

Lepidoptera pests collected in *Eucalyptus urophylla* (Myrtaceae) plantations during five years in Três Marias, State of Minas Gerais, Brazil

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Abstract: Lepidoptera pest species from eucalyptus were collected in *Eucalyptus urophylla* plantations in the region of Três Marias, State of Minas Gerais, Brazil, every 15 days from June 1989 to June 1994 with five light traps. Twelve primary and 15 secondary pest species were collected in the period with an average of 13 387 and 812 individuals per light trap, respectively. Most collected primary pest species were *Stenalcidia grosica* (Geometridae), *Iridopsis subferaria* (Geometridae), *Eupseudosoma aberrans* (Arctiidae) and *Psorocampa denticulata* (Notodontidae), totalizing for the study period an average of 5 450, 2 162, 2 436 and 1 458 individuals per light trap, respectively. *Idalus admirabilis* (Arctiidae) was the most collected secondary pest species, averaging 652 individuals/trap. Most primary pest species were collected during the dry season, from April to July, whereas most secondary pest species were collected during the rainy season, from January to March. These differences on seasonal occurrence between the two groups could be due to the fact that many secondary pest species of *Eucalyptus* in Brazil pupate in the soil, and they need humidity to complete its pupal stage.

Key words: Lepidoptera pests, light traps, *Eucalyptus urophylla*, faunistic analysis, frequency, constancy.

Brazil is the fourth country in the world on homogeneous forest plantations (Cottle *et al.* 1990) with an area over four million hectares (Ohmart and Edwards 1991). The State of Minas Gerais in the East Region of Brazil presents an area of 1 535 750 ha of plantations with eucalyptus species (Brandão 1997). According to Siqueira (1990) such reforestation constitutes an important source of wood for industries in Brazil, which use 39 % of the total volume of wood consumed from cultivated areas. Hence, this sector represents an important part of the Brazilian economy. During the first years of the 1990s approximately 5 % of the Brazilian Gross National Product originated from the forest sector (Rezende *et al.* 1996).

One factor that constrains increase in eucalyptus production is the damage caused to insects in the field. Defoliator insects such as

lepidopterous, coleopterous and leaf-cutting ants can cause significant losses to forest productivity in Brazilian reforested areas but very little is known about natural factors that regulate their populations (Bragança *et al.* 1998a, b). Therefore it is essential to identify herbivore species, their level of damage and the factors that could affect their populations in eucalyptus plantations (Zanuncio *et al.* 1998b). The importance of phytophagous insects is due to the fact that they can affect plants in different ways such as killing them, reducing their growth, and weakening plants, which will turn them more susceptible to pathogens (Coulson and Witter 1984).

Defoliating Lepidoptera species associated with eucalyptus are categorized according to their damage to the plantation. In southeastern Brazil, Zanuncio *et al.* (1994) described the major defoliator lepidopterous

occurring in the area, ranking them in primary and secondary pests after extensive studies on outbreaks reported in the area (Zanuncio and Lima 1975, Santos *et al.* 1982, Soares and Moraes 1982, Zanuncio *et al.* 1990, Zanuncio *et al.* 1992).

Light traps are being used for most entomofaunistic studies of Lepidoptera pests in reforested areas of Brazil. According to Menezes *et al.* (1986), the occurrence and population fluctuation of pests are essential in integrated pest management programs because they can show where pests occur and also when their populations fluctuate during the year. The objective of this research was to use light traps to monitor and to identify defoliator lepidopterous pests in plantations of *Eucalyptus urophylla* in the region of "Três Marias", State of Minas Gerais, Brazil.

MATERIALS AND METHODS

From June 1989 to June 1994 lepidopterous pests were collected in five blocks of *E. urophylla* plantations about two years old at the beginning of this study in the region of "Três Marias", State of Minas Gerais, Brazil (18° 10' 35" S, 45° 00' 10" W), altitude of 590 m. Mean annual temperature and rainfall of this region was 22 °C and 1 200 mm, respectively.

