



Formosan Entomologist

Journal Homepage: entsocjournal.yabee.com.tw

Preliminary Study of the Life Cycle of *Cassida circumdata* Herbst (Coleoptera: Chrysomelidae) 【Scientific note】

縱條姬斗笠龜金花蟲生活史初步研究【科學短訊】

Kao-Yu Liu and Wen-Feng Hsiao*

劉高佑、蕭文鳳*

*通訊作者E-mail: wfhsiao@mail.ncyu.edu.tw

Received: 2005/09/13 Accepted: 2005/12/12 Available online: 2005/12/01

Abstract

A study of the life cycle of *Cassida circumdata* Herbst (Coleoptera: Chrysomelidae) feeding on sweet potato leaf was conducted in a 25°C incubator. Results showed that the egg was greenish, elliptical, 1.2 mm long, 0.5 mm wide, and laid on the undersurface of the leaf. Eggs were covered by a secretion of the female's accessory glands. The hatching rate was 100%. The egg stage lasted 4-8 days with a mean of 5.65 days. The larvae had five instars and were spindle-shaped, and their periphery was fringed with spines. For the 1st to 5th instars, body lengths were 1.2, 1.5, 2.0, 2.8 and 3.5 mm, and stadium durations were 2.86, 2.82, 2.65, 2.92 and 4.21 days, respectively. Survival rates of larvae were 100%. Larva legs had hooks to help adhere onto the leaf surface, and exuvia remained attached at the tip of abdomen. Prepupae were fresh green, and the body length averaged 4.4 mm. The prepupal stage lasted 1-4 days, with a mean of 2.01 days. Pupae were greenish, elliptical, and 4.0 mm long, and the stage lasted 5-8 days, with a mean of 5.77 days. The notum was transparent and extended to the front, while exuvia remained at the tip of the abdomen. Adults had a metallic green color with two black lines on the dorsal surface. The compound eyes and antennae were black. The body size of the female was larger than that of the male with respective body lengths of 4.5 and 4.0 mm. Adult longevity of the female was 143 days, and was 161.6 days for the male, with some individuals able to live for 8 months. Adults were able to mate and oviposit in a small space such as a Petri dish (with a diameter of 5.5 cm). Females mated several times and laid 210-1444 eggs with a mean of 680.

摘要

於25°C恆溫箱內，以桃改二號甘藷葉片餵飼縱條姬斗笠龜金花蟲 (*Cassida circumdata* Herbst)，探討其生活史。結果顯示卵長橢圓形，卵長1.2 mm，寬0.5 mm，產於葉背，翠綠色，單產，卵包被一層翼狀膠質物。卵期4~8天，平均為5.7天。孵化率為100%。幼蟲全期五齡，一至五齡蟲之體長分別為1.2、1.5、2.0、2.8及3.5 mm。齡期平均分別為2.9、2.8、2.6、2.9及4.2天，存活率皆為100%。一、二齡幼蟲足趾鉤及其二旁的毛刺能將身體粘附在葉背。一、二齡幼蟲淡黃色。三至五齡幼蟲體色、棘毛等極為類似，只有體型大小之不同。幼蟲皆將蛻皮留在腹部末端。前蛹鮮綠色，體長4.4 mm，前蛹期1~4天，平均2.0天。蛹綠色，近長方形，蛹體長4.1 mm，齡期5~8天，平均5.8天，存活率為100%。蛹前胸背板外伸為本蟲特徵之一。化蛹時會將幼蟲最後一齡的蛻皮脫去，並留在腹部末端，以固定於葉背。成蟲翅鞘綠色光滑有金屬光澤，翅鞘上有黑色條紋，複眼及觸角的前端為黑色。雌成蟲比雄成蟲體型大，雌、雄成蟲體長各為4.5及4.0 mm，雌成蟲齡期平均為143天，雄成蟲齡期平均為161.6天，有些成蟲壽命可長達8個月以上。每隻雌成蟲一生交尾多次，產卵量變化甚多自210~1444個，平均680個。

Key words: tortoise beetle, *Cassida circumdata*, life cycle, sweet potato

關鍵詞: 縱條姬斗笠金花蟲、*Cassida circumdata*、生活史、甘藷

Full Text: [PDF \(0.55 MB\)](#)

