood areas were produced during the period from February to October where the mean degree of temperature and the R.H, were (max. 30.4°C, min, 15.6°C and 63% R.H.) while the low amounts of sealed brood areas were produced during the period from November to January, where the mean degree of temperature and R.H, were (max. 20.8°C, min. 10.1°C and 71.6% R.H.).

The data obtained in this experiment were in Agreement with **Rowland and Mclellan (1982), Harbo (1986) and Maria *et al.* (1995).**

The increasing in brood rearing production in case of Starline hybrid colonies return to the ovaries of the queen which had high numbers of ovarioles that produce more thousands of eggs than other hybrids. The decreased amount of brood reared in other hybrid colonies were due to the low numbers of ovarioles that produce less thousands of eggs than Starline hybrid. **Michener (1974)** concluded that this was a common feature of social Hymenoptera the increased rate of the sealed brood produced in the second season might returned to the convenience of the environmental conditions with the activity of the honey bee in this period.

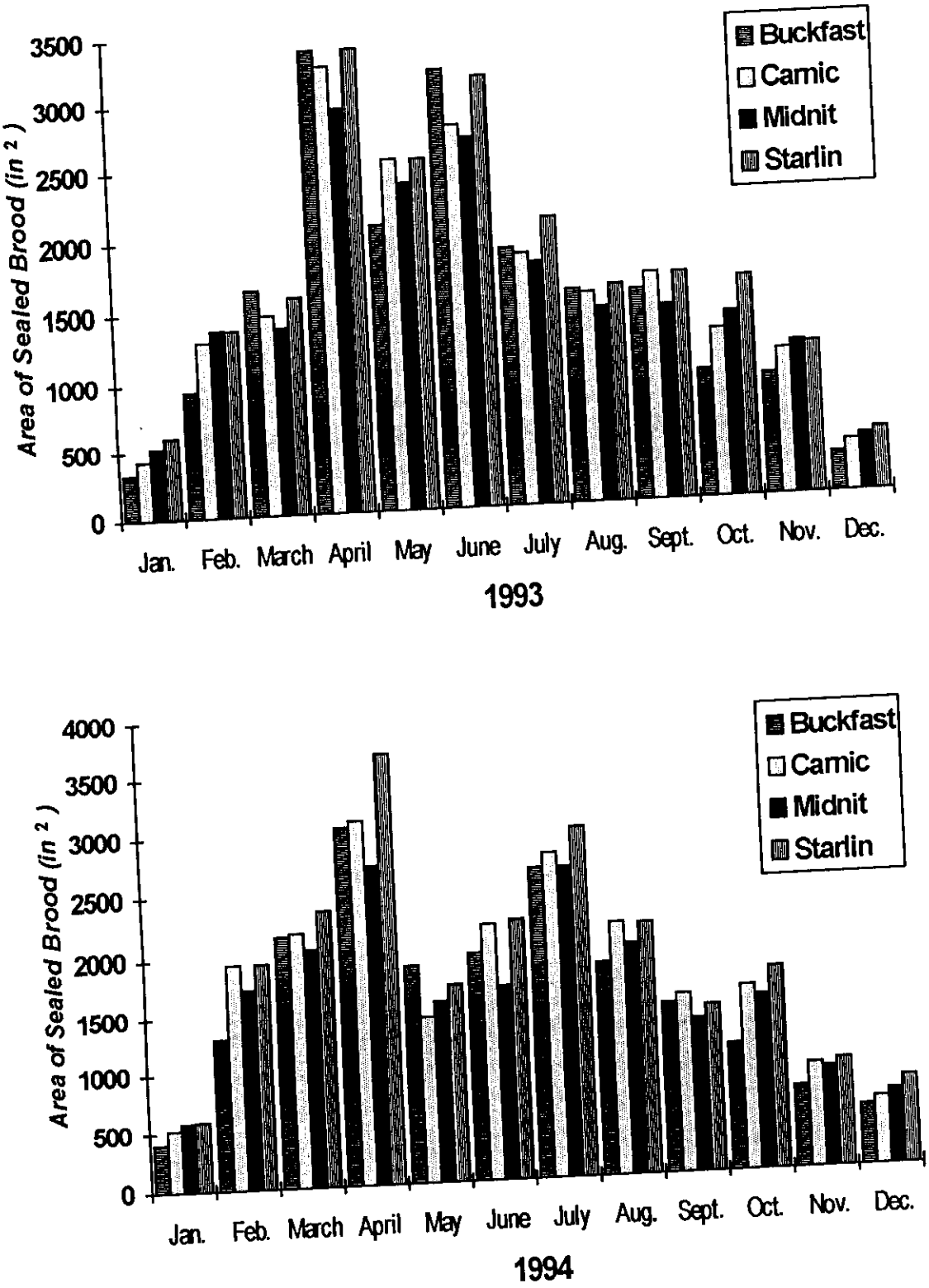


Fig. (13): Effect of type of honey bee hybrids for the sealed broad areas produced from January-December during the two seasons of the study (1993-1994).

Table (2): Honey bee hybrids activities for sealed brood rearing areas (square inches) produced from January-December (1994).

Period or Dates	Sealed brood areas of honey bee hybrids				Mean		
					Temperature		R.H.
	Buckfast	Carnica	Midnite	Starline	Max.	Min.	%
January 8, 22	404	518	574	581	19.9	9.5	72
February 5, 19	1300	1560	1734	1947	21.2	7.6	60
March 5, 19	2159	2179	2047	2348	22.3	8.4	71
April 2,14, 27	3041	3087	2705	3661	29.7	12.3	57
May 10, 23	1884	1429	1571	1711	32.0	14.9	56
June 5, 18, 30	1968	2192	1683	2217	33.7	18.1	58
July 13, 26	2631	2751	2634	2964	34.6	20.1	63
August 8, 21	1847	2165	1994	2153	34.3	20.5	70
September 3, 17	1470	1544	1317	1435	34.0	20.2	69
October 1, 15, 29	1074	1602	1515	1757	31.9	18.7	65
November 12, 26	687	886	854	918	23.4	13.1	71
December 10, 24	504	570	635	742	19.1	7.8	72
Total	18969	20483	19263	22434	--	--	--
Mean	1580.75	1706.92	1605.25	1869.50	28.0	14.3	65
X	234.19	252.88	237.81	276.96	--	--	--

L.S.D. for	Hybrids	Date
at 0.05 =	61.84	23.79
at 0.01 =	81.23	31.27

Statistical analysis of the data recorded in **Tables** (1 and 2) showed that the difference between the hybrids in amount of sealed brood areas were highly significant in the two seasons of the study, ($P<0.01$). L.S.D. 0.05 and 0.01 were 47.97 and 63.04 inch^2, respectively during 1993, while L.S.D. 0.05 and 0.01 were 61.84 and 81.23 inch^2, respectively

during 1994, and also the difference between various periods according to amount of sealed brood production were highly significant in the two seasons of the study, ($P<0.01$) L.S.D. 0.05 and 0.01 were 18.46 and 24.26 inch^2, respectively during 1993. While were 23.79 and 31.27 inch^2, respectively during .

II)- HONEYBEE HYBRIDS ACTIVITY FOR QUEEN REARING :

It is well known that queens are reared by worker bees under the swarming and supersedure impulse or in case of queen lessens. The present study examined the effect of the absence of the mother queen from the colony. The number of emerged queens per colony recorded in **Table** (3 & 4) and illustrated in **Fig.** (14).

The data recorded in **Table** (3) showed the number of emerged queens per colony in the different honey bee hybrids during the period of the study in the first season (1993).

The mean number of emerged queens per colony from these honey bee hybrids were 40.89, 42.28, 44.44 and 46.17 queens per colony of Buckfast, Carnica, Midnite and Starline respectively with percentage of 68.15%, 70.47%, 74.07% and 76.95%, respectively. It was also appeared &cm the data that the Starline honeybee hybrid was high in queen production while the Buckfast honey bee hybrid was the least in queen production.

The data in **Table** (4) showed the number of emerged queens per colony from the different honey bee hybrid during the second season. the mean number of emerged queens per colony were 34.11, 36.33, 40.33 and 42.11 queen per colony from colonies of different honeybee hybrids, Buckfast, Carnica, Midnite and Starline respectively with a percentage of

56.85%, 60.55%, 67.22% and 70.18% respectively.

The data recorded in **Table** (4) showed that the Starline hybrid was high in queen production, while the Buckfast hybrid was the lower in queen production.

From the data recorded in **Table** (3) and (4) during April in the two seasons of the study it was found that the mean number of queens produced per colony from the four hybrid, Buckfast, Carnica, Midnite and Starline was 45.0, 46.7, 49.7 and 54.3, respectively and also it appeared that the Starline honeybee hybrid had the dominance in queen production. These results obtained agreed with **Kyuregyan (1965).**

The statistical analysis of the data recorded in **Table** (3 and 4) showed that the difference between the honeybee hybrids in queen production were not significant in the two seasons of the study while the difference in queen production during various rearing period in the first season was highly significant and not significant in the second season of the study.

The increasing in queen production in colonies of the Starline hybrid return to the large number of nurse bees and that was in agreement with **Krol (1974)** who found that the racial origin of transplanted larvae and nurse bees influenced larval acceptance. As well as present pollen grains in these colonies affected the larvae accepted during artificial queen rearing. **Bobrzecki and Parbucki (1976)** studied the effect of the type of queen cells and food on the success of queen rearing.

The data obtained in this experiment agreed with **Pickard and Kither (1983) and Macicka (1985).**

Table (3): Honey bee hybrids activity for queen rearing in case of grafted larvae at 24 h. in artificial queen cups, starting with 60 queen cups per replicate, during 1993 season.

Dates	Rep.	No. of Emerged queens produced from honey bee hybrids												Mean		
		Buckfast			Carnica			Midnite			Starline			Temperature		R.H. %
		Emerged queens	Total	Mean	Emerged queens	Total	Mean	Emerged queens	Total	Mean	Emerged queens	Total	Mean	Max.	Min.	
24-2-93	1	30	90	30.0	39	112	37.3	42	124	41.3	47	121	40.3	26.3	8.2	63
	2	42			42			50			29					
	3	18			31			32			45					
22-3-93	1	42	134	44.7	32	128	42.7	56	146	48.7	35	141	47.0	21.4	4.7	73
	2	47			46			38			55					
	3	45			50			52			51					
24-4-93	1	39	135	45.0	46	140	46.7	41	149	49.7	54	163	54.3	25.6	8.7	64
	2	51			43			52			53					
	3	45			51			56			56					
24-5-93	1	40	131	43.7	38	137	45.7	52	148	49.3	54	153	51.0	30.4	15.2	65
	2	52			47			50			48					
	3	39			52			46			51					
23-6-93	1	40	128	42.7	31	121	40.3	40	133	44.3	46	131	43.7	34.8	19.4	56
	2	49			39			48			48					
	3	39			51			45			37					
24-7-93	1	42	118	39.3	42	123	41.0	47	100	33.3	45	122	40.7	32.4	21.2	68
	2	46			39			32			52					
	3	30			42			21			25					
Total			736			761			800			831				
Mean				40.9			42.28			44.43			46.17			
%				68.15			70.47			74.07			76.95			

L.S.D. for Dates
at 0.05 = 8.27
at 0.01 = 11.03

Table (4): Honey bee hybrids activity for queen rearing in case of grafted larvae at 24 h. in artificial queen cups, starting with 60 queen cups per replicate, during 1994 season.

Dates	Rep.	No. of emerged queens produced from honey bee hybrids												Mean		
		Buckfast			Carnica			Midnite			Starline			Temperature		R.H. %
		Emerged queens	Total	Mean	Emerged queens	Total	Mean	Emerged queens	Total	Mean	Emerged queens	Total	Mean	Max.	Min.	
23-2-94	1	21	78	26.0	37	97	32.3	48	106	35.3	42	109	36.3	20.3	10.3	72
	2	38			31			27			40					
	3	19			29			31			27					
26-3-94	1	41	108	36.0	44	103	34.3	42	125	41.7	46	127	42.3	23.2	9.5	74
	2	39			21			54			39					
	3	28			38			29			42					
25-4-94	1	51	118	39.3	48	133	44.3	54	138	46.0	37	138	46.0	24.9	11.9	67
	2	28			36			48			49					
	3	39			49			36			52					
25-5-94	1	39	115	38.3	36	116	38.7	31	130	43.3	39	136	45.3	35.2	16.8	58
	2	50			29			48			46					
	3	26			51			51			51					
25-6-94	1	19	100	33.3	38	103	34.3	42	116	38.7	51	127	42.3	33.5	19.0	63
	2	42			29			45			48					
	3	39			36			29			28					
24-7-94	1	29	95	31.7	38	92	30.7	51	111	37.0	46	121	40.3	34.7	17.4	61
	2	24			16			39			42					
	3	42			48			21			33					
Total			614			644			726			758				
Mean				34.11			35.77			40.33			42.13			
%				56.85			60.55			67.22			70.18			

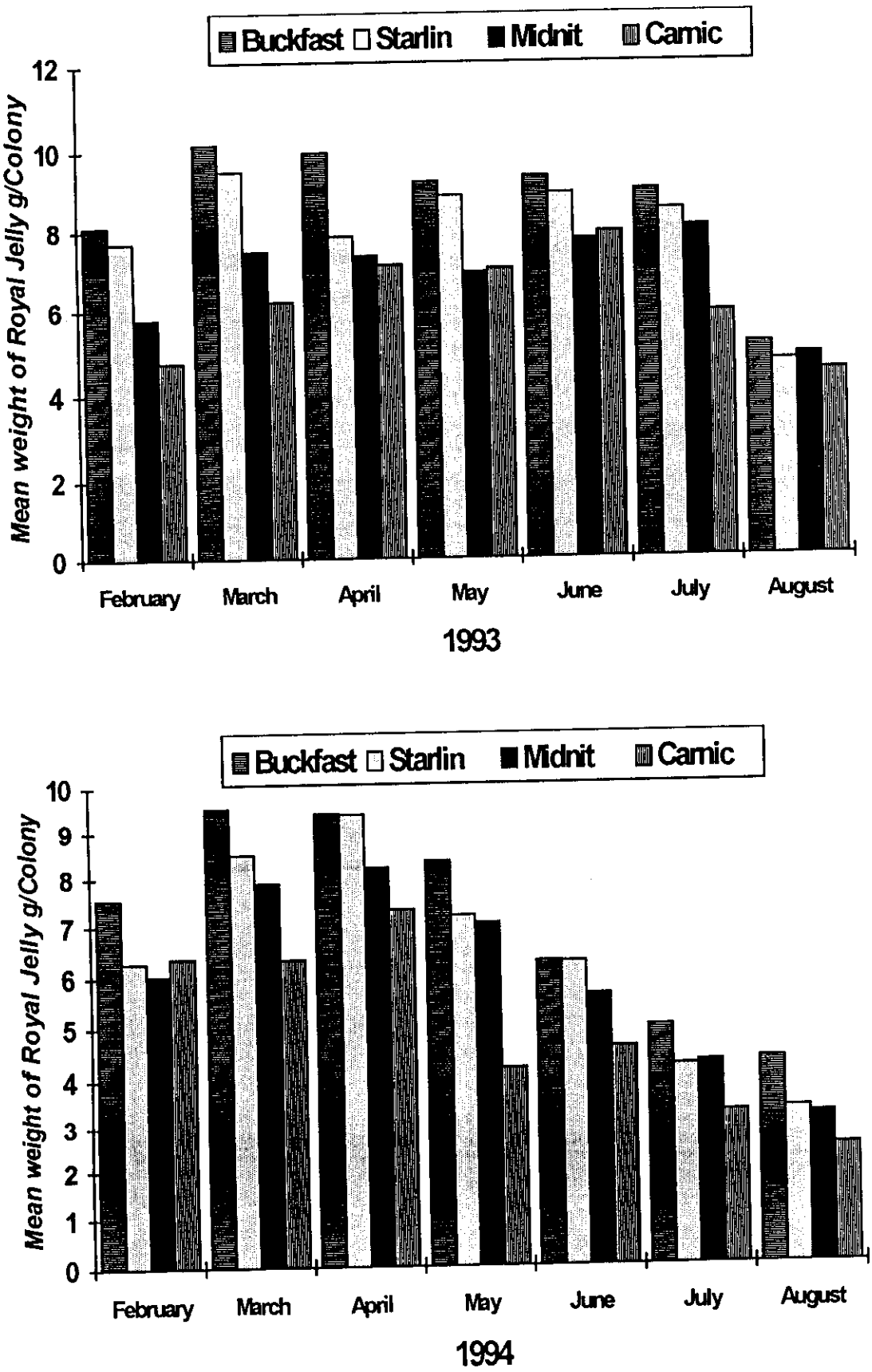


Fig. (15): Effect of type of honey bee hybrids for the royal jelly produced from February-August during the two seasons of the study (1993-1994).

