Results

RESULTS

I-*Varroa jacobsoni* as a parasite on honeybee colonies

A- Survey of *Varroa jacobsoni in the apiaries of some Governorates*:

The data presented in table (2) showed that all tested apiaries showed high percentage of infestation with *V.jacobsoni* . In 1998 season, 390 colonies were infested out of 550 colonies examined for varroa,. The highest percentage of Varroa infestation was in Kafr El-sheikh (86.66%) followed by Qualubia Moshtohor (81.25%), Tokh (66.66%), then El-Gharbia, Mehalla El-Kobra (62.50%) and Gemmeiza location (50.00%) . Adverse results were shown in 1999 season. The highest percentage was shown in Mehalla El-kobra (83.33%) while, the lowest infestation rate was in kafr El-sheikh (70.00%) .The infestation rates with *Varroa* was foundtobe equal in both Tukh and Mohtohor (Qualubia) apiaries where it was 75.00%.

B-Control of *Varroa* mites by different acaricides

1-Assessment of the efficiency of the testted materials :

a. Percentage of pre-post *varroa* infestation.

Data presented in table (3) and illustrated in Figur (1) showed that all tested materials significantly decreased precentage of *Varroa* infestation comparing with the untreated colonies, since percentage of Pre – treatment *Varroa* mites ranged from 16.00-28-33% while, percentage of post-treatment *Varroa* infestation ranged from 1-30.66% during 1998 season. Sigificant differences were observed beween Apistan ®, Apilife VAR ®+ Oxalic acid and Apilife VAR + paraffin treatments and the other materials tested.

The application of one Apistan stripe proved to be the most effective in reducing percentage of mite infestation of honeybee colonies, which gave 96.29% efficiency at 28 days post-treatment . Apilife VAR + Oxalic acid occupied the second rank exhibiting 93.36% efficiency. Apilife Var + Parafin

Table (2) : infestation percentages of with *Varroa Jacobsoni* in the apiaries of 3 Governorates i.e. Gharbia ,Qualubia and Kafr El-Sheikh during 1998 and 1999 seasons .

Governorate	1998 season					1999 season			
	Location	No. of apiaries	No .of colonies	No. of infested colonies	%. of infestation with *Varroa*	No. of apiaries	No .of colonies	No .of infested colonies	%. of infestation with *Varroa*
Gharbia	Mehalla El-Kobra	3	120	75	62.50	4	180	150	83.33
	Gemmeiza	1	80	40	50.00	1	55	40	72.72
Qualubia	Tokh	1	120	80	66.66	1	120	90	75.00
	Moshtohor	2	80	65	81.25	2	80	60	75.00
Kaf El-Sheikh	Kaf El-Sheikh	2	150	130	86.66	1	50	35	70.00
Total		9	550	390	70.90	8	485	375	77.31

Table (3). Efficiency of certain materials as acaricides on *Varroa* mites during1998 Season.

Treatment	Varroa mites % pre-treatment	Mean of fallen mites at indicated periods				Total number of fallen mites	Varroa mites % post-treatment	% Efficiency
		7 days	14 days	21 days	28 days			
A pistan (1 strip / colony)	27.00	1060	60	11	4	1135	1.00	96.29
Mavrik 0.1 %	26.33	780	182	40	5	1007	5.00	81.01
0.2 %	26.00	786	280	83	37	1186	4.66	82.01
0.3 %	25.00	870	330	112	42	1354	4.00	84.00
Formic acid 70 %	28.33	1740	810	245	65	1860	4.00	85.88
Oxalic acid 3%	16.00	990	472	156	84	1702	3.00	81.88
Apilife VAR + oxalic	25.00	2580	850	203	19	3652	1.66	93.36
Apilife VAR + parfin	24.00	2240	735	89	18	3082	2.00	91.66
Control	28.00	37.33	35.66	37	25	134.99	30.66	
L.S.D at 5%		57.036	24.652	9.325	5.625		.771	

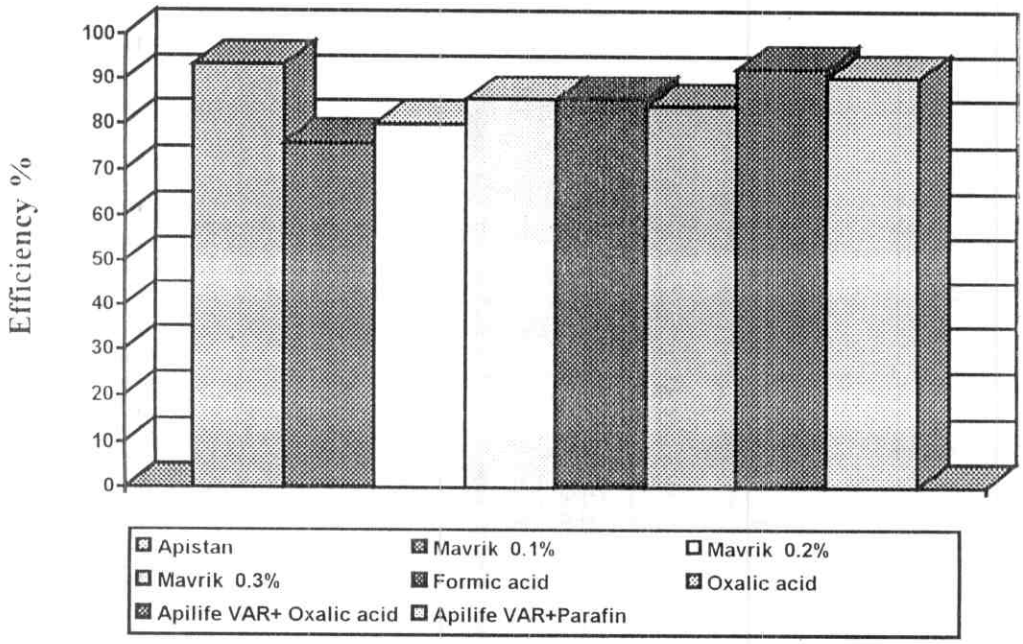


Fig (1).Efficiency of variousTreatments of honeybee colonies *V.jacobsoni* mites ,during 1998 .

came in the third rank, releazing 91:66% mite mortality . Formic acid showed an intermediat effect (70%) in reducing mite infestation (85.88%). Mavrik at 0.3% concenttration was more effective than at the used lower concentrations of (0.1% and 0-2%) which gave 81.01-84.00% kill and this value was similar to that obtained by oxalic acid (81.25%) .

Contrarly, the untreated colonies indicated an increase in the rate of mite infestation from 28-33% at the initial of the experiment to 30.66% at the end of the observation period.

In 1999 season, the results given in table (4) and illustrated in figur (2) revealed that the tested materials showed similar effect on mites mortality as follows : Apistan, Apilife VAR + oxalic acid and Apilife VAR + Paraffin came in first three ranks, since they showed 93.35%, 92.49% and 90.50,% respectively. Mavrik (0.3%) formic acid and oxalic acid were almost equal in their effect and proved to be intermediate in their efficiency on Varroa mortality (85.17, 85.56 and 84.00% ,respectively) an then Mavrik at 0.2% and 0.1% concentrations were the least in reducing the rate of mite infestation which gave 80.00 and 76.00 % ,respectively.

b. Number of fallen *Varroa* mites as an indicator for efficacy of treatments :

Results presented in table (3) revealed that the highest number of fallen *Varroa* mites on the sticky bottom board was estimated after 7 days from the onset of the treatments and decreased gradually at the end of the experimental period during 1998. Apilife VAR + Oxalic acid and Apilife VAR + Paraffin recorded the highest number of fallen mites after 7 days of treatment (2580 and 2240 mites, respectively) followed by formic acid (70%) and one Apistan stripe which recorded 1740 and 1060 mites, respectively.While Oxalic acid (3%) followed by mavrik (0.3% , 0.2% , 0.1%) recorded the lowest number of

fallen mites.On the other hand , the untreated colonies showed very low value (37.33 mites).