下載其它卷期全文 Browse all articles in archive: <http://entsocjournal.yabee.com.tw>

縱條姬斗笠龜金花蟲生活史初步研究

劉高佑 蕭文鳳* 國立嘉義大學生物資源暨植物保護系 嘉義市學府路 300 號

摘 要

於 25°C 恆溫箱內，以桃改二號甘藷葉片餵飼縱條姬斗笠龜金花蟲 (*Cassida circumdata* Herbst)，探討其生活史。結果顯示卵長橢圓形，卵長 1.2 mm，寬 0.5 mm，產於葉背，翠綠色，單產，卵包被一層翼狀膠質物。卵期 4~8 天，平均為 5.7 天。孵化率為 100%。幼蟲全期五齡，一至五齡蟲之體長分別為 1.2、1.5、2.0、2.8 及 3.5 mm。齡期平均分別為 2.9、2.8、2.6、2.9 及 4.2 天，存活率皆為 100%。一、二齡幼蟲足趾鈎及其二旁的毛刺能將身體粘附在葉背。一、二齡幼蟲淡黃色。三至五齡幼蟲體色、棘毛等極為類似，只有體型大小之不同。幼蟲皆將蛻皮留在腹部末端。前蛹鮮綠色，體長 4.4 mm，前蛹期 1~4 天，平均 2.0 天。蛹綠色，近長方形，蛹體長 4.1 mm，齡期 5~8 天，平均 5.8 天，存活率為 100%。蛹前胸背板外伸為本蟲特徵之一。化蛹時會將幼蟲最後一齡的蛻皮脫去，並留在腹部末端，以固定於葉背。成蟲翅鞘綠色光滑有金屬光澤，鞘翅上有黑色條紋，複眼及觸角的前端為黑色。雌成蟲比雄成蟲體型大，雌、雄成蟲體長各為 4.5 及 4.0 mm，雌成蟲齡期平均為 143 天，雄成蟲齡期平均為 161.6 天，有些成蟲壽命可長達 8 個月以上。每隻雌成蟲一生交尾多次，產卵量變化甚多自 210~1444 個，平均 680 個。

關鍵詞：縱條姬斗笠金花蟲、*Cassida circumdata*、生活史、甘藷。

甘藷 (*Ipomoea batata* (L.)) 其葉片及塊根皆可食用，重要性於根莖作物中列第三位 (Chalfant, 1990)。文獻記載甘藷的食葉性害蟲，有斜紋夜盜、中白夜蛾、蝦殼天蛾、猿葉蟲、白鳥羽蛾、小蛾、蝗蟲和金花蟲類 (Anonymous, 1964; Yen, 1973; Anonymous, 1990)。Hwang (1994) 描述取食甘藷葉片的花金蟲種類有四紋斗笠金花蟲 (*Lacoptera quadrimaculata* (Thunbery)) 及縱條姬斗笠金

花蟲 (*Cassida circumdata* Herbst)。

縱條姬斗笠金花蟲又稱綠龜金花蟲或甘薯龜金花蟲，英名 green tortoise beetle，屬鞘翅目，金花蟲科，Cassidina 亞科。分布於台灣及金門 (Ho and Lin, 1999; Hsien *et al.*, 2002)、中國大陸 (Gressitt and Kimoto, 1961)、日本 (Kimoto and Takizawa, 1994)、泰國 (Waterhouse, 1997)、孟加拉 (Bhuiya *et al.*, 1995)、印度 (Patel and

*論文聯繫人
e-mail: wfhsiao@mail.ncyu.edu.tw

Patel, 1971)、大洋洲 (Waterhouse, 1997) 等。其寄主植物主要為甘薯、蕹菜 (*Ipomoea aquatica* (Lev.) Forsk) 及牽牛花 (*Ipomoea nil* Roth)。

Bhuiya *et al.* (1995) 及 Ho and Lin (1999) 也在本島旋花科植物上採到並對其形態及生活環作簡單的介紹，本文擬進一步探討其形態及生活史。

於 1998 年 4 月中旬，自嘉義縣新港鄉新庄地區甘藷植株上，採回約 100 隻成蟲及 100 隻幼蟲，攜回室內後以未噴灑任何藥劑之盆栽桃改二號甘藷葉餵飼，作為蟲源，並於室溫下飼養一年後才進行以下的觀察。