IV- HONEYBEE RACES ACTIVITY DURING DIFFERENT HONEY FLOW SEASONS AT MOSHTOHOR REGION :

1)-Estimating the honeybee activity in nectar gathering during the nectar-flows seasons :

Four colonies each two races F_1 Carniolan and F_1 Italian honeybee were used in the study. Each colony was daily weighed during periods with electrical balance of the seasons nectar-flows as follows :

A-CITRUS NECTAR-FLOW SEASON :

At Moshtohor region citrus flow began from 15th March to 20th April. During this period the total amount of yield gained in the eight colonies was 15.45 kg with an average 1.93 kg/colony, **Table (7)**. The amount of gained stored in the four colonies of Carniolan race was 7.35 kg with an average of 1.840 kg/colony, while the amount of gained stored by the four colonies of Italian race was 8.100 kg, with an average of 2.025 kg/colony. Statistical analysis showed that the difference appeared in the yield gained between the two breeds was significant, ($P>0.05$). While was the difference in the daily gained during this period highly significant.

B- CLOVER NECTAR-FLOW SEASON :

The data recorded in **Table (8)** showed the amount of the net gained (food stored in the colony) in eight colonies during the clover nectar-flow seasons, which began from 10th May to 12th June. The total amount of net gained stored in the eight colonies in this period was 23.950 kg with an average 3.210 kg/colony. The amount of net gain yielded in the 4 colonies F_1 Italian was 13.200 kg, with an average 3.30 kg/colony, while these amount gained in 4 F_1 Carniolan colonies was 10.750 kg, with an average 2.690 kg/colony. Statistical analysis showed

that the difference between the two breeds was significant, (P>0.05). While was the daily gained during this period highly significant.

C- COTTON NECTAR-FLOW SEASON :

The data recorded in **Table (9)** illustrated the amount of net gain stored in the eight colonies of two strains during this period, which began from 6th July to 7th August. The total amount of net gain stored in these colonies was 27.850 kg, with an average of 3.480 kg/colony. The total amount of net gain yield in 4 F_1 Italian colonies was 15.450 kg, with an average of 3.860 kg/colony, while in the other 4 F_1 Carniolan colonies gained 12.400 kg, with an average of 3.100 kg/colony. Statistical analysis showed that the differences in gained colonies between the two breeds was non-significant, (P<0.05). While the daily gained during this period was highly significant.

The previous results showed F_1 Italian race was more proficient than the F_1 Carniolan.

The results obtained in this experimental agreed with **Szabo and Lefkovitch (1990).** These found the increased of weight colonies during period from March to October was no significant and while was the greatest monthly increases in weight regardless of treatment occurred during May and July with all colonies loosing significant amount of weight during August.

Table (7): The daily gains and losses in colonies weight (in kg) during the citrus nectar flow, 1997 from 15th March to 20th April.

Races	Italian race							Carniolan race						
Date	I	II	III	IV	G.T.	Total	Average	I	II	III	IV	G.T.	Total	Average
15/03/97	-0.15	-0.05	-0.10	0.20	0.50	0.025	0.100	0.15	-0.05	-0.15	0.10	0.45	0.05	0.013
16/03/97	-0.10	-0.15	-0.05	-0.15	0.45	0.45	0.113	-0.15	-0.15	-0.10	-0.10	0.50	0.50	0.125
17/03/97	-0.15	-0.05	-0.15	-0.10	0.45	0.45	0.113	-0.10	-0.15	0.00	-0.10	0.35	0.35	0.088
18/03/97	-0.25	-0.10	-0.10	-0.10	0.55	0.55	0.137	-0.25	-0.05	-0.05	-0.05	0.40	0.40	0.100
19/03/97	-0.25	-0.15	-0.30	-0.15	0.85	0.85	0.213	-0.35	-0.05	-0.05	-0.05	0.50	0.50	0.125
20/03/97	-0.25	0.05	-0.20	-0.05	0.55	0.45	0.113	-0.20	-0.05	-0.15	-0.10	0.50	0.50	0.125
22/03/97	0.10	0.10	0.25	0.05	0.50	0.50	0.125	0.10	0.20	0.15	0.20	0.65	0.65	0.163
23/03/97	0.30	0.20	0.40	0.70	1.60	1.60	0.400	0.65	0.40	0.40	0.35	1.80	1.80	0.450
24/03/97	-0.10	-0.05	-0.15	-0.25	0.55	0.55	0.138	-0.05	-0.10	0.05	-0.10	0.30	0.20	0.050
25/03/97	-0.15	-0.20	-0.05	-0.15	0.55	0.55	0.137	-0.05	-0.10	-0.15	-0.10	0.40	0.40	0.100
26/03/97	0.00	0.05	0.00	-0.10	0.15	0.05	0.013	0.15	-0.15	-0.15	-0.05	0.50	0.20	0.050
27/03/97	-0.10	-0.30	-0.05	-0.30	0.75	0.75	0.188	0.05	0.25	-0.15	0.00	0.45	0.15	0.038
29/03/97	-0.10	-0.15	0.10	-0.15	0.50	0.30	0.075	-0.15	-0.05	0.25	-0.10	0.55	0.05	0.013
30/03/97	0.10	0.20	0.70	0.50	1.50	1.50	0.375	0.35	0.50	0.30	0.15	1.30	1.30	0.325
31/03/97	-0.05	0.40	-0.10	-0.25	0.80	0.00	0.000	0.25	0.10	-0.15	0.20	0.70	0.40	0.100
01/04/97	0.05	0.45	0.40	0.00	0.90	0.90	0.225	0.05	-0.10	0.00	0.20	0.35	0.15	0.038
02/04/97	-0.05	0.25	0.30	-0.05	0.65	0.45	0.113	-0.05	0.15	-0.05	-0.15	0.40	0.20	0.050
03/04/97	-0.10	-0.15	0.35	-0.15	0.75	0.05	0.013	0.15	0.20	0.25	0.00	0.60	0.60	0.150
05/04/97	-0.05	-0.35	0.45	0.25	1.10	0.30	0.075	-0.10	0.05	-0.30	0.20	0.65	0.15	0.038
06/04/97	0.55	-0.60	-0.10	0.05	1.30	0.10	0.025	-0.35	-0.15	-0.25	-0.30	1.05	-1.05	0.263
07/04/97	0.65	0.10	0.10	0.15	1.00	1.00	0.250	-0.13	0.40	0.20	0.35	1.08	0.82	0.205
08/04/97	0.15	0.25	0.00	-0.15	0.55	0.25	0.063	-0.17	0.10	-0.05	0.15	0.47	0.03	0.008
09/04/97	0.15	0.15	-0.10	0.35	0.75	0.55	0.137	0.30	0.00	0.20	0.05	0.55	0.55	0.138
10/04/97	0.35	0.10	-0.08	0.35	0.88	0.72	0.180	0.20	0.10	0.15	0.02	0.47	0.47	0.118
12/04/97	0.50	0.25	-0.02	0.70	1.47	1.43	0.358	0.25	0.75	0.60	0.38	1.98	1.98	0.495
13/04/97	0.15	0.25	0.45	0.40	1.25	1.25	0.313	0.30	0.35	0.30	0.15	1.10	1.10	0.275
14/04/97	0.35	0.45	0.10	0.15	1.05	1.05	0.263	0.15	0.20	0.05	0.15	0.55	0.55	0.137
15/04/97	0.35	0.35	0.10	0.05	0.85	0.85	0.213	0.05	0.00	0.05	0.15	0.25	0.25	0.063
16/04/97	0.15	0.10	0.30	0.20	0.75	0.75	0.188	0.05	0.15	0.35	0.25	0.80	0.80	0.200
17/04/97	0.15	0.15	0.20	0.15	0.65	0.65	0.163	0.10	0.05	0.05	0.10	0.30	0.30	0.075
19/04/97	-0.05	-0.05	0.05	-0.15	0.30	0.00	0.000	0.20	-0.10	0.10	0.05	0.45	0.25	0.063
20/04/97	0.00	-0.05	-0.05	-0.05	0.15	0.15	0.038	-0.05	-0.05	-0.10	-0.15	0.35	0.25	0.063
G.T.	5.95	6.25	5.85	6.55	24.6	19.10	4.857	5.65	5.25	5.30	4.55	20.75	14.85	4.244
Total	2.15	1.45	2.65	1.95	24.6	19.03	4.857	1.35	2.65	1.6	1.85	20.75	14.85	4.244
Average	0.067	0.045	0.083	0.061	0.769	0.595	0.152	0.042	0.083	0.05	0.058	0.648	0.464	0.133

G.T. = grand total

L.S.D.	for	**Races**	**Date**
	at 0.05 =	0.236	0.059
	at 0.01 =	--	0.078

Table (8): The daily gains and losses in colonies weight (in kg) during the clover nectar flow, 1997 from 10th May to 12th June.

Races	Italian race							Carniolan race						
Date	I	II	III	IV	G.T.	Total	Average	I	II	III	IV	G.T.	Total	Average
10/05/97	0.15	0.20	0.15	0.15	0.65	0.65	0.163	0.15	0.15	0.20	0.20	0.70	0.70	0.175
11/05/97	0.15	0.10	0.15	0.15	0.55	0.55	0.138	0.10	0.10	0.20	0.15	0.55	0.55	0.138
12/05/97	0.05	0.10	0.05	0.15	0.35	0.35	0.088	0.05	0.15	0.05	0.10	0.35	0.35	0.088
13/05/97	0.20	0.05	0.10	0.30	0.65	0.65	0.162	0.05	0.05	0.15	0.05	0.30	0.30	0.075
14/05/97	0.20	0.05	0.05	0.15	0.45	0.45	0.113	-0.05	0.05	-0.05	-0.15	0.30	0.20	0.050
15/05/97	0.25	0.05	-0.15	0.20	0.65	0.65	0.162	0.05	-0.10	0.20	0.25	0.60	0.40	0.100
17/05/97	0.25	0.05	-0.30	0.15	0.75	0.75	0.188	-0.20	0.55	0.15	0.50	1.40	1.00	0.250
18/05/97	0.25	0.15	0.00	-0.15	0.55	0.25	0.063	0.15	-0.20	0.35	0.05	0.75	0.35	0.088
19/05/97	0.15	0.20	0.25	0.15	0.75	0.75	0.188	0.10	0.15	0.15	0.25	0.65	0.65	0.163
20/05/97	0.20	0.15	0.20	0.30	0.85	0.85	0.213	0.10	0.05	0.10	0.30	0.55	0.55	0.138
21/05/97	0.20	0.05	0.20	-0.10	0.55	0.35	0.088	0.20	0.15	0.40	0.35	1.10	1.10	0.275
22/05/97	0.35	0.25	-0.05	0.25	0.90	0.80	0.200	0.15	0.15	0.05	-0.05	0.40	0.30	0.075
24/05/97	0.25	0.15	0.10	0.15	0.65	0.65	0.163	0.00	0.30	0.15	0.20	0.65	0.65	0.162
25/05/97	0.70	0.30	0.35	0.05	1.40	1.40	0.350	0.10	0.05	0.05	0.10	0.30	0.30	0.075
26/05/97	0.55	0.25	0.00	0.35	1.15	1.15	0.288	0.25	0.15	0.20	0.10	0.70	0.70	0.175
27/05/97	0.30	0.50	0.25	0.25	1.30	1.30	0.325	0.15	0.10	0.15	-0.10	0.50	0.30	0.075
28/05/97	0.25	0.05	0.30	0.15	0.75	0.75	0.188	-0.05	0.30	0.35	0.05	0.75	0.65	0.163
29/05/97	0.25	0.15	0.00	-0.05	0.45	0.35	0.088	0.30	-0.05	-0.10	0.20	0.65	0.35	0.088
31/05/97	-0.10	-0.30	0.05	0.05	0.50	0.30	0.075	0.05	0.10	0.05	-0.05	0.25	0.15	0.038
01/06/97	0.10	0.10	0.30	-0.10	0.60	0.40	0.100	-0.05	0.00	-0.15	0.05	0.25	0.15	0.038
02/06/97	0.05	0.20	0.15	-0.05	0.45	0.35	0.088	0.15	-0.05	0.05	-0.15	0.40	0.00	0.000
03/06/97	-0.15	0.20	0.05	-0.05	0.45	0.05	0.013	-0.05	-0.05	0.00	-0.05	0.15	0.15	0.038
04/06/97	-0.20	0.25	0.25	0.15	0.85	0.45	0.113	0.25	-0.05	-0.05	0.30	0.65	0.45	0.113
05/06/97	0.10	0.20	-0.05	0.25	0.60	0.50	0.125	0.15	0.05	0.10	0.05	0.35	0.35	0.088
07/06/97	-0.35	0.20	0.25	-0.05	0.85	0.05	0.013	0.05	-0.10	0.25	0.20	0.60	0.40	0.100
08/06/97	0.20	0.05	0.15	-0.10	0.50	0.30	0.075	0.05	-0.05	0.20	0.25	0.55	0.45	0.113
09/06/97	0.15	0.10	-0.05	-0.10	0.40	0.10	0.025	0.25	-0.05	-0.05	0.15	0.50	0.30	0.075
10/06/97	0.00	0.15	0.00	0.00	0.15	0.15	0.038	0.15	0.25	-0.10	0.05	0.55	0.35	0.088
11/06/97	-0.05	0.00	-0.05	-0.05	0.15	0.15	0.038	-0.10	0.00	-0.05	0.00	0.15	0.15	0.038
12/06/97	-0.35	-0.15	0.15	-0.10	0.75	0.45	0.113	-0.05	0.05	-0.15	-0.20	0.45	0.35	0.088
G.T.	6.50	4.70	4.15	4.25	19.6	15.9	3.984	3.55	3.60	4.25	4.65	16.05	12.65	3.170
Total	4.10	3.80	2.85	2.45	19.6	15.9	3.984	2.45	2.20	2.85	3.15	16.05	12.65	3.170
Average	0.137	0.127	0.095	0.082	0.653	0.53	0.133	0.082	0.073	0.095	0.105	0.535	0.422	0.106

G.T. = grand total

L.S.D.	for	**Races**	**Date**
	at 0.05 =	0.200	0.052
	at 0.01 =	--	0.068

Table (9): The daily gains and losses in colonies weight (in kg) during the cotton nectar flow, 1997 from 5th July to 7th August.