Concerning the effects during 1999 season, results presented in table (4) clarify that there were some changes in the ranking of the tested materials and in the highest mean number of fallen mites recorded after seven days of treatments. Bee colonies treated with formic acid was 70% recorded the highest number of captured mites after 7 days of treatments (1640 mites), while Apilife VAR+Paraein came in the second rank (1580 mites) then oxalic acid (1309 mites), and Mavrik 0.3% (1140 mites) . Apilife VAR + Oxalic acid and Mavrik 0.2% were almost equal in their effect after 7 days (1065 and 1060 mites, respectively). Mavrik 0.1% and one Apistan strip was the least in this respect (878 and 275 mites, respectively), while the untreated colonies gave mean of 45.66 fallen mites. The number of fallen Mites decresed with followed interval periods.

The tested materials could be arranged in descending order according to their efficiency after treatment as follows, one Apistan strip, Apilife VAR + oxalic acid; and Mavrik 0.3% while oxalic acid and Mavrik 0-2% enhanced their ranking during the two seasons, while Mavrik 0.1% occupied the last rank Table 4).

2-Effect of certain control materials as acaricides anti-Varroatosis on brood rearing activity.

The results listed in table (5) and illustrated in Fig-(3) indicated that, all the tested materials significantly increased seald brood area reared in the experimental colonies which hony bee treated with acaricides, compared with untreated ones during 1998. the sealed brood area was increased with the increasing of application period of treatment .

Table (4). Efficiency of certain materials as acaricides on *Varroa* mites during1999 Season.

Treatment	Varroa mites % pre-treatment	Mean of fallen mites at indicated periods				Total number of fallen mites	*Varroa* mites % post-treatment	% Efficiency
		7 days	14 days	21 days	28 days			
A pistan (1 strip / colony)	20.00	275	41	14	5	355	1.33	93.35
Mavrik 0.1 %	25.00	878	356	89	9	1332	6.00	76.00
0.2 %	25.00	1060	369	91	25	1545	5.00	80.00
0.3 %	21.00	1140	557	30	53	1780	3.00	85.71
Formic acid 70 %	30.00	1640	835	225	72	2772	4.33	85.56
Oxalic acid 3%	25.00	1309	640	209	99	2257	4.00	84.00
Apilife VAR + oxalic	26.00	1065	472	111	18	1666	2.00	92.49
Apilife VAR+ paraffin	28.33	1580	553	95	17	2245	2.66	90.50
Control	26.62	45.66	43.33	47.33	11.33	147.65	28.85	
L.S.D at 5%		45.137	24.240	8.860	3.273		1.093	

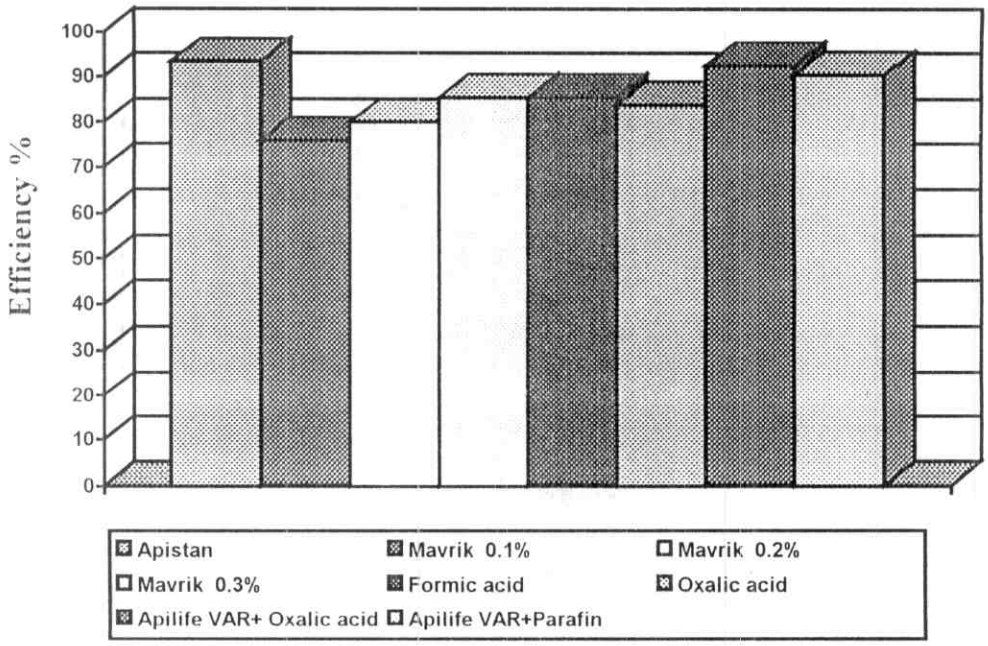


Fig (2).Efficiency of variousTreatments of honeybee colonies *V.jacobsoni* mites ,during 1999 .

The highest mean of sealed brood area was registered in bee colonies treated with oxalic acid 3% during the first interval period which recorded 171.44 $inch^2$. Hihly significant differences were found between the sealed brood area resulted in bee colonies treated with oxalic acid and the colonies treated with Formic acid (167.77 $inch^2$) and Mavrik 0.3% (166.77 $inch^2$) since they occupied the first three ranks, respectively. On the other hand, one Apistan strip resulted in lowest sealed brood area (88.99 $inch^2$), while the untreated colonies (control) reared 83.22 $inch^2$. On the second the measarments of sealed broad areas indicated that , no significant differences were found in seald brood area reared in colonies treated with Mavrik 0.3 %, and 0.2% ,Formic acid 70% and oxalic acid 3 % which were resulted (176.11, 174.00, 172.55 and 172.11 $inch^2$, respectively). These materials occupied the first four ranks in this respect, respectively.

On the third record, Mavrik 0.3% showed the highest sealed brood area (186.66 $inch^2$) followed by Mavrik 0.2% (182.66 $inch^2$) ,Formic acid (181.55 $inch^2$) and Apilife VAR + oxalic acid (181.33 $inch^2$), respectively.

On the fourth period (after 52 days), Apilife VAR + oxalic was the first in this respect (199- 10 $inch^2$) . Statistical analysis indicated ,no significant differences between Apilife VAR + oxalic, Mavrik 0.3% (196.44 $inch^2$) and Mavrik 0.2% (194.55 $inch^2$).

The eight treatments could be arranged according to the average of brood area and their efficiency compared to that resulted in the untreated colonies as follow :
1-The highest effective materials were Mavrik 0.3%, Formic acid 70% and Mavrik 0.2% since they showed average 180.96,

Table (5) Effect of certian treatments on brood rearing activity (in inch^2) of the tested honey bee colonies during 1998 season.