Insects were collected every two weeks with five black light traps installed at 2 m above ground as proposed by Ferreira and Martins (1982). Insects collected were screened and separated by size and conditioned in entomological blankets labelled with day, month, year, number of the trap and place of collection. Thereafter, they were sent to the Department of Animal Biology at the Federal University of Viçosa, State of Minas Gerais, Brazil where they were sorted, mounted, identified and separated in groups of importance to eucalyptus plantations (Zanuncio *et al.* 1994) as following: group I- species considered primary pests; group II- species considered secondary pests; group III- species considered

without defined importance to eucalyptus plantations, and group IV- non identified species.

Faunistic analysis of species from groups I and II were made by frequency (Bodenheimer 1955) and constancy (Dajoz 1974) indexes.

RESULTS

From June 1989 to June 1994 a total of 19 502.23 individuals of Lepidoptera per light trap were collected in the study area (Table 1). Number of species collected increased annually, except during the second year. At the fifth year, there were collected 488 species against 262 species collected in the first year (Table 1), which represents an increase of 1.86 times during the study period. Primary (group I) and secondary (group II) pests together totalized lower numbers of species than groups III and IV along the years. However, primary pests had more individuals collected per light trap, followed by the secondary ones, than groups III and IV when considering the number of individuals collected per light trap per species (Table 1).

Although highest number of population peaks of primary pests were recorded from February to June (Fig. 1), highest numbers of individuals of these pests occurred in different months during the five years with population peaks of *Eupseudosoma aberrans* (Lepidoptera: Arctiidae) being recorded in the second year, *Stenalcidia grosica* (Lepidoptera: Geometridae) in the third year, and *Iridopsis subferaria* (Lepidoptera: Geometridae) in the fifth year (Table 2). From the secondary pest group, *Idalus admirabilis*, responsible for the largest number of individuals of this group (Table 2), presented population peaks from January to March of the first year (Table 3).

Larger populations of primary pests were registered from April to June, except for *Psorocampa denticulata* (Lepidoptera: Notodontidae) and *Apatelodes cerrita* (Lepidoptera: Eupterotidae) occurring from October to April, while most of the secondary

TABLE 1

Individuals and species of Lepidoptera collected in Eucalyptus urophylla plantations in the region of "Três Marias", State of Minas Gerais, Brazil. June 1989 to June 1994

Group	1	2	Year 3	4	5	Total
Annual number of species						
I	7	8	9	11	12	12
II	10	10	9	11	13	15
III	51	34	51	74	86	98
IV	194	163	327	323	377	392
Total	262	215	396	419	488	517
Annual number of individuals per light trap						
I	505.85	3 625.20	4 684.10	1 299.30	3 272.40	13 386.85
II	662.90	39.80	26.65	21.75	61.02	812.12
III	153.90	76.60	74.10	148.30	164.20	617.10
IV	399.10	594.40	1 313.30	1 008.30	1 371.00	4 686.16
Total	1 721.75	4 336.00	6 098.15	2 477.65	4 065.80	19 502.23
Annual number of individuals per light trap/species						
I	72.26	453.15	520.46	118.12	272.70	1 115.57
II	66.29	3.90	2.96	1.98	4.71	54.14
III	3.02	2.25	1.45	2.00	1.98	6.30
IV	2.06	3.65	4.02	3.12	3.64	11.95
Total	6.57	20.17	15.14	5.91	10.04	36.15

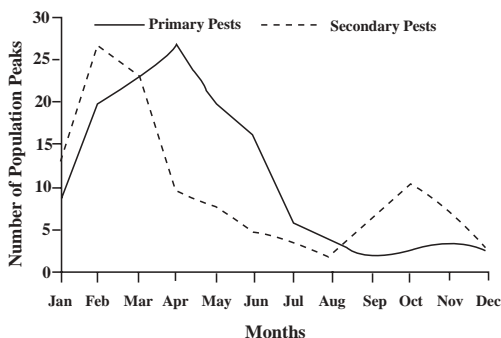


Fig. 1. Monthly numbers of population peaks of Lepidoptera pests in *Eucalyptus urophylla* plantations in the region of "Três Marias", State of Minas Gerais, Brazil. June 1989 to June 1994.