Races	Italian race							Carniolan race						
Date	I	II	III	IV	G.T.	Total	Average	I	II	III	IV	G.T.	Total	Average
06/07/97	0.15	0.10	0.20	0.10	0.55	0.55	0.138	0.15	0.05	0.05	0.15	0.40	0.40	0.100
07/07/97	0.00	0.05	-0.05	0.10	0.20	0.10	0.025	0.10	-0.05	0.10	-0.25	0.50	0.10	0.025
08/07/97	0.10	0.10	-0.05	-0.10	0.35	0.05	0.013	0.05	0.10	-0.20	0.05	0.40	0.00	0.000
09/07/97	0.10	0.05	0.05	-0.05	0.25	0.15	0.038	0.10	0.05	0.20	0.30	0.65	0.65	0.163
10/07/97	0.40	0.25	0.10	0.20	0.95	0.95	0.237	0.30	-0.25	0.15	-0.20	0.90	0.00	0.000
12/07/97	0.45	0.20	0.35	0.20	1.20	1.20	0.300	0.20	0.35	0.35	0.20	1.10	1.10	0.275
13/07/97	0.35	0.25	0.25	0.20	1.05	1.05	0.263	0.15	0.50	0.25	0.30	1.20	1.20	0.300
14/07/97	0.50	0.25	0.35	0.60	1.70	1.70	0.425	0.20	0.20	0.35	0.25	1.00	1.00	0.250
15/07/97	0.20	0.20	0.05	0.10	0.55	0.55	0.138	0.35	0.15	0.25	0.05	0.80	0.80	0.200
16/07/97	0.20	0.15	0.05	0.15	0.55	0.55	0.137	0.15	-0.20	0.25	0.15	0.75	0.35	0.088
17/07/97	0.50	0.05	-0.05	0.20	0.80	0.70	0.175	0.15	-0.15	-0.25	0.25	0.80	0.00	0.000
19/07/97	0.30	0.35	0.05	0.30	1.00	1.00	0.250	0.15	0.10	-0.05	-0.30	0.60	0.10	0.025
20/07/97	0.10	0.05	0.10	0.20	0.45	0.45	0.113	0.15	0.15	0.10	0.10	0.50	0.50	0.125
21/07/97	0.10	0.05	0.05	0.10	0.30	0.30	0.075	0.05	0.20	0.15	0.20	0.60	0.60	0.150
22/07/97	0.05	0.15	0.05	0.15	0.40	0.40	0.100	0.25	0.00	0.05	0.15	0.45	0.45	0.113
23/07/97	0.30	0.15	0.10	0.15	0.70	0.70	0.175	0.15	0.15	0.20	0.25	0.75	0.75	0.188
24/07/97	0.15	0.05	0.15	0.15	0.50	0.50	0.125	0.10	0.15	0.10	0.20	0.55	0.55	0.138
26/07/97	0.40	0.30	0.30	0.20	1.20	1.20	0.300	0.20	0.20	0.20	0.30	0.90	0.90	0.225
27/07/97	0.25	0.05	0.05	0.20	0.55	0.55	0.138	0.05	-0.10	0.05	0.10	0.30	0.10	0.025
28/07/97	0.05	0.15	0.15	0.05	0.40	0.40	0.100	0.10	0.15	0.05	0.10	0.40	0.40	0.100
29/07/97	-0.10	0.20	0.05	0.10	0.45	0.25	0.063	0.25	-0.10	-0.20	-0.15	0.70	0.20	0.050
30/07/97	0.15	0.10	0.10	0.00	0.35	0.35	0.088	0.15	0.20	0.15	0.05	0.55	0.55	0.138
31/07/97	0.05	0.15	0.20	0.15	0.55	0.55	0.138	0.05	0.15	0.10	0.10	0.40	0.40	0.100
02/07/97	-0.25	0.10	0.05	0.15	0.55	0.05	0.013	0.30	0.40	0.20	0.25	1.15	1.15	0.288
03/08/97	0.10	-0.40	-0.05	-0.25	0.80	0.20	0.050	-0.10	0.15	0.30	0.15	0.70	0.20	0.050
04/08/97	0.30	0.35	0.30	0.10	1.05	1.05	0.263	0.10	0.10	0.20	0.30	0.70	0.45	0.113
05/08/97	0.25	0.30	0.30	0.35	1.20	1.20	0.300	0.35	0.10	0.35	0.15	0.95	0.95	0.237
06/08/97	-0.25	0.25	0.10	-0.15	0.75	0.45	0.113	-0.25	-0.20	-0.35	-0.15	0.95	0.95	0.238
07/08/97	-0.05	-0.10	-0.20	-0.05	0.40	0.40	0.100	-0.05	-0.10	-0.20	-0.35	0.70	0.70	0.175
G.T.	6.15	4.90	3.90	4.80	19.75	17.55	4.393	4.70	4.75	5.40	5.50	20.35	15.5	3.879
Total	4.85	3.90	3.10	3.60	19.75	17.55	4.393	3.90	2.45	2.90	2.70	20.35	15.5	3.879
Average	0.167	0.134	0.107	0.124	0.681	0.605	0.151	0.134	0.084	0.1	0.093	0.702	0.534	0.134

G.T. = grand total

L.S.D.	for	**Races**	**Date**
	at 0.05 =	--	0.046
	at 0.01 =	--	0.060

2)- HONEY PRODUCED FROM SOME HONEYBEE RACES :

Four colonies were used from each hybrid in this experiment the amount of honey produced by each colony was determined by the difference in weight of combs before and after extraction. tabulated in **Tables** (10, 11 and 12), and illustrated in **Fig.** (16)

(A)- CITRUS NECTAR FLOW :

The data in **Table** (10) showed the amount of honey produced from different colonies of honey bee hybrids during the citrus nectar flow in the two seasons of the study. The average amounts of honey produced per colony from the four hybrids, Buckfast, Starline, Midnite and Carnica during the first season were 2.750, 2.530, 2.360 and 3.060 kg/colony, respectively, while they were 3.190, 3.740, 3.350 and 3.680 kg/colony, respectively during the second season.

From the data in **Table** (10) it was clear that the Carnica honey bee hybrid was better than the other honey, bee hybrids in the amount of honey produced during the two seasons of the study. The data in **Table** (10) indicated also that the amount of honey produced from each colony was high during the second season, that might be due to the adequacy of the environmental conditions in the region of the study, where the total amount of honey produced in this experiment during the second season was 55.8 kg, while the total amount of the honey produced during the first season was 42.8 kg.

For statistical analysis, the data recorded in **Table** (10) showed that the difference between the amount of honey produced from colonies of the four hybrids during first season was significant, while it was not significant during the second season.

B)- CLOVER NECTAR FLOW :

The data in **Table** (11) showed the amount of honey produced during the clover nectar flow in the two seasons of the study. The average amounts of honey produced per colony from the honey bee hybrids, Buckfast Starline, Midnite and Carnica were 2.14, 2.44, 2.41 and 2.91 kg/colony respectively during the first season, while they were 3.96, 3.98, 3.85 and 4.10 kg./colony, respectively during the second season.

The data appeared also that the Carnica honey bee hybrid gave the high weight of honey if compared with the other honey bee hybrids. The honey produced in the second season was higher than that of the first season where it was 63.22 kg. in the second season, while it was 46.60 kg. in the first season.

As for statistical analysis the data tabulated in **Table** (11) showed that the difference between the amount of honey produced from the four honey bee hybrids was significant during the first season, while it was not-significant during the second season.

C)-COTTON NECTAR FLOW :

The data recorded in **Table** (12) showed the honey yield produced during the cotton nectar flow in the two seasons of the study. The average weight of honey produced per colony from the different honeybee hybrids : Buckfast, Starline, Midnite and Carnica were 2.0, 2.11, 2.28 and 2.58 kg/colony respectively during the first season of the study, while they were 2.20, 2.17, 2.36 and 2.86 kg./colony respectively during the second season of the study. The data cleared also that the Carnica honey bee hybrid gave the highest weight of honey produced through the two seasons of the study.

The presence of different amounts of honey produced from honey bee hybrids might be returned to the increased rate of consumption of honey bee by bees in hybrid than other hybrid, or returned to tlle increasing in response bees hybrid than other honey bee hybrid, Oertel *et al.* (1980).

The rate of honey production was the highest in the second seasons while it was the lowest in the first season, where the amount honey produced during second season was 38.38 kg., while it was 35.90kg. during the first season, in this study.

The increased amount of honey produced during the second season might be due to the convenience of the environmental conditions with the activity of the different honey bee hybrids.

For statistical analysis the data recorded in **Table** (12) showed that the difference between the amount of honey produced from different honeybee hybrids, was highly significant during the first season of the study while it was significant in the second season of the study.

Table (10): Weight of honey produced from different honey bee hybrids during the citrus nectar flow (in kg/colony), during the two seasons 1993 and 1994.

Seasons	Rep.	Honey bee hybrids				Mean		
		Buckfast	Starline	Midnite	Carnica	Temperature		R.H.
						Max.	Min.	%
1993	1	2.350	2.100	1.650	3.350			
	2	2.650	2.450	2.250	2.850			
	3	2.900	2.700	2.750	2.900			
	4	3.100	2.850	2.800	3.150			
Total		11.000	10.100	9.450	12.250			
Mean		2.750	2.525	2.363	3.063	25.0	8.1	66.7
1994	1	2.100	3.400	3.250	4.350			
	2	4.000	3.150	2.800	2.200			
	3	3.200	4.050	3.500	3.550			
	4	3.450	4.100	3.850	3.850			
Total		12.750	14.700	13.400	13.950	13.950		
Mean		3.188	3.675	3.350	3.487	26.0	10.3	66.9

L.S.D. for 1993 1994
at 0.05 = 0.48 N.S

Table (11): Weight of honey produced from different honey bee hybrids during the clover nectar flow (in kg/colony), during the two seasons 1993 and 1994.

Seasons	Rep.	Honey bee hybrids				Mean		
		Buckfast	Starline	Midnite	Carnica	Temperature		R.H. %
						Max.	Min.	
1993	1	2.500	2.350	2.750	2.900			
	2	1.500	2.400	2.100	2.900			
	3	2.150	2.400	2.050	2.950			
	4	2.400	2.600	2.750	2.900			
Total		8.550	9.750	9.650	11.650			
Mean		2.138	2.438	2.412	2.913	32.0	16.4	57.6
1994	1	3.600	3.620	4.150	3.850			
	2	4.200	4.450	3.900	4.400			
	3	3.900	3.300	3.650	4.250			
	4	4.150	4.200	3.700	3.900			
Total		15.850	15.570	15.400	16.400			
Mean		3.963	3.893	3.850	4.100	33.6	17.1	58.2

L.S.D. for 1993 at 0.05 = 0.42 1994 N.S

Table (12): Weight of honey produced from different honey bee hybrids during the cotton nectar flow (in kg/colony), during the two seasons 1993 and 1994.

Seasons	Rep.	Honey bee hybrids				Mean		
		Buckfast	Starline	Midnite	Carnica	Temperature		R.H. %
						Max.	Min.	
1993	1	2.100	2.000	2.250	2.550			
	2	1.950	2.100	2.320	2.530			
	3	1.950	2.100	2.250	2.600			
	4	2.000	2.250	2.300	2.650			
Total		8.000	8.450	9.120	10.330			
Mean		2.000	2.113	2.280	2.583	34.0	20.8	69.3
1994	1	2.220	1.900	2.540	3.600			
	2	1.950	2.230	2.250	2.650			
	3	2.220	1.950	2.100	2.350			
	4	2.420	2.600	2.550	2.850			
Total		8.810	8.680	9.440	11.450			
Mean		2.203	2.170	2.360	2.862	33.9	20.8	68.7

L.S.D.	for	1993	1994
	at 0.05 =	0.10	0.51
	at 0.01 =	0.15	--

V)- DIFFERENT HONEYBEE HYBRIDS ACTIVITY FOR GATHERING POLLEN GRAINS :

Four colonies from each hybrid were used in this study. pollen grains stored in the cells were counted at 13 day intervals during the various periods of the flowering crops by means of a langstroth frame divided into square inches by wire intersecting curves. The average number of cells in a square inch was 25 cells, and each cell contained amount of pollen grains about 183 mg./cell (Rashad and Parker 1958a). The data recorded in **Tables** (13 to 15) and illustrated in **Fig.** (17).

The data in **Table** (13) showed the activity of honey bee hybrids in storing pollen grains during the citrus nectar flow in the two seasons of the study. The Starline hybrid was the best hybrid in storing pollen while Buckfast hybrid was the lowest one in storing pollen grains.

The average amount stored from pollen grains per colony from different honeybee hybrids, Buckfast, Starline Midnite and Carnica during the citrus flow were 30.24, 42.48, 33.66 and 33.62 g/colony, respectively in the first season, while were 32.63, 43.59, 33.58 and 38.75 g/colony, respectively during the second season.

For statistical analysis the data recorded in **Table** (13) showed that the difference between different honey bee hybrids in stored amount of pollen grains inside the cells were significant in the first season while were not significant in the second season of the study.

The data recorded in **Table** (14) showed that the amount of pollen grains stored inside the cells during g the clover flow in the second season was higher than that stored in the first season of the study where it was 148.03 and 144.67 g/colony, respectively. The average amount of pollen grains stored inside the cells during the period of the clover flow per colony by the four hybrids, Buckfast Starline, Midnite and Carnica were 127.37, 161.94, 138.68 and 150.68 g/colony, respectively in the first season of the study, while were 128.23, 164.6, 137.23 and 162.07

g/colony, respectively in the second season of the study. The Starline hybrid was the highest one also during this period of the study, where the collected and stored pollen grains was 161.94 g1rrt/colony during the first season, while it was 164.6 gn1/colony in the second season.

Statistical analysis of the data tabulated in **Table** (14) showed that the difference between the amount of pollen grains stored by the four honey bee hybrids was highly significant during the first season of the study, while it was only significant during the second season of the study.

