ECOLOGY, BEHAVIOR AND BIONOMICS

Nymph and Adult Biology of *Dichelops melacanthus* (Dallas) (Heteroptera: Pentatomidae) Feeding on Cultivated and Non-Cultivated Host Plants

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Biologia de Ninfas e de Adultos de *Dichelops melacanthus* (Dallas) (Heteroptera: Pentatomidae) Alimentando-se de Plantas Cultivadas e Não-Cultivadas

RESUMO - A biologia do pentatomídeo *Dichelops melacanthus* (Dallas) em plantas cultivadas e não-cultivadas foi estudada em laboratório. A mortalidade ninfal variou de ≈ 60% em milho (semente madura) a 77% em trigo (espiga imatura); nenhuma ninfa sobreviveu em plântulas de milho ou trigo. O desenvolvimento ninfal em soja, milho ou trigo (semente, vagem ou espiga) variou de 25,5 a 32,8 dias. O peso dos adultos na emergência foi menor em espiga de trigo. As ninfas alimentaram-se preferencialmente de soja (vagem imatura). Nas plantas não-cultivadas, as ninfas tiveram mortalidade de 73% em crotalária (vagem imatura); e 100% em trapoeraba (ramo). O desenvolvimento ninfal foi mais lento em crotalária ou trapoeraba do que em soja. A sobrevivência dos adultos decresceu com o tempo na maioria dos alimentos, com ≈50% dos adultos vivos no 30º dia. Em plântulas de milho e trigo ≈80% dos adultos estavam mortos no 20º dia. A longevidade total dos adultos variou de 31-43 dias, exceto em plântulas de milho e trigo (< 15 dias). A % de fêmeas que ovipositou foi maior (≈76%) em soja (vagem ou semente imatura) e menor (≈9%) em espiga imatura de trigo; as fêmeas não reproduziram em plântulas de milho ou trigo. O período de pré-oviposição foi menor (≈12 dias) em soja (vagem ou semente imatura) e maior (≈37 dias) em trigo (espiga imatura). A fecundidade foi semelhante e maior em todos os alimentos do que em trigo (espiga imatura). O ganho de peso ocorreu em todos os alimentos, menos plântulas de milho e trigo. Os adultos alimentaram-se preferencialmente em soja (vagem imatura e semente madura); plântula de trigo foi o alimento menos preferido.

PALAVRAS-CHAVE: Insecta, alimento, planta hospedeira

ABSTRACT - The biology of the pentatomid *Dichelops melacanthus* (Dallas) feeding on cultivated and non-cultivated plants was studied in the laboratory. Nymph mortality varied from ≈ 60 on corn (seed mature) to 77% on wheat (ear immature); no nymphs survived on seedlings of corn or wheat. Nymph developmental time on soybean, corn or wheat (seed, pod or ear) varied from 25.5 to 32.8 days. Body weight at adult emergence was similar and greater on most foods than on wheat ear. Nymphs fed preferentially on soybean (pod immature). On non-cultivated hosts, nymphs showed high mortality (73%) on crotalaria (pod immature); on tropical spiderwort (stem) all nymphs died. Nymphs took longer time to develop on crotalaria and/or on spiderwort than on soybean. Body weight at adult emergence did not differ on crotalaria or soybean. Survivorship decreased with time on most foods, with ≈50% of adults alive at day 30. On corn and wheat seedlings ≈80% of adults were dead on day 20. Adult longevity ranged 31-43 days, except on corn and wheat seedlings < 15 days. Females % ovipositing peaked (≈76%) on soybean (pod or seed immature), and was minimum (≈9%) on wheat ear (immature); no females reproduced on seedlings of corn or wheat. Preoviposition period was shorter (≈12 days) on soybean (immature pod or seed) and longer (≈37 days) on wheat (ear immature). Fecundity was similar and higher on all foods than on wheat (ear immature). Body weigh gain occurred on all foods, but on corn and wheat seedlings. Adults fed preferably on soybean (pod immature and seed mature); wheat (seedling) was the least preferred food.

KEY WORDS: Insecta, food, pentatomid

The neotropical pentatomid *Dichelops melacanthus* (Dallas) is considered an important pest of several crops in the south and southwestern Brazil. It was previously recorded feeding and damaging young corn plants (*Zea mays* L.), and because of its damage, chemical control measures were recommended to prevent economic losses to this crop (Ávila & Panizzi 1995, Gomez 1998).

D. melacanthus is also reported as a minor pest of soybean [*Glycine max* (L.) Merrill] (Galileo *et al.* 1977), along with another species of the same genus, *D. furcatus* (F.), which is often referred to as a secondary soybean pest (Galileo *et al.* 1977, Panizzi & Corrêa-Ferreira 1997). More recently, *D. melacanthus* has been reported as a pest of wheat (*Triticum aestivum* L.) causing economic damage, at least in some areas in the north of Paraná state (Chocorosqui & Panizzi 2004, Manfredi-Coimbra *et al*. 2005).

