

LIFE CYCLE OF *POPILLIA JAPONICA* NEWMAN
(COLEOPTERA: SCARABAEIDAE)
IN TERCEIRA ISLAND - AZORES

by
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ABSTRACT

In this paper the life cycle of Popillia japonica Newman in Terceira Island is described.

The first adults appear in the last week of May, reach its peak in early August and disappear in middle October.

The 1st instar larvae don't last long. The 2nd instar has a life span between 1 and 5 months. The 3rd instar is the one that lasts longer, about 6 to 8 months. The pupae stage is short, less than 1 month.

Notes are given on the food habits of adults and larvae.

In what concerns the natural enemies, only some larvae were found momified with the green muscardine fungus.

Key words: Japanese beetle, Popillia japonica, life cycle, natural enemies, Azores.

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RESUMO

Na presente nota, descreve-se o ciclo de vida de *Popillia japonica* Newman, na Ilha Terceira.

A emergência inicia-se na última semana de Maio. A população atinge o pico no início de Agosto e decresce até meados de Outubro.

O 1.º estado larvar é curto. O 2.º é muito variável, 1 a 5 meses, enquanto que o 3.º estado é o mais longo, entre 6 a 8 meses. O estado de pupa não vai além de 1 mês.

São ainda referidos a alimentação dos diversos estados do escaravelho japonês e a mortalidade verificada durante o inverno, em áreas acima dos 300 m.

Anota-se ainda a presença de algumas larvas parasitadas por *Metarhizium anisopliae* (Metch.) Sorokin.

Termos chave: Escaravelho japonês, *Popillia japonica*, ciclo de vida, inimigos naturais, Açores.

The Japanese beetle, *Popillia japonica* Newman, was introduced in Terceira Island (Azores) in the earlier 70's, in Lajes Air Field (SIMÕES & MARTINS, in press). Since then, it has been extending its range. So, it's important to control this pest to prevent its spreading all over Terceira Island, to other islands and to the mainland.

To apply an integrated control program it's important to know the annual activity pattern of the insect, the mortality of the immature stages during winter and the presence of natural enemies in its new environment.

Beetles were collected in traps baited with japonilure since 1974 to 1984. This traps were dispersed through all the area considered to be infested.

The first *P. japonica* adults of the season appear in the last week of May, the population reaches its maximum abundance in early August and then decreases until the

middle of October. About 85 p.100 of the beetles were dated during the second half of July throughout August (figure 1). The emergence increases some days after an important rainfall.

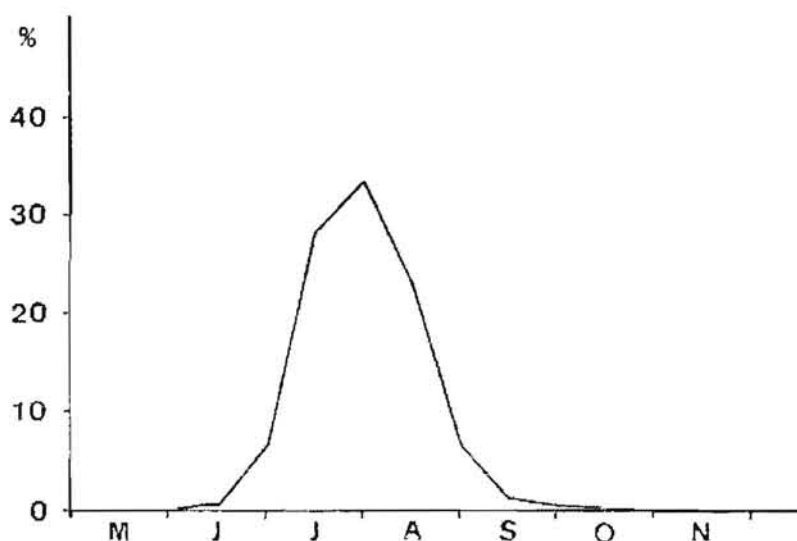


FIGURE 1

Fortnightly distribution of Japanese beetle trapping in Terceira Island (1983 and 1984 data).

Distribuição quinzenal das capturas de escaravelho japonês na Ilha Terceira (dados recolhidos em 1983 e 1984).

The beetles feed mostly on blackberries, *Rubus ulmifolius* Schott and *R. hochstetterorum* Seub., bracken, *Pteridium aquilinum* (L.) Kuhn., wild mint, *Mentha* spp., and white clover, *Trifolium repens* L.. Whenever the sun is shining the beetles can be seen feeding and mating on the leaves of their favoured plants. When it's cloudy or raining they hide under the bushes. The females do their laying

in the soil, in burrows under the turf, profiting the vicinity of the cattle dung.

