Development of Pachycoris torridus (Hemiptera: Scutelleridae) on Jatropha curcas (Euphorbiaceae), Psidium cattleianum (Myrtaceae) and Aleurites fordii (Euphorbiaceae)

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DEVELOPMENT OF *PACHYCORIS TORRIDUS* (HEMIPTERA: SCUTELLERIDAE) ON *JATROPHA CURCAS* (EUPHORBIACEAE), *PSIDIUM CATTLEIANUM* (MYRTACEAE) AND *ALEURITES FORDII* (EUPHORBIACEAE)

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Abstract

Pachycoris torridus (Scopoli, 1772) (Hemiptera: Scutelleridae) is a polyphagus insect and is traditionally considered the key-pest of jatropha (*Jatroph acurcas* L.; Malpighiales: Euphorbiaceae); however, occurrences of this pest have also been observed on strawberry guava (*Psidium cattleianum* Sabine; Myrtales: Myrtaceae) and the tung tree (*Aleurites fordii* Hemsl.; Malpighiales: Euphorbiaceae). This study investigated the development of *P. torridus* in fruits of jatropha, strawberry guava and tung to provide information for phytosanitary management of this pest. We evaluated the biological parameters in the nymphal and adult stages of the pest at 25 ± 2 °C, RH 70 ± 10% and 12:12 h (L:D). Nymphs of *P. torridus* did not develop in fruits of tung. In fruits of jatropha and strawberry guava, *P. torridus* had 5 instars of nymphal development with variable durations and survival rates. The nymphal stage showed durations and viabilities of 55 days and 33.7% and 56.1 days and 38.9% in strawberry guava and jatropha, respectively. The sex ratio (proportion of females in the population) was 0.6 in strawberry guava and 0.5 in jatropha. The weights of adult females and males were greater in jatropha (152.0 and 117.2 mg) than in strawberry guava (127.9 and 105.9 mg). Females fed with jatropha showed a longer pre-oviposition period and shorter periods of oviposition and post-oviposition than those fed on strawberry guava. Fecundity was similar in both treatments (hosts). Fruits of strawberry guava and jatropha are adequate for the development and reproduction of *P. torridus*.

Key Words: Hemiptera, stinkbug of jatropha, hosts, biology

Resumo

Pachycoris torridus (Scopoli, 1772) (Hemiptera: Scutelleridae) é um inseto polífago que tradicionalmente tem sido considerado praga-chave do pinhão-manso (*Jatropha curcas* L.), entretanto sua presença tem sido constatada também em araçá (*Psidium cattleianum* Sabine) e tungue (*Aleurites fordii*). O objetivo do trabalho foi estudar o desenvolvimento de *P. torridus* em pinhão-manso, araçá e tungue, visando fornecer informações para o manejo fitossanitário dessa praga. Foram avaliados parâmetros biológicos para as fases jovem e adulta de desenvolvimento a 25 ± 2 °C, 70 ± 10% UR e 12 h de fotofase. Frutos de tungue não possibilitaram o desenvolvimento das ninfas de *P. torridus*. Nos demais hospedeiros *P. torridus* apresentou cinco instares com valores de duração e sobrevivência variáveis, totalizando para o estágio ninfal uma duração e viabilidade de 55 dias e 35,7% e 56,1 dias e 38,9% em araçá e pinhão-manso, respectivamente. A razão sexual foi de 0,6 em araçá e 0,5 em pinhão-manso. O peso de adultos fêmeas e machos foi maior em pinhão-manso (152,0 e 117,2 mg) do que no araçá (127,9 e 105,9 mg). Fêmeas alimentadas com pinhão-manso apresentaram maior período de pré-oviposição e menores períodos de oviposição e pós-oviposição em relação as alimentadas com araçá. A fecundidade foi semelhante nos dois hospedeiros. Frutos de araçá e pinhão-manso são adequados para o desenvolvimento e reprodução de *P. torridus*

Palavras-Chave: Hemiptera, percevejo-do-pinhão-manso, hospedeiros, biologia

Pachycoris torridus (Scopoli, 1772) (Hemiptera: Scutelleridae) is a stinkbug pest of jatropha and is characterized by having a well-developed globoid scutellum over the wings for protection (Gallo et al. 2002). The adult insects are black or dark purple, with 14 red or yellow spots, displayed in rows of 5, 4, 3 and 2 spots, beginning from the apex, in addition to 8 spots on the pronotum, totaling 22 spots on the body (Monte 1937). Moreover, they have odoriferous glands in the ventral part of the thorax that release a secretion with the characteristic odor of stinkbugs (Costa Lima 1940).

