EFFECT OF PIRIMOR ON SOME BIOLOGICAL PROCESSES OF *Coccinella septempunctata* L.WITH SPECIAL CARE TO THE INTEGUMENT AND FAT BODIES AS DEFFENSIVE BARRIER

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ABSTRACT

The results showed that the pirimor (0.01) has highly effective against the aphid,*Aphis faba*e Scop. 70%The percentage of predators eggs *Coccinella septempunctat*a L to failed hatch and the percent mortalities; 1st.,2nd., 3rd.,4th. Instars, pupa and adults were; 20,25, 20,10,5, 10, and 13% respectively. The predatism efficiency rate of treated stage decreased during all larval and adult stages. Pirimor tended to decrease the period from egg to adult. Morphological deformities occurred in over14.28%of the adults developed from treated1st.instar larvae. Sex ratio differed slightly from the control. Cuticle thickness of each stage till the adults, was decreased slightly. Fat bodies diametersin treated stages were increased as aresult of insecticide storage.It could be concluded that the cuticle an the fat bodies were among the most important defense activities in predators.

INTRODUCTIOIN

The most enigmatic and destructive pest are the aphids,whose invade large number of crops where sucking the plant saps ,also secret the carbohydrates,so called the honey dew, and cause the accumulation of soil and lefl the infested plant to be weak, also play an important role for viral transmission(Daoud and El-Haidari,1986). Studies communicated that the selective insecticides be harmless to the natural enemies where used pirimorD.P50 against aphid *H. prun*i Geo..in iraq;(Mahmoud,1985,1992,1994 and Susan *et. al.* 2008.).

Gerolt,(1969)stated that the contact insecticide less in toxicity and indicated that the body Integument do as adefensive line and that eviedence by increased the accumulation In the Body wall by dissection and sectioning. It was found that 0.01% pirimor killed the adult, C. septempunctata after 24hr. of treatment (Dirimanov *et. al*.(1974).While, pirimor 0.05% was harmless to adult beetle Kirknell (1975).

Harper (1987) found that 280gm./hictar of pirimor quite enough for controlling the pea aphid to reduce the population of syrphid group. While, Kalushkov,(1982) found 100ppm. Of pirimor has a high effect against Aphis fabae which caused 72% mortality, with less effect on;egg larvae and adult,while the high percent of mortality was 23%. Mahmoud (1992) found, that 100ppm. Of pirimor DP 50 caused for 70% mortality among the aphids,*H. prun* Geof. Also found in (1994) that the same dose of pirimor on syrphid flies has significant effect for celluler alteration and encouraged the blood cells (stem cell) for the next generation.

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MATERIALS AND METHODS

Adult beetle and aphid,*A. fabe* were collected from the field of Agriculture college and Al-Rashidia field in Nineva province, the predators were placed in acage measured 15x15x15cm. supplied with alive aphid daily.Then the eggs were spread out in Petri-dishs for obtaining the larvae for experiments under laboratory condition at 25-27c. and 63-65%R.H. Pirimor D.P.50, produce (ICI) England, plant protection. Then, calculate the LC50.of aphid and by probability Log.,thereafter subsequent concentration being prepared from the stock solution in the field for spraying.

The egg: Klingman,(1966)Used the formula to convert the concentration ppm.to the perce-ntages stock solution being prepared by dissolve 2gms.Pirimor in 1L.of water to give 1000 ppm(stock solution) of which derived other concentrations need by diluting with tap water Pottre tower was used for all treatments.

Treatments: The eggs were treated by 0.01% with 3 replicates each included 5 eggs and observation being done after 24 hrs.for 2-3 days,and the control as well.

Larvae: The larvae of coccinellid were treated by 0.01% with 4 replicates for each instar, Replicate included 5 larvae,were fed by untreated aphids at 20-22c.and 65-68 % R.H.The aphids were treated by 0.01%and spread out in apetr-dishes as aprey to coccinellid larvae Both the larvae and aphids were treated by 0.01 % ,4 larvae/ instar and 5 larvae/ replicate with considerable numbers of aphids under the same condition.

Pupa: The newly pupa were treated by 0.01%.four replicates were used ,each included 5 pupa .Observation being taken till the adults emerged.