The data tabulated in **Table** (15) showed that the average amount of pollen grains stored inside the cells by the hybrids, Buckfast, Starline, Midnite and Carnica during the period of maize flow in the two seasons of the study. The average during the first season of the study were 205.56, 246.02, 212.75 and 229.62 g/colony, respectively, while were 239.85, 277.08, 227.27 and 263.98 g/colony during the second season of the study . The Starline hybrid was the best one about the average amount of the stored pollen grains where it arrived to 146.07 g/colony during the first season and was 277.08 g/colony in the second season of the study.

For statistical analysis of the data in **Table** (15) it showed that the di3emce between the amount of pollen stored inside the cells were significant during the first season of the study, while they were highly significant during the second season of the study.

The high amounts of pollen grains collected during the second season (1994) might be due to the convenience of the environmental conditions with the activity of the four honey bee hybrids, except the Starline hybrid which gave high amounts of pollen grains through the two seasons of the study. That perhaps according to the great numbers of eggs laid by its queens which afterwards became adult workers who gathered the high quantities of pollen grains. The obtained data in this experiment was agreed with Aly *et al.* (1989).

Table (13): Amounts of pollen grains collected by the four honey bee hybrids during the citrus flow (in g/colony), thorough 1993 and 1994.

Seasons	Rep.	Honey bee hybrids				Mean		
		Buckfast	Starline	Midnite	Carnica	Temperature		R.H. %
						Max.	Min.	
1993	1	35.50	41.60	28.60	39.60			
	2	29.40	45.70	32.40	36.66			
	3	27.17	41.40	39.63	31.52			
	4	28.90	41.20	34.00	35.70			
Total		120.97	169.90	134.63	143.48			
Mean		30.243	42.475	33.658	35.870	25.0	8.1	66.7
1994	1	40.50	38.50	26.60	42.88			
	2	26.50	58.20	40.50	35.60			
	3	30.00	36.50	31.00	36.70			
	4	33.50	41.15	36.20	39.80			
Total		130.50	174.35	134.30	154.98			
Mean		32.625	43.588	33.575	38.745	26.0	10.3	66.9

L.S.D. for 1993 1994
at 0.05 = 6.39 N.S

Table (14): Amounts of pollen grains collected by the four honey bee hybrids during the clover flow (in g/colony), thorough 1993 and 1994.

Seasons	Rep.	Honey bee hybrids				Mean		
		Buckfast	Starline	Midnite	Carnica	Temperature		R.H. %
						Max.	Min.	
1993	1	143.60	159.50	150.80	138.60			
	2	133.36	160.50	137.53	145.40			
	3	125.30	164.84	127.10	156.30			
	4	116.20	162.92	139.30	162.40			
Total		518.46	647.76	554.73	602.70			
Mean		129.615	161.940	138.683	150.675	32.0	16.4	57.8
1994	1	134.00	183.60	128.40	149.28			
	2	141.10	172.70	128.00	164.00			
	3	108.90	157.70	143.00	155.80			
	4	128.90	144.30	149.50	179.20			
Total		512.90	658.30	548.90	648.28			
Mean		128.225	164.575	137.225	162.070	33.6	17.1	58.2

L.S.D. for 1993 1994
at 0.05 = 15.50 24.17
at 0.01 = 22.99 --

Table (15): Amounts of pollen grains collected by the four honey bee hybrids during the maize flow (in g/colony), thorough 1993 and 1994.

Seasons	Rep.	Honey bee hybrids				Mean		
		Buckfast	Starline	Midnite	Carnica	Temperature		R.H. %
						Max.	Min.	
1993	1	242.70	238.30	220.60	231.34			
	2	199.65	263.16	235.10	247.00			
	3	188.10	236.30	194.60	219.22			
	4	191.80	246.50	200.70	220.90			
Total		822.25	984.26	851.00	918.46			
Mean		205.563	246.065	212.750	229.615	33.5	20.1	69.0
1994	1	217.40	282.88	232.30	275.80			
	2	212.10	271.40	246.68	252.10			
	3	206.90	277.85	215.10	255.80			
	4	223.00	276.20	215.00	272.20			
Total		859.40	1108.33	909.08	1055.90			
Mean		214.85	277.083	227.270	263.975	34.0	20.6	69.6

L.S.D. for 1993 1994

at 0.05 = 22.53 16.66

at 0.01 = -- 24.70

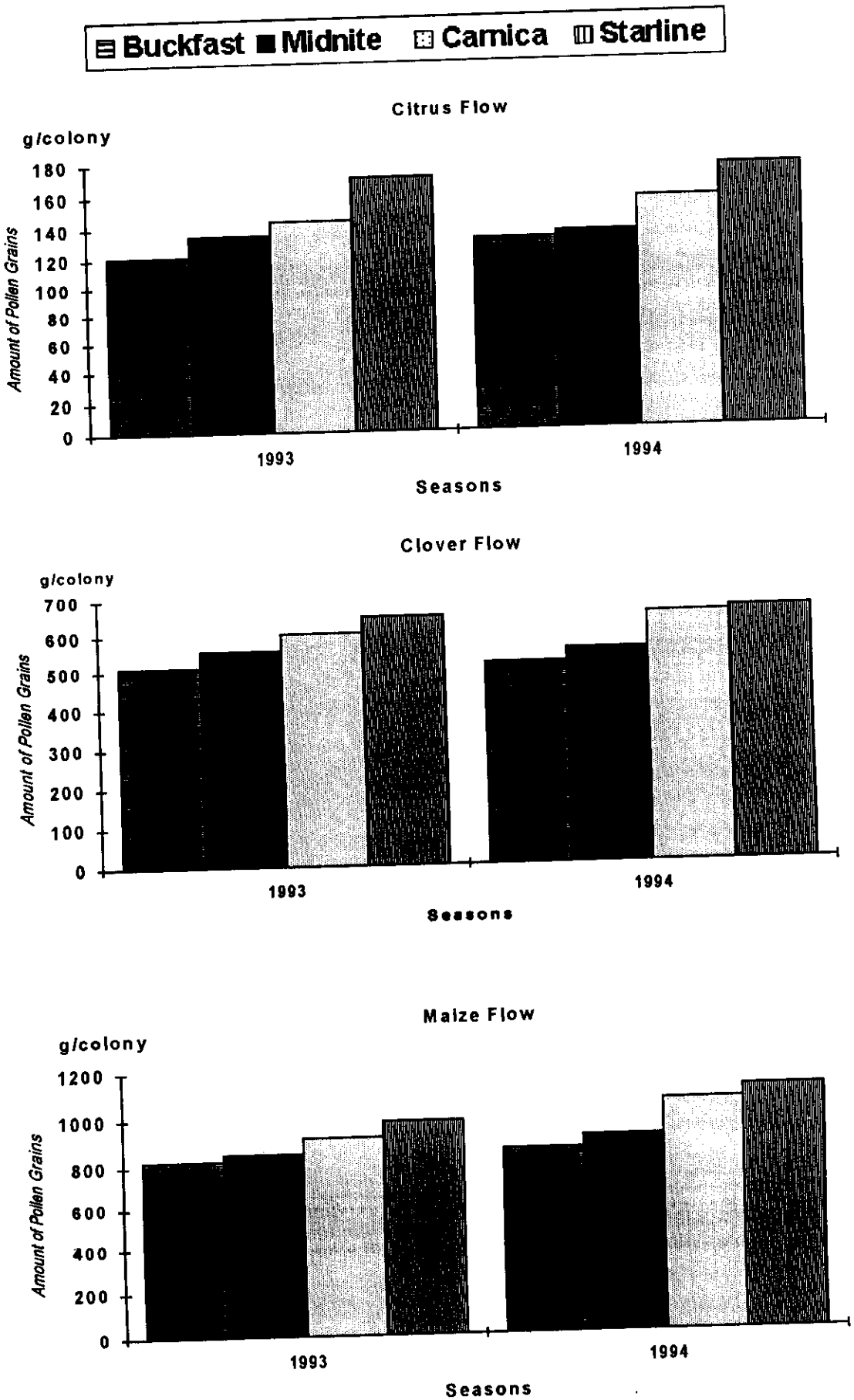


Fig. (17): Effect of type of honey bee hybrids for the amount of pollen grains produced in case of citrus, clover and maize flow during the two seasons of the study (1993-1994).

Table (16): Correlation coefficient matrix among some characters of honeybee workers during the study of different races.

Variable	Brood	Queen	Pollen	Honey	Royal
Brood	*	0.310	0.741**	-0.20	-0.020
Queen	0.489	*	0.409	0.327	0.106
Pollen	0.866**	0.358	*	0.056*	0.136
Honey	0.333	0.138	0.410	*	0.372
Royal	-0.288	-0.275	-0.375	-0.475	*

** Denotes highly significant correlation coefficient.
- Upper diagonal denotes correlation coefficient for the first season.
- Lower diagonal denotes correlation coefficient for the 2nd season.

Results show the association of brood, queen, pollen, honey and royal jelly production in different honeybee races during ours studies in laboratory and apiary.

BROOD AND QUEEN CORRELATION :

Data in **Table (16)** shows the correlation coefficient of brood and queen is small (low) and insignificant indicating the presence of low association between the two variable, i.e. brood and queen rearing because the effort of workers in is totally directed to rearing of the brood and ignoring the breeding of queens. These the results agreed with **Eischen *et al.* (1983), Pickard and Kither (1983), Milne and Pries (1984), and Szabo (1993).**

Meanwhile, the association of pollen and brood was highly significant in both seasons of the study, results show that the only significant association was that between brood and pollen grains in

the first season, the correlation coefficient was 0.741 and in the second season it was 0.866, and both coefficients were highly significant ($p \geq 0.01$). Results shows clearly the importance of pollen to the rearing of the brood. This is natural because the rearing of brood depends by and large on the availability of pollen in the field during the pollen and nectar flows seasons.

Other correlation coefficients, rarely were in the vicinity of -0.372 for honey and royal jelly, and -0.375 for pollen and royal jelly, and these indicate poor association between brood and honey; brood and royal jelly; queen and brood; queen and honey; queen and royal jelly in the two seasons of the study.

This indicates that the factors have little effect on the broad. Results also show same no-significant during the two seasons of the study; from this study appeared to the correlation between factors of the study was highly significant in the second season from the study, while was in the first season of the study it is low, this effect return to the adaptation of environmental factors in the second season of the study.

VI)- EFFECT OF TYPE OF HONEY BEE HYBRID ON BIOMETRIC CHARACTERS OF THE EMERGED QUEENS WHICH REARED IN COLONIES FROM THESE HYBRIDS. THE ARTIFICAL METHODS (DOOLITTLE) FOR REARING QUEEN WAS USED :

Queens were reared in queenless colonies from different honeybee hybrids.

A)- WEIGHT OF VIRGIN QUEENS :

The data recorded in **Table** (17 & 18) and **Fig.** (18) showed the average weight of virgin queens in the two season of the study (1993 &1994). during the different periods of the queen rearing. The mean weight of virgin queens which reared from Starline hybrid in the first season from March to August of the study were 1756±0.68, 162.2±0.88, 164.4±1.14, 173.0±1.05, 154.6±1.21 and 165.8±1.58 mg/queen, respectively and in case of Buckfast hybrid were 138.2±0.80, 122.2±1.24, 129.6±0.93, 126.8±1.24. 126.6±1.5 and 114.8±1.41 mg/queen, respectively. The mean weight of virgin queens reared from Midnite hybrid were 154.0±0.71, 124.4± 1.29, 135.0±0.89, 141.0±1.00, 128.0±1.44, and 121.2±1.85 mg/queen, respectively the period from March to August, while the mean weight of virgin queens in case of Carnica hybrid during the same period were 165.0 ± 0.71, 150.4 ± 1.21, 163.6 ± 1.03, 170.0 ± 1.58, 143.0 ± 1.41and126.6±1.60mg./queen respectively. From the data in **Table** (18) it appeared also that the mean weights all over the first season of the virgin queen reared from Starline, Buckfast, Midnite, and Carnica hybrid were 165.93±3.099, 126.37±3.17, 133.93±4.97, and 153.1±6.71 mg/queen, respectively.

The mean weights of virgin queens which reared from Starline,

Buckfast Midnite and Carnica hybrids during the second season of the study were recorded in **Table** (19), those data showed that the mean weight of virgin queens which reared from Starline hybrid in different periods from march to august were 168.0±1.14, 181.6±0.93, 1724±1.50, 183.4±1.21, 154.0±1.41, and 144.0±1.82 mg/queen, respectively, with an average was 167.23±6.35 mg/queen, and in case of the queens reared from Buckfast hybrid the mean weight of virgin queen in the same period were 137.4± 0.93, 140.0±1.22, 126.8±1.85, 133.4±1.08, 137.2±1.77, and 123.6 ±1.44 mg/queen, respectively with an average was 133.07±2.66 mg/queen, and the mean weight of virgin queens which reared from Midnite hybrid in the same periods were 159.6±1.44, 128.0± 1.30, 139.8±1.71, 145.6±2.38, 127.8±1.59 and 123.20±1.07 mg/queen, respectively with an average was 137.33±5.62 mg, while the mean weight of virgin queens which reared from Carnica hybrid in the same periods were 169.4±1.86, 154.8± 1.85, 168.0±1.52, 175.0±1.33, 145.4±2.23 and 131.6±1.29 mg/queen, respectively with an average was 157.43±6.82 mg/queen.

From the data in **Table** (17 and 18) it was found that the mean weights all over the second season were the highest than the mean weight in the first season in all hybrids. And appeared from the data also the mean weight of virgin queens which reared from Starline hybrid were the highest when compared with other hybrids. After words the mean weights of Carnica then Midnite queens and finally the Buckfast queens during the two seasons of the study. And was the best time for rearing honey bee queens the periods from March to July.

These results were in agreement with those obtained by Eckert (1934) Corbella and Concalves (1982), Nelson and Gary (1983), Eaton (1986) and Szabo *et al.* (1987).

Table (17): Average weights of virgin queens (in g) during March-August in 1993 season.

Periods	Honey bee hybrids				Mean		
	Buckfast X ± S.E.	Starline X ± S.E.	Midnite X ± S.E.	Carnica X ± S.E.	Temperature Max.	Temperature Min.	R.H. %
7-3-1993	175.6 ± 0.68	138.2 ± 0.80	154.0 ± 0.71	165.0 ± 0.71	19.8	4.9	68
2-4-1993	162.2 ± 0.86	122.2 ± 1.24	124.4 ± 1.29	150.4 ± 1.21	29.6	10.4	62
5-5-1993	164.4 ± 1.14	129.6 ± 0.93	135.0 ± 0.89	163.6 ± 1.03	28.3	14.2	63
3-6-1993	173.6 ± 1.05	126.8 ± 1.24	141.0 ± 1.00	170.0 ± 1.58	34.4	20.2	59
4-7-1993	154.6 ± 1.21	126.6 ± 1.50	128.0 ± 1.44	143.0 ± 1.41	34.2	21.8	66
4-8-1993	165.8 ± 1.85	114.8 ± 1.41	121.2 ± 1.85	126.6 ± 1.60	34.4	21.0	68
Total	995.6	758.2	803.6	918.6	--	--	--
Mean	165.93 ± 3.099	126.37 ± 3.17	133.93 ± 4.97	153.1 ± 6.71	30.12	15.48	64.33

10 queens from each hybrid were used.