Pachycoris torridus occurs in practically all countries in the Americas, from the United States to Argentina (Froeschner 1988). However, its occurrence is more frequent in South America (Peredo 2002). In Brazil, it is the best-known species of the Scutelleridae, and its occurrence has been observed in the northeastern, southeastern, southern and central-western regions (Costa Lima 1940; Nava et al. 2009; Broglio-Micheletti et al. 2010; Rodrigues et al. 2011). Besides having a wide geographic distribution, it is a polyphagus insect currently observed on more than 14 plant species, namely rice [*Oryza sativa* L. (Poaceae)], orange [*Citrus sinensis* (L.) Osbeck (Rutaceae)], mango [*Mangifera indica* L. (Anacardiaceae)], strawberry guava [*Psidium cattleyanum* Sabine (Myrtaceae)], guava [*Psidium guajava* L. (Myrtaceae)], cassava [*Manihot esculenta* Crantz (Euphorbiaceae)], tung [*Aleurites fordii* Hemsley (Euphorbiaceae)], jatropha [*Jatropha curcas* L. (Euphorbeaceae)], acerola [*Malpighia glabra* L. (Malpighiaceae)]and coffee [*Coffea arabica* L. (Rubiaceae)] (Silva et al. 1968; Gallo et al. 2002; Sanchez-Soto & Nakano 2002; Santos et al. 2005; Nava et al. 2009).

In Brazil, *P. torridus* is the only species of the Scutelleridae family considered a pest in agriculture (Gallo et al. 2002). The nymphs and adults of the insect pest suck soft parts of plants, mainly fruits, inflicting yield losses and, therefore, economic losses. In the region of temperate climate in Brazil, *P. torridus* causes serious damages to crops of tung and jatropha, which are used in biofuel production expressed as reduced size of mature fruits and necrotic areas on the fruits (Nava et al. 2009).

In 2004, the Brazilian government launched a program to further reduce dependency on fossil fuels, and this program has boosted the cultivation of tung and jatropha (Suarez et al. 2006). Currently, soybean is the basis for biodiesel production in Brazil, but governmental programs to develop agronomic and industrial characteristics of jatropha and tung have increased their area of production and the 2010/11 crop amounted to 3,000 and 4,000 ha cultivated, respectively (IBGE 2011). The cultivation of jatropha and tung plants in southern Brazil is carried out in areas near strawberry guava trees, a native species, whose fruits are consumed in natura or processed to make sweets or jellies. Damage to jatropha and tung fruits is caused by nymphs and adults of *P. torridus* that feed on the sap and thereby reduce weight and oil content. In the case of jatropha, this reduction can reach more than 50% (Rodrigues et al. 2011). For tung and strawberry guava, the levels of damage have not yet been quantified; however, severe attacks can cause damage of up to 30%.

The presence of several host fruits favors the development of *P. torridus*, which should be considered when developing pest management programs, mainly, when host fruits are from different genera or even different families, as observed in the southern region of Brazil with occurrences of this pest attacking strawberry guava, jatropha and tung. These hosts allow the insect to remain close to commercial plantations and contribute to population increase of *P. torridus*, given that adults have high dispersion capacity. In this sense, this study investigated the development of *P. torridus* in fruits of strawberry guava, jatropha and tung to obtain information useful for the pest control management. The development of *P. torridus* in the different hosts define vulnerable stages and help adopt the best strategy, for example, direct the pest control when the attack to the first hosts to be infected are observed.