Adult: The adults were treated by 0.01% in three cases: Adults treated only, Aphids treated only, both the adults and aphids treated .Each case used 3 replicates with 5 adults,daily supplied with large numbers of aphid 60 individuals/ adult beetle at 25-27C..and 63-65%R.H.

Histological study: This study was carried out in two separate experiments:-

1-Effect of insecticide on cuticle thickness and diameter of fat bodies in larval instars and Adults, where treated;1^{st}.,2^{nd}., 3^{rd}., and 4^{th}., instars andadults after 24hrs .The individuals were fixed and sectioned.

2- Effect of insecticide on cuticle thickness of larvae and adults which produsedfrom 1^{st}. instar larva previously treated alone, then followed the development and each instar being fixed and sectioned till the adult stage. Preparation of sections followed the procedure of (petrson,1964 and Mahmoud,1992).

RESULT AND DISCUSSION

The results indicated that the percentage of mortalities increased with increasing the Concentrations.The concentrations; 0.001,0.002,0.003,0.004,0.005% gave 7,20,32,41,47% mortalities respectively .While,0.01% gave 70% aphid mortality .This results agreed with Kaluhkov,1982,who mentioned that 100 ppm. of pirimor gave 72% mortality for broad bean aphid.While,Mahmoud ,(1992) found that the same concentration killed 70% of *H. pruni* Geof. on stone fruit trees.

Egg stage : Because 0.01% concentration of pirimor gave the highest mortality of aphids **,**therefore the concern to be care the study of this concentration.The failed of egg hatch being20%,while unhatched egg,appeared to be shrinkage and the color

turns from brielant yollow to orange ,which that indicate the egg shell did`nt involved the effective barrier to prevent the penetration of the poison ,also the incubation period of treated eggs became longer to be 3days in comparison with control which was 2days fig.(1).This results agreed with Kaluhkov, (1982) who claimed that 100 ppm. of pirimor gave the highest percent of failed hatch to last 23%.

Coccinellid Larvae: Figure (2) showed the percentage of mortality in treated larvae alone gave 25% in 1st. instar , while the lowest percent was recorded in 4th. Instar larvae 5%may due to the variation of cuticle nature which was less in thickness in1st.instar compared with 4th.instar, which let the permability more in first case.Inaddition to the immunity system (MFO) of insect including the enzyme which varied through the instar and the develop- mental stage Rockisten (1991). Also when the larvae advanced the content of fat bodies increase which subsequent produce tolerance for the insecticides ,therefore to develop the ways for whole larval instars to be15%.

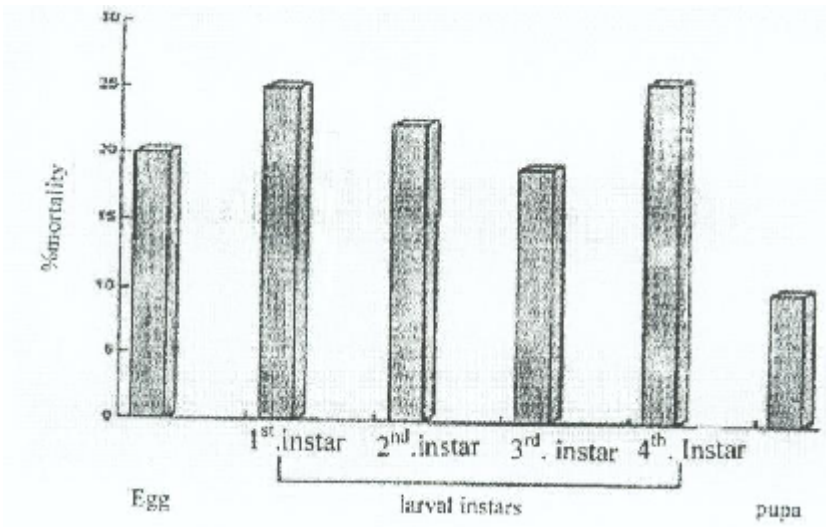

Fig.(1):Effect of 0.01pirimor on the varius stages of *C.septempunctata*

Treated aphid alone: Fig. (3) shows that the highest percent of mortality in 4th. Larvae last 36% because of this instar consumed large number of aphids being 60 individuals daily , and because the pirimor has a positive effect for mid gut , for that reason gave the high mortality. While,the low percent associated with 1st. instar,approached 20%. Due to this stage has a low potential voracity 6 individual daily . The mortality of 2nd. And 3rd. instar take the low value 22% for each instar. The general average for mortality of whole larval instar was 25.25%.

