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Biological Control and Crop Protection

Biology and reproductive capacity of *Spodoptera eridania* (Cramer) (Lepidoptera, Noctuidae) in different soybean cultivars

Bruna Magda Favetti[a,*], Alessandra Regina Butnariu[b], Luís Amilton Foerster[c]

[a] Programa de Pós-graduação em Proteção de Plantas (Agronomia), Universidade Estadual Paulista Júlio de Mesquita Filho (UNESP), Botucatu, SP, Brazil
[b] Programa de Pós-graduação em Meio Ambiente e Sistema de Produção Agrícola, Universidade do Estado de Mato Grosso (UNEMAT), Tangará da Serra, MT, Brazil
[c] Programa de Pós-Graduação em Zoologia, Laboratório de Controle Integrado de Insetos, Departamento de Zoologia, Universidade Federal do Paraná (UFPR), Curitiba, PR, Brazil

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ABSTRACT

This study aimed to evaluate the development, survival and reproductive capacity of *Spodoptera eridania* in four soybean cultivars. The experiment was conducted in the laboratory, in a climatic chamber at 25 °C ± 1 °C, 70 ± 10% relative humidity and 12 h photophase. The cultivars used were: FMT Tabarana, BRS/MT Pintado, FMT Tucunaré and Monsoy 8757, all conventional cultivars with medium cycles. All cultivars tested allowed the development of *S. eridania*. However, Monsoy 8757 was the cultivar that most affected the prolonged in the duration larval, pupal and total cycle, showed lower pupal weight as well as reduction in the intrinsic rate increase. These results contribute to the management of this species in regions of outbreaks in soybean areas.

Introduction

Spodoptera eridania (Cramer) (Lepidoptera, Noctuidae) is a polyphagous defoliator that feeds on several species of economic importance, such as apple (Nora and Reis-Filho, 1988), cotton (Miranda, 2010), soybean (Sosa-Gómez et al., 1993), maize (Picanço et al., 2003), beans (Savoie, 1988), rattlebox (Dias et al., 2009), tomato (Souza et al., 2013), sorghum, salad greens and fruit (King and Saunders, 1984), strawberry and grape (Bortoli et al., 2012); weeds, such as morning glory (Santos et al., 2005) and pigweed (Savoie, 1988); and bracatinga, which is used for reforestation (Mattana and Foerster, 1988).

Although this lepidopteran occurs in soybeans plantations, according to Sosa-Gómez et al. (1993) its presence in this culture is incidental, having thus a secondary role. The damage caused by this pest can be significant because, as well as damaging the leaves, it also consumes the pods, thus assuming an important role at the beginning of the reproductive phase of the crop (Gazzoni and Yorinori, 1995).

Control of *Spodoptera* species in soybeans can be made from chemical pesticides, resistant varieties and transgenic plants (Souza et al., 2012a; Bernardi et al., 2014). However, there is a low efficiency in the use of chemicals (Carvalho et al., 2013), as well as tolerance to some Bt proteins (Bernardi et al., 2014) by *Spodoptera*.

However, due to frequent outbreaks of *S. eridania* in the Cerrado region of Brazil (Santos et al., 2005; Bueno et al., 2007), its high capacity defoliation (Bueno et al., 2011) and population densities, this species became an important pest of soybean, causing damage and economic losses.

The Mato Grosso state, considered the largest producer of soybean in Brazil (IBGE, 2014), with large cultivated areas, the population increase of voracious insects that consumes several soybean genotypes (Souza et al., 2012a), may be a factor in reducing the production of this crop.

Although this pest eating of various soybean genotypes, morphological and chemical differences between cultivars may interfere in biology and behavior and induce pest degrees of resistance. This was verified by Souza et al. (2012a) evaluated the feeding preference of *S. eridania* for 23 soybean genotypes, where the cultivar IAC 100 showed a high degree of non-food preference in free choice and no choice test.

A common agricultural practice in many areas of soybean cultivation in the state of Mato Grosso is the planting of several cultivars in different plots in the same area, or even sharing the same field. However, there are no reports in the literature about the interference of this practice in population dynamics of *S. eridania* in the field. Thus, this work evaluated the influence of four soybean cultivars on the development, survival and reproduction of this species in the laboratory.

* Corresponding author.
E-mail: favettibruna@yahoo.com.br (B.M. Favetti).