Materials and Methods

The experiments were conducted in rooms with the temperature adjusted to 25 ± 2 °C, RH 70 ± 10% and 12:12 h L:D at the Laboratory of Entomology at Embrapa Clima Temperado, in the municipality of Pelotas, Rio Grande do Sul State, Brazil.

Collection and Maintenance Rearing

The eggs of *P. torridus* collected in the field were placed in plastic boxes (Gerbox®) and kept in rooms with the temperature controlled to obtain the nymphs. After hatching, the nymphs were placed in cages for nymphal development. The insects collected in the field were identified by comparing them to samples from the Entomology Museum of the Entomology Laboratory of Embrapa Clima Temperado.

We collected insects at different developmental stages from experimental crops of jatropha of Embrapa Clima Temperado. The insects were kept in plastic tubes (10 × 15 × 10 cm) and transported to the laboratory, where they were placed in wooden cages (27 × 27 × 35 cm), with the sides covered with a nylon screen. In each cage, we placed 100 insects at ratio of 1 female for 1 male. For rearing, the insects were separated in cages prepared for the nymphal and adult stages. The nymphs and the adults were fed with branches, leaves and fruits of jatropha and aroeira [*Schinus terebinthifolius* Raddi (Anacardiaceae)]. The branches and leaves were placed in plastic pots (250 mL) with water to keep the plants turgid and the fruits were offered in Petri dishes (8.5 × 1.5 cm). The foods were replaced each four days. Inside the cages, we also placed a Petri dish (8.5 × 1.5 cm) with hydrophilic cotton embedded with water. In the cage for the adult stage, the branches and leaves were also the substrate for oviposition and the egg collections were carried out daily. After hatching, the nymphs were kept in cages especially designed for insects reared in laboratory.

Biology in Different Hosts

Development of the Nymphal Stage

We used nymphs until 24 h of age from a maintenance rearing from the laboratory. Nymphs from an oviposition (regardless the number of eggs), along with the mother, because they receive maternal care (Costa Lima 1940), were placed in plastic cages (22.5 × 14.5 × 12.0 cm), which had a lid and the sides had openings covered with nylon screens for air circulation. On the cage floor, we placed filter paper, which was replaced every 4 days. At the 2nd stadium, when the nymphs started to feed, the mother was removed from the cage. Inside the cage, we offered water in a glass receptacle (10 mL) to the insects through capillarity of hydrophilic cotton. Moreover, we placed developing fruits of strawberry guava, jatropha and tung in different cages to constitute 3 treatments. The food was offered on a plastic Petri dish (8.5 × 1.5 cm), which was replaced every 2 days.

We carried out daily observations to register the number and duration of intars, duration and survival in the nymphal stage, weight of adults and sex ratio. The number of instars was determined during ecdysis by observing the presence of exoskeleton in the cage. The weight of adult insects was measured 1 day after emergence on an analytical scale with .0001 kg precision. The sex ratio (sr) was determined by the formula: sr = ♀/(♀+♀).

Adult Longevity and Reproduction

We isolated randomly 20 pairs of adult insects, newly emerged from nymphs fed with strawberry guava and jatropha in cages of plastic cups (700 mL). The open part of the cup was covered with a Gerbox® lid, and holes were made on it, then, covered with voile fabric for aeration. The adults were separated by sex according to their genital segments. Females show only genital plates, while the males have a developed pygophore at the rear of the abdomen.

The adults were fed with the same food used in the nymphal stage, offered in Petri dishes (8.5 ×1.5 cm). In each cage, we placed a plastic receptacle (3.5 cm wide × 1.5 cm high) containing cotton embedded in water. In addition, in each cage, we offered a branch with leaves of the respective hosts, in a 10-mL receptacle containing water, to serve as the substrate for oviposition. We carried out daily observations to register the number of eggs and adult mortality. We assessed the following biological parameters: pre-oviposition, oviposition, post-oviposition periods; fecundity; number of eggs in each oviposition; egg laying and life span of males and females. The survival and embryo period duration were determined based on the number of eggs laid in the second laying. For that purpose, the eggs and females were placed in a receptacle (22.5 × 15.0 × 11.5 cm) and kept in room with temperature controlled until the hatching of the nymphs.