Treated larvae and aphids together: Fig. (4) showed the highest mortality associated with 4th . Instar larvae was,35% ,followed the 1st. instar larvae to approach 30%.Then the 2nd. and 3rd. larval instars, to be equal to take 25% of each instar .Probably due to the effect of pirimor on two sides (stomach and contact).In case of4th.instar the poison ingest by stomach ,because of the predation of treated

aphids, also inter through the body wall, but in less percent,because of the cuticle which regard as first defense line.While1st.instar which affected by the insecticide ,due to of the thin body wall and predation of treated aphids . The general average of 4th inster mortality was 75.28%. The average mortality for the three cases above 23%.This results were in agreement with Kaluhkov,(1982) who stated that 100ppm. of pirimor gave 23% mortality of larvae (for all instars).

Treated the adults: The highest percent of mortality when both the adults and being treated to approach 20%,while the lowest percent last 6.66% in case of treated the adults only . So there are an intermediate those cases when the aphid only treated without the adult, where last 13.33% .Probably due to the insecticide in first case which affected on together by 0.01 pirimor on the % of mortalit stomach and contact while in case of adult treated alone, which affected by contact only with low percent because of cuticle thickness and the elytra play agood role as the effective barrier to prevent the insecticide to go inside the insect body. Also found that in treated adults the elytra changed from bright red to dark fig.(5). The average mortality of adults in three cases last 13.33%.,that in agreement with Sazanova *et.al.*,(1986),who mentioned that 100 ppm pirimor gave 13-15% of adult mortality.

Histological studies: Data showed that the fat bodies in larvae and adult of control treatment were distributed in the body haemocoel (fig.6 A,B,C). or arranged in rows around the alimentary cannal (fig.6D).While in adult stage the fat bodies arranged in one or two ribbons directly underneath the body (fig.6E) and around the alimentary canal but in less density as compared with larval stage (Al-darkazely,1982). As aresult of metamorphosing the larval tissues to adult tissues as agenetic characters and increased the cuticle thickness,also the thick elytra and full the haemocoel with tissues. The fat body appeared as oval with star shape nucleus where the cytoplasm distributed in radial case were tend from nucleus to the body wall.

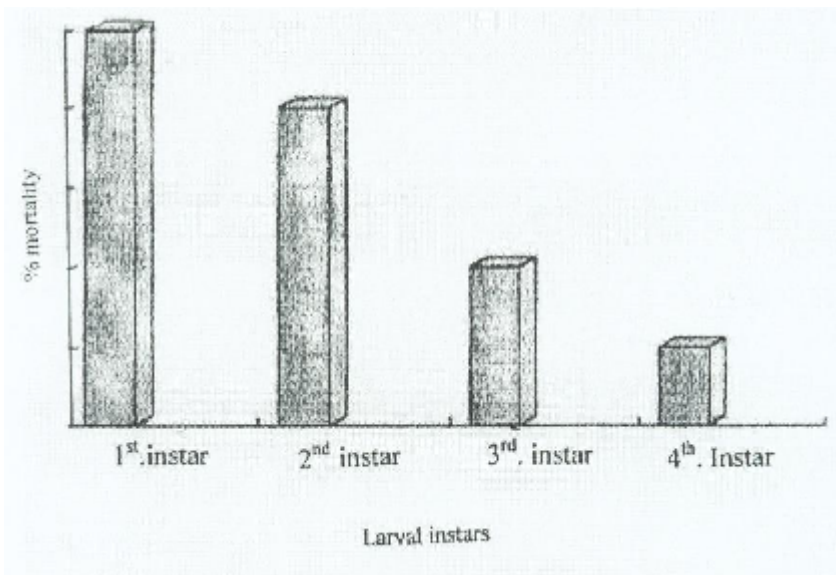

Fig.(2):Effect of 0.01 pirimor on the mortality of larval instar of *C.septempunctata*