The massive adoption by growers of the no-tillage cultivation system in the south and southwestern Brazil favors the biology of this stink bug which is commonly found on undisturbed soil underneath debris during certain periods of the year (Chocorosqui & Panizzi 2004). The cultivation of host plants in sequence such as soybean, corn and wheat on most areas of these regions allows the build up of populations of the bug.

In addition to the cultivated plants mentioned above, *D. melacanthus* has also been found on wild, non-cultivated plants in northern Paraná state such as lanceleaf crotalaria, *Crotalaria lanceolata* L. and tropical spiderwort, *Commelina benghalensis* L. In this paper we report results of laboratory studies in which nymphs and adults of *D. melacanthus* were reared on cultivated and non-cultivated host plants and their performance and feeding preference were analyzed.

Material and Methods

Nymphal study (cultivated host plants). This study was conducted during November1998 to May 1999. Adults of *D. melacanthus* were collected at the Embrapa (Empresa Brasileira de Pesquisa Agropecuária) Farm in Londrina Co., northern Paraná State, from areas under no-tillage that were cultivated with wheat/corn in the previous winter/spring. In general, bugs were found on the soil, underneath debris. They were taken to the laboratory and pairs of variable number (about five pairs) were placed in clear plastic boxes (11 x 11 x 3.5 cm), and provided with immature pods and mature seeds of soybean, cv. Paraná, to obtain eggs. Eggs were collected daily.

On the first day of the 2nd instar (first instars stay in group and do not feed), nymphs were placed singly in 9 x 1.5 cm Petri dishes with moistened filter paper, and were fed with the following foods (69 nymphs/food): immature soybean pod (cv. Paraná); mature soybean seed; mature corn seed (cv. BR-3123); mature wheat seed (cv. BR-18); immature wheat ear; corn seedling; and wheat seedling. In the dishes containing mature seeds, wet cotton on a plastic lid (2 cm diameter) was offered to provide water. Seedlings were wrapped with wet cotton to keep freshness. The food and filter paper in each Petri dish were changed every two days.

The dishes were placed at random in an environmental chamber maintained at 25 ± 1ºC and 65 ± 5% RH and with a photoperiod of 14h. Daily observations were made on molting and mortality. Nymphal developmental time and percentage of mortality of each instar, and from 2nd instar to adult, were calculated. Fresh body weight at adult emergence was taken using an electronic balance (Mettler Toledo PB 303). Data were analyzed with analysis of variance (ANOVA), and means were compared using the Tukey's test ($P < 0.05$) (SAS Institute 1981, Zar 1984).

An additional study with nymphs was carried out to test their feeding preferences for the cultivated host plants. Second-instar nymphs obtained from the lab colony were placed in clear plastic boxes (11 x 11 x 3.5 cm), and rose using a mix diet of all foods used in the previous test, to avoid any induced feeding preference. On the first day of the 4th instar, nymphs were fasted in the presence of water for 24h, and then placed in a glass arena (14.5 x 2.5 cm) covered with a lid. One single nymph was released in the center of each the arena containing the following foods: immature soybean pod (cv. Paraná); mature soybean seed; mature corn seed (cv. BR-3123); mature wheat seed (cv. BR-18); immature wheat ear; corn seedling; and wheat seedling. Foods were restricted to plastic containers (2.8 cm diameter) and were placed along the border of the arena. From 9:00 AM to 5:00 PM at each hour, the presence of nymphs on any of the foods (feeding or not) was recorded; 27 arenas were used (total number of observations $n = 243$). From the total number of visits, the mean percentage of times nymphs were recorded feeding (i.e., with the stylets inserted in the food) on each food was calculated. Data were analyzed using ANOVA, and means were compared using the Tukey's test ($P < 0.05$).

Nymphal study (non-cultivated host plants). This study was conducted during November 2000 to February 2001. A colony of *D. melacanthus* was set in the laboratory from field collected adults as described for the previous study. From eggs collected from the lab colony, individual nymphs on the first day of the second instar were placed singly in Petri dishes with moistened filter paper, and were fed with the following foods (30 nymphs/food): immature pod of lanceleaf crotalaria (*Crotalaria lanceolata* L.); stem of tropical spiderwort (*Commelina benghalensis* L.); and immature pod of soybean (cv. Paraná). This last food was used as comparison, since it is commonly used to rear the bugs in the laboratory. Stems of the common weed plant tropical spiderwort were wrapped with wet cotton to keep freshness. The food and filter paper in each Petri dish were changed every 2 days. The dishes were placed in an environmental chamber and data on nymph developmental time, and fresh body weight at adult emergence were taken and analyzed as described for the previous study.