In order to study the life cycle of the insect, the immature stages of *P. japonica* were sampled monthly in three samples of soil with 0.09 m² each, in each of 109 stations distributed in a screen of 1 by 1 km, covering the mainly infested area.

By the last week of August, about 100 p.100 of the Japanese beetle population in soil are first-instar grubs. During the last week of September, the first-instar only represents 10 p. 100 of the soil population. The second and third-instars are already present (5:4). In February, 12 p.100 of the whole population are still second-instar grubs. In May, 14 p.100 of the immatures are pupae and, the remaining, are prepupae and mainly third-instar grubs. The life span of pupae is short and the emergence begins by the end of May (figure 2).

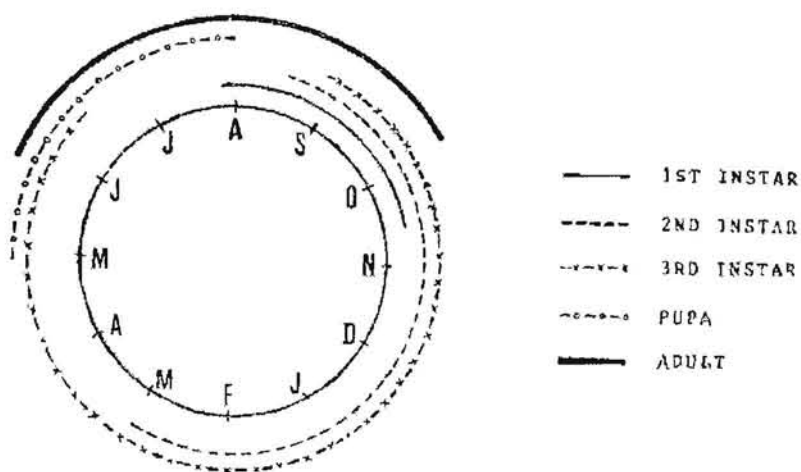


FIGURE 2

Annual activity pattern of *P. japonica* in Terceira Island.

Ciclo de vida de P. japonica na Ilha Terceira.

The larvae live in earthen cells among the roots of the pasture, in the 5 upper centimeters below the surface. However, in the colder months, January and February (table 1), they burrow deeper in the soil (10 to 15 cm). After these, they come up near the surface to pupate.

FOX (1937) noticed that the larval populations of *P. japonica* in New Jersey and Pennsylvania (U. S. A.) decreased about 21 p. 100 during overwintering. The sampling in Terceira, according to FLEMING & BAKER (1936), in November and Mars, show no significative mortality ($p < 0.05$) under the 300 meters, while in a field located at 320 meters there was a reduction of about 32 p. 100 in the population of larvae of the Japanese beetle (table 2).

The grubs of *P. japonica* can be infected by some parasitoids, nematodes, bacteria, and fungi (KLEIN, 1982). Although a large number of larvae were collected and checked in our laboratory, only some momified grubs were found covered with the green muscardine — *Metarhizium anisopliae* (Metch.) Sorokin.

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TABLE 1

Soil temperature ($^{\circ}\text{C}$) in Terceira Island Monthly averages at 2 depths at 12h T.M.G. (Serviço Nacional de Meteorologia records).
Temperatura do solo ($^{\circ}\text{C}$) na Ilha Terceira. Médias mensais a 2 profundidades às 12h T.M.G. (Dados do Serv. Nacional de Meteorologia).

Depth (m)	150 m 1951-1970		300 m (1964-1977)	
	0.10	0.20	0.10	0.20
J	12.8	13.2	12.2	12.6
F	12.4	12.8	11.9	12.3
M	13.2	13.5	12.5	12.9
A	15.0	15.2	14.0	14.5
M	17.5	17.6	15.9	16.3
J	20.4	20.6	18.2	18.2
J	22.9	23.2	20.1	20.3
A	23.5	24.0	20.9	21.3
S	21.6	22.1	19.8	20.2
O	18.4	18.8	17.5	18.1
N	15.1	15.6	14.7	15.3
D	13.7	14.1	12.9	13.9
Year	17.2	17.6	15.9	16.3

TABLE 2

Japanese beetle larval density means in 3 survey stations in Terceira Island, before and after the colder months.

Densidade larvar de P. japonica em 3 locais da Ilha Terceira, antes e depois dos meses mais frios.

	SURVEY STATIONS		
	I 100 m	II 210 m	III 320 m
November	8.5 <i>a</i>	13.5 <i>b</i>	8.2
March	12.7 <i>a</i>	14.4 <i>b</i>	5.6

Mean numbers followed by the same letters are not significantly different at the 5p.100 level, ANOVA.