

POPULATION DYNAMICS
OF THE JAPANESE BEETLE
(COLEOPTERA: SCARABAEIDAE)
IN TERCEIRA ISLAND - AZORES

by
ANTÓNIO MARTINS & NELSON SIMÕES*

ABSTRACT

Since its introduction in Terceira Island in the early 70's, the Japanese beetle (Popillia japonica Newman) has been spreading out from its initial focus of infestation, to the interior agricultural areas of the island, through more favourable zones to its establishment.

The data found in the survey trapping, in 1983 and 1984, show an increasing population throughout the area occupied by the pest (2.1 fold).

On the other hand, the estimation of the larvae population in February of 1984 and 1985 allows the prediction

Key words: Japanese beetle, Popillia japonica, population dynamics, Azores.

* Laboratório de Ecologia Aplicada, Universidade dos Açores, 9502 Ponta Delgada (Açores) Codex, Portugal.

RESUMO

O escaravelho japonês, *Popillia japonica* Newman, foi introduzido na Ilha Terceira, no início da década de 70. Desde então, a população tem vindo a aumentar e a dispersar-se pela área de pastagem.

As capturas de adultos em 1983 e 1984 mostram que a população aumentou 2,1 vezes, de um ano para o outro.

A estimativa da população larvar aponta para um crescimento de cerca de 6 vezes, de 1984 para 1985.

Termos chave: Escaravelho japonês, *Popillia japonica*, dinâmica populacional, Açores.

The Japanese beetle, *Popillia japonica* Newman, was first found in Terceira Island (Azores) in the early 70's, feeding in the officer's gardens of the United States Air Force Base (Lajes). Probably it was introduced from the United States by military aircrafts.

Initially the infestation was restricted to the Air Base fields and eradication measures were undertaken, namely, chlordane spraying plus trapping. Nevertheless, these proved to be insufficient to prevent dissemination of the pest. The beetle population increased and spread out of the Air Base (SIMÕES & MARTINS, in press).

Since 1974, the portuguese agricultural authorities carried out survey trapping off Base. The traps placed surrounding the air field caught the maximum number of beetles in 1976 and 1977. During the summers of 1977 and 1978, the local Department of Agriculture made aerial spraying with carbaryl, over the most affected areas, around the Base. Survey trapping was carried on with just a few bait traps. In 1977 and 1978, after the spraying with carbaryl, there was a considerable drop on the number of adults caught (A. CARVÃO, pers. comm.).

Although the number of catches in the traps surrounding the air field shows to be stationary since 1978, a spreading of the pest to the interior agricultural areas of the island, through more favourable zones to its establishment, has been observed.

In 1983, the infested area covered a strip of about 8 km, centered at the Air Base and, in the survey trapping, some 25,000 insects were captured, irregularly distributed throughout the infested area. The data found allowed the establishment of 3 zones with different degree of infestation (figure 1). A zone with maximum infestation (A), where 19 p. 100 of the traps caught 80 p. 100 of the whole beetles; a zone with medium infestation (B), where 21 p. 100 of the traps caught 5 p. 100 of the beetles; and, a zone with small infestation (C), where 60 p. 100 of the traps just caught 6 p. 100 of the total beetles (table 1).

In 1984, the number of catches increased 2.1 times (some 52,000 beetles were captured). Although the number of insects caught per trap increased all through the infested area, the rise was more clear in the zone with medium infestation (2.3 fold). In the other 2 zones, the number of catches only increased about 1.5 (table 1).

In order to estimate the larvae populations in each of the 3 zones with different adult densities, the immature stages of the beetle were sampled in soil, according to FLEMING & BAKER (1936), in February of 1984 and 1985.

The larvae densities estimated show a close relation with the data of the preceding survey trapping season. As we can see in table 2, there was an increase in the larval densities, in all the 3 zones considered, and that it was significantly greater in the zone with medium infestation.