Adult study (cultivated host plants). This study was conducted from January to August 1999. Adults were obtained from additional nymphs reared in the laboratory, as described above. On the day of emergence, 21 female/male pairs were each placed in a plastic rearing box (11 x 11 x 3.5 cm) with moistened filter paper and the box was covered with a lid. Food and water were provided as described for the nymphal study. Adult performance was assessed for each of the 21 pairs on the following foods: immature soybean pod (cv. Paraná); mature soybean seed; mature corn seed (cv. BR-3123); mature wheat seed (cv. BR-18); immature wheat ear; corn seedling; and wheat seedling. In the boxes containing mature seeds, wet cotton on a plastic lid (2 cm diameter) was offered to provide water. Seedlings were wrapped with wet cotton to keep freshness. The food and filter paper in each box were changed every two days.

Daily observations were made on adult survivorship and reproduction. Survivorship up to day 100, total longevity, percentage of females ovipositing, mean pre-oviposition time, mean number of egg masses and eggs per female, mean number of eggs/mass, and percentage of egg hatch were calculated. Mean adult body weight gains were calculated by subtracting the actual body weight from the body weight of the week before. This was done weekly up to the 4th week after emergence and from the 1st to the 4th week. Data were analyzed with ANOVA, and means were compared using Tukey's and *t* test ($P < 0.05$) (SAS Institute 1981, Zar 1984).

An additional study with adults was carried out to test their feeding preferences for the cultivated host plants. Second-instar nymphs obtained from the lab colony were placed in clear plastic boxes (11 x 11 x 3.5 cm), and rose using a mix diet of all foods used in the previous test, to avoid any induced feeding preference.

Adults obtained were allowed to feed on the mix diet for 10 days, fasted in the presence of water for 24h, and then placed in a glass arena (14.5 x 2.5 cm) covered with a lid. One adult was released in the center of the arena containing the following foods: immature soybean pod (cv. Paraná); mature soybean seed; mature corn seed (cv. BR-3123); mature wheat seed (cv. BR-18); immature wheat ear; corn seedling; and wheat seedling. Foods were restricted to plastic containers (2.8 cm diameter) and were placed along the border of the arena. From 9:00 AM to 5:00 PM at each hour, the presence of adults on any of the foods (feeding or not) was recorded; 43 arenas were used. From the total number of visits, the mean percentage of times adults were recorded feeding (i.e., with the stylets inserted in the food) on each food was calculated and data were analyzed using ANOVA, and means were compared using the Tukey's test ($P < 0.05$).

Results and Discussion

Nymphal study (cultivated host plants). Survivorship of *D. melacanthus* nymphs was variable on the different cultivated host plants utilized. Nymph mortality varied from approximately 60% to 64% on corn (seed mature), soybean (pod immature), and wheat (seed mature); it increased to 71% on soybean (seed mature) and to 77% on wheat (ear immature); no nymphs survived on seedlings of corn or wheat (Table 1). These mortalities are higher than those reported to nymphs fed pod (immature) and seed (mature) of soybean (about 45%) previously reported (Chocorosqui & Panizzi 2002, 2003). The fact that nymphs did not survive on seedling either of corn or wheat is in agreement with field observations that reveal the presence of adults only on seedlings, but no nymphs or egg masses.

Nymph developmental time among foods varied significantly ($P = 0.05$) during the 2nd and 5th instars, but not during the 3rd and 4th instars (Table 1). During the 2nd instar, nymphs on soybean pod took significantly less time to develop (6.2 days) than nymphs on wheat seedling (9.3 days); during the 5th instar, on wheat ear nymphs also took greater time (12.6 days) than on the remaining foods (8.3 to 9.7 days), with exception of seedlings of corn and wheat, on which foods nymphs did not pass the 3rd instar. On those foods in which *D. melacanthus* nymphs completed development, the time required to reach adulthood although variable (25.5 to 32.7 days for females; 28.5 to 32.8 for males) did not

Table 1. Mean (± SEM) developmental time and survivorship of *D. melacanthus* nymphs feeding on cultivated host plants in the laboratory.