Treatment	Sealed brood area (inch^2) after								Total Brood area	average	Increase %
	13 days		26 days		39 days		52 days				
	Brood area	% increase	Brood area	% increase	Brood area	% increase	Brood area	% increase			
Apistan (I stripe)	88.99	6.93	97.21	14.52	103.88	16.28	121.66	17.36	411.74	102.93	14.02
Mavrik 0.1 %	156.88	88.51	158.99	87.31	167.10	87.05	176.33	70.10	659.30	164.82	82.58
0.2 %	158.44	90.38	174.00	104.99	182.66	104.47	194.55	87.68	711.76	177.94	97.11
0.3 %	166.77	100.39	176.11	107.48	186.66	108.95	196.44	89.50	723.87	180.96	100.46
Formic acid	167.77	101.59	172.55	103.28	181.55	103.23	193.44	86.61	715.31	178.82	98.09
Oxalic acid	171.44	106.00	172.11	102.79	174.66	95.52	175.88	69.67	694.09	173.52	92.22
Apilife VAR + oxalic	153.55	84.51	167.66	97.52	181.33	102.98	199.10	92.07	701.64	175.41	94.31
Apilife VAR + paraffin	151.22	81.71	166.11	95.69	177.88	99.12	195.10	88.21	690.31	172.57	91.17
Control (un-treated)	83.22		84.88		89.33		103.66		361.09	90.27	
L.S.D at 5 %	5.199		7.096		6.290		5.242				

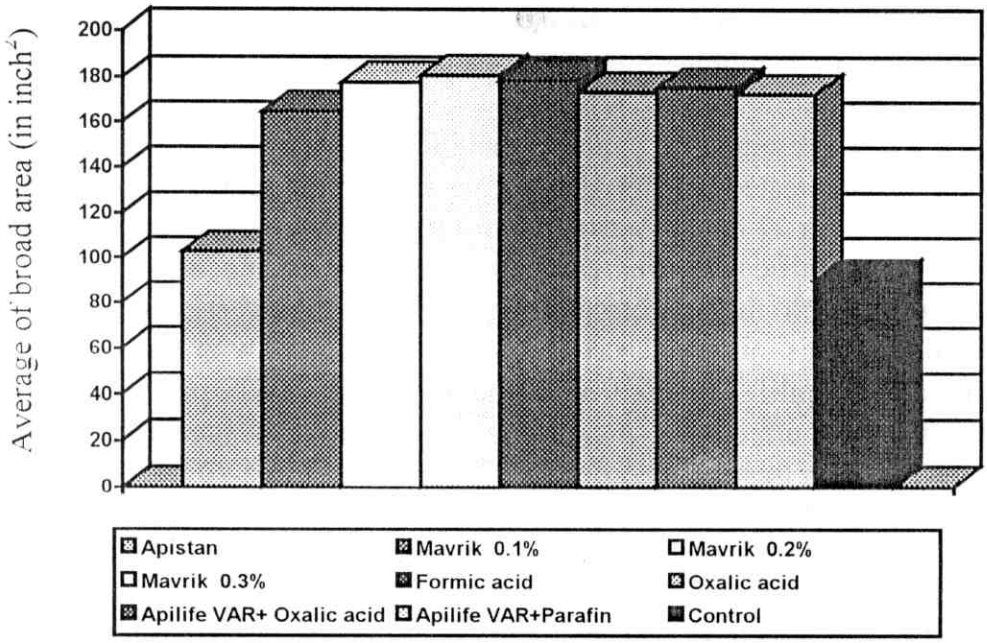


Fig (3).Effect of certain materials as acaricides on brood rearing activity (in inch^2) during 1998 season.

178.82 and 177.94 inch^2, respectively releazing 100.46, 98.09 and 97.11% efficiency.
2-The moderate effective materials,were Apilife VAR + oxalic acid (175.41 inch^2). Oxalic acid 3% (173.52) and Apilife VAR + Paraffin (172.57) releazing 94.31, 92-22 and 91.17% efficiency.
3-The lowest effective materials were Mavrik 0-1% and one Apistan stripe which showed 164.82 and 102.93 inch^2, respectively releazing 82.58, 14.02% efficiency.
4-The untreated colonies showed 90.27 inch^2 sealed brood area.

Data presented in table (6) and Fig. (4) showed that ,the effect of the tested materials as acaricides on the sealed brood area (inch^2) in 27 honey bee colonies during 1999. All the tested materials significantly increased the brood rearing activity comparing with the untreated colonies during the experimental period . It was observed that the colonies treated with oxalic acid, and Apilife VAR + oxalic acid, Apilife VAR + paraffin were the most effective in increaseing the sealed brood area after 13 days from treatment recording 235.73, 217,58 and 203.48%, respectively. Whereas, one Apistan strip was the least effective one (17.74%). The other tested materials were in between recording 111.72-173.33% efficiency. All over the 4 interval periods, the tested materials could be arranged descendingly according to the average of sealed brood area compared with the untreated colonies as follows: Apilife VAR + oxalic acid (191.85%), oxalic acid (190.82) Apilife VAR+ paraffin (180.85), Formic acid (163.63) Mavrik 0.3% (144.91) Mavrik 0.2% (138.63), Mavrik 0.1% (128.49%) and one Apistan strip (75.41%). Statistical analysis indicated,no significant differences between oxalic acid and Apilife VAR + oxalic acid on the average of brood while significant differences were found between the other tested materials in this respect.

Table (6) Effect of certian treatments on brood rearing activity (in inch^2) of the tested honey bee colonies during 1999 season.

Treatment	Sealed brood area (inch^2) after								Total Brood area	Average	% increase
	13 days		26 days		39 days		52 days				
	Brood area	% increase	Brood area	% increase	Brood area	% increase	Brood area	% increase			
Apistan (I stripe)	64.88	17.74	12.11	40.48	77.44	86.87	87.22	94.81	301.65	75.41	56.58
Mavrik 0.1 %	116.66	111.72	121.55	136.80	126.44	205.11	149.32	233.52	513.97	128.49	166.80
0.2 %	125.66	128.05	134.33	161.69	142.77	244.52	151.77	238.99	554.53	138.63	187.85
0.3 %	133.22	141.77	141.33	175.33	144.55	248.81	160.55	258.61	579.65	144.91	200.89
Formic acid	150.55	173.23	156.77	205.41	169.99	310.20	177.22	295.84	654.53	163.63	239.76
Oxalic acid	184.99	235.73	191.10	272.29	191.66	362.50	195.55	336.78	763.30	190.82	296.23
Apilife VAR + oxalic	174.99	217.58	185.99	262.34	198.10	378.04	208.33	365.33	767.43	191.85	298.36
Apilife VAR+ paraffin	167.22	203.48	174.88	240.69	183.33	342.39	198.00	342.26	723.43	180.85	275.53
Control (un-treated)	55.10		51.33		41.44		44.77		192.64	48.16	
L.S.D at 5 %	5.57		9.328		14.568		13.662				

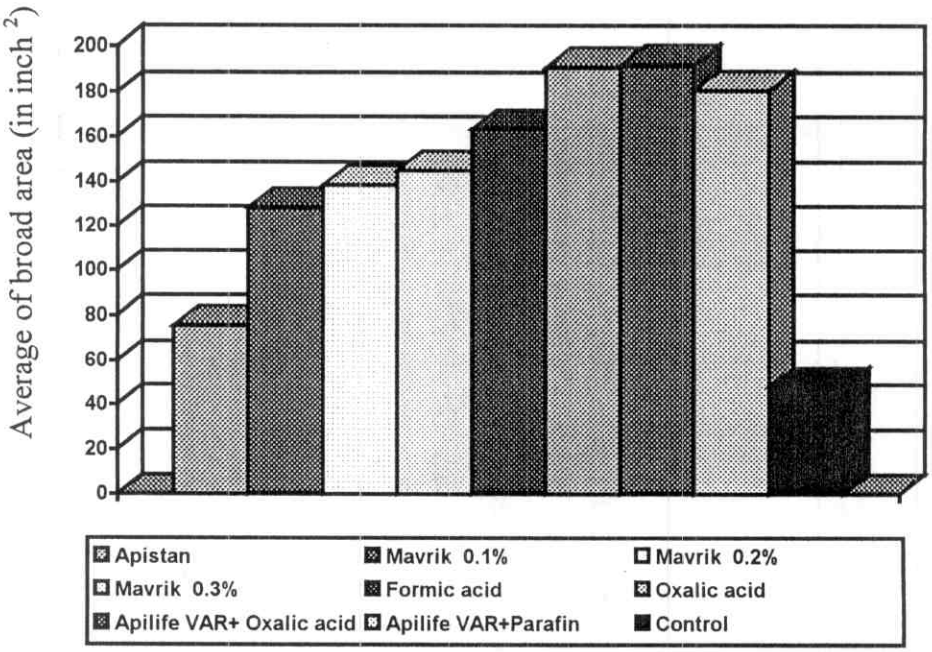


Fig (4).Effect of certain materials as acaricides on brood rearing activity (in inch^2) during 1999 season.

