International Journal of Fauna and Biological Studies
Available online at www.faunajournal.com

IJFBS International Journal of Fauna And Biological Studies

ISSN 2347-2677
IJFBS 2018; 5(3): 206-209
Received: 17-03-2018
Accepted: 22-04-2018

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Determining the criteria basis for struggle with the cotton pest in southeastern Anatolia: *Creontiades pallidus* Rmb. (Hemiptera: Miridae)

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Abstract
The pest population in Akçakale and Ceylanpınar districts was 5.3 individuals/50 sweep- nets as a maximum, number of damaged small boll is 4.8 boll/plant and 7.6 boll/sweep net as a maximum, and number of damaged small boll number was 5.7 boll/plant, respectively. The pest population in 2003 developed slowly and reached only the level of 4.5 individuals /50 sweep-nets. While one generation completed within 55.63 days under controlled conditions including 16 hours of light and 8 hours of darkness, 65±5% relative humidity at 25±1 ^{0}C temperature; the generation completed within 24.7 days at 30±1 ^{0}C. Maturation at the short period of time at high temperature (30±1^{0}C) and having a high capacity of egg-laying (122 eggs/individual) have led to the conclusion of *C. pallidus* can be a problem in case it is seen in cotton plantations at the flowering stage and it should be fought against; however, if mature individuals of *C. pallidus* are seen in cotton fields at stages that bolls have completed their development, there will be no need for struggle.

Keywords: southeast anatolia region, cotton, *Creontiades pallidus* Rmb, distribution areas, biology

Introduction
The Southeastern Anatolia Region includes 45% of the total cotton fields and 48% of the cotton-unseed is produced in these fields (Akyıl, 1999) [1]. *Creontiades pallidus*is a pest that creates problems in cotton fields. Stamp (1987) [17] has reported that *C. pallidus*is pest capable of causing damages in cotton fields up to 50.4%, and there will be no need for struggle in cases where the density is 7 Miridae individuals per 50 sweep nets. It causes damages in Israel on cotton plant, and nymphs and adults cause damages on flowers and small bolls (Nakhas *et al*., 1986). *C. dilitus* however, is a significant pest of cotton fields in Australia (Pyke and Brown, 1996) [15]. It has started to create problems in Iran recently (Fathipour *et al*., 2004) [9]. Mehdi and Mohammad, (2004) [12] reported in their study that this pest causes significant losses in cotton yield. Different species of Creontiades have started to create problems in several countries throughout the world in the recent years. *C. signatus* have started to cause problems in cotton fields in Texas. It lays its eggs on small capsules and bolls and mostly prefers leaves (Armstrong *et al*., 2009) [5]. Population and the damages caused by *C. dilitus* have increased in Australia with the increase in the with the increasing plantation areas of Bt cotton (Rohini *et al*., 2009) [16]. Stuart *et al*., (2011) have shown that *C. biseratense* is found in greater populations in Bt cotton field as compared to other fields. *C.signatus* causes damages in seeds of the cotton plant and reducing of the yield (Armstrong *et al*., 2009) [5]. Brewer *et al*., (2012) [6] have reported in their study that *C.signatus* reaches the highest numbered during the weeks 3 and 4 pf flowering. Brewer *et al*., (2013) [7] have reported that damages caused by *C. signatus* during flowering period increases the losses. *C. pallidus* has been detected in GAP area for the first time by Uygun *et al*. (1995) [9]. *C. pallidus*, which was not a problem in the area till that date, started to cause problems after 1999 (Efil and İlkan, 2003) [8]. Distribution and biology of *C. pallidus* has been attempted to be determined in this study.

Material and Method
Development of the population and damages
Population survey was carried out in Akçakale and Ceylanpınar districts. Twenty-five sweep nets were used through the rows each time, and the individuals collected were brought to the laboratory for counting.

All the bolls of five plants in three different parts of each field were checked to determine the status of damage, and numbers of damaged bolls were determined.