Foods	Stadium duration (days)				Total developmental time (days)[2]		Total (%)
[initial # of nymphs][1]	Second	Third	Fourth	Fifth	Female	Male	mortality
Soybean pod, mmature	6.2 ± 0.41 b	6.1 ± 0.52 a	7.9 ± 0.47 a	9.5 ± 0.90 b	25.5 ± 4.32 a	29.3 ± 1.55 a	63.8
[69]	[35]	[29]	[26]	[25]	[6]	[19]	
Soybean seed, mature	7.5 ± 0.45 ab	6.3 ± 0.54 a	7.1± 0.40 a	8.3 ± 0.36 b	27.1 ± 4.19 a	28.5 ± 1.64 a	71.0
[69]	[39]	[27]	[22]	[20]	[12]	[8]	
Corn seed, mature	6.7 ± 0.19 ab	5.8 ± 2.07 a	6.6 ± 0.28 a	9.7 ± 0.44 b	27.7 ± 3.04 a	29.3 ± 1.21 a	60.9
[69]	[38]	[34]	[30]	[27]	[13]	[14]	
Wheat seed, mature	7.6 ± 0.72ab	6.3 ± 0.69 a	6.5 ± 0.38 a	9.2 ± 0.45 b	29.3 ± 2.56 a	30.2 ±.77 a	63.8
[69]	[32]	[27]	[26]	[25]	[9]	[16]	
Wheat ear, immature	6.8 ± 0.29ab	7.1 ± 0.43 a	7.9 ± 0.47 a	12.6 ± 0.89 a	32.7 ± 1.77 a	32.8 ± 1.28) a	76.8
[69]	[42]	[28]	[23]	[16]	[5]	[11]	
Corn seedling	9.0 ± 2.00 ab	6.0 ± 0.00 a	-	-	-	-	100.0
[69]	[2]	[1]					
Wheat seedling	9.3 ± 1.50 a	8.0 ± 0.00 a	-	-	-	-	100.0
[69]	[10]	[1]					

Means in each column followed by the same letter are not significantly different ($P < 0.05$; Tukey test).
[1]Initial numbers of nymphs and number surviving each stadium; [2]From second stadium to adult.

Table 2. Mean (±SEM) fresh body weight of *D. melacanthus* at adult emergence feeding on cultivated host plants in the laboratory.

Food	Fresh body weight	
	Female	Male
Soybean pod, immature	43.7 ± 4.41ab [6][1]	40.7 ± 2.02 a [19]
Soybean seed, immature	46.6 ± 2.32 a [12]	42.3 ± 1.61 a [8]
Corn seed, mature	48.6 ± 2.54 a [13]	41.9 ± 0.98 a [14]
Wheat seed, mature	47.9 ± 3.92 a [9]	42.9 ± 1.03 a [16]
Wheat ear, immature	32.6 ± 5.22 b [5]	36.5 ± 1.22 b [11]

Means followed by the same lowercase letter in each column and uppercase letter in each row do not differ significantly (P < 0.05) using Tukey and *t* test, respectively.
[1]Number of adults in brackets.

differ significantly (P = 0.05) (Table 1). In general, nymphs took longer time to develop in this test in all foods that they reached adulthood compared to previous studies with soybean (immature pod + mature seed) under similar conditions of temperature and light regimes (24.0 days - Chocorosqui & Panizzi 2002; 20.8 days - mean obtained for bugs reared under 13h and 14h of photophase - Chocorosqui & Panizzi 2003).

Body weight at adult emergence for both females and males of *D. melacanthus* was similar on most foods (43.7 to 48.6 mg; 40.7 to 42.9 mg, respectively) and significantly (P = 0.05) greater than on wheat ear (32.6 and 36.5 mg for females and males, respectively) (Table 2). These results indicate smaller body weights than previously reported by Chocorosqui & Panizzi (2003) (ca. 51mg and 46 mg, for females and males, respectively) for bugs feeding on immature soybean pod + mature seed. The fact that adults reached minimum weights on wheat ear demonstrates the unsuitability of this food, which is not exploited by nymphs as a food resource in the field (VRC & ARP, unpublished).

Nymphal study (non-cultivated host plants). Nymphs of *D. melacanthus* showed high mortality on crotalaria (pod immature), with about 27% of nymphs reaching adulthood; on tropical spiderwort (stem) no nymphs passed the 4th instar, while on the control food (soybean pod, immature) 40% of nymphs completed development (Table 3). Other species of pentatomids, *Piezodorus guildinii* (Westwood) and *Nezara viridula* (L.) also shown high nymph mortality when fed pods of lanceleaf crotalaria (64 and 85%, respectively) (Panizzi & Slansky 1991, Panizzi *et al*. 2002). The total mortality of nymphs on stem of tropical spiderwort is not a surprise, since pentatomid nymphs in general do not develop on vegetative tissues (Panizzi 1997).

Except for the 4th instar, nymphs took longer time to complete each instar on crotalaria and/or on tropical spiderwort than on soybean. This resulted in a significant delay on total nymph developmental time on crotalaria compared to soybean for females, but not for males (Table 3).