Statistical Analysis

The experiment was carried out in a completely randomized design with 3 treatments (hosts) and 10 repetitions (hatched nymphs of 10 events of egg laying) for the nymphal stage and 20 repetitions (pairs) for adults. The data were subjected to analysis of variance and the means compared in the Student's t test, protected by the significance of the F test at 5% probability using the SAS program (SAS Institute 2002). The data regarding the periods of pre-oviposition, oviposition and post-oviposition and male and female longevity were analyzed using the survival analysis techniques (Colosimo & Giolo 2006). For each period, the survival curves of each treatment were estimated in the Kaplan-Meier estimator and compared in the log-rank test (Colosimo & Giolo 2006).

Results and Discussion

Development of the Nymphal Stage

The fruits of strawberry guava and jatropha allowed nymphal development of *P. torridus*, nymphs, but when reared on tung fruit, virtually 100% of the nymphs died as 2nd instars (Table 1). For the insects fed with strawberry guava and jatropha fruits, we observed 5 instars different only at the 5th instar, where the nymphal stadium lasted 6 days when reared jatropha than on strawberry guava (Table 1). However, the duration of the *P. torridus* nymphal stage whether fed on jatropha or on strawberry guava did not differ significantly, having a duration of 55.0 days when fed strawberry guava and 56.1 days when fed with jatropha (Table 1).

The shorter developmental period of the 1st instar in relation to the others is a characteristic of

TABLE 1. DURATION (DAYS) AND SURVIVAL RATE (%) (MEAN ± STANDARD ERROR) OF EACH INSTAR AND THE NYMPHAL STAGE OF *PACHYCORIS TORRIDUS* FED EITHER WITH STRAWBERRY GUAVA, JATROPHA OR TUNG AT 25 ± 2 °C, 70 ± 10% RH AND 12:12 H L:D.

		Instar					
Food (host)	Number of insects	1st	2nd	3rd	4th	5th	Nymphal stage
			Duration (days)				
Strawberry guava	400	7.0 ± 0.31 a	17.3 ± 2.16 a	10.5 ± 1.11 a	8.1 ± 1.04 a	12.1 ± 0.62 b	55.0 ± 1.56 a
Jatropha	494	7.3 ± 0.26 a	14.1 ± 1.32 a	8.8 ± 0.80 a	7.9 ± 0.82 a	18.0 ± 1.83 a	56.1 ± 2.49 a
Tung	454	7.1 ± 0.36 a	11.3 a *	—	—	—	—
Statistics	df**	26	17	17	17	17	17
	F	0.24	1.12	1.72	0.02	4.48	0.15
	P	0.7908	0.3483	0.2066	0.8907	0.0097	0.6995
			Survival rate (%)				
Strawberry guava	400	100.00 ± 0.00 a	67.5 ± 11.28 b	78.3 ± 6.59 a	85.5 ± 5.08 a	80.0 ± 9.78 a	35.7 ± 6.81 a
Jatropha	494	100.00 ± 0.00 a	76.4 ± 8.12 a	75.1 ± 4.25 a	76.3 ± 5.65 a	87.3 ± 4.74 a	38.9 ± 5.98 a
Tung	454	100.00 ± 0.00 a	0.71 ± 2.26 c	—	—	—	—
Statistics	df	26	17	17	17	17	17
	F	-	2.42	0.68	0.03	0.12	2.26
	P	-	0.1188	0.4197	0.8678	0.7329	0.1507

Means followed by the same letter in the column do not differ in the Student's t test, protected by the *F* significance ($P = 0.05$).
* Only one repetition observed. **df = degrees of freedom.

the Hemiptera (Brailovsky et al. 1992). Possibly due to the fact that this instar does not feed, and this occurs to other species of the super-family Pentatomoidea (Eberhard 1975; Peredo 2002). The 1st instars of species in this super-family probably use only reserves from the embryonic stage.

Rodrigues et al. (2011) reported that at 24 ± 1 °C and 12:12 h L:D, *P. torridus* reared on jatropha fruits also had 5 instars with durations of 8.1, 10.0, 9.7, 11.6 and 11.7 days, respectively, totaling 52 days for nymphal development; which is, therefore, slightly shorter than the duration found in our study in which the temperature was 1 degree lower.