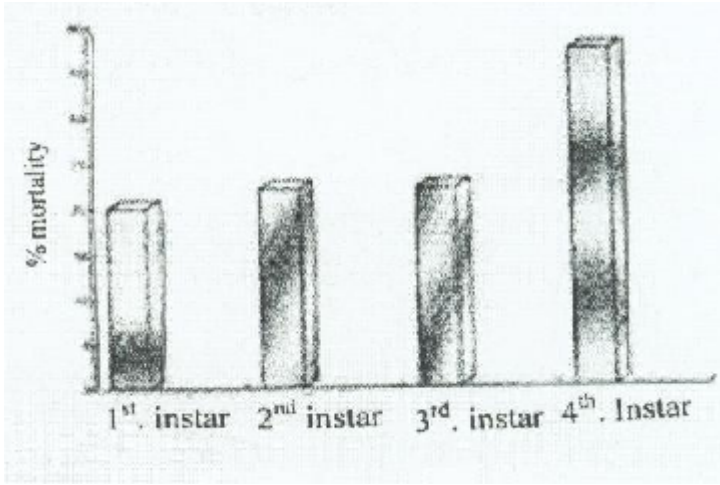

Fig.(3):Effect of treated aphids0.01 pirimor on the Percentage of mortality for larval instar

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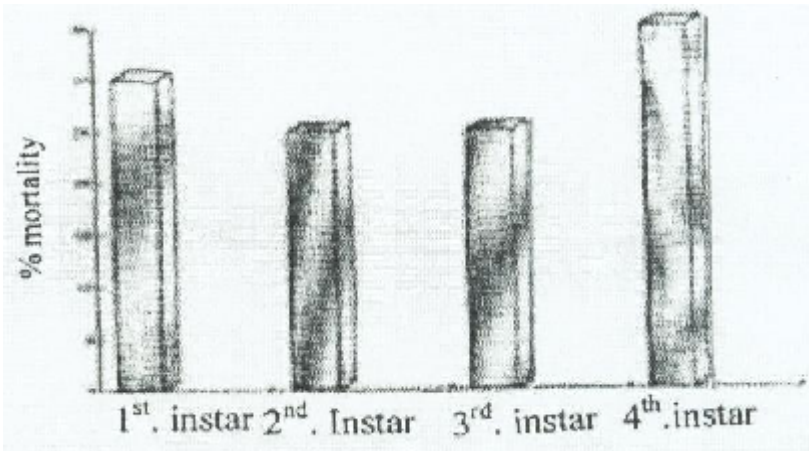

Fig.(4):Effect of treated both coccinellid larvae and aphids

Fig.(5): Two adults of coccinellids
A-Untreated.
B-Treated

Results in (fig7)indicated that there are no variation between the cuticle thickness of larval instars in the treated and control experiments. In control the average cuticle thickness of 1st.instar larvae was 102-+0.02 microns and in treated 101.6+.0.02 mic. while in 2nd. Instar larvae was111.2- +0.01mic. in control and 111.0+-0.01mic.in treated.

The average of cuticle thickness for 3rd. instar was127.1+- 0.02mic. in control and126.7+-0.02 for treated, while that of 4th. Instar was 157.6+-0.04 mic.for control and 157.3+-0.0 4mic in treated .In case of adults the average of cuticle thickness was205.8+-0.01mic.and 205.2+-0.01mic.for control and treated respectively.

The average diameter of fa t body was51+-0.03 mic.in untreated 1st.instar larvae and 53+- 0.03 mic.in treated larvae.While the average diameters of fat bodies in 2ndInstar were59.0+-0.1mic and 61.8+-0.1 for control and treated respectively.But that of 3rd.instar Larvae was 64.6+-0.02mic.and 75.7+-0.02mic.in control and treated respectively. In 4th. Instar larvae the values took 71.o+-0.01mic. and 75.0+-0.01mic. for control and treated respectively.

Fig.(7A,B.).The diameter of fat body in adult was 69.6+-0.03mic.in control and 71.6+-0.03 mic.in treated Fig.(7 C,D). The diameters of tegumental fat bodies in treated adults were increased while no change being observed in visceral fat bodies of untreated. Due to accumulate the insecticide which penetrated the defense barrier (body wall).In surface treatment the moluculs were capture in tegumental fat bodies which constituted a part of second defense barrier Fig.(7E). In treated prey(aphids)only the diameters of visceral fat bodies were increased compared with control, scattered cytoplasm being appeared Fig.(7 F).While no change in tegumental fat bodies, probably due to the insecticide during passthrough the mid gut wall be captured in visceral fat bodies and caused increasing in sizes.