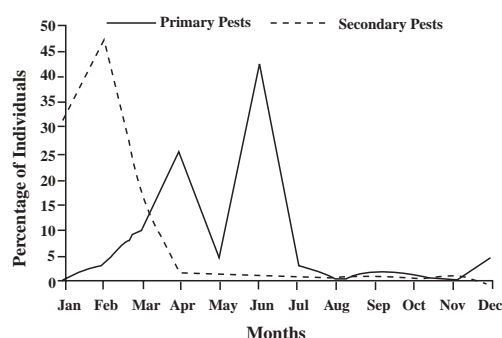


Fig. 2. Percentage of individuals collected in the population peaks of Lepidoptera primary and secondary pests of *Eucalyptus urophylla* in the region of "Três Marias", State of Minas Gerais, Brazil. June 1989 to June 1994.

pests presented larger numbers between January and March (Fig. 2). Secondary pests such as *I. admirabilis*, *Lepidokirbya vittipes* (Lepidoptera: Arctiidae) and *Misogada blerura* (Lepidoptera: Notodontidae) showed population peaks in similar periods as the primary ones (Table 3).

Most species of group I were collected during the whole period of five years. Exceptions were for *Thyrinteina arnobia*

(Lepidoptera: Geometridae), which was not collected during the first year; *Blera varana* (Lepidoptera: Notodontidae) in the first and second years; *A. cerrita* and *I. subferaria* in the first, second and fourth years, and *Oxydia vesulia* (Lepidoptera: Geometridae) collected only in the last year (Table 2).

The species with highest annual frequency were different for each year during the whole period of this study (Table 3). *Idalus*

TABLE 2
Annual number of individuals per light trap of Lepidoptera primary and secondary pests, collected in the region of "Três Marias", State of Minas Gerais, Brazil. June 1989 to June 1994

Species	Annual number of individuals per light trap					Total
	1	2	3	4	5	
PRIMARY PESTS						
Arctiidae						
<i>Eupseudosoma aberrans</i>	244.90	1 972.00	32.95	85.20	100.60	2 435.65
<i>Eupseudosoma involuta</i>	217.90	198.20	5.40	7.30	2.40	431.20
Eupterotidae						
<i>Apatelodes cerrita</i>	-	-	-	0.40	1.40	1.8
Geometridae						
<i>Glena unipennaria</i>	20.00	138.40	66.35	2.30	199.40	426.45
<i>Iridopsis subferaria</i>	-	-	-	3.40	2 162.40	2 165.80
<i>Oxydia vesulia</i>	-	-	-	-	13.40	13.40
<i>Stenalcidia grosica</i>	0.40	541.20	4 325.70	135.60	447.20	5 450.10
<i>Thyrinteina arnobia</i>	-	427.00	114.00	2.75	37.80	581.55
Lymantriidae						
<i>Sarsina violascens</i>	16.80	159.00	33.40	27.60	123.60	360.40
Notodontidae						
<i>Blera varana</i>	-	-	21.60	-	10.80	32.40
<i>Nystalea nyseus</i>	2.25	10.40	4.75	1.80	1.40	20.60
<i>Psorocampa denticulata</i>	3.60	178.20	79.55	1 024.95	172.00	1 458.30
Subtotal	505.85	3 624.40	4 683.70	1 291..30	3 272.40	13 377.65
SECONDARY PESTS						
Arctiidae						
<i>Idalus affinis</i>	1.20	0.20	-	0.40	1.40	3.20
<i>Idalus admirabilis</i>	618.30	16.60	6.40	2.80	7.60	651.70
<i>Lepidokirbya vittipes</i>	3.80	6.80	10.50	4.95	34.60	60.65
Eucleidae						
<i>Phobetron hipparchia</i>	0.80	-	-	-	0.60	1.40
Mimallonidae						
<i>Mimallo amilia</i>	1.40	2.60	1.65	3.05	1.20	9.90
Notodontidae						
<i>Misogada blerura</i>	33.60	6.00	3.05	0.40	6.80	49.85
Psychidae						
<i>Oiketicus kirbyi</i>	-	-	-	0.20	-	0.20
Saturniidae						
<i>Automeris illustris</i>	1.20	0.20	0.20	3.45	0.60	5.65
<i>Citheronia laocoon</i>	2.00	6.00	4.00	2.60	3.20	17.80
<i>Dirphia albolinea</i>	-	-	-	2.40	1.40	3.80
<i>Dirphia rosacordis</i>	-	0.20	-	0.65	0.40	1.25
<i>Eacles imperialis</i>	-	0.40	0.45	-	1.60	2.45
<i>Eacles penelope</i>	0.40	-	-	-	0.20	0.60
<i>Hyperchiria incisa</i>	0.20	-	0.20	0.85	1.60	2.85
Stenomatidae						
<i>Timocratica palpalis</i>	-	-	0.20	-	-	0.20
Subtotal	662.90	39.00	26.65	21.75	61.20	811.50
Total	1 168.75	3 663.40	4 710.75	1 313 . 05	3 333.60	14 189.15

