SCIENTIFIC NOTE

Survey of the Hymenoptera Parasitoids in *Eucalyptus grandis* and in a Native Vegetation Area in Ipaba, State of Minas Gerais, Brazil

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An. Soc. Entomol. Brasil 29(3): 583-588 (2000)

Levantamento da Fauna de Hymenoptera Parasitóides em uma Plantação de *Eucalyptus grandis* e em Vegetação Nativa em Ipaba, Minas Gerais

RESUMO – Foi feito um levantamento da fauna de Hymenoptera parasitóides em um transecto eucalipto/vegetação nativa/eucalipto, em Ipaba, Minas Gerais, no período de março de 1997 a março de 1998, com armadilhas Malaise. Foram coletados indivíduos de nove superfamílias (Ceraphronoidea, Chalcidoidea, Chrysidoidea, Cynipoidea, Evanioidea, Ichneumonoidea, Proctotrupoidea, Platygastroidea e Vespoidea), distribuídos em 26 famílias.

PALAVRAS-CHAVE: Insecta, eucalipto, fragmentação, inimigos naturais.

ABSTRACT - A survey of Hymenoptera parasitoids fauna was made in a transect of *Eucalyptus*/native vegetation/*Eucalyptus* in Ipaba, state of Minas Minas Gerais, Brazil from March 1997 to March 1998 with Malaise traps. Individuals of nine superfamilies were collected (Ceraphronoidea, Chalcidoidea, Chrysidoidea, Cynipoidea, Evanioidea, Ichneumonoidea, Proctotrupoidea, Platygastroidea and Vespoidea) which belong to 26 families of this order.

KEY WORDS: Insecta, biological control, *Eucalyptus* reforestation, fragments, monitoring.

Parasitoids are insects which larva grow feeding inside the body of other insects, resulting in the death of the host (Godfray 1994). Species of this group represent the largest component of many terrestrial ecosystems and can constitute above 20% of all insect species (La Salle & Gauld 1991, Godfray 1994, Memmott *et al*. 1994). Most of the parasitoids

belong to the Hymenoptera and Diptera orders (Godfray 1994), with approximately 50.000 species described only in the first order (LaSalle & Gauld 1991, Godfray 1994). According to LaSalle & Gauld (1991), at least 77% of the species of Parasitic Hymenoptera have not been yet described and this group can have the largest number of species in all the class Insecta. The great proportion of non described species of this group can be due to their small size and also to the difficulty of identifying them. Since only around 12% of the world fauna of insects are known, it is urgent to explore and to describe the remaining diversity of insects and other arthropods due to fast decreasing of global biodiversity (Kim 1994).

According to Bragança *et al*. (1998a, 1998b) and Zanuncio *et al*. (1998), fragments and corridors of native vegetation associated to forest monocultures can be used as a management strategy with the objective of increasing the diversity of natural enemy species and also to reduce problems with insect pests. The objective of this research was to identify Hymenoptera parasitoids in the area of Ipaba, state of Minas Gerais, Brazil, in a transect, including, both an area of plantation of *Eucalyptus* and an area of native vegetation. Current literature does not register any study with this group of insect in plantations of *Eucalyptus* in the State of Minas Gerais, Brazil.

The survey was made in a plantation of *Eucalyptus grandis* of the "Celulose Nipo Brasileira S/A - Cenibra", in the Ipaba County, State of Minas Gerais, Brazil from March 1997 to March 1998. Eleven Malaise traps were used in a transect including an *Eucalyptus* plantation, a fragment of native vegetation and, again, an *Eucalyptus* plantation. The sampling points were chosen with GPS (Global Positioning System), in the same direction and in a similar altitude, starting from the *Eucalyptus* plantation. The first three traps were installed inside a block of an *Eucalyptus* plantation at 300, 200 and 100 meters from the border of a fragment of native vegetation; the fourth trap was located in the border of this area; the fifth, the sixth and the seventh traps were placed inside this fragment, at 100 meters distant from each other; the eighth at the other border of the native vegetation; and the ninth, tenth and the eleventh traps were distributed inside another block of this *Eucalyptus* plantation at 100, 200 and 300 meters from the transition of the native vegetation and the *Eucalyptus* plantation. The collecting pots of the Malaise traps were removed every two weeks and brought to the farm where the insects collected were sorted and sent to the Federal University of Viçosa, in Viçosa, State of Minas Gerais, Brazil. There they were quantified and catalogued. The Hymenoptera parasitoids were identified with Goulet & Huber (1993) key at the superfamily and family levels, except for the superfamily Chalcidoidea, which insects were identified with the Gibson *et al*. (1997) and Grissel & Schauff (1990) keys. Due to the difficulties to identify Hymenoptera parasitoids, family richness was used instead of species richness. The positive relationship between species richness and number of higher taxa is documented for several different areas and for a reasonable number of organisms (Williams *et al*. 1997), and it is also valid for Hymenoptera. Hymenoptera parasitoids collected were deposited at the Entomological Museum of the Universidade Federal de Viçosa.