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Material and methods

S. eridania was reared in the Entomology Laboratory of the Centro de Pesquisas, Estudos and Desenvolvimento Agro-Ambientais, of the Universidade do Estado de Mato Grosso, campus of Tangará da Serra-MT, after collecting specimens in soybean plantations.

The larvae were maintained at room temperature (approximately 26 °C ± 2 °C) in 500 mL polyethylene pots, lined with absorbent paper, and daily fed with soybean leaves until the pre-pupal stage. The pupae were removed from the pots and placed in Petri dishes and sexing of the pupae was carried out according to Zenker et al. (2007).

After emergence, the adults were maintained at room temperature (approximately 26 °C ± 2 °C) in PVC tubes (10 cm in diameter by 21.5 cm high), with a Petri dish on the top and the bottom, and coated internally with bond paper functioning as a substrate for oviposition. A solution of 10% honey, offered as food inside the tubes was placed in a plastic container containing cotton wool. Eggs deposited on the bond paper were removed by cutting the paper and then transferred to a Petri dish kept in a climatic chamber (25 °C ± 1 °C, 70% ± 10% RH and 12 h photophase). Tube maintenance and exchange of food were carried out daily.

The medium cycle soybean cultivars were chosen because they are some of the more conventional genotypes used in the state of Mato Grosso. The cultivars used were: FMT Tabarana, BRS/MT Pintado, FMT Tucunaré and Monsoy 8757, provided by a seed resale company.

The plants were grown in plastic buckets, with capacity for 8 kg of soil, in a greenhouse located in UNEMAT, campus of Tangará da Serra (MT). The commercial fertilizer used in the experiments was NPK at a concentration of 10% for each compound. When the V8 development stage was reached (approximately 35 days after planting), the leaves were collected and immersed for 20 min in a 1% solution of commercial sodium hypochlorite to eliminate possible entomopathogens and, soon after, offered to the larvae.

Forty-nine newly hatched larvae, for each soybean cultivar, were maintained individually in 145 mL plastic pots lined with filter paper and fed daily. They were maintained in a climatic chamber at 25 °C ± 1 °C, 70% ± 10% relative humidity and photoperiod of 12 h. The number of instars and their duration was determined by the presence of the cephalic capsule and exuviate. This procedure was repeated until the pre-pupal stage, when the caterpillar integument changes color and stop feeding.

The pupae were placed in Petri dishes and, 24 h after formation, the occurrence of deformities was evaluated, they were sexed, and weighed using an analytical balance of 0.0000 g accuracy. The biological parameters used were duration of larval, pre-pupal and pupal stages (days), viability of immature stages (%), number of instars, weight pupal, percentage of deformed pupae, and sex ratio (number of females/(number of males + numbers of females)).

For each treatment, 15 couples were isolated in PVC tube cages (10 cm in diameter by 21.5 cm high), according to the date of emergence. The cages were maintained at 25 °C ± 2 °C, covered with voile, placed on a Petri dish, and internally lined with bond paper as a substrate for oviposition.

Adults were fed a solution of 10% honey on cotton wool placed in plastic vials at the bottom of the cages. The eggs contained in the sheets of bond paper and voile were removed daily, placed in Petri dishes (10 cm diameter) and kept in a climatic chamber (25 °C ± 1 °C, 70% ± 10% RH and 12 h photoperiod) until the emergence of the caterpillars.

To evaluate the reproductive performance of *S. eridania* in the four treatments, the biological parameters considered were: fecundity (daily and total), egg viability, incubation period, longevity (males and females), pre-oviposition, oviposition periods and total cycle (egg-adult emergence). To record fecundity and egg viability, eggs were removed daily and isolated in Petri dishes until caterpillar emergence.

Eggs were counted with the aid of photographic images. Photographs of each egg clutch were taken with a camera and a stereoscopic microscope and transferred to a computer for counting on the screen. For the egg masses containing more than one layer of eggs, the number of eggs on the top layer were counted, multiplied by the number of layers, and added to the number of surrounding eggs. The total viability of the eggs was found by recording larval emergence throughout the oviposition period.

With the data of survival and oviposition of each female was prepared the fertility life table. The parameters followed the formulas contained in Maia et al. (2000). We calculated according to Montezano et al. (2013): Ro (net reproductive rate) = ratio between the number of females in two successive generations; *T* (mean generation time) = mean number of days from the birth of the parents to the birth of offspring; r_m = daily intrinsic rate of increase; λ = the daily finite rate of increase.