- not collected

TABLE 3
Annual number of individuals per month of higher occurrence of Lepidoptera primary and secondary pests, collected in the region of "Três Marias", State of Minas Gerais, Brazil. June 1989 to June 1994

Species	Months of higher occurrence*				
	1	2	3	4	5
PRIMARY PESTS					
Arctiidae					
<i>Eupseudosoma aberrans</i>	Ja,Fe,Mr	Fe,Ap,Se	Ap,Ma,Jn	Ma, Jl,Au	Ap,Ma,Jn
<i>Eupseudosoma involuta</i>	Ja,Fe,Mr	Mr,Ap,Au	Ap,Ma,Jn	Mr,Jl,Au	Mr,Ap,Jn
Eupterotidae					
<i>Apatelodes cerrita</i>	-	-	-	Ja,Fe	Fe,Oc,No
Geometridae					
<i>Glena unipennaria</i>	Ja,Fe,Mr	Fe,Mr,Ap	Jn,Jl	Mr,Ma,De	Ap,Ma,Jn
<i>Iridopsis subferaria</i>	-	-	-	Ja,Fe,Ap	Ap,Ma,Jn
<i>Oxydia vesulia</i>	-	-	-	-	Ap,Ma,Jn
<i>Stenalcidia grosica</i>	Ma	Fe,Ap,Ma	Jn,Jl,Se	Fe,Ap,Jl	Ma,Jn,Jl
<i>Thyrinteina arnobia</i>	-	Mr,Ap,Ma	Ap,Ma,Jn	Ja,Fe,Mr	Ap,Ma,Jn
Lymantriidae					
<i>Sarsina violascens</i>	Fe,Mr,Ma	Fe,Mr,Ap	Ap,Ma,Jn	Fe,Mr,Ap	Mr,Ap,Ma
Notodontidae					
<i>Blera varana</i>	-	-	Ap,Ma,Jn	Fe,Mr,Ap	Fe,Mr,Ap
<i>Nystalea nyseus</i>	Fe,Mr,Jn	Mr,Ap,Ma	Ma,Jn	Fe,Ap,Ma	Mr,Ap,No
<i>Psorocampa denticulata</i>	Ja,Fe,Mr	Mr,Ap,De	Fe,Mr,No	Mr,Oc,De	Fe,Oc,No
SECONDARY PESTS					
Arctiidae					
<i>Idalus affinis</i>	Jl,Au,Se	Ap	-	Au,Se	Mr,Ap,Ma
<i>Idalus admirabilis</i>	Ja,Fe,Mr	Fe,Ap,Se	Ap,Ma,Jn	Fe,Ma,Jl	Ap,Ma,Jn
<i>Lepidokirbya vittipes</i>	Ja,Fe,Ma	Mr,Ap,Se	Ap,Ma,Jn	Mr,Jn,Jl	Mr,Ma,Jl
Eucleidae					
<i>Phobetron hipparchia</i>	Mr	-	-	-	Mr
Mimallonidae					
<i>Mimallo amilia</i>	Ja,Ap	Ja,Fe,Mr	Fe,Mr,No	Fe,Oc,No	Ja,Fe,No
Notodontidae					
<i>Misogada blerura</i>	Fe,Mr,Ap	Ja,Fe,De	Ma,Jn	Ja,Jl	Fe,Mr,Ma
Psychidae					
<i>Oiketicus kirbyi</i>	-	-	-	Oc	-
Saturniidae					
<i>Automeris illustris</i>	Ja,Fe,Se	Fe	Ap	Fe,Mr,Ap	Mr,Oc
<i>Citheronia laocoon</i>	Ja,Mr,Oc	Ja,Fe,Mr	Fe,Mr,No	Ja,Fe,No	Ja,Fe,Oc
<i>Dirphia albolinea</i>	-	-	-	No	No
<i>Dirphia rosacordis</i>	-	Fe	-	Mr,No	Fe,Oc
<i>Eacles imperialis</i>	-	Mr	Fe,Mr	-	Ja,Fe,Mr
<i>Eacles penelope</i>	Oc	-	-	-	Oc
<i>Hyperchiria incisa</i>	Se	Fe,Mr	Mr	Fe,Oc,De	Fe,Oc,De
Stenommatidae					
<i>Timocratica palpalis</i>	-	-	Fe	-	-