Fresh body weight of adults on the emergence day did not differ significantly on immature pod of crotalaria or soybean, despite the tendency of both females and males to gain more weight on the last food (Table 4). This result indicates that the relatively low number of nymphs that are able to complete development on crotalaria, originate adults of normal size.

Feeding preference of *D. melacanthus* nymphs as a result of their feeding frequency indicated that soybean (pod immature) was greatly (ca. 60%) preferred over the remaining six foods, on which nymphs were found feeding on less than 15% of the cases (Fig. 1).

Adult study (cultivated host plants). Survivorship of adult *D. melacanthus* followed a similar pattern on all foods, except

Table 3. Mean (± SEM) developmental time and survivorship of *D. melacanthus* nymphs feeding on non-cultivated host plants and compared with one of the cultivated host plants, in the laboratory.

Foods [initial # of nymphs][1]	Stadium duration (days)				Total developmental time (days)[2]		Total (%) mortality
	Second	Third	Fourth	Fifth	Female	Male	
Crotalaria pod, immature	7.0 ± 0.63 ab	7.4 ± 0.85 ab	5.2 ± 0.62 b	11.5 ± 0.96 a	32.7 ± 0.80 a	29.5 ± 0.50 a	73.3
[30]	[16]	[10]	[9]	[8]	[6]	[2]	
Tropical spiderwort, stem	7.8 ± 0.83 a	9.2 ± 1.32 a	5.0 b	-	-	-	100.0
[30]	[15]	[5]	[1]				
Soybean pod, immature	5.9 ± 0.47 b	5.9 ± 0.70 b	8.8 ± 1.07 a	8.1 ± 0.51 b	25.8 ± 2.75 b	28.0 ± 1.84 a	60.0
[30]	[18]	[18]	[16]	[12]	[4]	[8]	

Means in each column followed by the same letter are not significantly different (P < 0.05; Tukey test).
[1]Initial numbers of nymphs and number surviving each stadium; [2]From second stadium to adult.

Table 4. Mean (±SEM) fresh body weight of *D. melacanthus* at adult emergence feeding on cultivated and non-cultivated host plants in the laboratory

Food	Fresh body weight	
	Female	Male
Crotalaria pod, immature	40.2 ± 2.51a [6][1]	38.5 ± 2.50 a [2]
Soybean pod, immature	42.5 ± 2.40 a [4]	41.7 ± 1.45 a [8]

Means in each column followed by the same letter do not differ significantly (P < 0.05) using the *t* test.
[1]Number of adults in brackets.

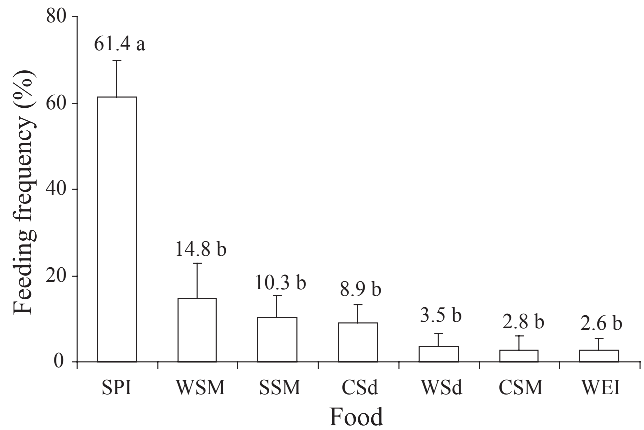

Fig. 1. Mean (± SEM) feeding preference (%) of *D. melacanthus* nymphs on cultivated host plants in the laboratory. Means followed by the same letter do not differ significantly (P < 0.05) using the Tukey test. Data transformed to arcsine for analysis. SPI = soybean pod immature; WSM = wheat seed mature; SSM = soybean seed mature; CSd = corn seedling; WSd = wheat seedling; CSM = corn seed mature; and WEI = wheat ear immature.

when fed on seedlings of corn and wheat. On most foods, survivorship decreased with time, with approximately 50% of adults still alive after 30 days. However, on corn seedling, no male reached day 20 and most females (≈90%) were dead at this time (Fig. 2). On wheat seedling, the majority of males and females (≈80%) were dead on day 20. Total longevity for males was similar on most foods (range of 31 to 43 days), except on corn and wheat seedlings (9.9 and 14.5 days, respectively). For females, longevity range was ≈33 to 39 days on most foods, down to ≈15 days on seedlings of corn and wheat (Fig. 2). No data were found in the literature regarding total longevity of *D. melacanthus* on any food. However, our data showing a mean longevity (females + males) of ca. 32 to 40 days on most foods are comparable to the longevity of other species of phytophagous pentatomids, such as *N. viridula* and *P. guildinii*, feeding on different foods (see review in Panizzi 1997). The drastic reduction in longevity on seedlings of corn or wheat (< 15 days) reinforces the indication of the poor quality of these foods.