The experimental design was completely randomized and the results were tested by Shapiro Wilk's normality test ($p > 0.05$). Data that did not reach normality were tested using the Kruskal–Wallis test (5%) and the rest were analyzed by ANOVA at 5%. Means were compared using the Tukey test at 5% probability. To compare the sex ratio, the chi-square test was used with 0.5 for the expected value. The software used were R Studio and Statistica 7.0.

Results

Development of the immature stages of S. eridania in laboratory

There was no difference in the duration of the incubation period of eggs of *S. eridania* reared in the four soybean cultivars, the average being about three days (Table 1). The larval period ranged from 15 to 19 days and was significantly influenced by the cultivars tested, being similar only in cultivars FMT Tabarana and FMT Tucunaré, and in Monsoy 8757, the highest larval period was recorded compared to the other cultivars (Table 1).

The number of instars of *S. eridania* ranged from six to seven, and only individuals fed with BRS/MT Pintado did not reach the 7th instar (Fig. 1). The mean duration of the 1st instar was three days, with no significant differences between cultivars. In the 2nd and 3rd instars lasted longer in cultivar FMT Tucunaré, when compared to the others (Fig. 1). In the 4th and 5th instars the highest means were found in cultivar Monsoy 8757 (Fig. 1). The duration of the 6th instar was not statistically different among the cultivars (Fig. 1). Although the number of individuals in the 7th instar was lower, the mean for all treatments that reached this instar was approximately five days (Fig. 1).

The percentages of individuals of *S. eridania* that reached the 7th instar were 12.2%, 0.0%, 6.1% and 2.0%, when fed on FMT Tabarana, BRS/MT Pintado, FMT Tucunaré and Monsoy 8757, respectively. The only larval mortality recorded was for the cultivar FMT Tucunaré in the 5th and 6th instars (Fig. 1).

The duration of the pre-pupal stage of *S. eridania* was similar among cultivars (Table 1). The average duration of the female pupal stage, fed on Monsoy 8757 during the larval stage, was greater than the other cultivars (Table 1). The development time of the male pupal stage was similiar in all cultivars (Table 1).

Weight pupal of *S. eridania* was affected by the soybean cultivars and statistical differences were observed in the mean mass of males and females. The greatest values were observed in FMT Tabarana, and the lowest in Monsoy 8757 (Table 2). Of the pupae from which adults did not emerge, the major deformities occurred in those reared in BRS/MT Pintado and FMT Tucunaré (Table 2). There was no difference in the sex ratio of *S. eridania*, reared in the

Table 1
Mean (±SD) duration (days) of immature stages of *Spodoptera eridania* maintained in four soybean cultivars.

Cultivars	Duration of immature stages (days)				
	Egg[a]	Larvae[b]	Prepupae[a]	Pupa	
				Female[b]	Male[a]
FMT Tabarana	3.2 ± 0.43	15.9 ± 0.70 b	1.0 ± 0.24	10.5 ± 0.63 b	11.4 ± 0.61
BRS/MT Pintado	3.1 ± 0.30	15.0 ± 0.80 c	1.0 ± 0.23	10.5 ± 0.69 b	11.3 ± 0.57
FMT Tucunaré	3.1 ± 0.30	16.4 ± 1.01 b	1.2 ± 0.42	10.6 ± 0.59 b	11.2 ± 0.62
Monsoy 8757	3.2 ± 0.40	18.5 ± 0.93 a	1.1 ± 0.48	11.2 ± 0.46 a	11.8 ± 0.49
H	3.1	129.5	11.2	18.2	16.6
Df	3	3	3	3	3
p	–	<0.05	–	<0.05	>0.05

[a] Not significant according to Kruskal–Wallis at 5%.
[b] Means followed by the same letter do not differ statistically by Kruskal–Wallis test at 5% probability.