L.S.D. for Hybrids Dates

at 0.05 = 8.71 7.11

at 0.01 = 11.54 9.42

Table (18): Average weights of virgin queens (in g) during March-August in 1994 season.

Periods	Honey bee hybrids				Mean		
	Buckfast X ± S.E.	Starline X ± S.E.	Midnite X ± S.E.	Carnica X ± S.E.	Temperature Max.	Temperature Min.	R.H. %
6-3-1994	168.0 ± 1.14	137.4 ± 0.93	159.6 ± 1.44	169.4 ± 1.86	26.3	7.4	67
7-4-1994	181.6 ± 0.93	140.0 ± 1.22	128.0 ± 1.30	154.8 ± 1.85	27.2	8.2	64
6-5-1994	172.4 ± 1.50	126.8 ± 1.85	139.8 ± 1.71	168.0 ± 1.52	33.0	13.9	45
5-6-1994	183.4 ± 1.21	133.4 ± 1.08	145.6 ± 2.38	175.4 ± 1.33	34.0	16.1	58
6-7-1994	154.0 ± 1.41	137.2 ± 1.77	127.8 ± 1.59	145.4 ± 2.23	34.6	19.1	61
4-8-1994	144.0 ± 1.82	123.6 ± 1.44	123.2 ± 1.07	131.6 ± 1.29	34.0	20.9	70
Total	1003.4	798.4	824.0	944.6	--	--	--
Mean	167.23 ± 6.35	133.07 ± 2.66	137.30 ± 5.62	157.43 ± 6.82	31.52	14.27	60.83

10 queens from each hybrid were used.

L.S.D.	for	Hybrids	Dates
	at 0.05 =	11.79	9.62
	at 0.01 =	15.61	12.74

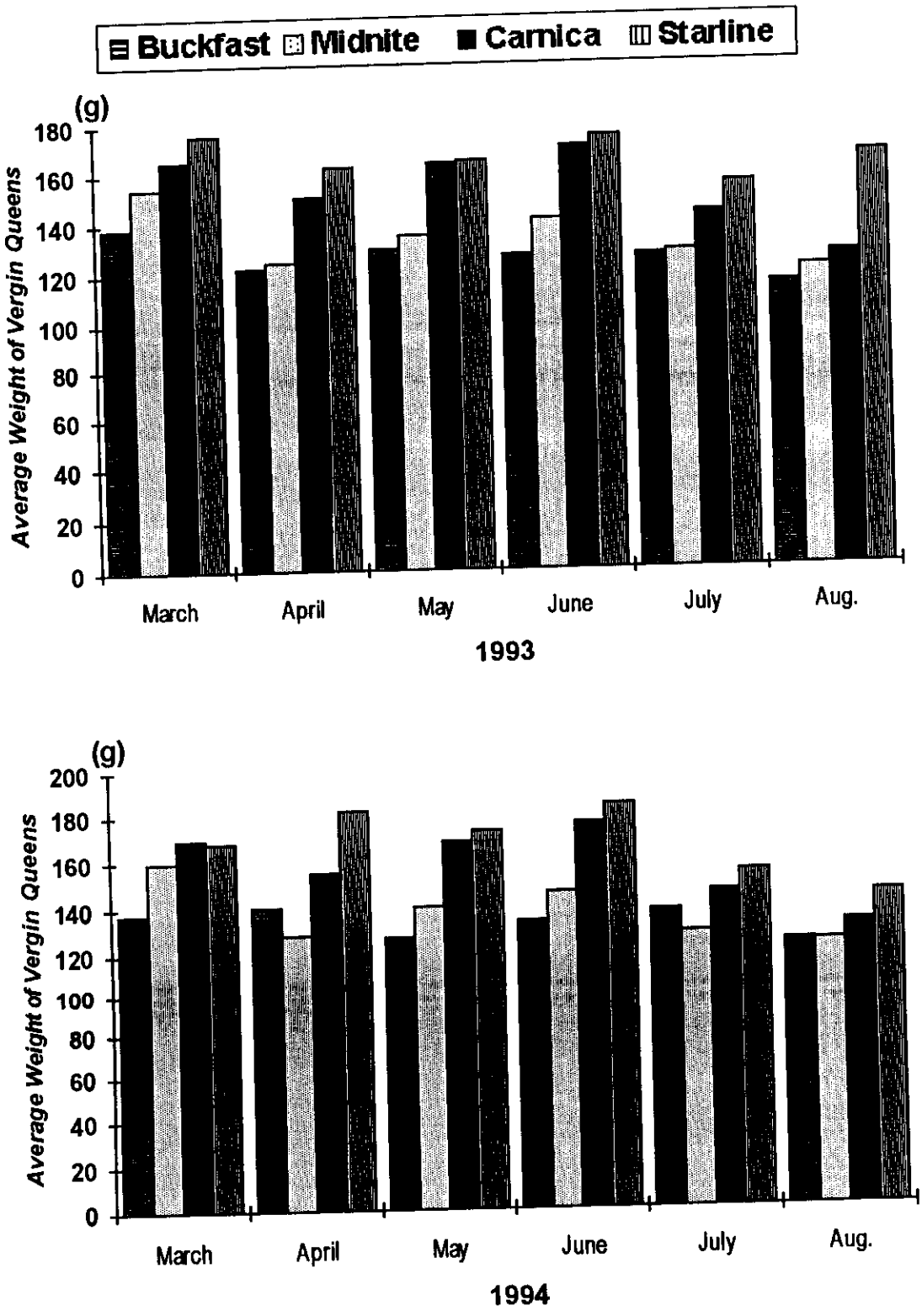


Fig. (18): Effect of type of honey bee hybrids for the weight of virgin queens during the two seasons of the study (1993-1994).

For statistical analysis the data in **Table** (17 and 18) showed that the different between the mean weight of virgin queens which reared from the four hybrids were highly significant during the two season of the study and also the di3erent between weight of virgin queens which reared in different periods in this study were highly significant during the two seasons of the study.

B)- NUMBER OF OVERIOLES IN MATED QUEENS :

The data in **Tables** (19 and 20) and **Fig.**(19) indicated the mean number of ovarioles in the two branches of the vary of mated queens which reared in colonies from different honey bee hybrids and different rearing periods during the two seasons in the study. The mean number of ovarioles in the mated queens which reared from Starline hybrid in the first season during the period from March to August were 358.00±10.58, 334.33±2.77, 349.7±11.41, 362.0±5.03, 312.7±8.59 and 292.3±4.41 ovariol/queen respectively, while in the second season during this period were 338.7±3.53, 362.7±4.81, 354.7±5.21, 364.00±6.16, 306.0±12.50 and 287.7±6.17 ovariol/queen, respectively. The mean number of ovarioles in queens which reared from Buckfast hybrid in the first season during this period were 306.7±6.96, 271.3±10.09, 282.0± 8.08, 274.7±11.76, 272.7±3.71 and 268.7±8.67 ovariol/queen respectively, while in the second season in the study were 294.0 ± 6.93, 276.7±3.71, 270.7±1.76, 268.0±4.24, 267.6±1.76 and 267.7 ±2.23 ovariol/queen respectively. The mean number of ovarioles in queens which reared from Midnite hybrid in the first season during period from March until August were 320.3±14.17, 282.7±7.51, 291.7±4,55, 274.7±3.71, 282.0±6.23 and 266.7±6.57 ovariol/ queen respectively, while in the second season were 302.0±3.71, 283.7±5.78, 277.0±6.6, 296.2±6,69, 282.0±5.29 and

272.0±5.51 ovariol/queens, respectively. The mean number of ovarioles in queen ovary which reared in colonies from Carnica hybrid in the first season during the period from March to August were 334.0± 17.78, 319.7±14.88, 335.0±16.74, 330.7±12.90, 298.30±7.57 and 288.3±4.98 ovariol/queen ovary respectively, while in the second season were 327.3±12.09, 328.3±4.33, 298.7±5.81, 323.7±6.14, 294.7±16.83, and 275.7± 9.87 ovariol/queen ovary respectively.

The difference in numbers of ovarioles in side the same hybrid might be returned to the increased quantity of royal jelly which was taken through the larval stage,

Cur results were in agreement with **Eckert (1934), Corbella and Concalves (1982), Gasagrande-Jalaretto *et al.* (1984) Eaton (1986), and Attili *et al.* (1987).**

For statistical analysis the data in **Tables** (19 and 20) showed that the difference between the number of ovariol estimated queens which produced in colonies from different honey bee hybrids were highly significant during the two seasons of the study, and the difference between the number of ovarioles in the mated queens in different periods in this experiment were highly significant during the two seasons.

The increase of the number of ovarioles in queens might returned to the feeding of the larval queens on much amounts from royal jelly during the larval stage **(Snodgrass 1956),** and return heavy weight of mated queens might returned to the increase of the number of ovarioles, development of reproductive organs and other systems in these queens. Those obtained result agreed with **Attili *et al.* (1987).**

Finally it could be said that, (a) the type of honey bee hybrid and, (b) the period of queen rearing were effective on the weight, and the number of the ovarioles of the queens.

Table (19): Average number of ovarioles in mated honey bee queens of different hybrids at different periods of artificial queen rearing in 1993 season.

Periods	Honey bee hybrids				Mean		
	Starline X ± S.E.	Buckfast X ± S.E.	Midnite X ± S.E.	Carnica X ± S.E.	Temperature Max.	Temperature Min.	R.H. %
12-3-1993	358.00 ± 10.58	306.70 ± 6.96	320.30 ± 14.17	334.00 ± 17.78	23.3	6.2	67
07-4-1993	334.33 ± 2.77	271.30 ± 10.09	282.70 ± 7.51	319.70 ± 14.88	29.4	10.4	61
14-5-1993	349.70 ± 11.41	282.00 ± 8.08	294.70 ± 4.55	335.00 ± 16.74	30.5	14.7	55
10-6-1993	362.00 ± 5.03	274.70 ± 11.79	274.70 ± 3.71	330.70 ± 12.90	33.3	17.2	59
14-7-1993	312.70 ± 8.59	272.70 ± 3.71	282.00 ± 6.23	298.30 ± 7.57	33.7	21.4	66
12-8-1993	292.30 ± 4.41	268.70 ± 8.67	266.70 ± 6.57	288.30 ± 4.98	34.2	21.0	70
Total	2009.03	1676.10	1721.10	1906.00	--	--	--
Mean	334.84 ± 11.25	279.35 ± 5.77	286.85 ± 7.69	317.67 ± 8.12	30.73	15.15	66

5 queens from each hybrid were used.

L.S.D. for Hybrids Dates

at 0.05 = 24.63 20.11

at 0.01 = 32.76 26.75

Table (20): Average number of ovarioles in mated honey bee queens of different hybrids at different periods of artificial queen rearing in 1994 season.

Periods	Honey bee hybrids				Mean		
	Starline X ± S.E.	Buckfast X ± S.E.	Midnite X ± S.E.	Carnica X ± S.E.	Temperature Max.	Temperature Min.	R.H. %
11-3-1994	338.70 ± 3.53	294.00 ± 6.93	302.00 ± 3.71	327.30 ± 12.09	26.7	8.3	67
12-4-1994	362.70 ± 4.81	276.70 ± 3.71	283.70 ± 5.78	328.30 ± 4.33	28.2	9.7	63
11-5-1994	354.70 ± 5.21	270.70 ± 1.76	277.00 ± 6.66	298.70 ± 5.81	32.0	16.7	54
13-6-1994	364.00 ± 6.16	268.00 ± 4.24	296.30 ± 6.69	323.70 ± 6.13	32.6	16.5	58
12-7-1994	306.00 ± 12.50	276.60 ± 1.76	282.00 ± 5.29	294.70 ± 16.83	34.6	19.1	64
10-8-1994	287.70 ± 6.17	267.70 ± 2.23	273.00 ± 5.51	275.70 ± 9.87	34.4	21.1	72
Total	2013.80	1653.70	1714.00	1848.40	--	--	--
Mean	335.63 ± 13.02	275.62 ± 4.02	285.67 ± 4.59	308.07 ± 8.83	31.42	15.23	63

5 queens from each hybrid were used.

L.S.D. for Hybrids Dates

at 0.05 = 23.78 19.42

at 0.01 = 31.63 25.83

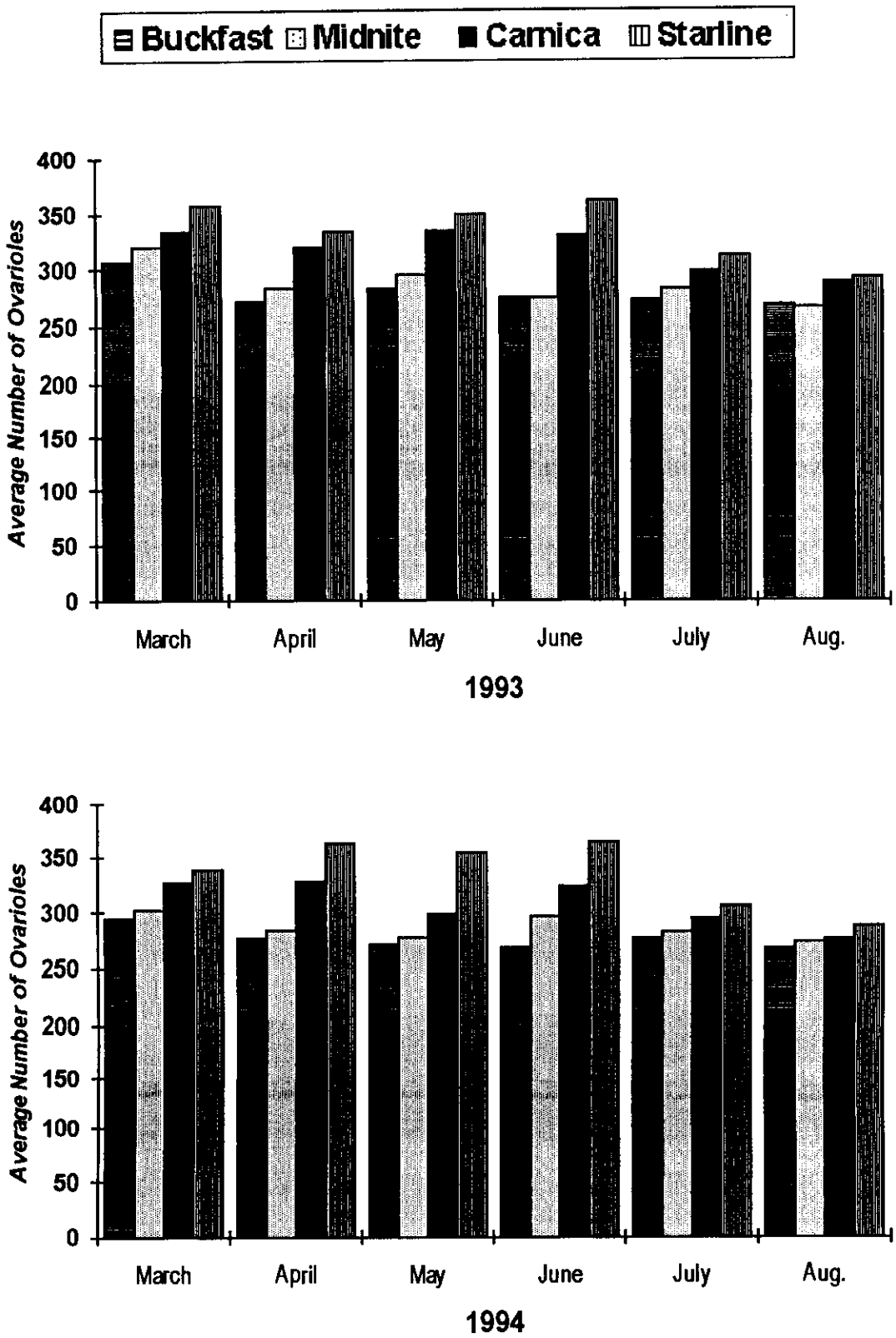


Fig. (19): Effect of type of honey bee hybrids for the number of ovarioles in the ovary of mated queens during the two seasons of the study (1993-1994).