Individuals of nine Hymenoptera superfamilies (Ceraphronoidea, Chalcidoidea, Chrysidoidea, Cynipoidea, Evanioidea, Ichneumonoidea, Proctotrupoidea and Vespoidea) were collected, and distributed in 26 families (Table 1). The largest number of individuals were collected in the traps located in the sites closer to the border of the native vegetation, in the border and inside the native vegetation area (Fig. 1). Higher numbers of individuals were collected during the months of March, August and September (Fig. 2).

Most species of the superfamilies Ceraphronoidea, Evanioidea, Ichneumonoidea, Proctotrupoidea, Chrysidoidea, Rhopalosommatidae are parasitoids of insects and other arthropods (Borror *et al*. 1989). Spe-

Table 1. Number of individuals (N) and percentage of frequency (F) of superfamilies and families of Parasitic Hymenoptera collected in an *E. grandis* plantation intermingled with native vegetation area in Ipaba, the State of Minas Gerais, Brazil. From March 1997 to March of 1998.

Superfamilies	Families	N	F (%)
Ceraphronoidea	Ceraphronidae	06	0.29
Chalcidoidea	Chalcididae	132	6.29
	Encyrtidae	24	1.14
	Eucharitidae	04	0.19
	Eulophidae	185	8.81
	Eupelmidae	29	1.38
	Eurytomidae	04	0.19
	Mymaridae	36	1.72
	Perilampidae	03	0.14
	Pteromalidae	49	2.33
	Signiphoridae	01	0.05
	Torymidae	39	1.86
	Trichogrammatidae	01	0.05
Chrysidoidea	Bethylidae	03	0.14
	Chrysididae	11	0.52
	Dryinidae	22	1.05
Cynipoidea	Eucoilidae	37	1.76
	Figitidae	01	0.05
Evanioidea	Evaniidae	66	3.14
Ichneumonoidea	Braconidae	452	21.53
	Ichneumonidae	577	27.50
Proctotrupoidea	Diapriidae	23	1.10
	Monomachidae	03	0.14
Platygastroidea	Platygasteridae	13	0.62
	Scelionidae	374	17.82
Vespoidea	Rhopalosommatidae	04	0.19
Total		2.099	100.00

cies of the superfamily Ichneumonoidea constitute one of the largest group of parasitoid insects, which are natural enemies of many plant pest species (Clausen 1940). The Chalcidoidea is one of the most abundant and biologically diverse superfamily of parasitoid insects (Grissell & Schauff 1990, Grissell & Schauff 1997). The species of this superfamily represent a significant portion of the biological diversity in terrestrial ecosystems and they play an important role in the regulation of insect populations in these areas (Grissell & Schauff 1997). Hosts of Chalcidoidea superfamily species include individuals of the most common orders, especially Lepidoptera, Diptera, Coleoptera and Homoptera (Clausen 1940).

The Hymenoptera parasitoid fauna collected in the area of Ipaba, State of Minas Gerais, showed greater diversity where spe-

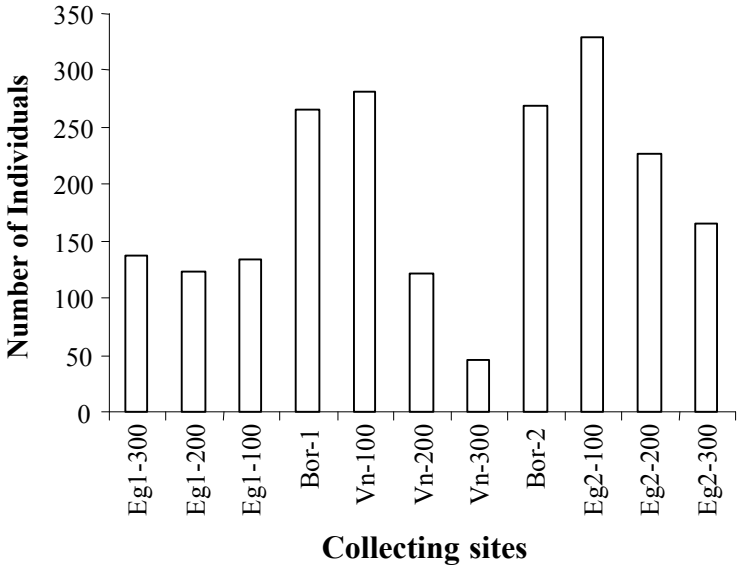

Figure 1. Number of individuals of Hymenoptera parasitoids per Malaise trap in Ipaba, state of Minas Gerais, Brazil. *Eucalyptus* area at 300, 200 and 100 meters from the transition of the native vegetation (Eg1-300, Eg2-300, Eg1-200, Eg2-200, Eg1-100 and Eg2-100); at the transitions of *Eucalyptus* with the native vegetation (Bor-1 and Bor-2) and in the native vegetation at 100 and 200 meters from the transition *Eucalyptus* with the native vegetation (Vn-100, Vn200 and Vn-300).