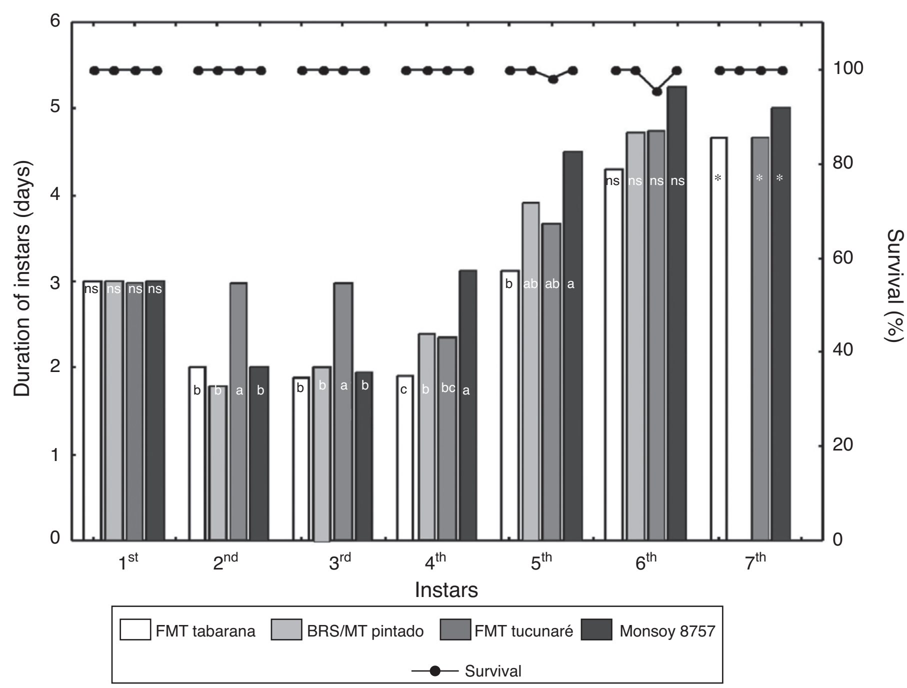

Fig. 1. Duration (days) and survival (%) of larval instars of *Spodoptera eridania* fed on different soybean cultivars. Means followed by the same letter differed by Kruskal–Wallis test at 5%. [ns]Not significant according to Kruskal–Wallis ($p > 0.05$). *Due to the low number of individuals, it was not possible to apply statistical tests.

soybean cultivars evaluated, and the values ranged from 0.4 to 0.5 (Table 2).

In all treatments, the viability of the larval, pre-pupal, and pupal stages was high, with no significant differences among treatments (Table 3). The total viability of the eggs was not affected by the cultivars, ranging from 43.0% to 53.6% (Table 3). Over the oviposition period, the viability was above 60%, from the 2nd to the 8th day of oviposition (Fig. 2).

Reproductive capacity of S. eridania in laboratory

The longevity of males and females of *S. eridania* was not influenced by the different soybean cultivars; female longevity ranged from 10.1 to 11.1 days, and male longevity between 13.6 and 17.8 days (Table 4). The duration of the pre-oviposition period was also not affected by the cultivars tested, with a mean of two days (Table 4). Differences in oviposition period of *S. eridania* were not

Table 2
Mean (±SD) total weight pupal (g) and females and males, pupal deformity (%) and sex ratio of *Spodoptera eridania* in four soybean cultivars.

Cultivars	Pupal weight[a]			Deformity pupal (%)	Sex ratio[b]
	Mean	Female	Male		
FMT Tabarana	0.2509 ± 0.02 a	0.2533 ± 0.02 a	0.2474 ± 0.01 a	6.1	0.59
BRS/MT Pintado	0.2195 ± 0.02 b	0.2296 ± 0.02 b	0.2122 ± 0.02 b	14.2	0.42
FMT Tucunaré	0.1978 ± 0.02 c	0.2079 ± 0.02 c	0.1882 ± 0.02 c	10.6	0.48
Monsoy 8757	0.1723 ± 0.02 d	0.1816 ± 0.02 d	0.1639 ± 0.01 d	0.0	0.42
F	12.0	95.2	39.9	–	–
X^2	–	–	–	–	4.0
Df	3	3	3	–	3
p	<0.05	<0.05	<0.05	–	>0.05

[a] Means followed by the same letter in columns are not statistically different by the Tukey test at 5%.
[b] Not significant according to the chi-square test at 5%.

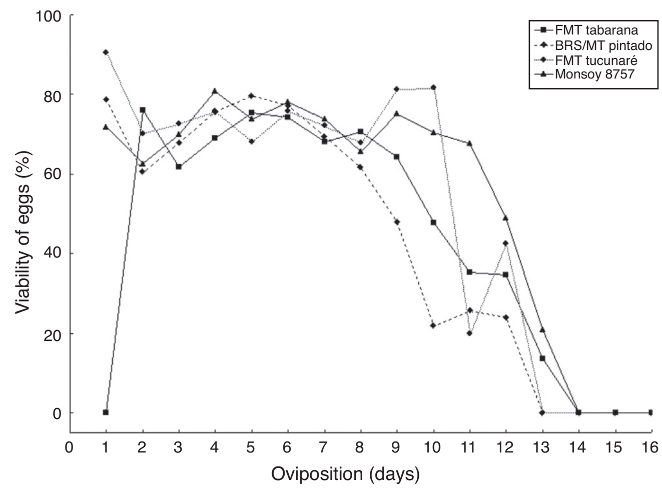

Fig. 2. Egg viability (%) of females of *Spodoptera eridania* during the oviposition period.