VII)- BIOMETRIC STUDIES OF HONEY BEE WORKERS OF SOME F1 HYBRID RACES :

The measurements of some parts of the body of the honeybee workers, might be taken into consideration for identification of various honey bee hybrids.

The present investigation was decided to compare between different races of honey bee hybrids F_1 (Carniolan, Starline, Buckfast, Midnite, Italian, Caucasian and Egyptian races) based on the biometrics of the different important organs of the bee workers.

The morphometrical parameters investigated were the length of tongue, width and length of forewing, cubital index, size of venom sac, and pollen basket area (Corbicula), hypopharyngeal glands and wax glands.

In this experiment the mentioned parts of the honey bee workers of F_1 hybrid-races was indicated and calculated in **Table** (21).

The mean length of proboscis for F_1 hybrids of Carniolan, Starline, Buckfast, Midnite, Italian, Caucasian, and Egyptian bees were 6.31±0.051, 6.21±0.074, 6.197±0.062 6.997±0.049, 6.12±0.044, 6.54±0.054, and 5.77±0.07 mm, respectively.

From the data showed that the longest proboscis was 6.54 mm, in F_1 Caucasian workers, while the shortest was 5.73 mm, in Egyptian workers. The other F_1 hybrids was intermediate between these two races. The maximum longest for proboscis was 7 mm, while the shortest was 4.9 mm.

This result might be due to that the Caucasian bees were related to the dark bees which are much inferior to the long-tongued races (Br. Adam, 1966). The statistical analysis indicated that the differences between F_1 hybrids-races were significant ($P > 0.05$), while the Duncan's method showed that the difference in the length of proboscis between

Caucasian bees and each Midnite, Italian, Egyptian bees was significant, and was significant also between Carniolali and Egyptian bees, while was unsignificant between Caucasian, Carniolan, Buckfast bees and Starline bees, and was also unsignificant between Starline, Italian bees, and Midnite bees, while was unsignificant also between Midnite bees and Egyptian bees.

For the width of forewing it was dear in **Table** (21) that the mean width F_1 Carniolan, Starline, Buckfast, Midnite, Italian, Caucasian and Egyptian bee workers forewing were 2.983±0.039, 3.063±0.021, 2.02±0.03, 3.05±0.034, 3.133±0.028, 2.927± 0.024 and 2.773±0.033 mm, respectively.

From the stated data it was showed that the largest width of forewing was 3.133 mm. in Italian bee workers, while the least width of forewing was 2.773 mm. in Egyptian bee workers. From the data showed also that the large width of forewing was 3.4 mm, while the lowest width was 2.5 mm.

The statistical analysis of the data recorded in **Table** (22) Showed that the differences between F_1 hybrids-races were significant ($P > 0.05$), while the Duncan's method showed that the difference in the width of forewing was significant between Italian and each Buckfast, Caucasian and Egyptian bee workers, and was significant also between Midnite and each Caucasian and Egyptian bee workers, and was significant also between Egyptian and Caucasian bee workers. While, these differences were unsignificant between Italian, Midnite, Starline, and Carniolan bees, and was unsignificant also between each Midnite, Starline, Carniolan and Buckfast bees, and also unsignificant between Starline, Carniolan, and Starline Carniolan, Buckfast and Caucasian bees.

between F_1 Carniolan, Italian and Midnite bees, As was unsignificant between Italian, Midnite, Starline and Egyptian bees, and was unsignificant also between each Starline, Buckfast, Caucasian and Egyptian bees. While this difference significant between Carniolan bees and each Starline, Buckfast, Caucasian and Egyptian bees, and was significant between Italian bees and each Buckfast and Caucasian bees.

The data recorded in **Table** (21) showed also that the mean size of venom sac in the worker bees for Carniolan, Starline, Buckfast, Midnite, Italian, Caucasian and Egyptian bees were 0.765±0.051, 0.935±0.038, 0.940±0.049, 1.002±0.057, 1.018± 0.054, 0.748±0.055 and 0.994±0.056 mm^3, respectively.

From the found data it was shown that the larger size of venom sac was 1.018 mm^3 in Italian bee workers, while the small size of venom sac was 0.748 mm^3 in Caucasian bee workers the other honey bee strains were intermediate between these to honey bee strains. These results cut of intermediate in the yellow honey bee strains and equanimity in the dark honey bee strains. Largest size of venom sac recorded was 1.51 mm^3, while the lowest one was 0.29 mm^3.

From the statistical analysis of the data recorded in **Table** (22), the difference in the size of venom sac was significant between Italian bees and each Buckfast, Midnite, Caucasian, Egyptian and Carniolan bees, and was significant also between Starline bees and each Caucasian and Carniolan bees, and was significant also between Carniolan bees and each Buckfast, Midnite and Egyptian bees, while this difference was unsignificant between Italian bees and Starline bees, and was unsignificant also between Starline, Buckfast, Midnite and Egyptian bees, and also was unsignificant between Caucasian and Carniolan bees.

From the data recorded in Table (21) showed that the mean area of the pollen basket (corbicula) for Carniolan, Starline, Buckfast, Midnite, Italian, Caucasian and Egyptian bee workers were 1.651±0.049, 1.671±0.023, 1.671±0.023, 1.671±0.034, 1.774±0.045, 1.558±0.042, and 1.713±0.041 mm^2, respectively. And also showed from the data that the largest area of corbicula was 1.774 mm^2 in the Italian bees, and the smallest area was 1.558 mm^2 in the Caucasian bees, and the other honey bee strains were intermediate between these two honey bee races. Data showed that largest pollen basket area was 2.4 mm^2 and lowest one was 1.0 mm^2.

The statistical analysis of the data recorded in **Table** (22) showed that the difference in the corbicula area between all honey bee strains were unsignificant.

The results returned to subspecies *Apis mellifera* L., known as adenosine, is found widely distributed in Africa. So for very little seems to be known about its behavior, but it might be suspected that it will be found to be some what intermediate between that of *Apis indica* and the typical western honeybee, and was the increased pollen collected by colonies of bees with larger corbicula area results in an increased egg-laying rate and brood area.

Our results were in agreement with **Ruttner (1975a), Dutton *et al.* (1981), Rashad & Elsarrage (1981), Ruttner and Hesse (1981), Milne & Karen (1984), Allen & Thomas (1987) and Atallah *et al.* (1989).**

Table (21): Maximum, minimum and means of some characters studied in some honeybee races by using descriptive measurement of analysis.

Variables	Proboscis			Forewing lingth			Forewing width			Cupital index			Venom sac size			Pollen basketarea		
Races	Max.	Min.	Mean ± S.E.	Max.	Min.	Mean ± S.E.	Max.	Min.	Mean ± S.E.	Max.	Min.	Mean ± S.E.	Max.	Min.	Mean ± S.E.	Max.	Min.	Mean ± S.E.
Carnica bee (mm)	6.80	5.70	6.310±0.051	9.80	8.70	9.223±0.059	3.20	2.60	2.983±0.039	3.95	2.65	3.047±0.049	1.40	0.35	0.765±0.051	2.23	1.04	1.651±0.049
Starline bee (mm)	7.00	5.50	6.210±0.074	9.80	8.50	9.390±0.066	3.20	2.90	3.063±0.021	2.96	2.03	2.796±0.040	1.38	0.65	0.935±0.038	1.92	1.40	1.671±0.023
Buckfast bee (mm)	6.80	5.70	6.197±0.062	9.50	8.20	8.937±0.072	3.30	2.70	3.020±0.030	2.81	2.00	2.346±0.056	1.40	0.52	0.940±0.049	1.92	1.00	1.671±0.023
Midnite bee (mm)	6.50	5.50	5.997±0.049	9.50	8.50	9.027±0.058	3.30	2.50	3.050±0.034	3.60	2.50	2.916±0.066	1.47	0.52	1.002±0.057	2.13	1.50	1.761±0.034
Italian bee (mm)	6.50	5.60	6.120±0.044	9.60	9.00	9.357±0.058	3.40	2.90	3.133±0.028	3.75	2.08	2.943±0.065	1.51	0.51	1.018±0.054	2.40	1.40	1.774±0.045
Caucasian bee (mm)	7.00	6.00	6.540±0.054	9.40	8.40	8.890±0.052	3.10	2.70	2.927±0.024	2.88	2.00	2.513±0.044	1.33	0.29	0.748±0.055	1.80	1.00	1.558±0.042
Egyptian bee (mm)	6.50	4.90	5.770±0.076	9.50	7.80	8.560±0.090	3.10	2.50	2.773±0.033	3.08	1.68	2.322±0.083	1.47	0.47	0.994±0.056	2.21	1.28	1.713±0.041

Table (22): Some biometric measurements of honey bee workers from F_1 hybrids of honeybee races (each measurement concluded 3 replicates and 10 workers in each replicate were used).

Biometric measure / hybrids	Length of "tongue proboscis"	Forewing		Cubital index	Size of venom sac	Pollen "basket corbicula"
		Width (mm)	Length (mm)			
Carnica	6.36 ab	3.007 abc	9.287 ab	3.111 a	0.584 d	1.768 a
Starline	6.18 ab	3.060 abc	9.340 a	2.664 bc	0.789 ab	1.666 a
Buckfast	6.21 ab	2.993 bc	9.007 bc	2.354 c	0.705 bc	1.583 a
Midnite	6.05 bc	3.073 ab	9.027 bc	2.909 ab	0.750 b	1.664 a
Italian	6.09 b	3.107 a	9.433 a	2.953 ab	0.882 a	1.732 a
Caucasian	6.50 a	2.953 c	8.893 c	2.396 c	0.641 cd	1.508 a
Egyptian	5.73 c	2.740 d	8.220 d	2.678 bc	0.700 bc	1.577 a

Means followed by the same letter's within each column are not significantly different at 5% level, according to the Duncan's multiple range test.

Some characters **(Table, 23)** of honeybee workers measure-ment analysis by using Descriptive measurements methods :-

Differences in size can be assessed to assortment some behavior of honeybees races to indicate the classification only by measuring isolated parts of the body, using magnifications of 40x. The variation between the populations of different races with the smallest and the largest bees were found to range between 25 - 42% of the smaller value, except for variation in cubital index, venom sac size and pollen basket area, which is still more important which were 76.04%, 422.07% and 140.00% of the smaller value, respectively.

Table (23): Overall means of some characters of honeybee workers proboscis, fore wings, cubital index, bee-venom sac and pollen basket (in mm).

Characters measurements	Proboscies	Fore wing		Cubital index	Venom sac	Pollen basket
		Length	Width			
Maximum	7.000	9.800	3.400	3.954	1.514	2.400
Minimum	4.900	7.800	2.500	1.678	0.290	1.000
Differences	2.100	2.000	0.900	1.276	1.224	1.400
Percentage	42.860	25.641	36.000	76.040	422.070	140.000
Mean	6.163	9.055	2.993	2.698	0.915	1.677
Diff. Between means	0.700	0.800	0.300	0.600	0.300	0.200
Percentage	11.360	8.380	10.020	22.240	32.790	11.930
S.E.	0.027	0.030	0.014	0.029	0.021	0.016

Generally, measurements of size are to some extent correlated with each other, but to a varying degree. Therefore, it is quite justified to include several measurements of different body parts to achieve a better discrimination of population. The results obtained in this experiment agreed with **Alpatov (1929), Smith *et al.* (1988) and Atallah *et al.* (1989)** detected that the body and appendices (wings, tongue, cubital index, venom sac size, and pollen basket area) may very independently.

The data obtained in this analysis showed that the varies in proboscises length, fore wing length and width, cubital index, venom sac size, and pollen basket area within a range of 0.7, 0.8, 0.3, 0.6, 0.3 and 0.2 mm differences between means of races, respectively, while were corresponds to 11.36%, 8.38%, 10.02%, 22.24%, 32.79% and 11.73% of

the total variability of this characters, respectively. It is evident that this races are to discriminate exclusively by size.

Necessarily, most characters used in morphometrics are those of size, and in most programs for morphometric analysis the heaviest load of canonical factors is of this category.

In *Apis mellifera*, however, many races are accumulated in very narrow field of size variation. On the other hand, several races of *Apis mellifera* can be completely separated by a few characters of size alone, as shown in **Fig. (20)** for the races Egyptian, Carniolan, Starline, Caucasian, Buckfast, Midnite and Italian bees. Characters variation in only slightly less in Carniolan, Caucasian, Starline, Midnite and Buckfast bees than in Egyptian and Italian bee races, while the variation characters between Egyptian race and Italian race was largest.