In case of treated the prey and predator together, the diameters of both were increased; the tegumental and visceral fat bodies in coparison with control,probably related to the effect of pirimor from two ways (stomach and contact)at same time.

تأثير البريمور في بعض العمليات الحيوية للدعسوقة ذات السبع نقاط مع الاشارة الى الجليد والاجسام الدهنية كحواجز دفاعية

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الخلاصة

اظهرت نتائج الدراسة ان التركيز ٠.٠١% كان مؤثرا في حشرة من الباقلاء الاسود وان ٧٠% من بيض المفترس فشل في الفقس وبلغت نسبة الموت في العمر اليرقي الاول والثاني والثالث والرابع والعذارى والكاملات ٢٠و ٢٥ و ٢٠ و٥.١٠ و ١٣% على التوالي . ان معدل كفاءة الافتراس للاطوار المعاملة انخفضت خلال الطور اليرقي والبالغ وان البريمور خفض فترة الجيل اضافة الى تسببه في ظهور العديد من التشوهات في البالغات بلغت ١٤.٢٨ % في الكاملات فضلا عن تأثيره في سمك الكيوتكل مع حدوث زيادة في الاجسام الدهنية .

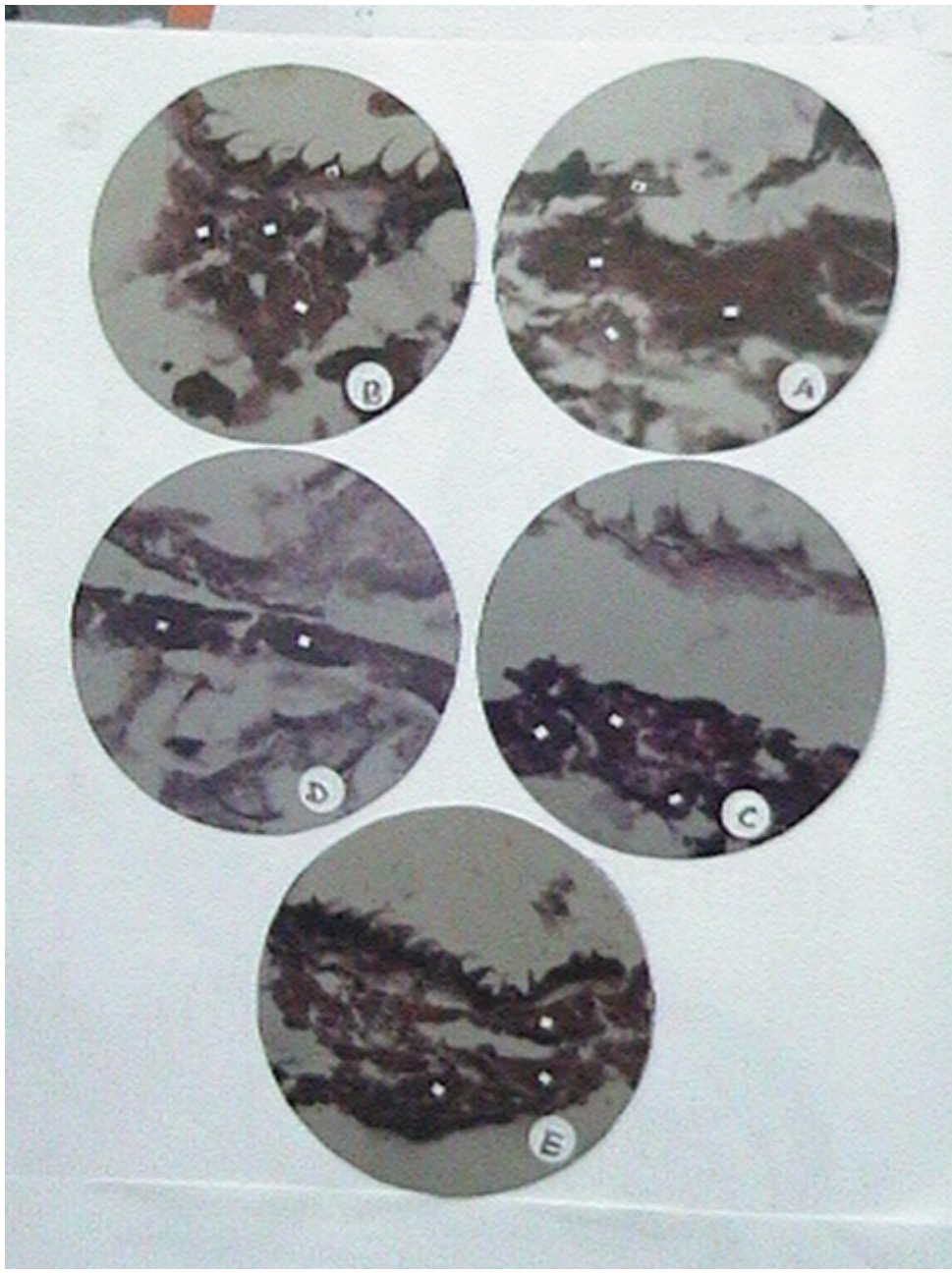

Fig.(6):Sections in untreated larvae and adults of *C. septempunctata*. x40
A-Section in 2nd.instar larvae showing the body wall and fa*t* bodies in normal limitation.
B-Section in 3rd instar larvae showing the tegumental fat bodies.
C-Section in 4rh. Instar larvae showing the tegumental fat bodies
D-C.section in mid gut of 4th. Instar larvae showing the visceral fat bodies.
E-C. section in adult beetle illustrating the tegumental fat bodies