observed among cultivars, and the values ranged from 7.3 to 7.8 days (Table 4). The total cycle (egg-adult emergence) of *S. eridania* was longer in larvae fed with cultivar Monsoy 8757, when compared with the other cultivars, and this period ranged, on average, from 29.1 to 33.3 days (Table 4).

The soybean cultivars tested did not affect the fecundity and egg viability of *S. eridania* (Tables 3 and 4). Although no differences were observed, total fecundity ranged from 2034.6 to 2766.4 eggs, and the number of eggs produced per day by females ranged from 211.0 to 279.1 (Table 5). The cultivars tested did not affect the total number of egg masses of *S. eridania*, which ranged from 8.8 to 11.1 egg masses (Table 5).

In all cultivars, the highest oviposition occurred on the 3rd and 4th days. There was also a downward trend in the number of eggs and larvae toward the end of the oviposition period (Fig. 3).

During the oviposition period, the percentage of egg viability of *S. eridania*, reared in four soybean cultivars, was above 60% until the 8th and/or 11th day, depending on the cultivar (Fig. 2). After this period, a decrease in viability was observed in all cultivars (Fig. 2). The average number of eggs per female of *S. eridania* during the oviposition period was higher in the first few days (1st–4th), with a decrease toward the end of this period, except in cultivar FMT Tabarana in which an increase in the number of eggs was observed from the 12th to the 14th day (Fig. 4).

The fertility life table showed that all cultivars are suitable host to complete development of *S. eridania*. The net reproductive rate (Ro) indicated that *S. eridania* fed with Monsoy 8757 may increase 558.12 times in each generation, and double in FMT Tabarana (1004.12 per generation). The mean generation time (T) was higher maintained in Monsoy 8757 and lowest in BRS/MT Pintado. The intrinsic rate of increase (r_m) was similar to 0.20 for all cultivars,

Table 3
Mean (±SD) viability of immature stages of *Spodoptera eridania* in four soybean cultivars.

Cultivars	Viability of immature stages (%)			
	Egg[a]	Larvae[a]	Prepupa[a]	Pupa[a]
FMT Tabarana	43.1 ± 30.97	100.0 ± 0.00	100.0 ± 0.00	93.8 ± 24.22
BRS/MT Pintado	43.0 ± 31.97	100.0 ± 0.00	100.0 ± 0.00	85.7 ± 35.35
FMT Tucunaré	51.1 ± 34.60	95.9 ± 19.99	100.0 ± 0.00	89.3 ± 31.16
Monsoy 8757	53.6 ± 30.14	100.0 ± 0.00	100.0 ± 0.00	100.0 ± 0.00
H	2.0	6.0	0.0	7.7
Df	3	3	3	3
p	>0.05	>0.05	>0.05	>0.05

[a] Means not significant according to the Kruskal–Wallis test at 5% probability.

Table 4
Mean (±SD) longevity of females and males (days), pre-oviposition period (days), oviposition (days) and total cycle (days) of *Spodoptera eridania* reared on different soybean cultivars when larvae.

Cultivars	Longevity[a]		Pre-oviposition[a]	Oviposition[a]	Total cycle[b]
	Female	Male			
FMT Tabarana	11.0 ± 2.18	13.6 ± 3.99	2.4 ± 0.63	7.7 ± 1.79	30.1 ± 1.08 b
BRS/MT Pintado	10.3 ± 1.91	15.5 ± 0.46	2.4 ± 0.50	7.8 ± 1.52	29.1 ± 1.25 b
FMT Tucunaré	10.1 ± 1.50	14.8 ± 0.44	2.1 ± 0.51	7.2 ± 1.62	30.4 ± 1.16 b
Monsoy 8757	10.8 ± 3.88	17.8 ± 1.48	2.6 ± 0.82	7.6 ± 2.02	33.3 ± 1.06 a
H	1.3	6.4	2.9	1.1	–
F	–	–	–	–	77.0
Df	3	3	3	3	3
p	–	–	–	–	<0.05

[a] Non-significant means according to Kruskal–Wallis test at 5% probability.
[b] Means followed by the same letter in the column do not differ by Tukey test at 5%.