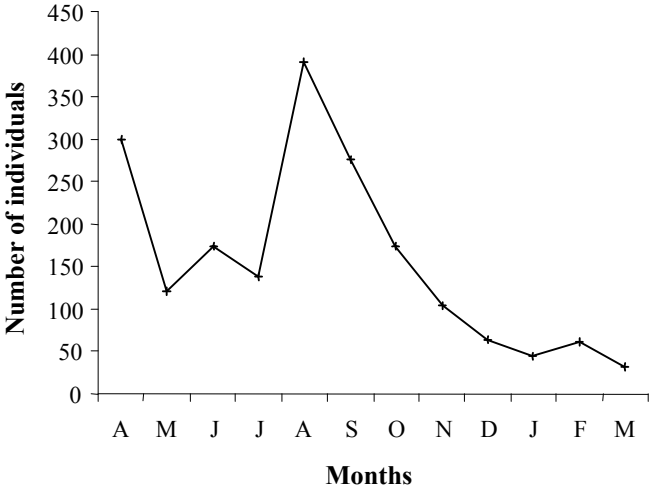

Figure 2. Number of individuals of Hymenoptera parasitoids collected per month with Malaise traps in Ipaba, state of Minas Gerais, Brazil. From March 1997 to March 1998.

cies of most of the superfamilies and families of this group of insect are represented. Individuals of both families of the superfamily Ichneumonoidea, which includes parasitoid species (Goulet & Huber 1993) were captured. Out of the 20 families of the superfamily Chalcidoidea (Gibson *et al*. 1997), a group of great importance for biological control, 12 were represented in the samples. Larger numbers of parasitoids were collected in the vicinity and in the borders of the *Eucalyptus* plantation and inside the native vegetation (Fig. 1), probably due to a larger number of feeding places for adult parasitoids in the area of native vegetation. For the reasons expressed above, it is recommended to include fragments of native vegetation inside *Eucalyptus* plantations as a strategy for pest management in these areas, as this procedure can help to increase the number of species and individuals of parasitoids for a greater effect of natural biological control of pest species on *Eucalyptus*.

Acknowledgements

To "Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq)", to "Fundação de Amparo à Pesquisa do Estado de Minas Gerais", and to "Celulose Nipo Brasileira – Cenibra", specially to the Eng. Antonio Sérgio Fabres for the development of this research in plantations of this company.

Literature Cited

Borror, D.J., C.A. Triplehorn & N.F. Johnson. 1989. An introduction to the study of insects. New York, Saunders College Publishing, 875 p.

Bragança, M.A.L., J.C. Zanuncio, M. Picanço & A.J. Laranjeiro. 1998b. Effects of environmental heterogeneity on Lepidoptera and Hymenoptera populations in *Eucalyptus* plantations in Brazil. Forest Ecol. Manage. 103: 287-292.

Bragança, M.A.L., O. De Souza & J.C. Zanuncio. 1998a . Environmental heterogeneity as a strategy for pest management in *Eucalyptus* plantations. Forest Ecol. Manage. 102: 9-12.

Clausen, C.P. 1940. Entomophagous insects. London and New York, McGraw-Hill Company, 688p.

Gibson, G.A.P., J.T. Huber & J.B. Woolley. 1997. Annoted keys to the genera of Nearctic Chalcidoidea (Hymenoptera). Ottawa, NRC Research Press, 794p.

Godfray, H.C.J. 1994. Parasitoids, behavioral and evolutionary ecology. Princeton, Princeton Univ. Press, 473p.

Goulet, H. & J.T. Huber. 1993. Hymenoptera of the world: an identification guide to families. Research Branch Agriculture Canada Publication, Ottawa, 668p.

Grissell, E.E. & M.E. Schauff. 1990. A handbook of the families of nearctic Chalcidoidea (Hymenoptera). Entomol. Soc. Washington, Washington, 85p.

Grissell, E.E. & M.E. Schauff. 1997. Chalcidoidea, p. 45-117. In G.A.P. Gibson, J.T. Huber & J.B. Woolley (ed.), Annotated keys of the genera of nearctic Chalcidoidea (Hymenoptera). Ottawa, NCR Research Press, 794p.

Kim, K.C. 1994. Entomology in the changing world: Biodiversity and sustainable agriculture. Korean J. Entomol., 24: 145-153.

La Salle, J. & J.D. Gauld. 1991. Parasitic Hymenoptera and the biodiversity crisis. Redia, 74: 315-334.

Memmott, J., H.C.J. Godfray & J.D. Gauld. 1994. The structure of a tropical

host-parasitoid community. J. An. Ecol. 63: 521-540.

Williams, P.H., K.J. Gaston & C.J. Humphries. 1997. Mapping biodiversity value worldwide: combining higher-taxon richness from different groups. Proc. Roy. Entomol. Soc. 264: 141-148.

Zanuncio, J.C., J.A. Mezzomo, R.C.N. Guedes & A.C. Oliveira. 1998. Influence of strips of native vegetation on Lepidoptera associated with *Eucalyptus cloeziana* in Brazil. Forest Ecol. Manage. 108: 85-90.

Accepted 12/II/2000.