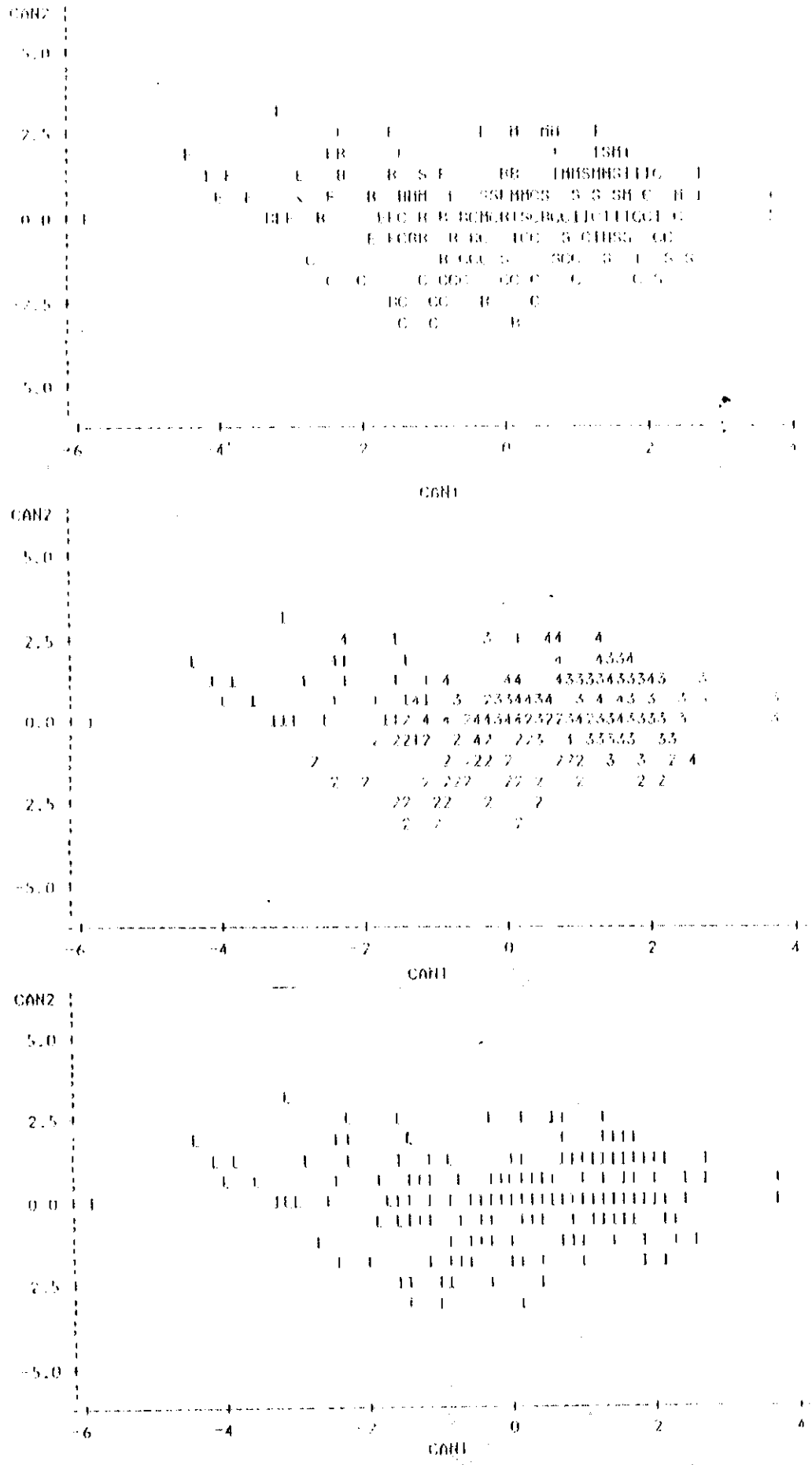


Fig. (20): Descriptive measurements for type only plot of can_1 - can_2 symbol is value of type, cluster and group.

DISCRIMINATE ANALYSIS OF SOME CHARACTERS OF WORKERS AND INTERACTION BETWEEN DIFFERENT HONEYBEE RACES.

Table (24) and **Fig. (21 A, B, C, D, E and F)** shows the pairwis generalized squared distances between honeybee races.

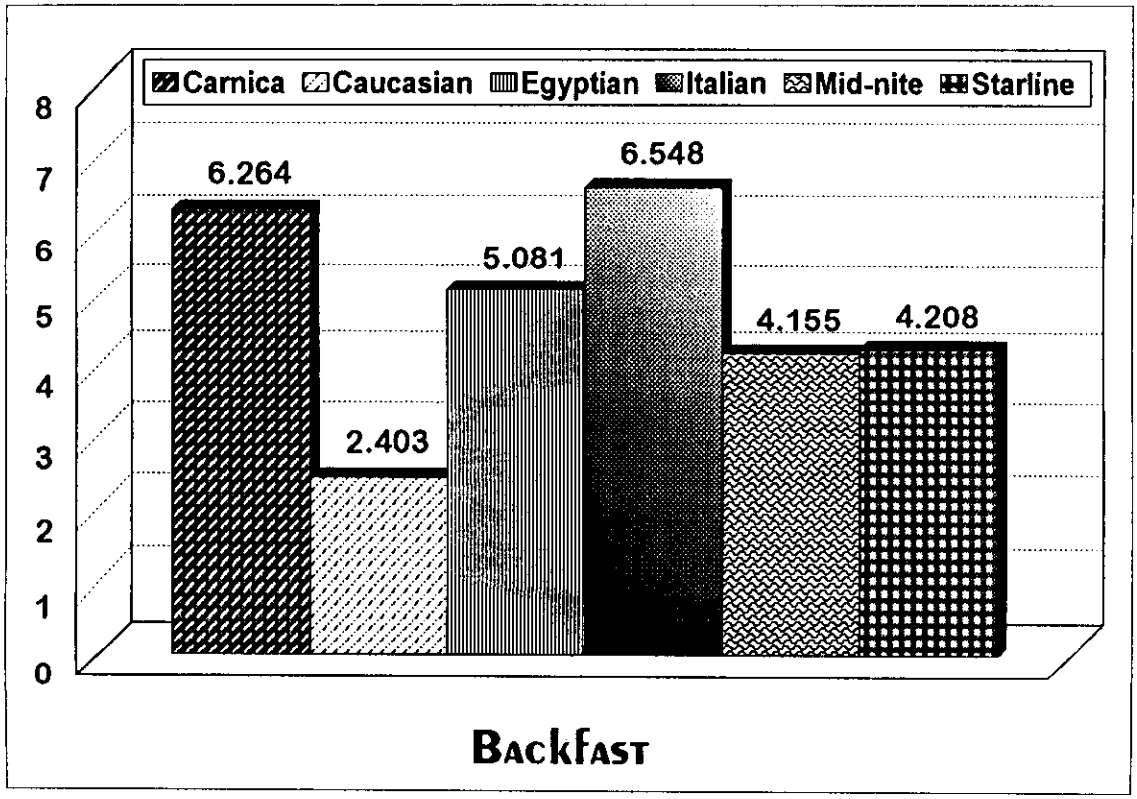
The distances between Buckfast race and other honeybee races (Carnica, Caucasian, Egyptian, Italian, Midnite and Starline) were 6.264, 2.403, 5.081, 6.548, 4.155 and 4.208%, respectively, and was the distances between Carnica race and other honeybee races (Caucasian, Egyptian, Italian, Midnite and Starline) were 4.914, 13.791, 2.704, 2.504 and 1.568%, respectively, and was the distances between Caucasian honeybee race and other honeybee races (Egyptian, Italian, Midnite and Starline) were 8.181, 9.747, 7.056 and 6.110%, respectively, and was the distances between Egyptian honeybee race and other honeybee races (Italian, Midnite and Starline) were 16.710, 8.947 and 13.242, respectively, and the distances between Italian honeybee race and other honeybee races (Midnite and Starline) were 1.309 and 0.749%, respectively, while was the distances between Midnite and Starline races 1.704%.

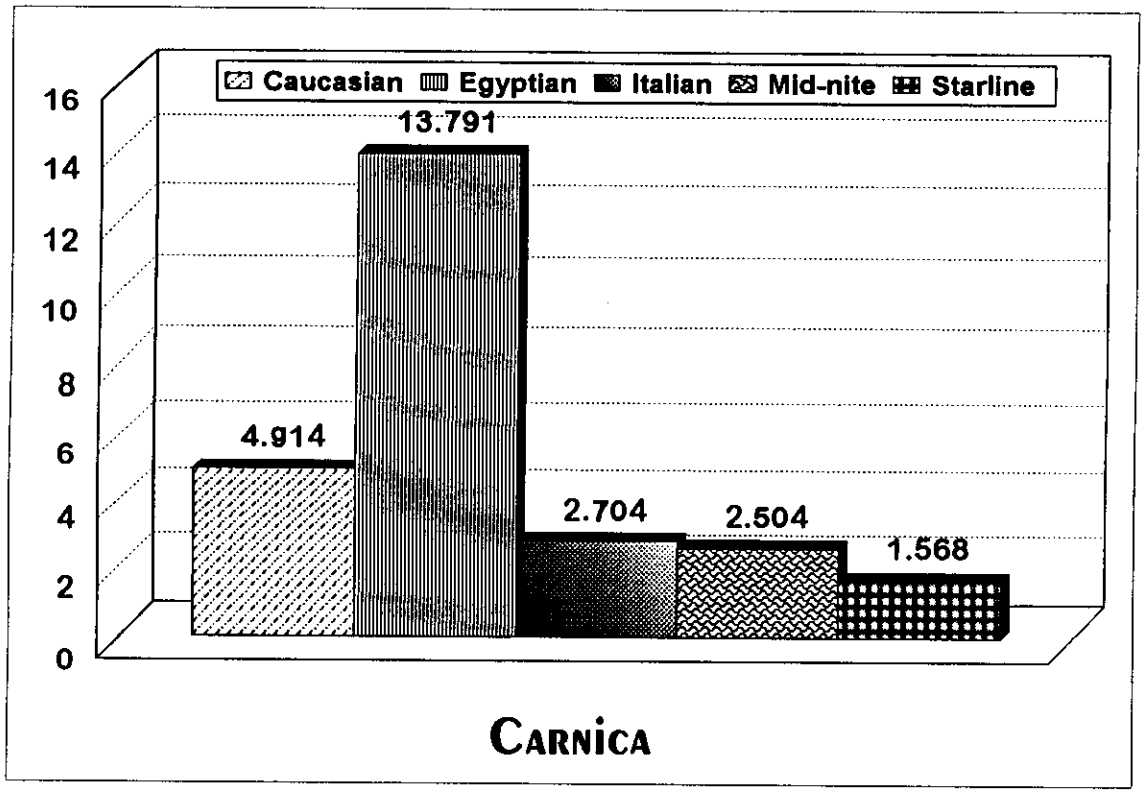
The statistical analysis of the data recorded in this study showed that the different between the biometric characters of different honeybee races as well as (proboscis, forewing, length and width, cubital index, venom sac size and pollen basket area) was significant just as demonstrated the statistical analysis also that the different in the same biometric characters between the local race (Egyptian bee) and important races (Italian, Carnica, Buckfast, Midnite, Caucasian and Starline bees), was highly significant. These results are agreement with **Sylvester and Rinderer (1987)** who reported that there different in biometric characters between honeybee races, and agree also with Orantes-Bermejo and Garcia-Fernandez (1995).

Table (24): Squared distance in some honeybee reared at Moshtohor region.

Type	Buckfast	Carnica	Caucasian	Egyptian	Italian	Midnite	Starline	Total
Buckfast	0.000	6.264	2.403	5.081	6.548	4.155	4.208	28.659
Carnica	6.264	0.000	4.914	13.791	2.704	2.504	1.568	31.745
Caucasian	2.403	4.914	0.000	8.181	9.747	7.056	6.110	38.411
Egyptian	5.081	13.791	8.181	0.000	15.710	8.947	13.242	64.952
Italian	6.548	2.704	9.747	15.710	0.000	1.309	0.749	36.767
Midnite	4.155	2.504	7.056	8.947	1.309	0.000	1.704	25.675
Starline	4.208	1.568	6.110	13.242	0.749	1.704	0.000	27.581
Total	28.659	31.745	38.411	64.952	36.767	25.675	27.581	---

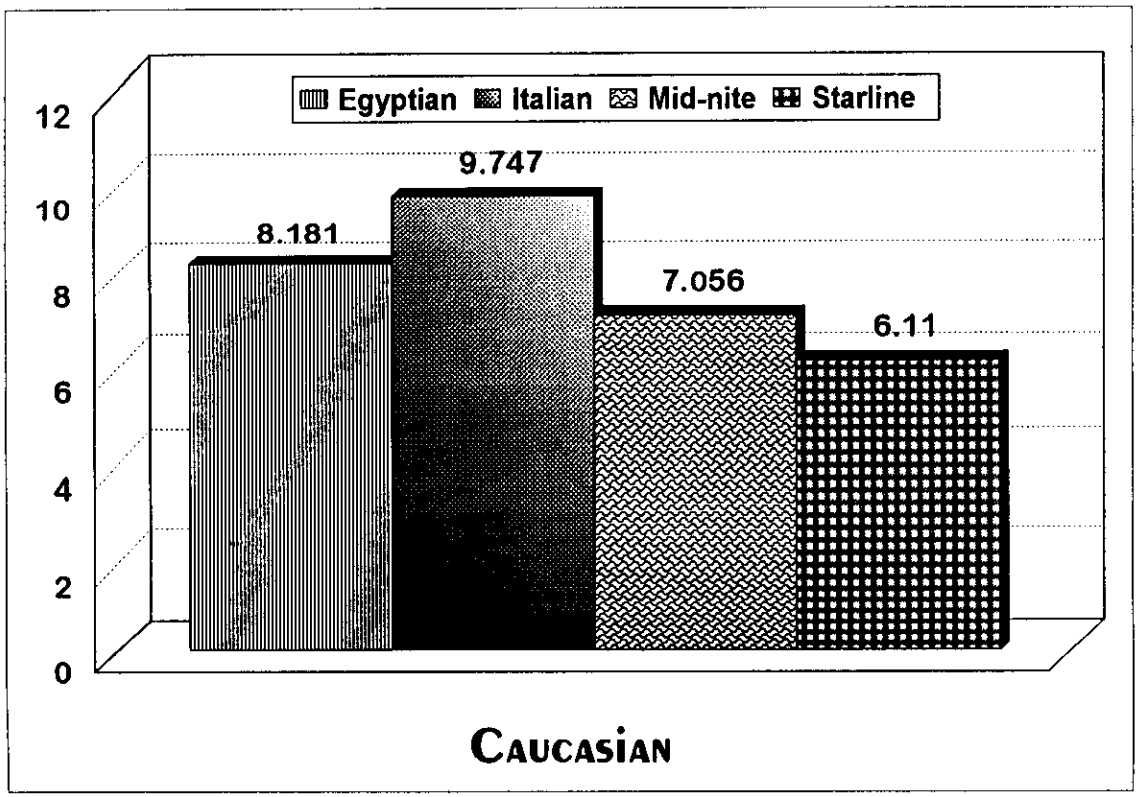
Figure (21, A-B)

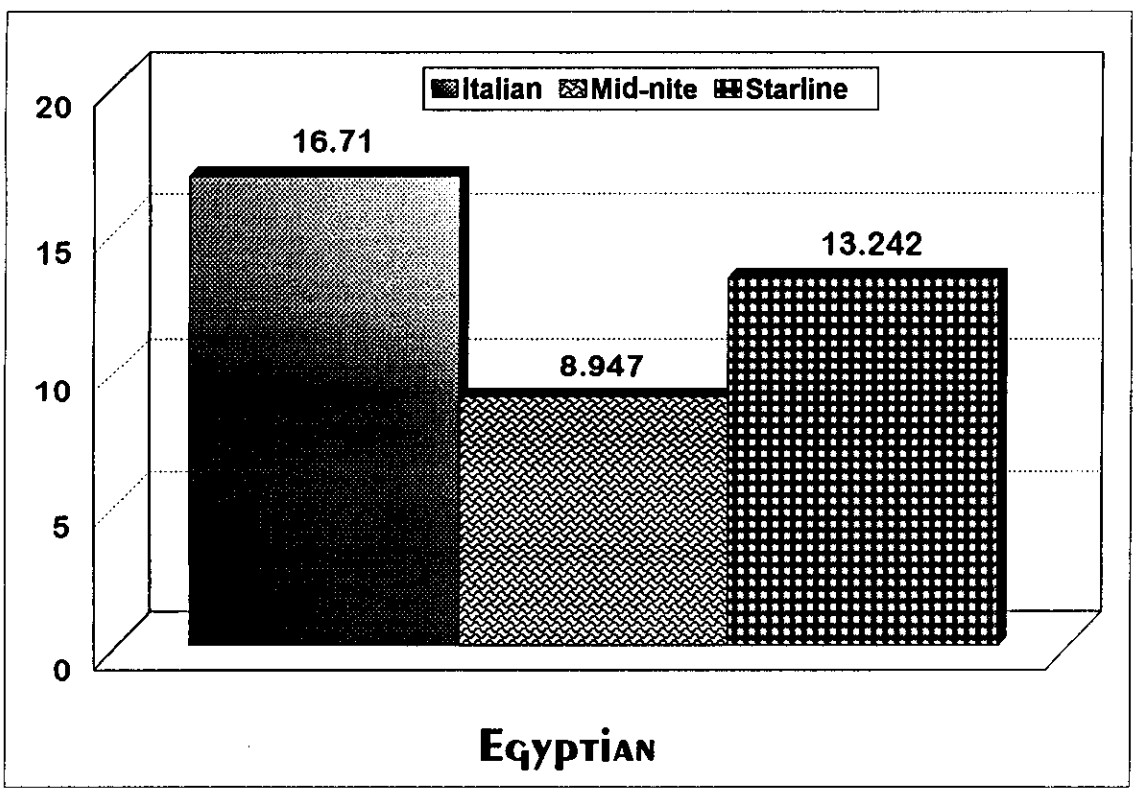




Discriminant Analysis Pairwise Generalized Squared Distance Between Types.