Biology

Study of the biology of the pest were carried out in a climate chamber at temperatures of 30±1C^{0}and 25±1C^{0}and at 65±5% relative humidity with 16hours of light and 8 hours of darkness. Culture dishes with dimensions of 7cmx5cm were used in the study. Small bolls 2.5cm in diameter were placed in culture dishes. Females collected from the field were placed in such dishes and were allowed to lay eggs. Nymphs coming from hatched eggs were taken to separate dishes and were allowed to mature. Males and females becoming adults on the same day were left to dishes and fed till they died to determine their different biologic phases. Small bolls that mature individuals fed from were replaced every day with fresh ones. Bolls that eggs were laid on were checked twice a day to determine the egg yields and hatching times of eggs. Nymph stages were recorded based on skin residues with checks carried out twice a day. Periods passed till the nymphs became mature were thus determined. Square were used to feed the pests in the 1st and 2nd nymph phases of the pest. Cotton was coiled at the bottom of square, and then wetted to ensure remaining fresh. Small bolls 1.5cm in diameter were used to feed nymphs in 3rd, 4th and 5th phases. Cotton bolls 2.5 cm in diameter with coiled cotton at the bottom were used to feed the mature individuals and allow them to lay eggs. Small bolls with laid eggs were kept fresh by wetting the cotton till the eggs were hatched.

Findings and Discussion

Population development and determining the rate of damage on plants

In the year 2002**, p**opulations in Akçakale district developed in numbers close to each other in both fields, and while the population was 5.3 individuals /sweep nets in the 1st field in September 7, the same reached only 4.6 individuals in the 2nd field at the same date. Together with the development of the population in both fields, damages on bolls increased; and while 4.8 individuals per plants with damaged bolls were found in the 1st field, while 3.4 damaged large bolls were determined. Also, 4.8 individuals per plants with small bolls and 3.7 large bolls were found in the 2nd field (Table 1).

The population that started maturing at an earlier date in Ceylanpınar district was greater than the population in Akçakale district. The population, which reached 6 individuals /50 sweep nets in the 1st field in August 28, reached 7.6 individuals in the 2nd rate on the same rate (Table 1). Likewise, the rate of damaged bolls increased with the development of the population; however, this rate remained low because of the POW levels of population. Drying of the small bolls were not observed also in the field in the Ceylanpınar District.

Table 1: Development of *C. pallidus* population (individuals per 50 sweep-net) and numbers of damaged small and large boll in Akçakale District

Date		23-8	29-8	7-9	12-9	18-9	27-9
1.Field	Nymph+Adult	1.0	3.3	5.3	4.0	4.0	2.6
	Damaged small boll	0.4	1.2	2.3	3.3	4.4	4.8
	Damaged matured boll	0.4	0.8	2.8	2.5	3.2	3.4
2.Field	Nymph+Adult	1.3	2.6	4.6	3.6	2.6	2.0
	Damaged small boll	0.4	1.4	2.2	3.2	4.2	4.6
	Damaged matured boll	0.6	0.8	2.4	2.5	3.0	3.7

Table 2: Development of *C. pallidus* population (individuals per 50 sweep-net) and numbers of damaged small and large boll in Ceylanpınar District

Date		23-7	15-8	21-8	28-8	4-9	11-9	26-9
1. Tarla	Nymph+Adult	0.6	1.6	2.6	6.0	4.3	1.6	1.3
	Damaged un matured boll	-	0.6	1.0	2.3	5.2	5.7	-
	Damaged matured boll	-	0.4	0.7	1.4	2.3	1.8	-
2.Tarla	Nymph+Adult	0.3	2.0	4.6	7.6	5.0	2.3	0.6
	Damaged un matured boll	-	0.7	1.2	2.5	4.0	4.8	-
	Damaged matured boll	-	0.3	0.8	2.2	2.6	3.7	-

Biology of the Pest

Determining the hatching times of eggs

The shortest period of hatching was 7 days at 25±1^{0}C. The most abundant opening was seen in day 8 with an opening rate of 68.61%. The initial eggs hatched at day 5 at 3±1C^{0}and the biggest hatching rate was seen at day 6. The total rate of hatching was 71.05+% (Table 3).

Table 3: Egg-hatching of *C. pallidus* at 25 ± 1, 30 ± 1, 65 ± 5% relative humidity and 16 hours of light and 8 hours of darkness conditions

Duration of eggs stage(days)	25±1		30±1	
	Opening egg number (n:1109)	% opening	Opening egg number (n:629)	% opening
5	-	-	60	9.53
6	-	-	312	49.6
7	149	13.43	67	10.65
8	544	49.05	8	1.27
9	63	5.68	-	-
Total	756	68.61	447	71.05

Development times for nymph phases

While the total nymph phase lasted for 22.23 days at 25±1^{0}C, the same took 12.98 days at 30±1^{0}C. The nymph development period was shortened by 9.25 days with a 5^{0}C of temperature rise (Table 4).