自供試蟲源中，逢機選取 30 對剛羽化之成蟲放入養蟲籠 (29×29×29 cm) 內。於 50 ml 三角燒瓶內裝 40 ml 自來水，再插入有 5~6 葉片之甘藷藤蔓，供成蟲取食及產卵；每籠放 6 瓶，每天更換甘藷葉片，同時計數葉背所產之卵數。就三日齡之雌成蟲所產之卵，逢機選取 200 個卵，移至底部置一濕潤的濾紙 (Toyo #1) 的培養皿 (直徑 5.5 cm，高 1 cm)，再移入 25 ± 1°C，光週期 12L:12D 之恆溫箱內飼養。每天觀察孵化之幼蟲數及紀錄卵期。

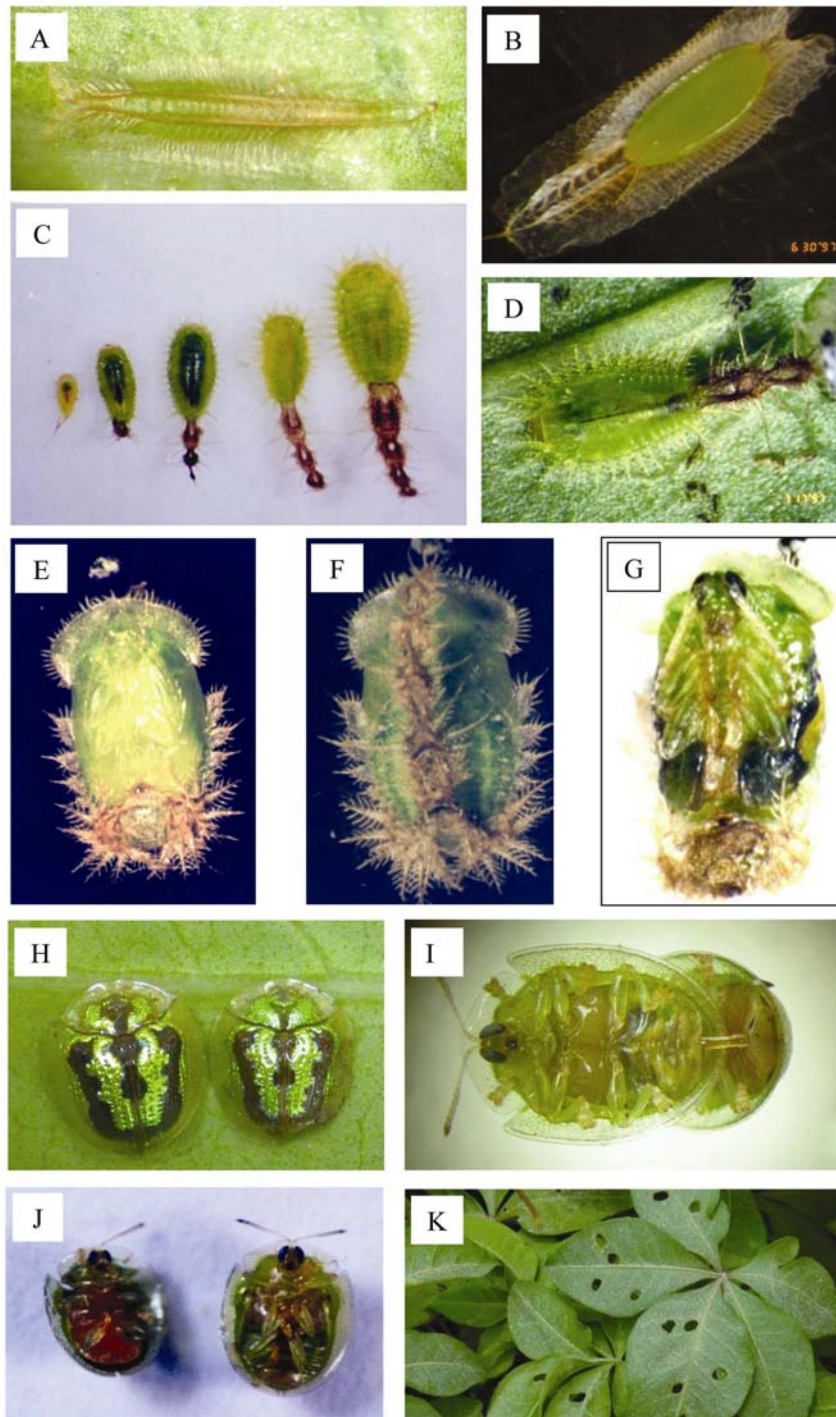
將上述孵化之幼蟲，採單隻飼育之方式，共飼育 200 隻，將幼蟲放入底部舖有一張濾紙 (Toyo #1) 的 5.5 cm 塑膠培養皿，加入一片甘藷葉片，並添加約 0.5 ml 的蒸餾水，以保持濾紙濕度防止葉片枯萎。再將蟲移入 25 ± 1°C，光週期 12L:12D 之恆溫箱內飼養。每日更換新鮮的甘藷葉片。每天觀察幼蟲存活、生長狀況及蛻皮情形，幼蟲每次蛻皮後即量其體長。將一隻幼蟲視之為一重複，共 200 個重複。當末齡幼蟲化蛹前，同樣採單隻飼育的方式，持續觀察記錄前蛹形態及化蛹情形及蛹期的變化。

