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NEW RECORD OF SOME BIOLOGICAL ENEMIES OF CITRUS LEAFMINER Phyllocnistis citrella Stainton (Lepidoptera: Gracillaridae) IN IRAQ

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ABSTRACT

An extensive survey of citrus leaf miner (CLM) , *Phyllocnistis citrella* Stainton parasites and predators was conducted during 1998 and 1999 in citrus orchards and nursuries in Baghdad, Diyala and Wasit .Five eulophid parasites were recorded for the first time on citrus leaf miner larvae , prepupae and pupae viz. *Cirrospilus* sp, *Pnigalio* sp ., *Ratzburgiola incompleta* , *Tetrasticus* sp. and, *Neochrysocharis formosa*. Parasitism rate was ranged from 15% to 63% *Chrysopa carnea* , *Orius albidipennis* , *Amblyseius* sp . Were observed as predators on CLM .

INTRODUCTION

Citrus leaf miner (CLM) is considered to be one of the most important pest of citrus species CLM Larvae form mines predominantly in leaves, but also in succulent stems and sometimes fruits .

CLM was first described from Calcutta, India by Stainton in 1856. Dc Villiers (1994) stated that CLM is now known from China (1915), Philippines (1915), Pakistan (1916), Australia (1918) , Japan (1927),Taiwan (1985), During 1993 and 1994 the invasion of CLM was expanded to include another countries viz Florida , Bahamas ,Cuba, Costa Rica , Spain Puerto Rico , Palestine occupied ,Jordan , Egypt ,Algeria , Morocco, Italy, Syria, Mexico , Louisiana and Texas (Knapp *et al* l995and FAO l996 .It was reported from Iraq by Gentry (1965) .
This insect became very serious pest in all citrus orchards and nursuries in a very short period (AL-Jboory 1992; Abas and AL-Jboory 1994 ،Al-Barak 1994 .

Natural enemies of CLM were studied and evaluated in the areas in which CLM became pest LaSalle and Schauff (1996) reported on 36 genera of calcidoid parasitoids in six families identified from the CLM from around the world including areas in which the CLM has recently invaded.Heppner (1993) listed 26 eulophid parasitoids attacking CLM in Asia Batra and Sandhu (1981) found the eulophids *Cirrospilus guadristriatus* and *Tetrstichus phylloenistoides* attacking the CLM in Punjab , with maximal mean parasitism ranging from 30-47% in August and September Browning and pena (1995) arid pena *et at*.(1996)identified the following native parasitoids all Eulophidae, on CLM in Florida during 1993 and 1994 : *Cirrospilus* sp, *Pnigalio minio, Closterocerus cinctipennis*, *Horismenus* sp, , *Elasmus tischeriae* ,*Sympiesis* sp. and *Zagrammosoma multilineatum* The parasitism level achieved by native parasitoids varied , ranging up to 60% . Pena (1996) stated that the most important aspect of CLM management is biological control . While in many cases , the diversity of natural enemies of the leaf miner (hymenopterous parasitoids , predacious arachnids,ants and lacewings) accounts for significant reduction of the CLM population, in other case their presence and activity are low . Introduction of exotic parasitoids from the area of origin has proven to be successful in Australia , Florida and Syria (FAO,1996) The objectives of this

study was to survey the natural enemies of the CLM in citrus nursuries and orchards in Baghdad , Diyala and Wasit provinces .

Survey of the CLM parasitoids and predators was conducted in the citrus nursuries and orchards in Baghdad (Greaat , Doora ,. Abu-Ghraib ,. Salman Pak , Rashdiya) Diyala (Ba'quba) and Wasit (Suwaira) during 1997 and 1998 . A sample of 100 CLM infested leaves were picked up and brought to the laboratory for counting natural enemies . The parasitism level was determined and the parasitoids and predators were identified using the keys given by Erdos (1971) and Prinsloo (1984) Some biological observation was studied in the laboratory for the most dominant species *Cirrspilus* sp. and *Pnigalio* sp. on 20°C ond 25°C.

RESULTS AND DISCUSSIONS

The survey of citrus leaf miner in Baghdad, Diyala and Waist showed presence of some parasitoids and predators feeding on CLM.