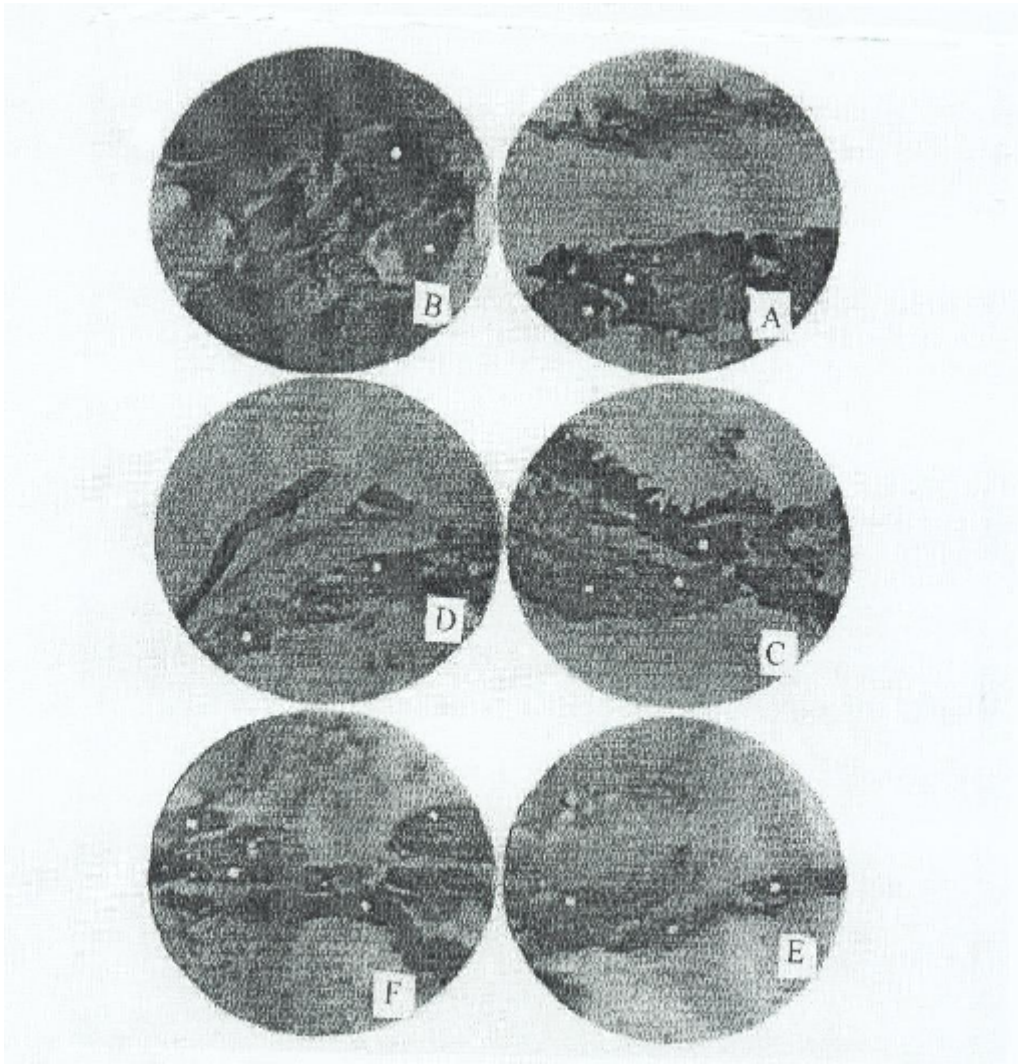

Fig.(7):Sections in larvae and adults *C.septempunctata* treated and Untreated.

X 40

A-Tegumental fat bodies in untreated4th.instarlarvae.
B---------- in treated 4th. instar larvae,
0.01 pirimor.
C---------- in untreated adult.
D---------- in treated adult,0.01% pirimor.
E---------- in adult treated subsequent in
1st.instar larvae.
F- Visceral fat bodies in adult fed on treated aphid by A.I.
0.01% Pirimor.

REFERENCE

Al- Darkazely,T.A (.1982). Insect physiology. Pobl.Univ.of Mosul press 463pp.

Dirimanov , M.; D. Stefanov and A. Dimitrov (1974).The effect of certain insect-cide of more important species of useful insect on tobacco .Rastitch Zashchita 22(11):18-20.

El- Haidari , H. and A. K. Daoud , (1968) . Recordd aphids of Iraq . Iraq nat.Hist Mus.publ.No.24 Baghdad.

Gerolt , (1969). Mode of entry of control insecticides . J. Insect Physiology15:563-580.

Harpar , A. M. (1978). Effect of insecticides on the pea aphid,*Acyrthosiphon pisum* and associated fauna on alfalfa.Canadian entomologist,110(8):891-894.

Kalushkov , P. (1982) .The effect of 5 insecticides on Coccinillid predators (Coleoptera) of aphid *Phorodon humuli* and *Aphis fabae* (Homoptera). Acta enomologica Bohemoslovaca 79 (3) : 167-180

Kirknel , E. (1975) .The effect of various insecticides in laboratory experiments with two aphid predators,the seven spoted lady bird(*C.septumpunctata* L.) and larvae of hover flies *(M.corollae*F.)Tidsskrift for planteavl 79: 393 – 404 . [Rev appl. Ent. A, 65(2) No. 4 1977 .