待蛹羽化後，除了量成蟲的體長，並觀察雌、雄成蟲形態之差異，並自同一羽化日齡之群體中，逢機挑出雌、雄成蟲個體加以配對，放入圓柱形之塑膠筒 (直徑 9 cm，高 25 cm) 內，取具 5~6 片葉之甘藷藤蔓，插入內有 45 ml 自來水的 50 ml 三角瓶內，供成蟲取食及產卵。每天觀察成蟲產卵數，各組有 25 重複。為明瞭其交尾行為，另取 10 對金花蟲成蟲，白天每隔二小時觀察其交尾行為。

結果顯示縱條姬斗笠金花蟲的卵為翠綠色，產於葉背，卵被一層由副腺分泌的淡褐色膠質物包被成翼狀，其上具兩條對稱之深褐色線條，其餘則為透明 (圖一 A)，腹面則可見到翠綠的卵 (圖一 B)。卵單產長橢圓形，卵長 1.2 mm，寬 0.5 mm。此與 Bhuiya *et al.* (1995) 的長 1.2 mm，寬 0.46 mm 極為類似；Ho and Lin (1999) 的長 1.35 mm，寬 0.49 mm 有些微差異。

在 25°C 恆溫下，卵期 4~8 天，平均為 5.65 天。卵多在夜間孵化，於次日可見到一齡幼蟲在葉背取食，卵孵化率為 100%。卵孵化後，一齡幼蟲於葉背取食，造成孔洞狀之食痕 (圖一 K)。取食量會隨齡期增加而增大，而四、五齡幼蟲食量大，所排出的黑色糞便量也多。

幼蟲全期有五齡，成紡錘型，二側有棘毛 (圖一 C)，各齡之形態分述如下：第一齡幼蟲體呈翠綠色，身體分節明顯，眼、觸角皆為黑色。足趾鉤發達，可勾住葉面以協助身體粘附在葉表。腹末端常留有排泄物，遇到碰觸時尾部會上翹。初蛻皮的二齡幼蟲體翠綠色，一齡蟲蛻並不排掉而留在尾端，可用於辨識齡期。第三齡幼蟲身體也呈翠綠色，身體變寬，側肉棘淡綠色。第四齡幼蟲其外形、體色、棘毛等和第三齡極為類似，第五齡幼蟲除前胸的第一



圖一 縱條姬斗笠龜金花蟲各期形態。A 卵背面；B 卵腹面；C 各齡幼蟲；D 三齡幼蟲背面；E 蛹背面(去掉尾部之蛻皮)；F 蛹背面(去掉尾部之蛻皮)；G 蛹腹面；H 成蟲背面(右為雄成蟲、左為雌成蟲)；I 成蟲交尾，可見到交尾刺；J 成蟲腹面(左為雄成蟲、右為雌成蟲)；K 危害狀。

Fig. 1. Morphology of different stages of the tortoise beetle, *Cassida circumdata*. A, Egg, dorsal view; B, egg, ventral view; C, larvae from the 1st to the 5th instar; D, 3rd instar larva; E, pupa, dorsal view without exuviae. F, pupa, dorsal view with exuviae; G, pupa, ventral view; H, adult, dorsal view (left, female; right, male); I, mating; J, adult, ventral view (left, male, right, female); K, damage symptom.