Table 5
Mean (±SD) of daily and total number of egg masses and eggs of *Spodoptera eridania* reared in different soybean cultivars when larvae.

Cultivars	No. egg masses[a]		Fecundity[a]	
	Daily	Total	Daily	Total
FMT Tabarana	1.1 ± 0.42	8.8 ± 7.41	263.2 ± 270.69	2338.0 ± 2890.40
BRS/MT Pintado	1.1 ± 0.25	9.7 ± 5.04	261.6 ± 216.76	2478.1 ± 2131.02
FMT Tucunaré	1.2 ± 0.42	11.1 ± 5.88	279.1 ± 274.19	2766.4 ± 2754.52
Monsoy 8757	1.1 ± 0.19	9.1 ± 5.76	211.0 ± 173.61	2034.6 ± 2032.11
H	1.2	1.1	0.3	0.7
Df	3	3	3	3
p	>0.05	>0.05	>0.05	>0.05

[a] Means not significant using the Kruskal–Wallis test at 5%.

Table 6
Net reproductive rate (Ro), mean generation time (*T*), daily intrinsic rate of increase (r_m) and the daily finite rate of increase (λ) of the *Spodoptera eridania* in four soybean cultivars.

Parameters	Cultivars			
	FMT Tabarana	BRS/MT Pintado	FMT Tucunaré	Monsoy 8757
Ro	1004.12	587.08	790.81	558.12
T	33.30	32.22	33.52	36.89
r_m	0.21	0.20	0.20	0.17
λ	1.23	1.21	1.22	1.18

except in Monsoy 8757. The finite rate of increase (λ) corresponding to the number of individuals added to the population/female/day ranged 1.18–1.23 (Table 6).

Discussion

The results showed that the development of *S. eridania* was most affected by the cultivar Monsoy 8757, when compared to the other cultivars, since an increase in the duration of the larval, pupal and total cycle occurred, as well as a reduction in pupal mass. The fact that this cultivar affected these biological parameters is probably related to the low nutritional quality of the ingested food. According to Panizzi and Parra (2009), ingestion in the early life stages is of paramount importance for phytophagous insects because some dietary requirements of the host plant must properly fill their nutritional needs, in order for them to develop normally into the adult stage.

The lengthening of the larval and pupal stages, and increase in number of instars in cultivars FMT Tabarana, FMT Tucunaré and Monsoy 8757 may have occurred, according to Machado et al. (1999), as a compensatory strategy for *S. eridania* to reach the ideal mass with less than adequate food.

The duration of the instars of *S. eridania* maintained in different soybean cultivars provided different responses, since the early instars showed reduced periods and the latter ones were longer (Fig. 1). This is possibly related to the fact that, at the end of the larval stage, the larvae of Lepidoptera consume more food (Grützmacher et al., 1999) to meet their nutritional needs (Bortoli et al., 2005), acquiring the necessary reserves for the development of pupae and, consequently, adults.

The addition of a seventh instar in three of the soybean cultivars tested was similar to that found by Parra et al. (1977) and Santos et al. (2005), in which larvae of *S. eridania* reared in different host plants reached the seventh instar only when fed on soybean leaves. According to Esperk et al. (2007), the occurrence of additional instars is a compensatory mechanism during adverse conditions, where temperature, photoperiod, quality and quantity of food, density of individuals, and humidity are the most common factors that affect the number of instars.

Esperk et al. (2007) showed that in some species of noctuids, such as *Anticarsia gemmatalis* Hüebner, 1818 (Lepidoptera, Noctuidae), *Chrysodeixis includens* (Walker, 1858) (Lepidoptera, Noctuidae), *Spodoptera frugiperda* and *Spodoptera litura* (Fabricius, 1775) (Lepidoptera, Noctuidae), the quality of food is referred to as one of the possible factors affecting the increase in number of instars, a fact that may also have occurred with the larvae of *S. eridania*, since the other variables mentioned above remained constant in the present study.