Reproductive performance of *D. melacanthus* varied significantly among foods. Percentage females ovipositing reached maximum on soybean (immature pod or seed) (≈76%), decreased to ≈47% on wheat (mature seed), ≈33% on corn (mature seed) and down to ≈9% on wheat ear (immature); no females reproduced on seedlings of corn or wheat (Table 5). On those foods females reproduced, the preoviposition period was shorter on soybean (immature pod or seed) (≈12 days) and longer on wheat (seed mature or ear immature) (26 and 37.5 days, respectively). Fecundity (egg masses and eggs/female) was similar on all foods (range ≈10 to 14, and ≈74 to 131, respectively) except on wheat (ear immature) that presented the lowest fecundity (3 and 16, respectively). The number of eggs/mass and egg hatchability did not differ significantly among foods (Table 5). The data on the reproductive performance of *D. melacanthus*, despite some similarities among foods, demonstrated that soybean (immature pod or seed) was the best food. Chocorosqui & Panizzi (2003) reported 65% of female oviposition and 55% egg hatchability on soybean pod, and fecundity (7.9 and 55.8 egg masses and eggs/female, respectively) lower than reported here.

Fresh bodies weigh gain of *D. melacanthus* females and males occurred during the first week of adult life on most foods, except on wheat (ear immature) and corn and wheat seedlings (Fig. 3). In general, during the 2nd, 3rd and 4th weeks adults did not gain weight, except males on the 3rd week. Considering the total time (four weeks), body weigh gain occurred on all

Table 5. Reproductive performance of females *D. melacanthus* feeding on cultivated host plants in the laboratory

Food [initial number of adults = 21]	Females laying eggs (%)	Preoviposition time (days)	Number/female			
			Egg masses	Eggs	Eggs/mass	Egg hatch[1] (%)
Soybean pod, immature	76.2 [16][2]	12.3 ± 1.03 c	14.5 ± 2.43 a	131.4 ± 28.97 a	9.1 ± 1.45 a	55.8 ± 9.52 a
Soybean seed, immature	76.2 [16]	12.6 ± 1.07 c	12.1 ± 3.49 a	74.1 ± 12.74 a	9.2 ± 0.86 a	74.9 ± 8.29 a
Corn seed, mature	33.3 [7]	18.2 ± 2.41 bc	11.7 ± 3.60 a	122.1± 54.06 a	8.5 ± 1.12 a	69.8 ± 12.46 a
Wheat seed, mature	47.6 [10]	26.0 ± 2.71 ab	10.6 ± 1.71 a	92.7 ± 14.05 a	9.4 ± 1.05 a	71.4 ± 6.19 a
Wheat ear, immature	9.5 [2]	37.5 ± 12.5 a	3.0 ± 1.00 b	16.0 ± 2.00 b	6.2 ± 2.75 a	53.1 ± 25.35 a
Corn seedling	0.0 [0]	-	-	-	-	-
Wheat seedling	0.0 [0]	-	-	-	-	-

Means in each column followed by the same letter do not differ significantly (P < 0.05) using the Tukey test.
[1]Data transformed to arcsine for analysis; [2]Number of adults that oviposited in brackets.