行黑斑淡化外，特徵都和第四齡幼蟲相同，但體型較大。

一至五齡幼蟲體長分別平均為 1.5、2.0、2.8、2.8 及 3.5 mm，體寬則各別平均為 0.6、1.0、1.2、1.8 及 2.3 mm。相較於 Ho and Lin (1999) 所紀錄的 1.2、1.7、3.2、4.9 及 5.1 mm，後者的第四齡及第五齡較本實驗所得之體長為長；至於體寬則為 0.06、0.10、0.21、0.35 及 0.38 cm，因為 Ho and Lin (1999) 並未詳述飼育之溫度及寄主植物等條件，故無從比較。

結果顯示一至五齡幼蟲齡期長各別為 1~4、1~4、2~4、2~5 及 2~12 天，齡期平均為 2.86、2.63、2.65、2.92 及 4.21 天，一至五齡幼蟲存活率皆為 100%。Bhuiya, *et al.* (1995) 於室內變溫的狀況下飼養，幼蟲齡期長為 2~3、2~4、2~3、3~4 及 3~4 天，齡期平均為 2.74、2.70、2.20、3.2 及 3.2 天。本實驗結果 Bhuiya *et al.* (1995) 極為類似。

前蛹體綠色，其形態和五齡幼蟲極為類似，不易分出，二側之棘毛呈三角形，不取食不活動。化蛹時，尾部末端仍有幼蟲的蛻皮（圖一 F），可協助將身體固定於葉背面。蛹近長方形，裸蛹，淡綠色，蛻皮時是自前胸背板裂開，再將身體掙開，遇驚擾時會擺動腹部尾端。前蛹與蛹前胸背板透明向外伸，如斗笠狀，尾部末端仍有幼蟲的蛻皮，除去後可見到鮮綠色的外表（圖一 E），腹面可明顯看出裸蛹的特徵。前蛹及蛹體長分別平均為 4.4 及 4.0 mm，前蛹期 1~4 天，平均 2.01 天，蛹期 5~8 天，平均 5.77 天，兩者之存活率皆為 100%。Bhuiya *et al.* (1995) 於室內飼養下，蛹期 4~7 天，平均 4.8 天，較本實驗蛹期短。羽化前翅鞘上會出現斑紋，體色轉為墨綠色。

成蟲綠色具金屬光澤，前胸發達蓋住頭部且有黑色斑點。翅鞘半透明，鞘翅上邊緣周圍

透明，口及複眼黑色、觸角前端為黑色（圖一 H）。身體拱起的幅度甚大，身體兩側及中線有黑色線條。足淡綠色但肘節為淡紅色，爪為黑色（圖一 I）。

成蟲體小型，雌成蟲比雄蟲體型大（圖一 J），雄成蟲體長平均為 4.0 mm，雌成蟲體長平均為 4.5 mm，雌成蟲壽命平均為 143.6 天，雄成蟲壽命平均為 161.6 天，有些成蟲壽命可長達 8 個月以上。

交尾時，雄成蟲位於雌蟲的上方，雄成蟲伸出其交尾刺插入雌成蟲的腹部，藉由此方式完成它們的交尾（圖一 I），在這過程中，觀察到雄成蟲的體軀及足會左右輕微的搖動，可能是雄蟲藉由此動作將精子傳送到雌蟲體內授精。本蟲一生交尾多次，交尾時間多在晚上，交尾時間從短短的幾分鐘到 8 小時以上，交尾時如受到干擾，則會迅速的分開，或者是當干擾消失後則又會馬上恢復交尾。老齡成蟲其副腺無法分泌膠質物來包被卵粒，未被包被的卵不會孵化。

誌 謝

蒙行政院農委會台中農業試驗所應用動物系前 周樑鎰博士協助鑑定本蟲，謹此誌謝。計畫助理張閣宏先生協助文稿編排使本文得以完成，特此致謝。

引用文獻

- Anonymous.** 1964. Chapt. 1. Rice and Sweet Potato. *In: NonChiaYiauNen* Vol. 6, Food crop. 342 pp. (in Chinese)
- Anonymous.** 1990. Plant Protection Section. *In: Taiwan-non chia book* pp. 19-21. Executive Yuan, Taipei, Taiwan. (in