3-Effect of certain control materials as acaricides on honey production.

The amount of honey produced by bee colonies treated with the tested control materials were determind for clover and cotton crops during 1998 and 1999 seasons. Results presented in table (7) and illustrated in Fig (5) showed that all the tested materials were significantly increased the honey production over the untreated colonies either after clover or cottonnectar flow. Also, significant difference were achieved between the different treatments as well as between the production of honey from clover and cotton, whereas the production after clover was higher than after cotton. Bee colonies treated with Apilife VAR + oxalic acid gave the highest honey production (3.91 kg / coloney) after cotton and 5.33 kg / colony) after clover in 1998 season . Apilife VAR + paraffin came insignificantly in the second rank yielding 3.47 kg/colony after cotton nectar flow and 5.10 kg after colver. Bee colonies treated with the other materials i.e formic acid 70% and mavrik (0.1, 0.2 and 0.3%) were almost equal in their production after cotton which ranged between 3.03 – 3.33 kg/ colony, while there were significant differences between the to yields them after colver. On the hand, colonies treated with oxalic acid 3% yielded the lowest honey production 2.74kg/colony after cotton and 3.75 kg/colony after colver. Statitistical analysis of the data showed, no significant differences between honey production from oxalic acid treatment and the untreated colonies after cotton.

The tested materials could be arranged descendingly according to their efficiency in increasing the honey production during 1998 as follow: Apilife VAR + oxalic (65.00%) , Apilife VAR + paraffin (53.03%), one Apistan stripe (49.46%), Mavrik 0.3% (39.82%), Mavrik 0.2% (36.07%) , Mavrik 0.1% (31.25) then Formic acid (27.32%) . Oxalic acid exhibited the lowest efficiency in increasing honey production (15.89%) .

In 1999 season, data presented in the table (8) and illustrated in Fig. (6) revealed that the tested materials approximately occupied the same ranks with different amounts of honey yield, since it was higher than those of 1998 season either after clover or cotton. Apilife VAR + paraffin recorded the highest honey yield, which gave 5.95 and 5.55 kg / colony after cotton and 7.5 and 7.15 kg / colony after colver respectively. Bee colonies treated with oxalic acid recorded the lowest honey production either after cotton (4.45 kg / coloney) or after colver (5.33 kg / coloney). however, the untreated colonies were the least one.

The tested materials could be arranged descendingly according to their efficiency in increasing the honey production in 1999 as follow, Apilife VAR + oxalic acid (47.32 %), Apilife VAR + Paraffin (41.74%), Mavrik 0.3% (31.13%), one Apistan strip (28.45%), Mavrik 0.2% (28.34 %), Mavrik 0.1% (24.44 %), Formic Acid 70% (20.53 %) then oxalic acid 3% (4.13 %).

Table (7): Effect of certain materials used in controling *Varroa* mites on the honey production of clover and cotton nectarflow during 1998 seasons.

Treatment	Clover		Cotton		The total production	Increasing %
	Yield kg./colony	Increasing %	Yield kg./colony	Increasing %		
Apistan	5.10	61.90	3.27	33.46	8.37	49.46
Mavrik 0.1%	4.25	34.92	3.10	26.53	7.35	31.25
Mavrik 0.2%	4.36	38.41	3.26	33.06	7.62	36.07
Mavrik 0.3%	4.50	42.85	3.33	35.91	7.83	39.82
Formic acid 70%	4.10	30.15	3.03	23.67	7.13	27.32
Oxalic acid 3%	3.75	19.04	2.74	11.83	6.49	15.89
Apilife VAR+ Oxalic acid	5.33	69.20	3.91	59.59	9.24	65.00
Apilife VAR+Paraffin	5.10	61.90	3.47	41.63	8.57	53.03
Control	3.15		2.45		5.60	
L.S.D. 5%	0.13		0.48			

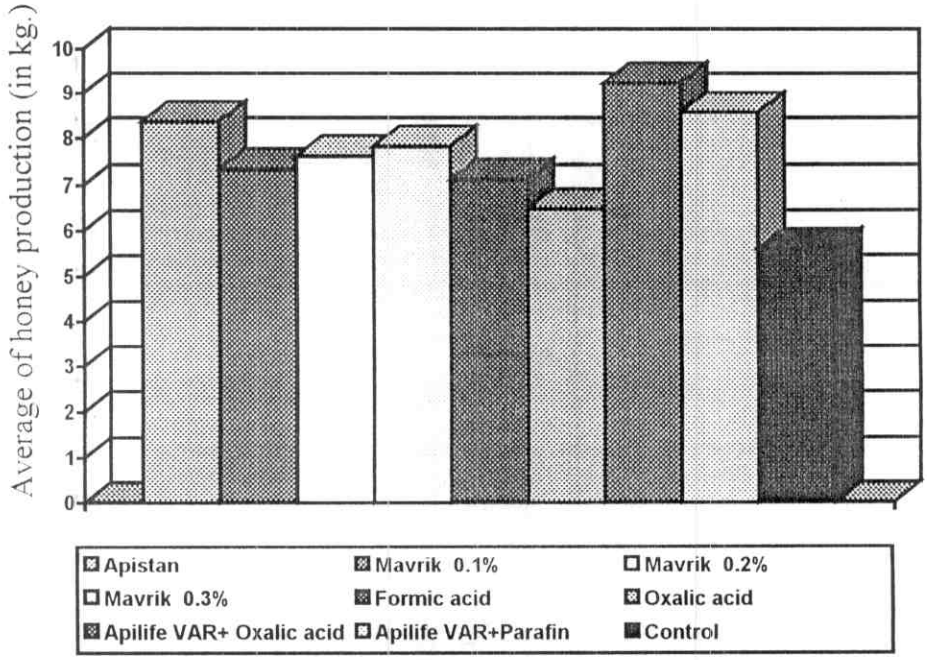


Fig (5).Efficacy of some acaricides used for controlling *Varroa* mites in honeybee colonies on the honey production in 1998 .

Table (8): Effect of certain materials as acaricides in controlling of *Varroa* mites and their efficiency on honey production (kg./ colony) after clover and cotton nectar –flow during 1999 season.

Treatment	Clover		Cotton		The total production	Increasing %
	Yield kg./colony	Increasing %	Yield kg./colony	Increasing %		
Apistan	6.55	34.22	4.96	21.56	11.51	28.45
Mavrik 0.1%	6.15	26.02	5.0	22.54	11.15	24.44
Mavrik 0.2%	6.25	28.07	5.25	28.67	11.50	28.38
Mavrik 0.3%	6.45	32.17	5.30	29.90	11.75	31.13
Formic acid	5.95	21.92	4.85	18.87	10.80	20.53
Oxalic acid	5.33	9.22	4.45	9.06	9.33	4.13
Apilife VAR+ Oxalic acid	7.25	48.56	5.95	45.83	13.20	47.32
Apilife VAR+Parafin	7.15	46.51	5.55	36.02	12.70	41.74
Control	4.88		4.08		8.96	
L.S.D. 5%	0.15		0.88			