Table 4: nymph development periods at 25 ± 1, 30 ± 1, 65 ± 5%reletive humidity and 16 hours of light and 8 hours of darkness conditions

Nymph	Duration of nymph stage (days)	
	25±1	30±1
Instar 1	3.43 ± 0.11	2.30 ± 0.11
Instar 2	3.30 ± 0.12	2.37 ± 0.09
Instar 3	3.40 ± 0.20	2.28 ± 0.08
Instar 4	4.60 ± 0.24	2.4 2 ± 0.09
Instar 5	7.50 ± 0.18	3.60 ± 0.12
Total	22.23± 0.80	12.98± 0.44

Fig 1: Eggs of *C. pallidus* in boll and and different stage biological development

Determining pre-oviposition, oviposition, post-oviposition, egg yield and lifetime of adults

The pre-oviposition time for *C. pallidus* adults at 25±1ºC temperature was 25.5 days, oviposition time was 31.6 days, post-oviposition time was 14.4 days, while the mean egg yield throughout their lifetime was 35.1 eggs. While the lifetime was 71.6 days for females, the same was 40.1 days for males. The biggest egg yield was seen at week 5. Pre-oviposition time was 6 days at 30±1ºC, oviposition was 38.3 days, and post-oviposition was 3.7 days; the egg yield was 122.9 eggs. The adult lifetime for females was 48.1 days, while the same for males was 33 days. While the pre- oviposition time for *C. pallidus* was 25.5 days at 25±1ºC, the same was 6 days at 30±1ºC. While no significant differences were observed between the oviposition times at two temperature values, almost 4 folds different was present in post-oviposition times. Large differences were also seen between egg differences (Table 5).

Table 5: Biologic periods of *C. pallidus* at 25 ± 1, 30 ± 1, 65 ± 5%reletive humidity and 16 hours of light and 8 hours of darkness conditions

Temp.	N	Duratiıon of (days)			Mean egss number	Adult life (day)	
		Pre-ovipozision	Ovipozision	Postovipozision		Female	Male
25±1	15	25.5 ± 1.27	31.6 ± 2.66	14.4 ± 1.94	35.1 ± 3.56	71.6 ± 2.87	40.1 ± 2.67
30±1	12	6 ± 0.56	38.3 ± 1.84	3.7 ± 0.82	122.9 ± 8.42	48.1 ± 1.88	33 ± 2.71

It was found in the studies carried out that *C. pallidus* contaminates the cotton fields in a high rate in Southeastern Anatolia. It was concluded that population development of *C. pallidus* and rate of damages on the plant remained at a low level, and completion of this population development at the period of completion of cotton plant did not exert any effects on the yield. It has been reported in some studies that *C. pallidus* causes damages the capsules, flowers and small bolls in cotton plant, and damages on mature balls is not significant (Stamp 1987, Peyke and Brown, Mehdi and Mohammad, 2004) [17, 12]. Studies on the biology of this pest under controlled conditions have shown that one offspring was completed within a very long (55.7 days) at a low temperature (25±1), the same was completed within the shorter time (24.7 days) at a higher temperature (30±1).It was found that the pest laid its eggs one by one within the tissue of the plant and preferred the places on cocoons close to its stem, did not cause great damage at the 1st, 2nd and 3rd nymph phases, while it caused much greater damages at the 4th and 5th phases. It has been concluded that *C. pallidus* can create problems if seen within the flowering phase in cotton fields because of the short period of the completion of an offspring at a higher temperature (30±1) with a high capacity of egg-laying (122 eggs/individual), and struggle will be required in this case. Likewise, Stamp (1987) [17] has reported that if*C. pallidus* can cause loss of yield up to 50.4% if it is seen in cotton fields at an early period, while Mehdi and Mohammad (2004) [12], have reported that *C. pallidus* starting its damages at the flowering period could cause yield losses between 40.5% and 81.9%. Brewer *et al*., (2013) [7] have reported that damages caused by C. signatus at the early flowering period can be significant. It has been concluded that presence of adult *C. pallidus*

individuals in cotton fields in the late period when the cotton plant has completed its development will not require struggle. Likewise, Stamp (1987) [17] has reported that presence of this pest in cotton fields in August is not important, and fight against it should not be undertaken.