- not collected

* Ja- January, Fe- February, Ma- March, Ap- April, Ma- May, Ju- June, Jl- July, Au- August, Se- September, Oc- October, No- November, De- December.

admirabilis, *E. aberrans*, *S. grosica*, *P. denticulata* and *I. subferaria* reached 36 %, 45 %, 71 %, 41 % and 53 % of total number of individuals collected in the periods 1, 2, 3, 4 and 5 (Table 4), respectively.

Although a total of 12 primary and 15 secondary pests were collected in the region of "Três Marias", the majority of individuals collected belongs to four primary and one secondary pest species (Table 4).

TABLE 4
Annual frequency and constancy of Lepidoptera primary and secondary pests, collected in the region of "Três Marias", State of Minas Gerais, Brazil. June 1989 to June 1994

Family/Species	Annual frequency (%)					Annual constancy*				
	1	2	3	4	5	1	2	3	4	5
PRIMARY PESTS										
Arctiidae										
<i>Eupseudosoma aberrans</i>	14.22	45.48	0.54	3.44	2.07	x	x	y	x	y
<i>Eupseudosoma involuta</i>	12.65	4.57	0.09	0.29	0.05	x	x	y	y	z
Eupterotidae										
<i>Apatelodes cerrita</i>	-	-	-	0.02	0.03	-	-	-	z	z
Geometridae										
<i>Glena unipennaria</i>	1.16	3.19	1.09	0.09	4.10	y	y	y	y	x
<i>Iridopsis subferaria</i>	-	-	-	-	53.19	-	-	-	-	z
<i>Oxydia vesulia</i>	-	-	-	-	0.20	-	-	-	-	z
<i>Stenalcidia grosica</i>	0.20	12.48	70.93	5.47	9.19	z	x	x	x	x
<i>Thyriniteina arnobia</i>	-	9.05	1.80	0.11	0.70	-	y	y	z	z
Lymantriidae										
<i>Sarsina violascens</i>	0.98	3.67	0.55	1.11	2.54	y	x	x	x	x
Notodontidae										
<i>Blera varana</i>	-	-	0.35	0.32	0.22	-	-	z	x	y
<i>Nystalea nyseus</i>	0.13	0.24	0.08	0.07	0.03	z	z	z	z	z
<i>Psorocampa denticulata</i>	0.21	4.11	1.30	41.37	3.53	z	y	x	x	x
SECONDARY PESTS										
Arctiidae										
<i>Idalus affinis</i>	0.07	0.01	-	0.02	0.03	z	z	-	z	z
<i>Idalus admirabilis</i>	35.91	0.38	0.10	0.11	0.16	x	x	y	z	y
<i>Lepidokirbya vittipes</i>	0.22	0.16	0.17	0.20	0.71	y	x	y	z	x
Eucleidae										
<i>Phobetron hipparchia</i>	0.05	-	-	-	0.01	z	-	-	-	z
Mimallonidae										
<i>Mimallo amilia</i>	0.08	0.06	0.03	0.12	0.02	z	z	z	z	z
Notodontidae										
<i>Misogada blerura</i>	1.95	0.14	0.05	0.02	0.14	z	z	z	z	y
Psychidae										
<i>Oiketicus kirbyi</i>	-	-	-	0.01	-	-	-	-	z	-
Saturniidae										
<i>Automeris illustris</i>	0.07	0.01	0.01	0.14	0.01	z	z	z	z	z
<i>Citheronia laocoon</i>	0.12	0.14	0.07	0.10	0.07	z	z	z	z	z
<i>Dirphia albolinea</i>	-	-	-	0.10	0.03	-	-	-	z	z
<i>Dirphia rosacordis</i>	-	0.01	-	0.03	0.01	-	z	-	z	z
<i>Eacles imperialis</i>	-	0.01	0.01	-	0.03	-	z	z	-	z
<i>Eacles penelope</i>	0.02	-	-	-	0.01	z	-	-	-	z
<i>Hyperchiria incisa</i>	0.01	0.02	0.01	0.03	0.03	z	z	z	z	z
Stenomatidae										
<i>Timocratica palpalis</i>	-	-	0.01	-	-	-	-	z	-	-