Kilngman G.C.(1966). weed control : As a science .North Carolina state college United State Department of Agriculture 421 pp.

Mahmoud,T.T.(1985).The haemocytes and heart activities of *Episyrphus balteatus* DeG. (syrphidae:Diptera)and their response to Environmental factors ,ph.D.Thesis,Univ. of Newcastle England 321pp.

Mahmoud,T.T.(1992).Comparative anatomical and histological study of the heart of four Syrphid species (Diptera : Syrphidae).in Iraq, Pak. J. Sci. Ind.Res. 35

Mahmoud,T.T.(1994).Study the physiologicaleffect of pirimor on syrphid Predator and the percentage of aphid mortality. Derasat 21B. (6): 29-37.

Peterson , A. (1964). Entomological Techniques, the Ohio State univ. Columbus, Ohio press 10^{th} ed.

Rockestein,M.(1991). Insect biochemistry .press Ltd.,London.p.123,245.

Sazanova,I.N;E.V. Nicanorova; E.K.Shevets; I.petrova and A.G. Koval (1966). Selectivity of the action of hostaquick and pirimor for aphids and their natural enemies .Leningrad, USSR ; Vsesoyuznaya .Akademiya Istv-emykh Nauk im V.1 lenina 48-59.

Susana,C.;G.Patricia;O,Antonio and Soares (2008). Effects of pirimicarb, and Pymetrozine on survival,development and reproduction of *Coccinella undecimpunctata* (coccinellidae:coleopteran),Biocontrol Science and Technology 18 (3) :307-318.