For nymphal development from the 1st to the 2nd instar, we observed a survival rate of 100% in the three treatments (Table 1). According to Panizzi and Silva (2009), the 1st instar nymphs still do not have the buccal system and intestinal flora completely developed, and therefore, they do not feed, but use body reserves to reach the next stage, so that they require only humidity. First instar nymphs continue under oviposition, protected by the mother, who provides maternal care until the 2nd instar, second instars display gregarious behavior as they search for food. Similar behavior was observed for other species of Scutelleridae *Pachycoris klugii* Burmeister,1835 and *Pachycoris stallii* Uhler, 1863 (Peredo 2002; Williams III et al. 2005).

The greater reduction of the survival rate in the nymphal stages was observed in the 2nd instar, which was significantly higher for nymphs fed with jatropha (Table 1). For the other instars, the survival rate remained above 75% (Table 1). Although occurrences of damage to the tung cultures caused by *P. torridus* have been reported (Nava et al. 2009), in our study, we observed that the early developmental stage of this stinkbug does not develop on this fruit, i.e., from the 2nd instar onwards, mortality is almost complete (Table 1). This shows that the attack behavior is different and, possibly, adults of the insect inflict damage to tung cultures. Possibly, the mortality for the 2nd instar of *P. torridus* on tung fruits is attributed to physical characteristics of the fruit's epicarp that has a fibrous texture (approximately 50.6%) (Gengling 2001) and, therefore, the nymphs would have more difficulty to drill through these tissues. Different results were observed for jatropha and strawberry guava, which have fleshy fruits and, thus, more suitable for the nymphs to feed on. Moreover, this hypothesis may be confirmed by the presence of only adults on the plants, which theoretically have better capacity to suck and feed.

The total survival rate of the nymphal stage was 35.7% for insects fed strawberry guava and 38.9% for those fed jatropha, and these rates were not significantly different (Table 1). Although considered low, these survival rates are higher than those reported by Rodrigues et al. (2011), who found 18.43% of survival rate for nymphs of *P. torridus* fed jatropha. This difference is probably attributed to the method used for the nymphal development, given that Rodrigues et al. (2011) reared insects in different cages and did not specify the number of insects used in each unit.

The sex ratio was not influenced by the food ingested in the nymphal stage, being 0.6 and 0.5 for insects fed with fruits of strawberry guava and jatropha, respectively. Therefore, we found a sex ratio of 1 female to 1 male, which is similar to populations studied in the field (Nava et al. 2009).

Adult Longevity and Reproduction

The weight of adults differed significantly when the insects were fed with different foods and between the sexes (Fig. 1). Females and males reared on fruits of jatropha (152.0 and 117.2 mg, respectively) were heavier than those reared on strawberry guava fruit (127.9 and 105.9 mg, respectively). Regarding the sexes, females reared on strawberry guava and jatropha (127.9 and 152.0 mg, respectively) were heavier than males (105.9 and 117.2 mg, respectively). The greater weight of insects reared on jatropha as compared to those reared on strawberry guava may be related to the nutritional aspect of the host. Possibly, jatropha contains the quantity and quality of nutrients required for the development of *P. torridus*. Therefore, the parameters of reproduction and longevity of *P. torridus* reared on jatropha reflect the insect development during the nymphal stage. The fact that the females may feed more in the adult stage, the formation of the reproduction system, and subsequent egg production occurs during the nymphal development (Panizzi & Silva 2009). Even though there are no studies comparing the development of *P. torridus* on different foods, this pest is of great importance to

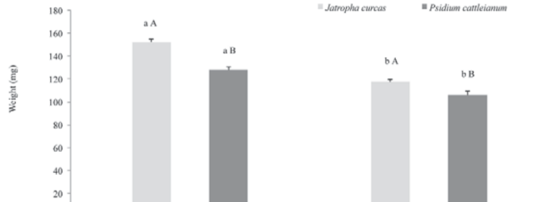

Fig. 1. Weights (mg) (means ± standard error) of females and males of *Pachycoris torridus*, determined 24 h after emergence, when fed with strawberry guava and jatropha at 25 ± 2 °C, 70 ± 10% RH and 12:12 h L:D. Means followed by the same letter (lowercase between sexes and uppercase between foods) do not differ in the Student's t test protected at significance of F test at 5% probability ($gl = 316$, $F = 53.65$, $P < 0.00001$).