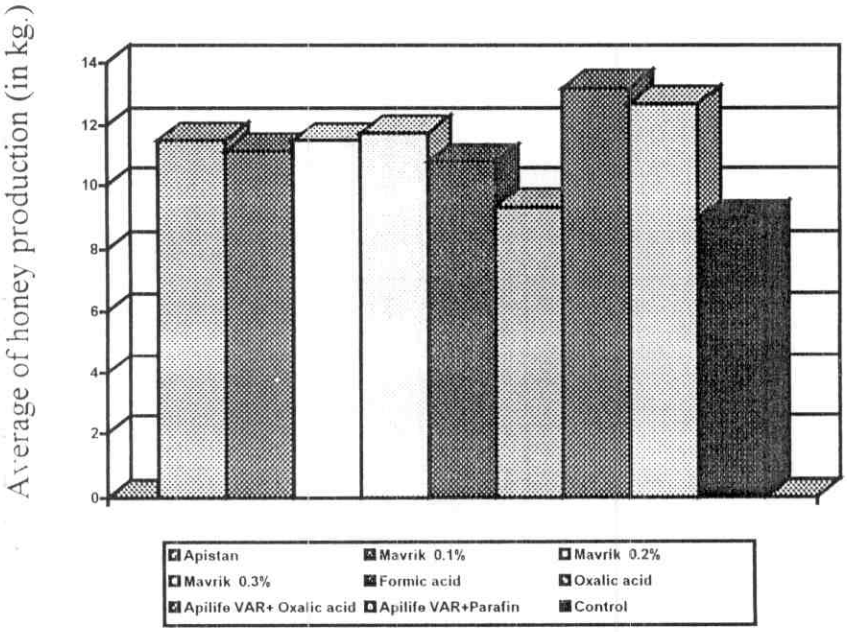


Fig (6). Efficacy of some acaricides used for controlling *Varroa* mites in honeybee colonies on the honey production in 1999 .

II-Chalkbrood disease (*Ascosphaera apis*)

1- Survey of chalkbrood disease in honeybee colonies:

The results presented in table (9) showed that the percentages of infested colonies examined for chalkbrood disease at three Governorates (i.e. Gharbia, Qualubia and Kafer El-sheikh)during 1998 and 1999 seasons. Twelve apiaries included 645 colonies were examined in 1998, the total number of infested colonies were 130 comprising 20-15%. The percentages of infested colonies ranged from 10 - 42.85 %. The highest percentage of infested colonies was at El-Ameria location (42.85%) at Gharbia, while the lowest ate of infested colonies with chalkbrood (10%) was recorded at Mehalla El-Kubra Gharbia) and Kafr-El-Sheikh. In 1999 season, 10 apiaries were examined at six locations included about 545 colonies. The total percentage of infested. Colonies with chalkbrood was 29.35%. The highest percentage of infested colonies was 35.71% at Mehalla El-Kubra Gharbia, while the lowest percentage was 25% at both of Tukh and Moshtohor (Qualubia). The other tested apiaries were in between.

2- Isolation and identification of chalkbrood disease

Isolation of *A. apis* was carried out from the samples of mummies collected from different locations . Pure cultures were identified in the laboratory of the National Project for Control of Fungus on Honey bee at Fac .Agric ., Moshtohor , the mumnies were white, gray or black (Fig.7) and the spore balls of *A.apis* were white (Fig. 8) .

3- Experimental trails for controlling of chalkbrood disease(*A.apis*).

PDA media at laboratory were used for evaluating certain materials as acaricides atdifferent concentrations on linear growth of *A. apis*, the causal fungus of chalk brood disease. Results presented in table (10) revealed significant differences between the tested materials and their concentrations. Sodium

Table (9): Survey of chalkbrood disease infested honeybee colonies at 3 Governorates i.e. Gharbia , Qualubia and Kafr El-Sheikh during 1998 and 1999 seasons .

Governorate	1998 season					1999 season				
	Locations	No. of apiaries	No .of colonies	No. of infested colonies	%. infestation	Locations	No. of apiaries	No .of colonies	No .of infested colonies	%. infestation
Gharbia	Mehalla El-Kobra	4	200	20	10.00	Mehalla El-Kobra	3	140	50	35.71
	Gemmeiza	1	75	15	20.00	Gemmeiza	1	55	15	27.27
	Amria	2	70	30	42.85	Aiash	1	50	15	30.00
Qualubia	Tokh	1	120	30	25.00	Tokh	1	120	30	25.00
	Moshtohor	2	80	15	18.75	Moshtohor	2	80	20	25.00
Kaf El-Sheikh	Kaf El-Sheikh	2	100	20	10.00	Kaf El-Sheikh	2	100	30	30.00
Total		12	645	130	20.15		10	545	160	29.35

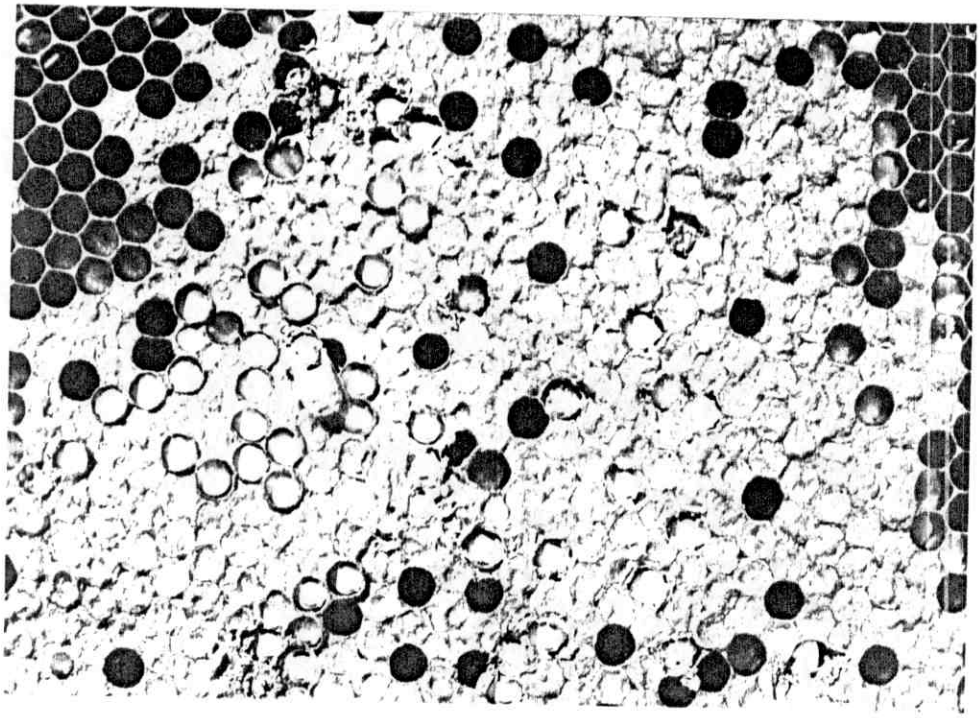


Fig (7) .White and black mummies of chalkbrood disease .