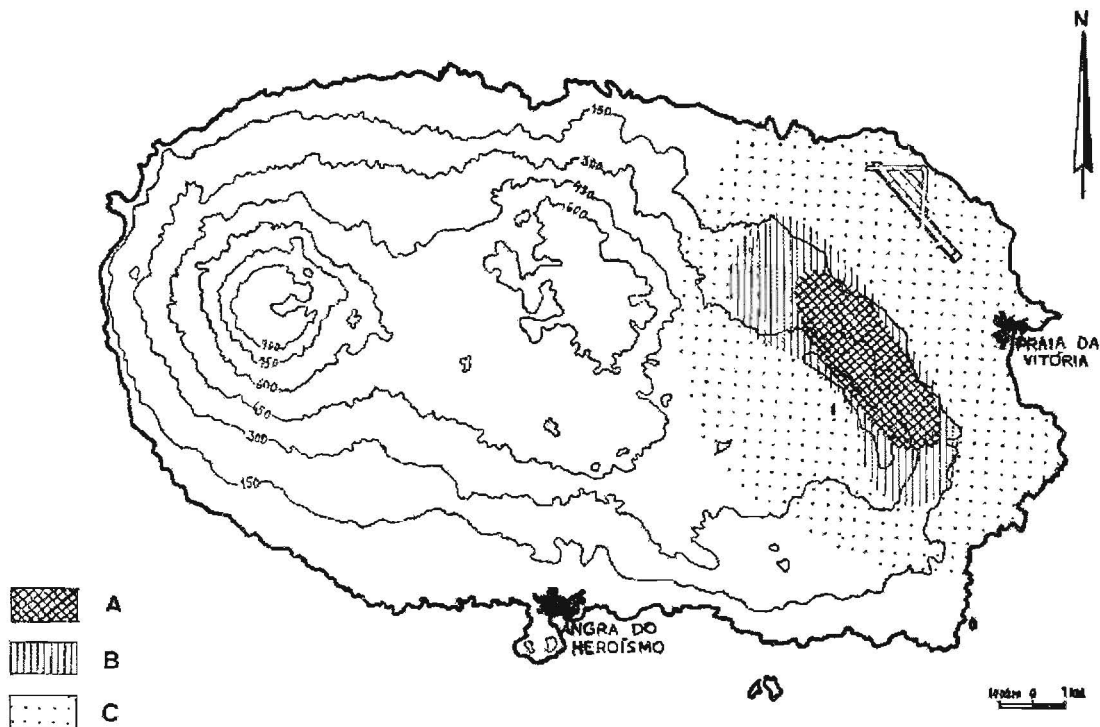


FIGURE 1

Terceira Island with the 3 zones of different infestation of *P. japonica*.
 A. Highest infestation. B. Medial infestation. C. Small infestation.

Mapa da Ilha Terceira com as 3 zonas de diferente infestação de *P. japonica*.
 A. Grande infestação. B. Média infestação C. Baixa infestação.

TABLE 1

Japanese beetle trapping data in Terceira Island
in the 3 zones of different infestation in 1983 and 1984.

*Dados das capturas de escaravelho japonês na Ilha Terceira,
nas 3 zonas de diferente infestação, em 1983 e 1984.*

Zone	1983			1984		
	Traps	Adults		Traps	Adults	
	%	%	mean	%	%	mean
A	19	89	2493 ± 756	29	91	3943 ± 1514
B	21	5	122 ± 38	29	6	279 ± 63
C	60	6	55 ± 13	42	3	80 ± 14

TABLE 2

Grub surveys of Japanese beetle in Terceira Island
in the 3 zones of different infestation in 1984 and 1985.

*Amostragens larvares de P. japonica na Ilha Terceira,
nas 3 zonas de diferente infestação, em 1984 e 1985.*

Zone	Number of larvae per unit area sampled (0.09 m ²)	
	1984	1985
A	2.4 ± 0.2	5.6 ± 0.9
B	1.8 ± 0.2	12.2 ± 1.5
C	0.1 ± 0.05	0.2 ± 0.1

The results show that the population of *P. japonica* in the initial core begun to decrease and that, simultaneously, an increasing colonization occurred to the inner part of the island, above the 200 meters. The actual core of infestation is located 6 km away from the initial one, occupying an area of about 1170 ha.*

REFERENCES CITED

- FLEMING, W. E., F. E. BAKER, 1936. A method for estimating populations of larvae of the Japanese beetle in the field. *J. Agri. Res.*, 53, 319-331.
- SIMÕES, N., A. MARTINS. Preliminary note on the infestation of *Popillia japonica* Newman (Coleoptera: Scarabaeidae) in Terceira Island — Azores (in press).

* The present work was supported by the Regional Directory for Agriculture (D. R. A., Azores).