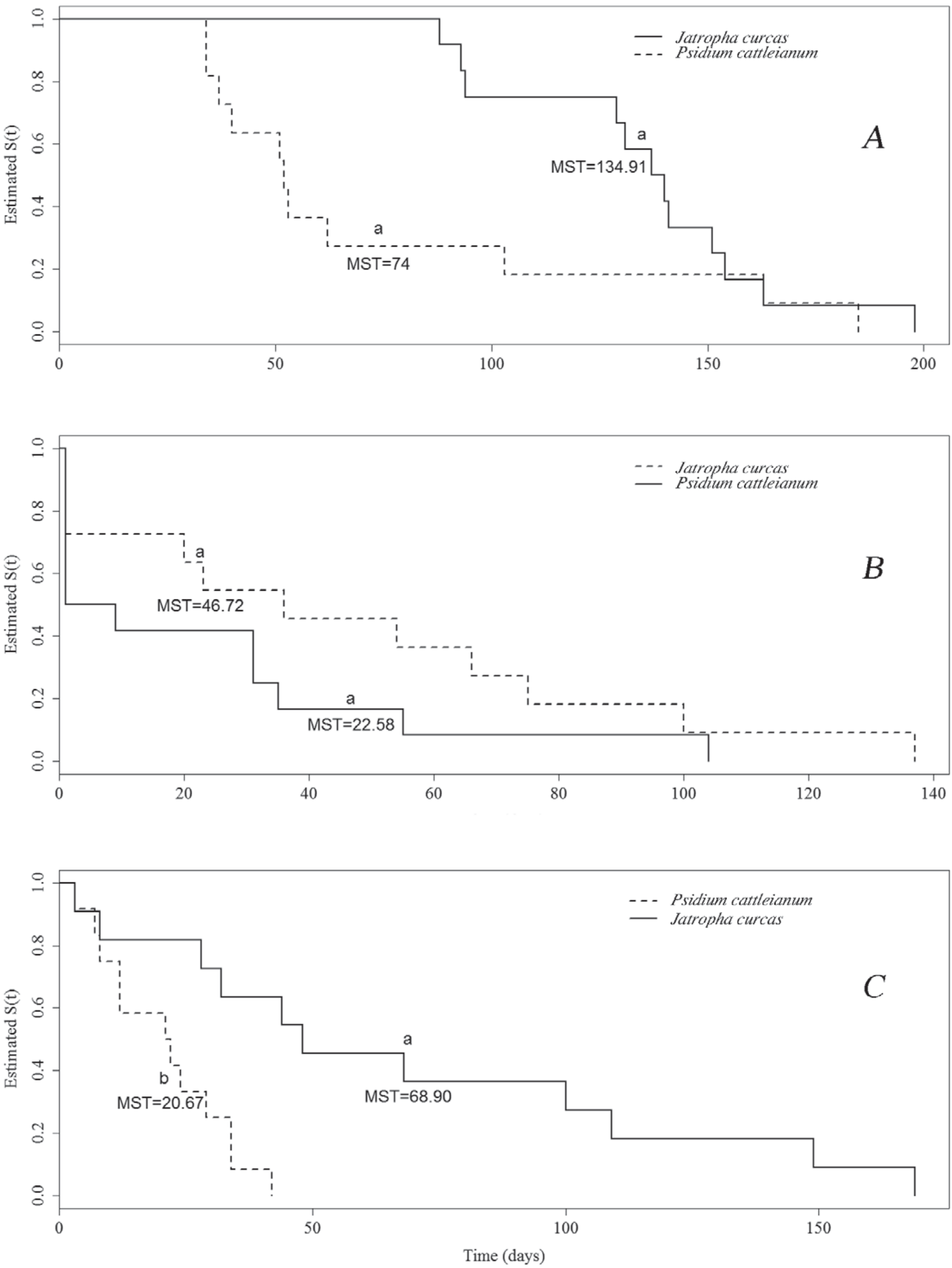

Fig. 2. Survival curve for the periods of pre-oviposition (A), oviposition (B) and post-ovipodition (C) for *Pachycoris torridus* reared on strawberry guava (*Psidium cattleianum*) and jatropha (*Jatropha curcas*) at 25 ± 2 °C, 70 ± 10% RH and 12:12 h L:D. Curves identified with the same letter do not significantly differ from one another. MST = Mean Survival Time.

jatropha culture, and is considered a key pest of this culture (Carvalho et al. 2009).

The pre-oviposition period for females fed jatropha (134.9 days) was almost double the period found for strawberry guava (74.0 days) (Fig. 2A). The oviposition period for females fed strawberry guava (46.7 days) was roughly the double of the period for females reared on jatropha (22.6 days) (Fig. 2B). During the oviposition period, females fed with strawberry guava had 1.65 egg-laying events on average, amounting to an average of 59.15 eggs per female and 37.05 eggs per oviposition, while females fed with jatropha had 1.15 egg-laying events on average, roughly 42.3 eggs per female and 36.21 eggs per oviposition, and these differences were slight (Table 2). However oviposition when fed jatropha showed a greater number of eggs, ranging from 57 to 87 (Gabriel et al. 1988; Rodrigues et al. 2011).

The average number of eggs per oviposition was also lower than that collected from insects in the field, such as *P. klugii* and *P. stallii*, with values of 82.3 and 53.8 eggs per oviposition, respectively (Peredo 2002; Williams III et al. 2005). It is possible that in the field, insects have a greater variety of foods, mainly in the adult stage (Silva et al. 1968; Sanchez-Soto & Nakano 2002) and are, therefore, capable of supplying their nutritional requirements more adequately. Moreover, the developmental stage of fruits of jatropha and strawberry guava may also interfere diminish insect fecundity. According to Rodrigues et al. (2011), although *P. torridus* develops in seeds of jatropha, this insect shows preference for developing fruits, which possibly have a different physical and chemical constitution.