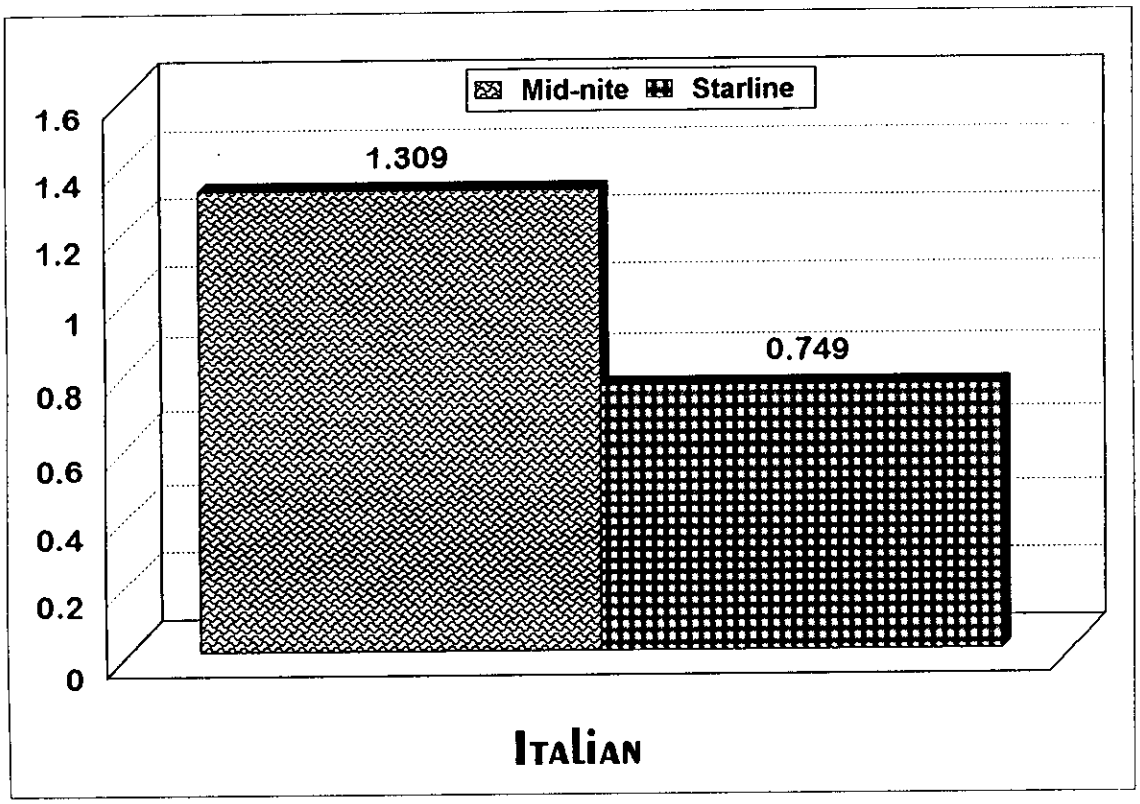
Figure (21, C-D)

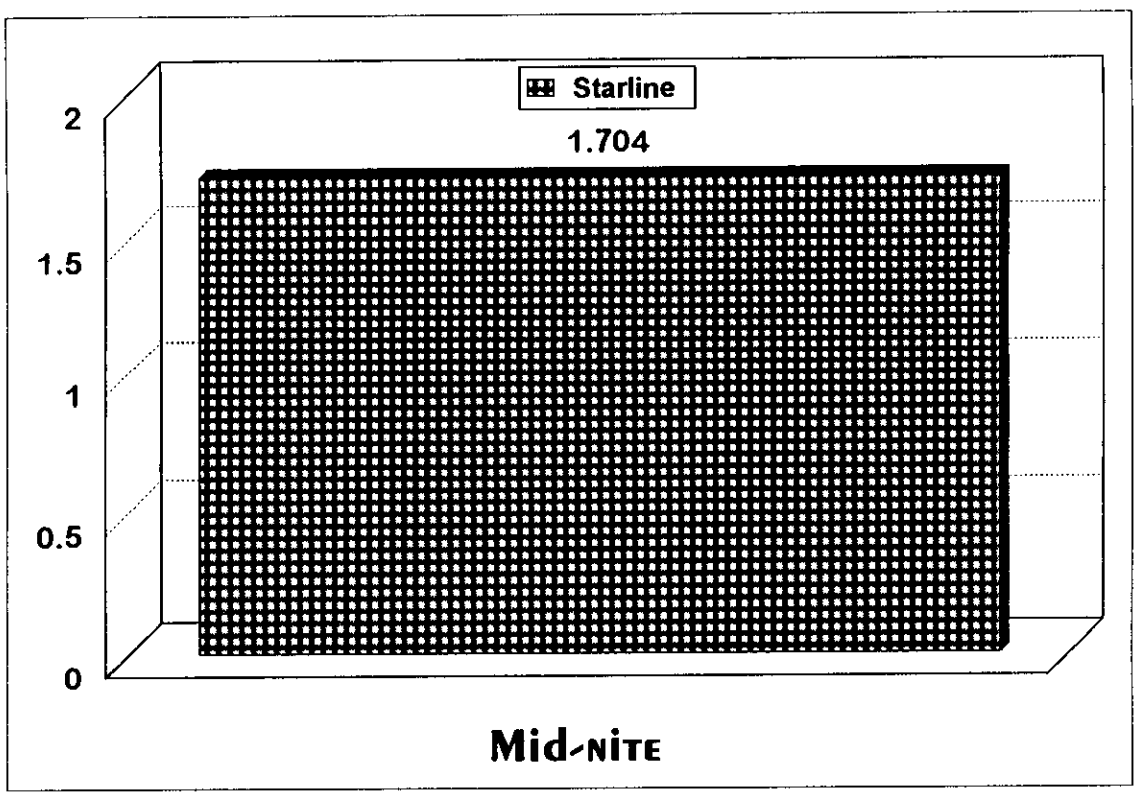




Discriminant Analysis Pairwise Generalized Squared Distance Between Types.

Figure (21, E-F)





Discriminant Analysis Pairwise Generalized Squared Distance Between Types.

HYPOPHARYNGEAL GLANDS AND WAX GLANDS OF HONEYBEE WORKERS MEASUREMENTS IN ITALIAN, CARNIOLAN AND EGYPTIAN BEES :-

This study showed that the hypopharyngeal glands development to start in workers of honeybee activity from fifth day of worker age after emergence and finished in seventeen days of worker age and was to do well period activity of the hypopharyngeal glands from seven day to thirteen day of worker age and showed also the hypopharyngeal glands in the Italian bees was greater in size than the Carnica and Egyptian bees, as was this glands in Italian race also more developed than in the Carnica and Egyptian bees, (**Huang and Yaren, 1994).**

From the data recorded in **Table (25)** show that the maximum weight of hypopharyngeal glands in Italian, Carniolan and Egyptian workers were 13.6, 12.3 and 10.56 mg, respectively. While, the minimum weight of the same glands in those races were 8.57, 7.68 and 7.53 mg, respectively. This results agreed with **Pickerd and Kither (1983), Kaatz and Takenaka (1987) and Knecht and Kaatz (1990).**

From the data recorded in **Table (25)** also show the longest diameter of the lobe hypopharyngeal glands Carniolan and Egyptian workers were 0.20, 0.16 and 0.18 mm, respectively, while the shortest one were 0.11, 0.06 and 0.07 mm, respectively.

From this study also showed that the wax glands have to start activity for wax secretion from the sixteenth day of worker age and continue until twenty-two days of worker age. The development of this glands depending to natural of work of the worker in the hive.

Table (25): The means weight and diameter of hypopharyngeal glands in some honeybee races.

Races	Hypopharyngeal glands									
	Italian		Carnica		Egyptian		Weight		Daimeter	
Age (days)	weight (mg)	diameter (mm)	weight (mg)	diameter (mm)	weight (mg)	diameter (mm)	Total	Mean	Total	Mean
6	10.17	0.14	9.63	0.12	8.63	0.09	28.43	9.477	0.35	0.117
7	10.87	0.15	9.57	0.13	8.98	0.08	29.42	9.807	0.36	0.120
8	12.40	0.16	10.83	0.14	10.05	0.12	33.28	11.093	0.42	0.140
9	13.60	0.19	11.98	0.15	10.33	0.14	35.91	11.970	0.48	0.160
10	13.32	0.18	12.30	0.16	10.00	0.15	35.62	11.873	0.49	0.163
11	13.32	0.20	11.59	0.12	10.48	0.18	35.39	11.797	0.50	0.167
12	13.22	0.20	10.72	0.11	11.33	0.18	35.27	11.757	0.49	0.163
13	13.08	0.18	10.85	0.10	10.56	0.13	34.49	11.497	0.41	0.137
14	10.48	0.14	9.50	0.08	10.53	0.14	30.51	10.170	0.36	0.120
15	9.47	0.12	8.72	0.06	9.77	0.12	27.96	9.320	0.30	0.100
16	9.13	0.12	7.68	0.06	7.96	0.08	24.77	8.257	0.26	0.087
17	9.57	0.11	0.0	0.0	7.53	0.07	17.10	5.700	0.18	0.060
18	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.000
Total	138.63	1.89	113.37	1.23	116.15	1.48	368.15	122.72	4.60	1.533
Mean	11.553	0.158	10.306	0.112	9.679	0.123	31.538	10.513	0.393	0.131

L.S.D. for	Weight		Diameter	
	Races	Age	Races	Age
at 0.05 =	2.545	1.272	0.07	0.03
at 0.01 =	3.459	1.729	0.09	0.04

From the data recorded in **Table (26)** show that the maximum longitudinal of wax plate (WL) in the Starline 4 of worker of Egyptian,

Data recorded in the same table show that the maximum transversal of wax plate (WT) of the Starline 4 were 2.25, 2.30 and 2.35 mm in Egyptian, Carnica and Italian workers, respectively, while, the minimum one in the same gland of those races were 1.90, 1.95 and 2.05 mm, respectively.

Also, data recorded in **Table (26)** indicate that the maximum distance between wax plate (WD) in the same sternum of worker Egyptian, Carnica and Italian were 0.30, 0.30 and 0.30 mm, respectively, while the minimum one in the same sternum of worker of those races were 0.20, 0.15 and 0.20 mm, respectively.

These results in the agreement of those obtained by **Snodgrass (1956)** who mentioned that the development and physiological activity of the food glands vary with the worker in which the bee is engaged, the glands being fully functional when the worker is serving in the hive as a nurse bee feeding the larvae and the queen. According to **Soudek (1927),** the gland cells are empty or atrophic in bee collecting pollen and nectar, though a high percentage of bees with full glands were taken on the hive entrance, these were probably young bees making orientation flights.

These results agreed with **Kaatz and Takenaka (1987)** who recorded that hypopharyngeal glands in workers was being from 4-days secreted 90% of the maximum amount of proteins, worker aged 10-14 days produced secretions with the highest protein contents. From day 14 protein production decreased and **Cassier and Lensky (1995).**

Table (26): The measurements of wax glands (mm) in some workers of honeybee races (sternite 4).

Races	Wax gland of														
	Egyptian			Carnica			Italian			Total			Mean		
Age (days)	WL	WD	WT	WL	WD	WT	WL	WD	WT	WL	WD	WT	WL	WD	WT
16	1.20	0.20	2.10	1.40	0.20	2.10	1.30	0.25	2.20	3.90	0.65	6.40	1.33	0.22	2.13
17	1.25	0.25	2.25	1.55	0.30	2.15	1.40	0.25	2.25	4.20	0.80	6.65	1.40	0.27	2.22
18	1.30	0.25	2.25	1.60	0.30	2.25	1.65	0.25	2.30	4.55	0.80	6.80	1.52	0.27	2.27
19	1.40	0.30	2.25	1.50	0.30	2.30	1.65	0.30	2.35	4.55	0.90	6.90	1.52	0.30	2.30
20	1.40	0.30	2.20	1.45	0.30	2.30	1.65	0.30	2.30	4.50	0.90	6.80	1.50	0.30	2.27
21	1.20	0.25	2.10	1.40	0.30	2.30	1.60	0.30	2.20	4.20	0.85	6.60	1.40	0.28	2.20
22	1.15	0.20	2.10	1.40	0.25	2.25	1.55	0.25	2.15	4.10	0.70	6.50	1.37	0.23	2.17
23	1.05	0.20	1.90	1.30	0.20	2.10	1.55	0.25	2.10	3.90	0.65	6.10	1.30	0.22	2.03
24	1.05	0.20	1.90	1.30	0.15	2.00	1.50	0.20	2.10	3.85	0.55	6.00	1.28	0.18	2.00
25	1.05	0.20	1.90	1.25	0.15	1.95	1.30	0.20	2.05	3.60	0.55	5.90	1.20	0.18	1.97
Total	12.1	2.35	20.9	14.2	2.45	21.7	15.2	2.55	22.0	41.4	7.35	64.7	13.8	2.45	21.5
Mean	1.21	0.24	2.1	1.42	0.25	2.17	1.52	0.25	2.20	4.14	0.74	6.47	1.38	0.25	2.16

WL = Wax plate longitudinal. WD = Distance between wax plates. WT = Wax plate transversal.

L.S.D. for	WL		WD		WT	
	Races	Age	Races	Age	Races	Age
at 0.05 =	0.14	0.08	---	0.091	0.094	0.052
at 0.01 =	0.20	0.11	---	0.125	0.130	0.071