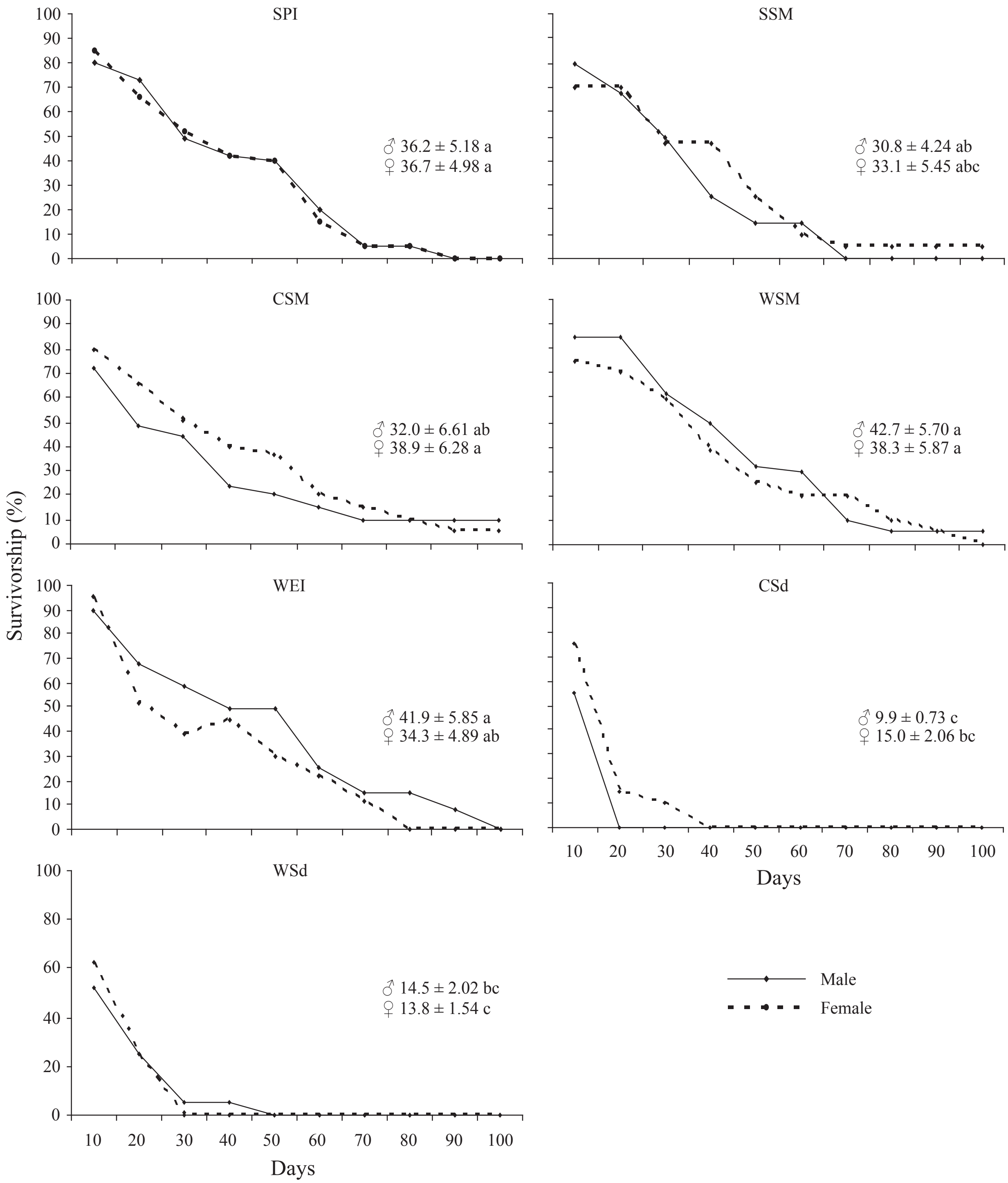

Fig. 2. Survivorship (%) up to 100 days and longevity (mean ± SEM) of adult *D. melacanthus* feeding on cultivated host plants in the laboratory. Means (between foods for each gender) followed by the same letter do not differ significantly ($P < 0.05$) using the Tukey test. SPI = soybean pod immature; SSM = soybean seed mature; CSM = corn seed mature; WSM = wheat seed mature; WEI = wheat ear immature; CSd = corn seedling; and WSd = wheat seedling.

foods, except on corn and wheat seedlings, on which foods adults either did not gain or lost weight (Fig. 3).

Feeding preference of adult *D. melacanthus* indicated that soybean (pod immature and seed mature) and corn (seedling) were equally preferred, while the remaining foods were less preferred. Wheat seedling was the least preferred food (Fig. 4).

In conclusion, these laboratory tests with nymphs and adults *D. melacanthus* allow saying that among all foods tested, soybean and corn (pod/seed) are better ones. Despite