The duration of the post-oviposition period was 3 times longer for insects fed strawberry guava (68.9 days) than for those fed jatropha (20.7 days) (Fig. 2C).

Life span of adult insects fed jatropha was greater than that for adults fed strawberry guava (Fig. 3A and B). The same behavior was observed for males, while for females, there was no significant difference (Fig. 3C and D. In strawberry guava fruits, we also observed significant difference between males and females, while in jatropha fruits, although females lived longer, the difference was no significant. Rodrigues et al. (2011) reported life span of 93 days, therefore, shorter than the results in our study. The difference of approximately 50 days between the result obtained in the current study and those reported in the literature may also be related to the method used in the evaluation of longevity, given that Rodrigues et al. (2011) assessed adult longevity from nymphs collected in the field, while in our study, the insects used came from laboratory rearing. Moreover, the populations of *P. torridus* used are from different locations with distinct climatic conditions. Rodrigues et al. (2011) used populations from the Central-Western region in Brazil, which is characterized by tropical climate, while in our study; we used a population collected from the Southern region in Brazil, characterized by temperate climate. For the egg stage, we observed that the duration was roughly 11 days for both treatments. For the survival in the embryonic stage, eggs laid by females fed with jatropha had a survival rate (51.5%) significantly higher than for those fed with strawberry guava (32.1%) (Table 2). These values of the embryonic stage are similar to those found by Rodrigues et al. (2011) (12.7 days), while the survival rate for eggs reported by the authors was 90.5%. In case of embryonic period survival, probably the used method influenced on the study whether in this work the eggs under female care were removed from the laying place, while Rodrigues et al. (2011) didn't use this procedure.