* x = Constant species y = Accessory species z = Accidental species
- = not collected

DISCUSSION

Increasing number of lepidopterous species from the first to the last year of study (Table 1) could indicate that lower input on weed control with age increase of the eucalypt-

tus plants probably allow an increase in vegetation diversity in the area, which could in turn permit a partial recovery of the insect fauna in ecosystems formed by plantations of eucalyptus species (Zanuncio *et al.* 1998a, b). Besides, the similar number of pest species

TABLE 5

Annual number of individuals of Lepidoptera primary and secondary pests of Eucalyptus, collected in the region of "Três Marias", State of Minas Gerais, Brasil June 1989 to June 1994

Family/Species	Annual number of individuals/light trap		Year of collection
	Total	% within group	
PRIMARY PESTS			
Arctiidae			
<i>Eupseudosoma aberrans</i>	2 436.45	18.20	1,2,3,4,5
<i>Eupseudosoma involuta</i>	431.20	3.22	1,2,3,4,5
Eupterotidae			
<i>Apatelodes cerrita</i>	1.00	0.02	4,5
Geometridae			
<i>Glena unipennaria</i>	426.45	3.19	1,2,3,4,5
<i>Iridopsis subferaria</i>	2 165.80	16.18	4,5
<i>Oxydia vesulia</i>	13.40	0.10	5
<i>Stenalcidia grosica</i>	5 450.10	40.71	1,2,3,4,5
<i>Thyrinteina arnobia</i>	501.95	4.35	
Lymantriidae			
<i>Sarsina violascens</i>	360.40	2.69	1,2,3,4,5
Notodontidae			
<i>Blera varana</i>	40.40	0.30	3,4,5
<i>Nystalea nyseus</i>	20.60	0.15	1,2,3,4,5
<i>Psorocampa denticulata</i>	1 450.30	10.89	1,2,3,4,5
Total	13 386.85	100.00	-
SECONDARY PESTS			
Arctiidae			
<i>Idalus affinis</i>	3.20	0.40	1,2,4,5
<i>Idalus</i> sp.	651.70	80.23	1,2,3,4,5
<i>Lepidokirbya vittipes</i>	60.65	7.47	1,2,3,4,5
Eucleidae			
<i>Phobetron hipparchia</i>	1.40	0.17	1,5
Mimallonidae			
<i>Mimallo amilia</i>	9.90	1.22	1,2,3,4,5
Notodontidae			
<i>Misogada blerura</i>	49.85	6.14	1,2,3,4,5
Psychidae			
<i>Oiketicus kirbyi</i>	0.20	0.02	4
Saturniidae			
<i>Automeris illustris</i>	5.65	0.70	1,2,3,4,5
<i>Citheronia laocoon</i>	17.80	2.19	1,2,3,4,5
<i>Dirphia albolinea</i>	3.80	0.47	4,5
<i>Dirphia rosacordis</i>	1.25	0.15	2,4,5
<i>Eacles imperialis</i>	2.45	0.30	2,3, 5
<i>Eacles penelope</i>	0.60	0.07	1,5
<i>Hyperchiria incisa</i>	3.65	0.45	1,2,3,4,5
Stenomatidae			
<i>Timocratica palpalis</i>	0.20	0.02	3
Total	812.30	100.00	-

during the study period shows that in the first years of the eucalyptus plantations these species which are, probably, reproducing in native plants can adapt to the new ecosystem

formed by plantations. Low number of individuals per species of groups III and IV could indicate that they do not feed on eucalyptus trees but they are probably associated to vegetation

under these trees or even that they come from areas surrounding the eucalyptus plantations. On the other hand, high number of individuals per species of group I show that they can feed and reproduce on eucalyptus trees. Largest number of individuals of primary pests from April to July and of secondary ones from January to March agrees with other reports on lepidopterous pests of eucalyptus (Balut and Amante 1971, Moraes and Soares 1981, Santos *et al.* 1985, Pereira *et al.* 1994). Such high numbers of primary pest individuals are usually associated to periods of low temperature and low rainfall while the opposite happens for many secondary ones (Zanuncio *et al.* 1993). Most species of this last group pupate in the soil because they need humidity for adult emergency, and this may explain their largest occurrence during periods of high rainfall. Additionally, several secondary pest species, which do not pupate in the soil, present population peaks in similar periods as the primary species.