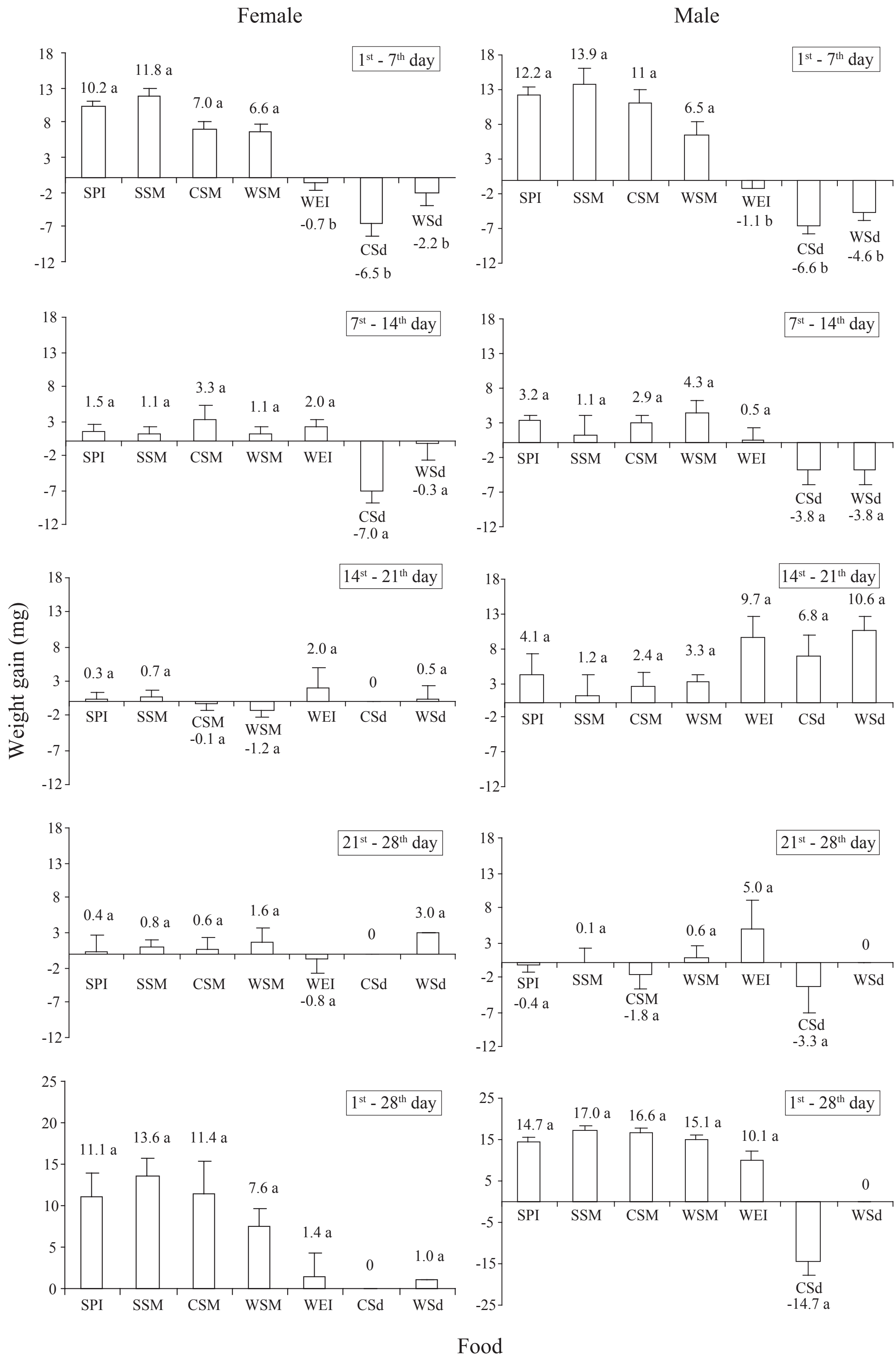

Fig. 3. Mean ± SEM percentage change in fresh body weight during the first three weeks of adult life and from day 1 to day 22 of *D. melacanthus* feeding on natural (immature pods of soybean and immature seeds of corn), and on artificial dry diet in the laboratory. Means for each diet among weeks, and for each diet during the whole period (day 1 to day 22) followed by the same letter do not differ significantly ($P < 0.05$) using the Tukey test. Data transformed to arcsine for analysis.

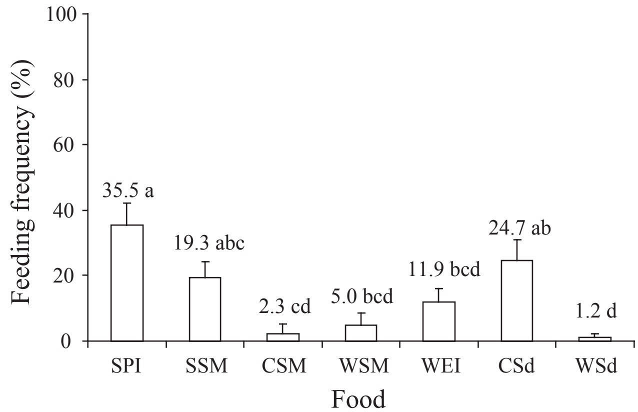

Fig. 4. Mean (± SEM) feeding preference (%) of *D. melacanthus* adults on cultivated host plants in the laboratory. Means followed by the same letter do not differ significantly ($P < 0.05$) using the Tukey test. Data transformed to arcsine for analysis. SPI = soybean pod immature; SSM = soybean seed mature; CSM = corn seed mature; WSM = wheat seed mature; WEI = wheat ear immature; CSd = corn seedling; and WSd = wheat seedling.

the damage of *D. melacanthus* on corn (Ávila & Panizzi 1995) and on wheat (Chocorosqui & Panizzi 2004, Manfredi-Coimbra *et al*. 2005), bugs are not found reproducing on them. Apparently, in the field, corn and wheat provide nutrients to sustain adult life only.

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