Thus, the fruits of strawberry guava and jatropha are adequate for the development and reproduction of *P. torridus*, however, this stinkbug shows greater weights for males and females and longer life span when fed with jatropha. Therefore, the management of this insect pest in jatropha cultivations should take into account the control of this pest in other hosts as well, such as strawberry

TABLE 2. MEAN VALUES (± STANDARD ERROR) OF BIOLOGICAL PARAMETERS OF *PACHYCORIS TORRIDUS* REARED ON STRAWBERRY GUAVA AND JATROPHA AT 25 ± 2 °C, 70 ± 10% RH AND 12:12 H L:D.

			Statistics		
Parameters	Strawberry guava	Jatropha	df	*F*	*P*
Number of egg-laying events	1.65 ± 0.45 a	1.15 ± 0.33 a	21	2.58	0.1235
Number of eggs	59.15 ± 15.86 a	42.30 ± 12.60 a	21	2.21	0.1518
Number of eggs per laying	37.05 ± 1.96 a	36.21 ± 2.21 a	21	1.32	0.2631
Daily oviposition	13.2 ± 5.69 b	19.2 ± 5.21 a	21	0.61	0.4418
Duration of egg stage (days)	10.5 ± 0.26 a	10.7 ± 0.26 a	10	0.04	0.8436
Survival rate in the egg stage (%)	32.1 ± 12.04 b	51.5 ± 12.53 a	21	1.23	0.2794

Means followed by the same letter (lowercase in the row and uppercase in the column) do not differ in the Student's t test, protected by the *F* significance at 5% probability. **df = degrees of freedom.

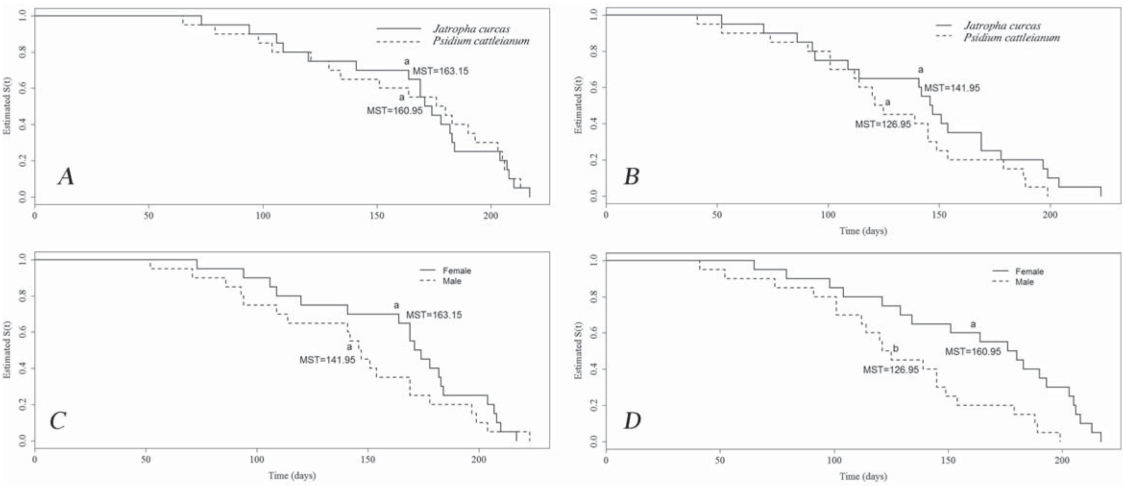

Fig. 3. Survival curves for *Pachycoris torridus*. Graphs A refer to longevity of females reared on strawberry guava (*Psidium cattleianum*) and jatropha (*Jatropha curcas*); graph B refer to longevity of males reared on *P. cattleianum* and *J. curcas*; graphs C refer to longevity of females e males reared on *P. cattleianum*; and graphs D refer to longevity of females e males reared on *J. curcas*. 25 ± 2 °C, 70 ± 10% RH and 12:12 h L:D. Curves identified with the same letter do not significantly differ from one another. MST = Mean Survival Time.

guava, for the climatic conditions found in the Rio Grande do Sul State, Brazil. Given that the development of *P. torridus* occurred in jatropha and strawberry guava, the control should be applied soon after the occurrence of the pest in the culture to avoid its migration to others.

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