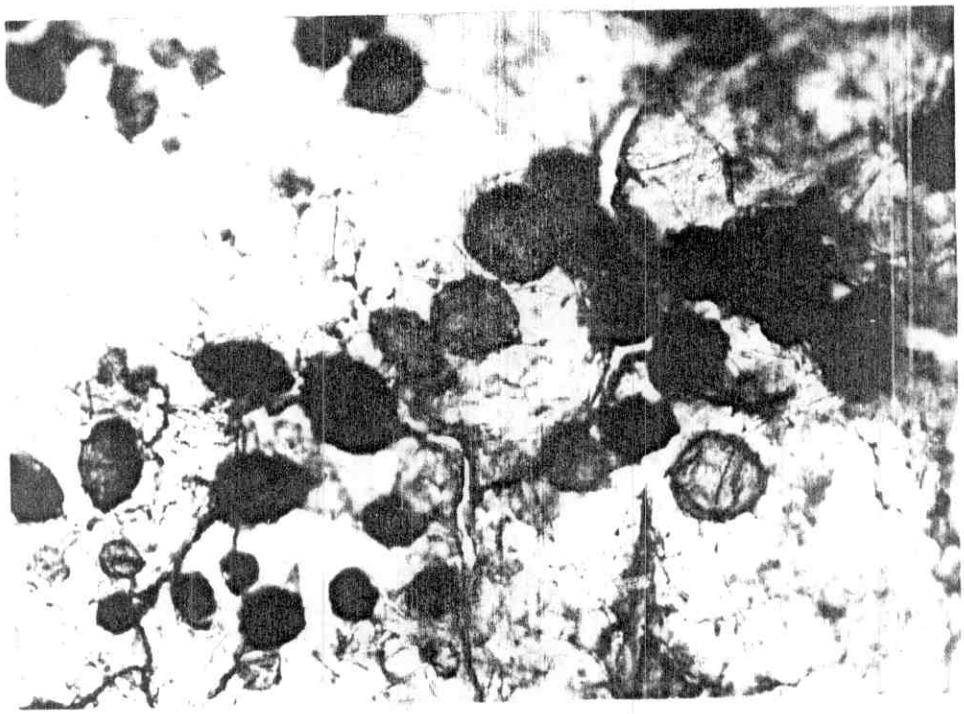


Fig (8). Spore balls of *Ascosphaera apis*

benzuate, Thymol, and Apilife VAR Completely inhibited the fungal growth of *A.apis* at all the tested concentrations exhibiting 100% reduction in mycelium growth of the *A apis* (Fig. 9.10.11) . Meanwhile, the fungal growth was completely inhibited at the highest concentrations of citric acid (4 and 6%), ultragriseofulvin (6 and 8%) and Neem, extract at 10%. Fig (12,13,14)

The highest rate of linear growth observed with 1% citric acid was 3.50 cm releazing a percentage growth rate of 29.43% while Neem extract at 2% showed ,46.37% and citric acid at 2% (2.50 cm) recording 49.59% efficiency. While the lowest fungal growth recorded at 8% Neem (0.16 cm) followed by 4% ultragriseofulvin (0.33 cm), 4% Neem extract (0.70cm), 2% ultragriseofulvin (1.16 cm) then ultragriseofulvin (1.83 cm), Since they recorded 96.77, 93-34, 85-88, 76-71 and 63.10% efficiency, respectively. The untreated PDA media recorded the hightest mean of linear growth of 4.96 cm (Fig 15) .

4-Relation ship between *V.jacobsoni* mites and infestation of chalkbrood disease in honey bee colonies .

Data presented in tables (11 and 12) indicated that *Varroa* mites proved to be a good carrier of *A.apis*, the causal fungus of chalkbrood disease. Highly significant differences were found between infested colonies and un-infested ones. The results in table (11) cleared that the *Varroa* – infested colonies with ascosphaera spores showed 24.16 mean no. of mummices at bottom board and 26.23 inside cells comparing with 13.66 and 18.33 respectively in the un-infested colonies during 1998. on the other hand data presented in table (12) revealed that in the infested colonies with *Varroa*. The mean no. of mummies was 28.33 at bottom board and 35.00 inside cells. While, the unifested colonies showed 17.00 and 19.66 as a mean no. of mummies 1999 season . These results clearly showed a positive relationship between *Varroa* mites and chalkbrood disease,the

Table (10) : Effect of certain materials as fungicides on the rate of linear growth of *Ascospheaera apis* after 10 days of incubatation at 28 ± 2c°

Treatment	Rate of application	Rate of mycelium growth in cm	
		10 days	% Efficacy
Neem extract	2	2.60	47.58
	4	0.70	85.88
	8	0.08	98.38
	10	0.00	100
Sodium benzuate	1	0.00	100
	2	0.00	100
Citric acid	1	3.50	29.43
	2	2.50	49.59
	4	0.00	100
	6	0.00	100
Thymol	0.25	0.00	100
	0.5	0.00	100
	0.75	0.00	100
	1.00	0.00	100
Ultragriseofulvin®	1	1.83	63.10
	2	1.16	76.61
	4	0.33	93.34
	6	0.00	100
	8	0.00	100
Apilife – VAR®	0.5	0.00	100
	0.75	0.00	100
	1.00	0.00	100
Control		4.96	
L.S.D at 5%		0.479	

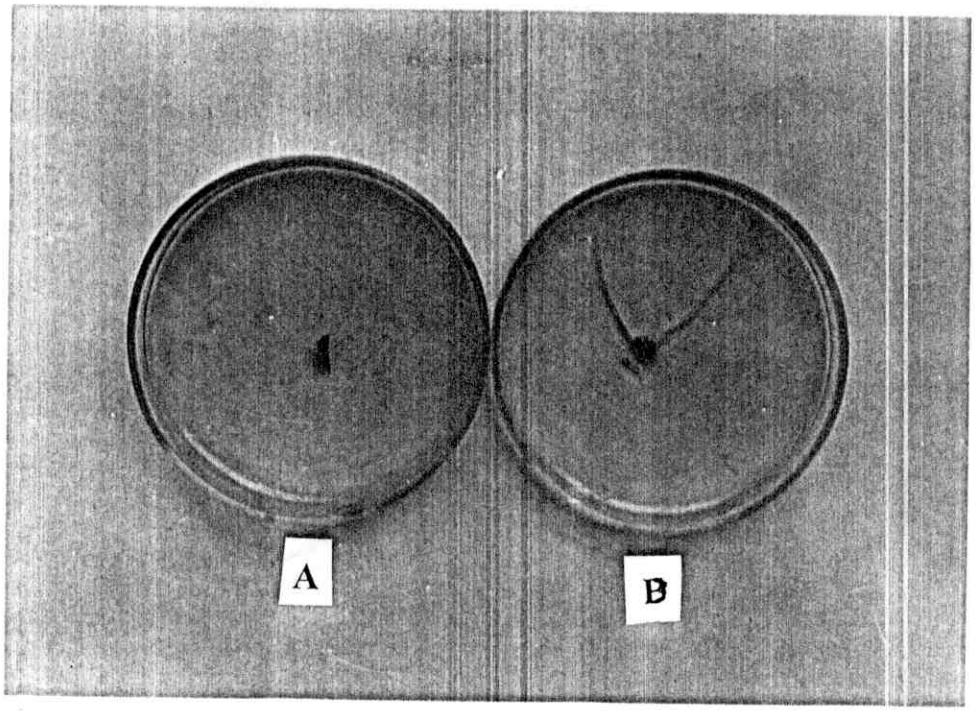


Fig (9)Effect of sodium benzuate at 1% (A) and 2 % (B) concentrations on linear growth of *A. apis*

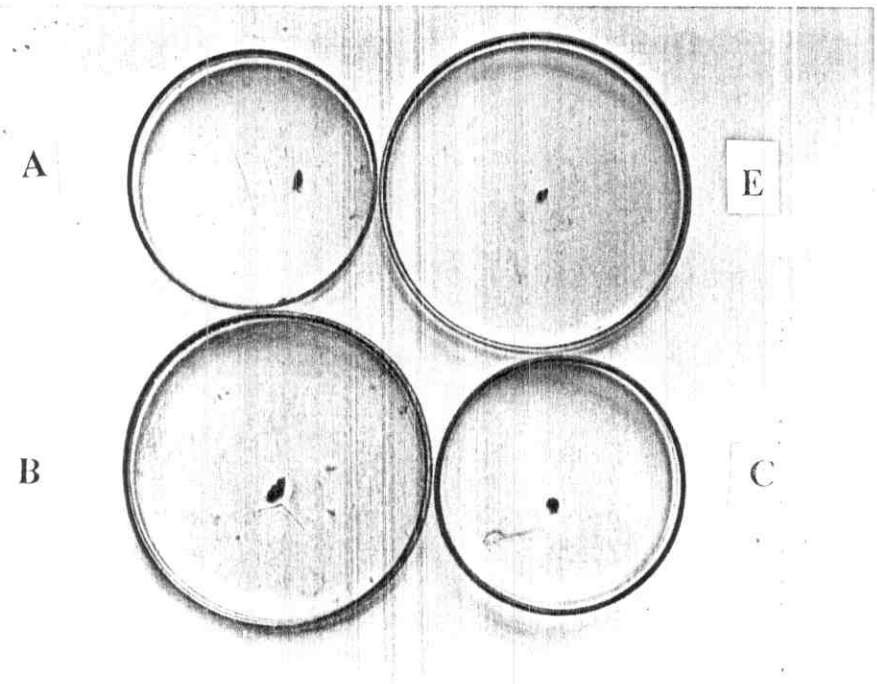


Fig. (10) Effect of Thymol at 0.25%(A) , 0.5%(B) and ,0.75%(C) and 1.00% (D) on linear growth of *A. apis* .