The mean duration of pupae of *S. eridania* was greater than those recorded by Farahani et al. (2011) for *Spodoptera exigua* (Hüebner, 1808) (Lepidoptera, Noctuidae) on different soybean cultivars, in which the pupal period ranged from 7.0 to 8.9 days. The results for the pupal duration in females and males were similar to those reported by Mattana and Foerster (1988) for *S. eridania* in sweet potato (10.0 days for male pupae and 9.0 days for females) and bracatinga, (11.8 days for male pupae and 12.0 days for females). For the same species fed on soybeans during the larval stage, Parra et al. (1977) reported lower values for female (8.6 days) and male (9.5 days) pupae.

Gazzoni and Tutida (1996) reported that high pupal mass in female Lepidoptera, as found in *S. eridania* when fed with FMT Tabarana and BRS/MT Pintado, may be related to a high level of reserves, which are fundamental for adequate performance in the reproductive phase, including mating, oviposition, and egg viability.

Some disadvantages of inadequate food intake are suggested by Beland and Hatchett (1976), such as the extension of the life cycle which, in the field, in addition to causing other physiological disorders, exposes the insects to natural enemies for a longer time, usually under stress and higher susceptibility. The high survival of the developmental stages and the high reproductive potential of *S. eridania* found in the present study shows that it has a great potential for multiplication in soybean.

Souza et al. (2012b) evaluated the effect of different cultivars of cowpea on the biological parameters of *S. eridania*, and found that development was significantly affected by the cultivars. One factor that may have affected the development of *S. eridania*, when fed with cultivar Monsoy 8757, is the possible presence of toxins.

According to Bortoli et al. (2012), soybean can change its metabolism after herbivory, producing substances that enable it to develop a protection mechanism (resistance) against the herbivore itself. Thus, some of these defense compounds produced by plants can be non-proteinaceous (antibiotics, alkaloids, terpenes,