The parasitism level achieved by eulophids ranging up to 63% in Doora to %١٥ in Salman Pak and Rashdiya (Table 1) while parasitism was 29% , 32% %٤٠and 41% in Ba'quba , Suwaira , Abu-Ghraib and Greaat respectively The survey revealed that some eulophids are dominant in comparison to others *Cirrospilus* sp . and *Cirrospilus* sp. were dominant in Ba'quba، Rashdiya 'Suwaira and , Salman Pak while *Pnigalio* sp. C. *verigatus* and *Ratzburgiola incompleta* Boucek were dominaut in Greaat. *P*. sp .nr *soemius* C. *verigatus* , and *Tetrasticus* sp were found in Abu-Ghraib . *P*. sp .nr *soemius* C. *verigatus Tetrasticus* sp and *Neochrysocharis formosa* Westwood which were found in Doora a. *Pnigalio* and Cirrospilus were the most dominant parasitoids which were found during survey period 1998 and 1999 in all citrus areas.

The eulophids are external hymenopterous parasitoid they lay their eggs on larva, prepupa and pupa after paralyze their host by their sting. .Eggs are gray to white color , the female of *Cirrospilus* and *Pnigalio* laid 1-3 eggs on the CLM. The incubation period is 1.25 and 1.75 days on the temperature 25°C and 20 °C respectively . The hatched larvae are crystal white , and transparent they feed either on the parasitoid eggs when present or on CLM larvae fluids . Finally the CLM larvae became black and die. One parasitoici could complete its life on one larva The duration of larval instars are 6 and 8.5 days on 25 °C and 20°C respectively.

The Larvae are pupate either besides the host or inside the CLM . The average 2 of pupa are 5.5 and 9.5 days on 25 °C and 20°C respectively (Tabl 2) The results which are achieved agreed with Beattie and Simth (1993) and Hoy and Nguyen (1997).

Several Predators , among them lacewing larvae *Chrysopa carnea* , flower bug *Orius albidipennnis*, phytoseid mite *Amblyseius* sp. have been found feeding on CLM larvae.

It is believed that these predators may be provide a complimentary control together with parasites . This results agreed with the findings of De Villiers (1994) and Knapp (1995) .

Surveys in the middle of Iraq showed that studies are needed to determine the role of indigenous parasitoids and predators . It seems that a great potential are available for the recorded parasitoids to start a biological control program.

Table 1 : The Distribution of CLM parasitoids

Locality	No of CLM larvae and pupae 100 leaves		Perceotage of parasitism	Dominant Species
	parasitized	Non parasitized		
Greaat	322	225	41%	*Pnigalio* sp , *Ratzburgiola incomplete* *Cirrospilus* sp
Abu – Ghraib	60	40	40%	*Pnigalio* sp . , *Cirrospilus* *Tetrasticus* sp
Doora	35	60	63%	*Cirrosspilus* sp., *pnigalio* sp., *Tetrasticus* sp ,*Neochrysocharis formosa*
Rashdiya	99	17	15%	*Cirrospolus*
Baquba	169	70	29%	*Cirrospolus*
Suwaira	130	62	32%	*Cirrospolus*
Salman pak	76	13	15%	*Cirrospolus*

Table 2 : Effect of temperature on the incubation period , larval instars and pupal stage of *Chrysoplas* and *syrfidae*

Tempature	Incubation Period (Days)			Larval instar (Days)			Pupal Stage Days			Mean
	Range		Mean	Range		Mean	Range		Mean	
	Minimum	Maximum		Minimum	Maximum		Minimum	Maximum		
25 C	1.0	1.5	1.35	5	7	6	4	7	5.5	5.5
20 C	1.0	2.0	1.75	8	9	8.5	9	10	9.5	9.5

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أول تسجيل للأعداء الحيوية لحفار أوراق الحمضيات (Lepidoptera : Gracillaridae)
Phyllocnistis citrella Staintion

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الخلاصة

أجري مسح للأعداء الحيوية (طفيليات ومفترسات) في بساتين ومشاتل الحمضيات في محافظات بغداد ، واسط وديالى خلال عامين ١٩٩٨ و ١٩٩٩ سجلت خمسة طفيليات تنتمي إلى عائلة Eulophidae لأول مرة في العراق متطفلة على يرقات وطور ما قبل العذراء والعذراء لحفار أوراق الحمضيات هذه هي :

Rrigalio near *somemus* , *Cirrospilus verigatus Neochrysocharis Formosa* , *Tetrastius* sp , *Ratzburgiola incomplete* .

وبلغت نسبة التطفل بين ١٥% - ٦٣ % وسجلت المفترسات *Chrgsopa careen* وبقة الأزهار *Orius albidipennis* والحلم المفترس *Amblyseius* sp .