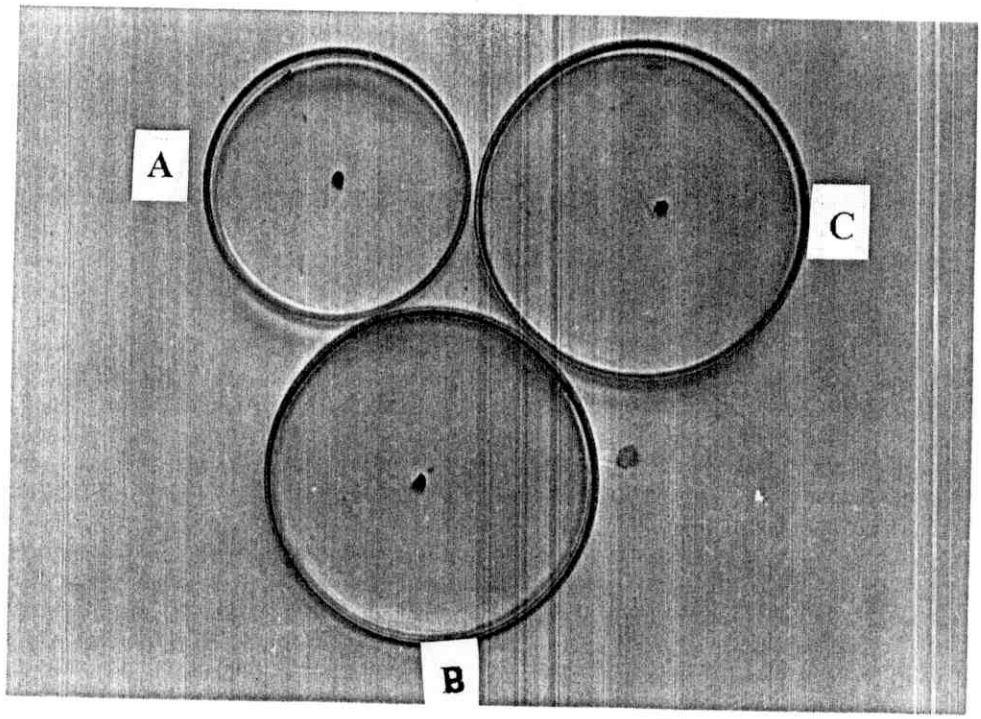
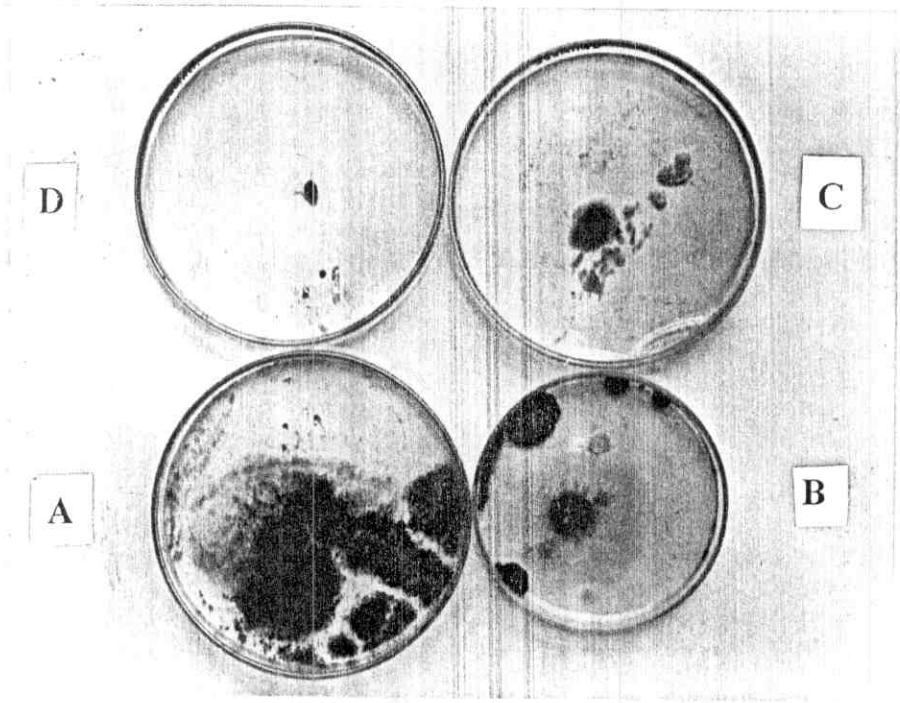


Fig (11) Effect of Apilife-VAR at 0.5%(A) , 0.75% (B) ,and 1.00% (C) on linear growth of *A .apis.*



Fig(12) Effect of citric acid at 1%(A) ,2%(B) ,4%(C) ,6%(D) on linear growth of *A . apis* .

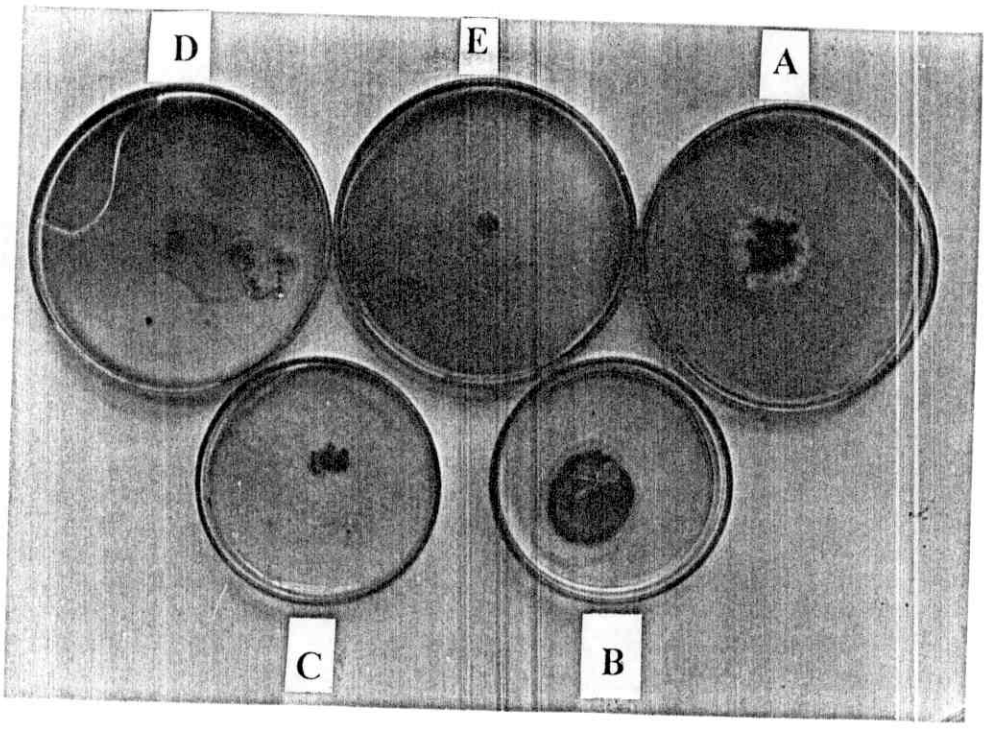


Fig.(13) .Effect of Ultragriseofulvin at 1%(A) ,2%(B) ,4%(C) ,6%(D) and 8%(E) on linear growth of *A .apis* .