The year by year alternation of species with the highest annual frequency shows low risk of outbreaks occurrence for the same species in the area during more than one consecutive year. This could suggest that after reaching a population peak, numbers of individuals of each species are reduced by natural factors such as predators or parasitoid insects and diseases, thereby maintaining these pests at low population levels during several consecutive years (Zanuncio *et al.* 1994). On the other hand, such decrease on the population leaves the habitat available for another species to show a population increase. Some species were classified as constant (Table 3) in a year before their population peak, which shows that such population increase starts in the previous year when these species show a gradual increase of their number of individuals.

The predominance of four primary and one secondary pest species shows that even though there is an abundance of food supply for these pests in eucalyptus plantations their populations do not increase steadily probably due to biotic or abiotic factors which need to

be better studied (Zanuncio *et al.* 1996, Torres *et al.* 1996/1997, Saavedra *et al.* 1997). The understanding of such factors could be used in programs of integrated pest management of defoliator Lepidoptera in eucalyptus plantations. The number of primary pest increased from seven to 12 species from the first to the fifth collecting period, showing that some of these species may prefer to feed on older eucalyptus trees while other are able to feed on these trees during all its growing stage which is usually about seven years in Brazil.

Some ecological aspects of defoliating caterpillars found in the area are important when considering an integrated pest management program. For example, caterpillars of *S. grosica*, the primary pest with largest number of individuals, besides those of *I. subferaria* are found on eucalyptus leaves while its pupation occur in organic debris over the superficial layer of the soil (Santos *et al.* 1998). For this reason, the detection of those species, in the field can be made by counting their caterpillars per branch of eucalyptus or removing the organic layer on the top of the soil near to eucalyptus plants, aiming to count number of their pupae per square meter. In a similar way, number of caterpillars of *E. aberrans* could be either expressed as number per leave or per branch of eucalyptus. Alternatively, number of pupae could be evaluated by area of eucalyptus trunk where this species presents its pupal phase.

Population monitoring of primary and secondary lepidopterous pests in this area should be made from January to May when most of population peaks of these pest species occur. Such monitoring can be made with different methods, including use of a cheese cloth under the eucalyptus trees for collecting falling caterpillars. Light traps or even counting numbers of caterpillars per eucalyptus branches could be used to detect population of defoliator caterpillars in more limited and smaller areas. These practices could reduce control costs and damage if such pests are found before reaching outbreak conditions.

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RESUMEN

La ocurrencia de plagas primarias y secundarias del orden Lepidoptera fue estudiada desde junio de 1989 hasta junio de 1994 en plantaciones de *Eucalyptus urophylla*, localizadas en la región de Tres Marias, Estado de Minas Gerais, Brasil. Durante este periodo, las colectas de lepidópteros fueron realizadas quincenalmente usando cinco trampas de luz. Después de cinco años de recolección la media total por trampa fue de 13 387 especímenes de plagas primarias y 812 de plagas secundarias, pertenecientes a 12 y 15 especies diferentes respectivamente. Las cuatro especies de plagas primarias más comunes fueron *Stenalcidia grosica* (Geometridae), *Iridopsis subferaria* (Geometridae), *Eupseudosoma aberrans* (Arctiidae) e *Psorocampa denticulata* (Notodontidae) con media de 5 450; 2 162; 2 436 y 1 458 especímenes, respectivamente. A su vez, la plaga secundaria más común entre las colectadas fue *Idalpus admirabilis* (Arctiidae) con media de 652 especímenes. Por otro lado, durante la estación seca (marzo a julio) fue la época más adecuada para la presencia de plagas primarias, mientras que durante la época lluviosa (enero a marzo) fue la más apropiada para las plagas secundarias.

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