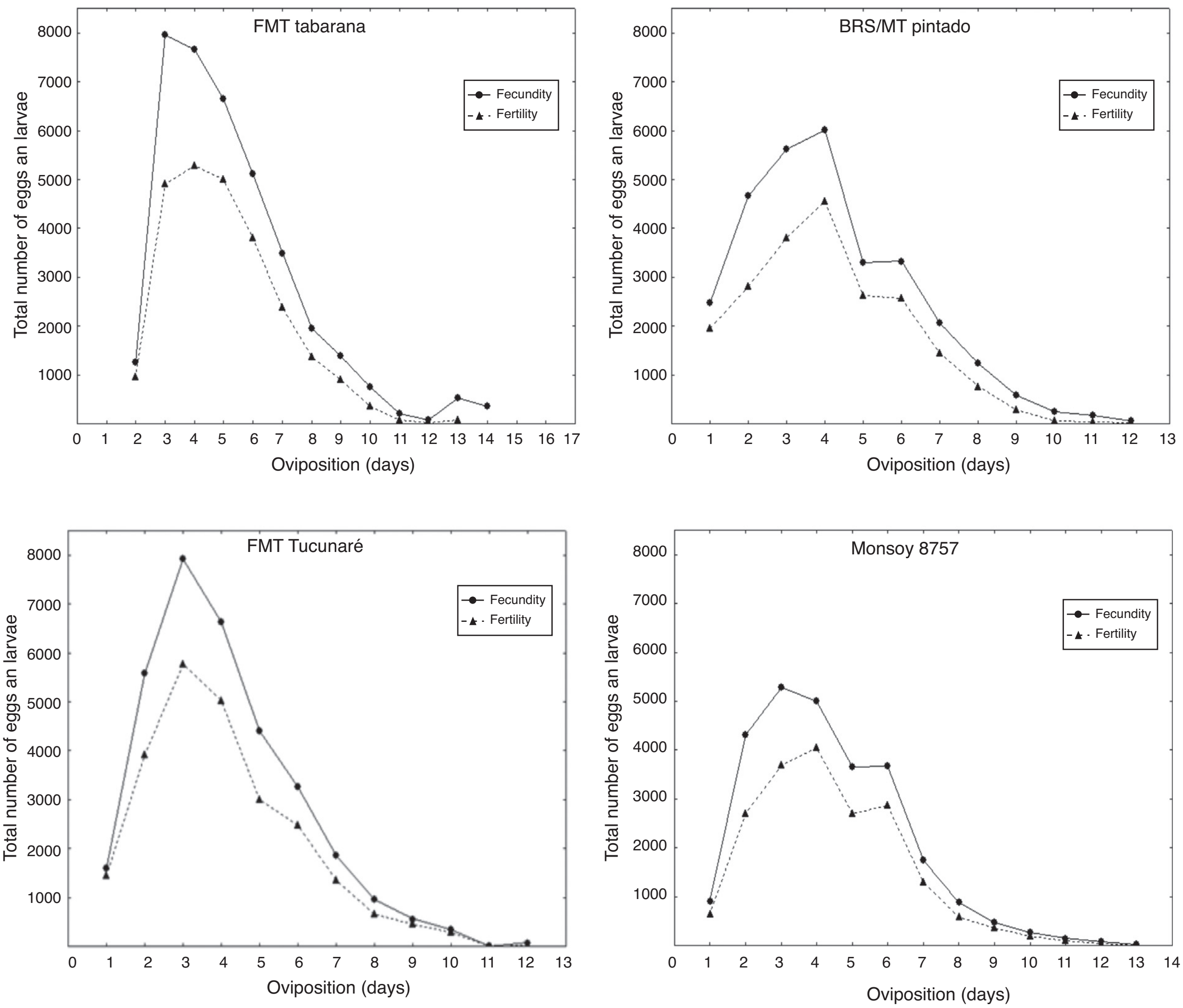

Fig. 3. Total number of eggs and larvae of *Spodoptera eridania* during the oviposition period in cultivars TMG Tabarana, BRS/MT Pintado, FMT Tucunaré and Monsoy 8757.

glucosides, cyanogens) or proteinaceous (lectin, arcelin, vicilin, sistemin, chitin, glucanase and enzyme inhibitors) (Franco et al., 2002), with pre- and post-ingestive effects, hindering the development of insects (Bortoli et al., 2012). Piubelli et al. (2005), when studying the biology of *A. gemmatalis* after ingestion of soybean genotypes containing isoflavones, observed high mortality, decreased weight of larvae and pupae, and a prolonged cycle.

The ingestion of substances produced by soybean that can provide different degrees of resistance to defoliators causes negative effects on the biology of insects, such as antibiosis. Thus, as there were no drastic changes in the development of *S. eridania*, except for the addition of one instar (seventh), greater duration of the larval and pupal stages, and significantly smaller pupal mass, it is believed that these antibiotic effects are being only moderately expressed (Vendramim and Guzzo, 2009).

In general, although no observe significant differences between various biological parameters of *S. eridania* among cultivars, Monsoy 8757 prolonged the larval, pupal and total cycle, and showed lower pupal weight as well as reduction in the intrinsic rate increase. These characteristics may be favorable to the producer, since the extension of duration the cycle can reduce the number of generations in the field, and the decrease in the number of females produced per female, in next generation, will result in fewer of egg masses and consequently less caterpillars in the field.

The increase in the density of pest insects, from the high capacity of multiplication is a crucial factor of outbreaks. In the present study, the multiplication was not affected by tested soybean cultivars, suggesting that population outbreaks no occur only by agricultural practice used in Mato Grosso state. The good

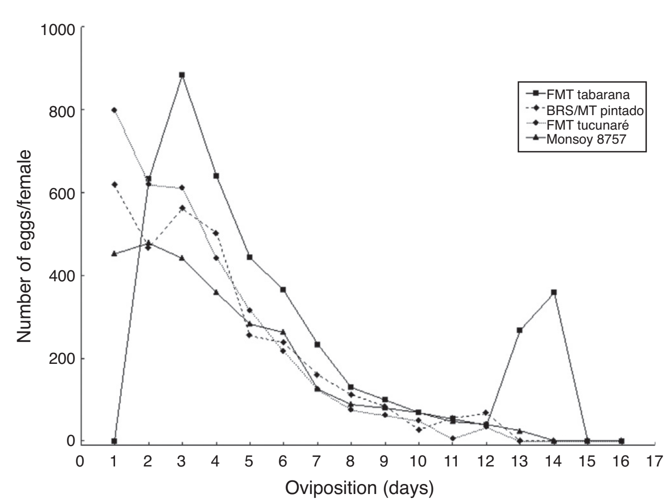

Fig. 4. Number of eggs/female of *Spodoptera eridania* during the oviposition period.

development and reproduction of *S. eridania* in tested cultivars may be occurred by polyphagous habit. This demonstrating that the species is adapted to consume plants with distinct morphological and physiological characteristics, thus providing higher feeding plasticity and promoting the maintenance of the reproductive cycle of the pest. Thus, studies that consider the population dynamics of this pest, in the field, are fundamental to seek ways to prevent and control outbreaks population.

Conflicts of interest

The authors declare no conflicts of interest.

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