- Chinese)
- Bhuiya, B. A., I. Miah, and S. Dev.** 1995. Some aspects of the biology of the tortoise beetle, *Cassida circumdata* Herbst (Coleoptera: Chrysomelidae, Cassidinae). Bangladesh J. Entomol. 5: 1-9 (abstract).
- Chalfant, R. B.** 1990. Ecology and management of sweet potato insects. Annu. Rev. Entomol. 35: 157-180.
- Gressitt, J. L., and S. Kimoto.** 1961. The Chrysomelidae (Coleopt.) of China and Korea. Part I. Pac. Inst. Monogr. 1A: 1-229.
- Ho, J. R., and C. J. Lin.** 1999. Tortoise beetles fed on the Convolvulaceae plant (I) Nat. Q. Issue. 26: 16-19. (in Chinese)
- Hsien, T. S., C. C. Ho, and W. J. Wu.** 2002. Chrysomelidae (Insecta: Coleoptera) from Kinmen. J. Agric. Res. China 51: 45-55.
- Huang, J. S.** 1994. Sweet potato insect management in Taiwan. pp. 191-201. In: C. T. Yeh, Y. Yeh, and C. T. Tzen, eds. Proceedings of the Symposium on Upland Crop Protection. 385 pp. (in Chinese)
- Jansson, R. K., and K. V. Raman.** 1991. Sweet potato pest management: a global perspective. 439 pp. Westview Press, Boulder, Co.
- Kimoto, S., and H. Takizawa.** 1994. Leaf beetles (Chrysomelidae) of Japan. Yokai Uni. Press. Japan. 539 pp.
- Patel, H. K., and N. G. Patel.** 1971. New records of *Catephia leucomelas* Linn., *Cretonia vegata* Swinhoe and *Cassida circumdata* Herbst. on sweet potato, *Ipomea batatas* Lam. Indian J. Entomol. 33(4): 459-460.
- Waterhouse, D. F.** 1997. The major invertebrate pests and weeds of agriculture and plantation forestry in the southern and western Pacific. The Australian Center for International Agricultural Research, Australia. 93 pp.
- Yen, F. C.** 1973. The damage of foliage pests and relationship with sweet potato, peanut and soybean yield. Taiwan Agric. 9(1): 41-49.

收件日期：2005年9月13日

接受日期：2005年12月12日

Preliminary Study of the Life Cycle of *Cassida circumdata* Herbst (Coleoptera: Chrysomelidae)

Kao-Yu Liu and Wen-Feng Hsiao* Department of Bioresources and Plant Protection, National Chiayi University, No. 300 University Road, Chiayi, 600 Taiwan

ABSTRACT

A study of the life cycle of *Cassida circumdata* Herbst (Coleoptera: Chrysomelidae) feeding on sweet potato leaf was conducted in a 25°C incubator. Results showed that the egg was greenish, elliptical, 1.2 mm long, 0.5 mm wide, and laid on the undersurface of the leaf. Eggs were covered by a secretion of the female's accessory glands. The hatching rate was 100%. The egg stage lasted 4-8 days with a mean of 5.65 days. The larvae had five instars and were spindle-shaped, and their periphery was fringed with spines. For the 1st to 5th instars, body lengths were 1.2, 1.5, 2.0, 2.8 and 3.5 mm, and stadium durations were 2.86, 2.82, 2.65, 2.92 and 4.21 days, respectively. Survival rates of larvae were 100%. Larva legs had hooks to help adhere onto the leaf surface, and exuvia remained attached at the tip of abdomen. Prepupae were fresh green, and the body length averaged 4.4 mm. The prepupal stage lasted 1-4 days, with a mean of 2.01 days. Pupae were greenish, elliptical, and 4.0 mm long, and the stage lasted 5-8 days, with a mean of 5.77 days. The notum was transparent and extended to the front, while exuvia remained at the tip of the abdomen. Adults had a metallic green color with two black lines on the dorsal surface. The compound eyes and antennae were black. The body size of the female was larger than that of the male with respective body lengths of 4.5 and 4.0 mm. Adult longevity of the female was 143 days, and was 161.6 days for the male, with some individuals able to live for 8 months. Adults were able to mate and oviposit in a small space such as a Petri dish (with a diameter of 5.5 cm). Females mated several times and laid 210-1444 eggs with a mean of 680.

Key words: tortoise beetle, *Cassida circumdata*, life cycle, sweet potato