References

1. Akyıl N. Pamuk durum ve tahmin. Tarımsal Ekonomi Araştırma Enstitüsü. 1999; 33:37.
2. Alvarado M, Duran JM, Serrano A, Rosa Adela, Ortiz E, Rosa Dela A. Contribution to the knowledge of bugs (Heteroptera) infesting cotton in Western Andalucia. Boletin-de-Sanidad-Vegetal,-Plags. 1998; 24(4):817-828.
3. Anonymous. G.A.P. Master plan çalışması. Master plan nihai raporu. T.C. Başbakanlık D.İ.E., Nippon Koei cc. Ltd. (Tokyo, Japonya), Yüksel Proje A.Ş. (Ankara, Türkiye), Cilt 1. 27.S, 1989.
4. Armstrong JS, Coleman RJ, Duggan BL. Characterizing the damage and oviposition of a Creontiades plant bug to South Texas Cotton.National Cotton Council Beltwide Cotton Conference, January 9-12, 2007, New Orleans, Louisiana. 2007, 34-37.
5. Armstrong JS, Coleman RJ, Sétamou M. Oviposition Patterns of Creontiades signatus (Hemiptera: Miridae) on Okra-Leaf and Normal-Leaf Cotton Annals of the Entomological Society of America. 2009: 102(2):196-200.
6. Brewer MJ, Armstrong JS, Medrano EG, Esquivel JF. Association of Verde Plant Bug, Creontiades signatus (Hemiptera: Miridae), with Cotton Boll Rot. The journal of cotton science. 2012; 16:144-151.
7. Brewer MJ, Anderson DJ, Armstrong JS. Plant Growth Stage-Specific Injury and Economic Injury Level forVerde Plant Bug, *Creontiades signatus* (Hemiptera: Miridae), onCotton: Effect of Bloom Period of Infestation J Econ. Entomol. 2013; 106(5):2077-2083.
8. Efil L, İlkan A, Harran ovasında pamukta zararlı *Creontiades pallidus* Rmb. (Hemiptera: Miridae)'un popülasyon değişiminin belirlenmesi. GAP III. Tarım Kongresi 02-03 Ekim Şanlıurfa. 2003, 395-397.
9. Fathıpour Y, Jafari A, Hosseini SM. Population grpwth statistic of *Creontiades pallidus* (Het.: Miridae) and Associated Predators *Nabis capsiformis* (Het.: Nabidae) and Chrysoperla carnea (Neu.: Chrysopidae). Journal of Entomological Society of İran. 2004; 23:15-31.
10. Kansu İA. Tarımsal savaşımın önemi. GAP Bölgesi Bitki Koruma Sorunları ve Çözüm Önerileri Sempozyumu, 1995; 27-29:1-21.
11. McColl SA, Khan M, Umina PA. Review of the biology and control of *Creontiades dilutus* (Stål) (Hemiptera: Miridae). Australian Journal of Entomology. 2011; 50:107-117.
12. Mehdi HS, Mohammad S. Evaluation of Economic threshold of cotton shedder bug. *Creontiades pallidus* Ram. (Hem., Miridae). Procedings of the XVth International Plant Protection Congress, Beijing, China, 2004, 11-16.
13. Nakash J, Hameiri J, Bitton S. Biyology and chemical control of the cotton shedder bug *Creontiades pallidus* Ramb. Hassadeh. 1989; 69(8):1400.
14. Norman JW Jr, Pest Cast, Integrated Pest Management (IPM) newsletter for the Row Crops in the Lower Rio Grande Valley. 2003; XXVIII(15):6.
15. Pyke BA, Brown EH. The cotton pest and benefical guide. CRDC, Narrabi and CTPM, Brispane, 1996, 51.
16. Rohini RS, Mallapur CP, Udikeri SS. Incidence of mirid bug, *Creontiades biseratense* (Distant) on Bt cotton in Karnataka. Journal article : Karnataka Journal of Agricultural Sciences. 2009; 22(3):680-681 ref.4
17. Stamp PA. *Creontiades pallidus* (Rambur) (Miridae,hemiptera) a pest of cotton along the Euphrates river and its effect on yield and control action threshold in the Syrian Arab Republic. Tropical Pest Management. 1987; 33(4):273, 276, 385, 389.
18. Tuncer C, Akça İ. Bitkisel Çeşitlilik ve Böcekler. O.M.U. Ziraat Fakültesi Dergisi. 1995; 10(1):57-168.
19. Uygun N, Başpınar H, Şekeroğlu E, Kornoşor S, Özgür AF, Karaca İ *et al*. GAP Alanında Zirai Mücadele Politikasına Esas Teşkil Edecek Zararlı ve Yararlıların Saptanması. GAP Bölgesi Bitki Koruma Sorunları ve Çözüm Önerileri Sempozyumu. 1995; 27-29:99-119.