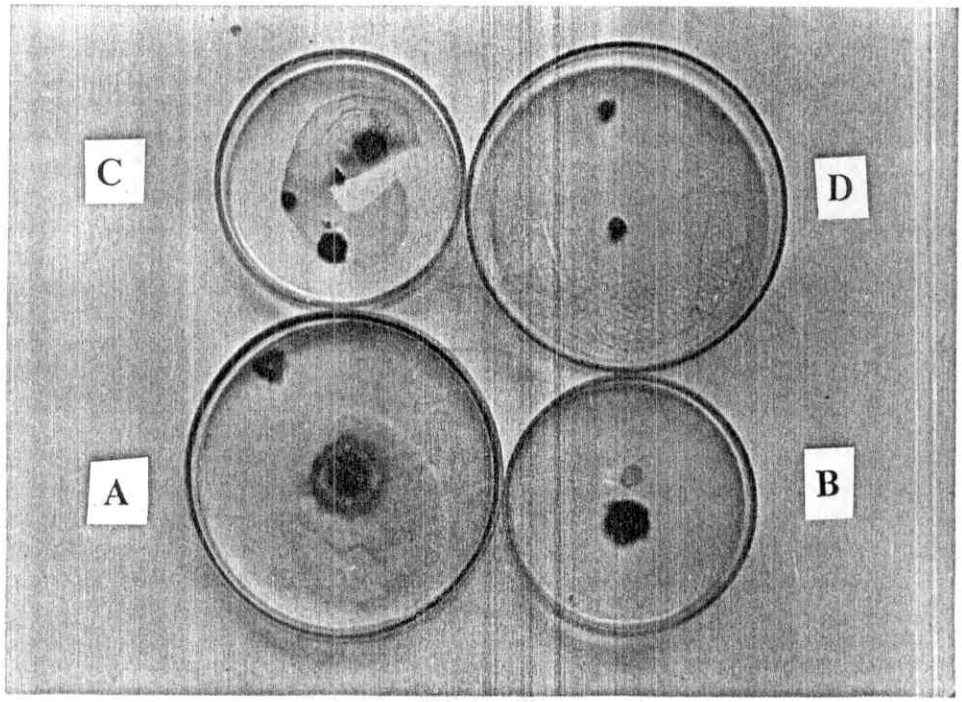


Fig. (14). Effect of Neem extrat at 2%(A) ,4% (B) , 8%(C) and 10% (D)on linear growth of *A* .apis .

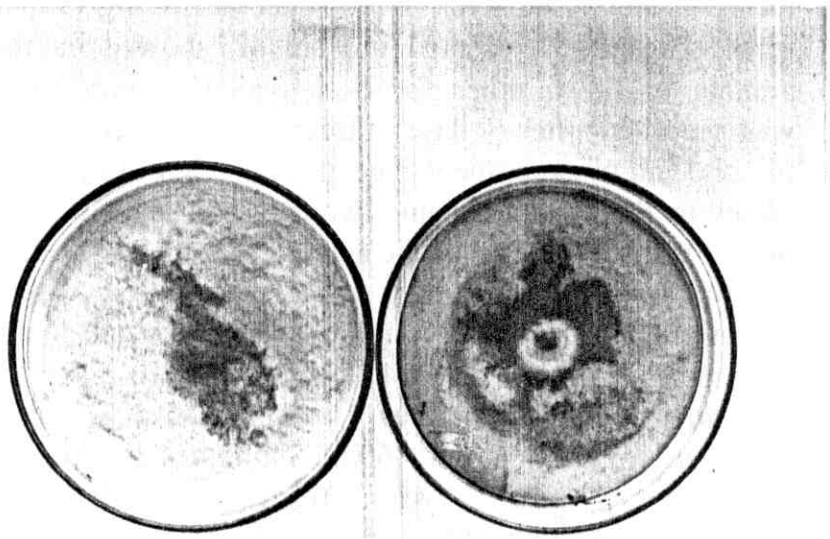


Fig. (15).Linear growth of *A. apis* as a check treatment .

higher the numbers of *Varroa* which infest the colonies the higher their infestion rate with chalkbrood disease (*A.apis*) .

5-Control of varroa and chalk brood disease.

Apilife – VAR oxalic acid was used for controlling both of *Varroa* mites and chalkbrood disease. Mean number of fallen mites and mummies (at bottom board and inside cells) were recorded every 7 days for various intervals during 1998 and 1999 seasons.Results presented in table (13) showed that the highest number of fallen mites for both treated and untreated colonies was recorded after 7 days of treatment and decreased gradually till the end of experiment. The mean number of fallen mites was 66.99 in the treated colonies while it was 12.66 in the untreated ones. Apilife VAR + oxalic acid recorded 81.10% efficiency in controlling V*arroa.* Concerning chalkbrood disease, data presented in table (13) indicated that the mean number of mummies decreased from 24.33 after 7 days of treatment to 7.66 mummies, while mummies were increased in the untreated colonies from 44.33 to 160.65 mummies at the end of the experiment. Apilife VAR+ oxalic acid showed 63.49% efficiency to chalkbrood disease .

In 1999 season, results in Table (14) indicated that the colonies treated with Apilife-VAR+ oxalic acid caused 89.67 as a mean of fallen mites after 28 days of treatment comparing with 13.12 in the untreated colonies releazing 85.36% efficiency. On the other hand the mean number of mummies was 28.26 in the treated colonies while it was 142.32 in the untreated colonies. Apilife-VAR+ oxalic acid releazed 73.11% efficiency during this season of 1999 .

Table (11): Effect of artificial inoculation of *Varroa* mites with *A.apis* on the number of chalkbrood mummies in honeybee colonies in 1998.

Treatment	Mean number of mummies at bottom board	Mean number of mummies inside cells
Infested colonies	24.16	26.23
Un-infested colonies	13.66	18.30
L.S.D. at 5%	0.37	0.06

Three colonies were used for each treatment

Table (12): Effect of artificial inoculation of *Varroa* mites with *A.apis* on the number of chalkbrood mummies in honeybee colonies in 1999.

Treatment	Mean number of mummies at bottom board	Mean number of mummies inside cells
Infested colonies	28.33	35.00
Un-infested colonies	17.00	19.66
L.S.D. at 5%	0.232	0.226

Three colonies were used for each treatment

Table (13):Efficiency of Apilife VAR + Oxalic acid at concentrations 1.0 % in controlling *Varroa mite* and chalkbrood in honeybee colonies during 1998 season .

Treatment	Mean number of fallen mites at indicated						Mean number of Chalkbrood mummies					
	7 days	14 days	21 days	28 days	Total mites	Efficiency %	7 days	14 days	21 days	28 days	Total mummies	Efficiency %
Apilife VAR + oxalic acid	35.00	19.33	7.66	5.00	66.99	81.10	24.33	15.00	11.66	7.66	58.65	63.49
Control	5.00	4.00	2.00	1.66	12.66		44.33	46.33	38.99	31.00	160.65	
L.S.D at 5%	0.34	3.07	1.33	1.94			0.03	0.27	0.09	1.52		

Table (14):Efficiency of Apilife VAR+ Oxalic acid at 1%,concentrations in controlling of *Varroa* mite and chalkbrood in honeybee colonies during 1999 season.

Treatment	Mean no. of fallen mites at indicated periods						Mean no. of chalkbrood mummies					
	7 day	14 day	21 day	28 day	Total mites	Efficiency %	7 day	14 day	21 day	28 day	Total mites	Efficiency %
Apilife –VAR Oxalic acid	42.00	23.68	15.33	8.66	89.67	85.36	20.33	10.00	5.33	2.60	38.26	73.11
Control	4.66	3.33	2.80	2.33	13.12		25.00	36.66	39.66	41.00	142.32	
L.S.D.	0.28	0.39	0.32	0.12			0.22	0.35	0.10	0.20		