Necrobia rufipes (De Geer): an emerging pest associated with pet store chain in Europe

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Abstract

Necrobia rufipes is a cosmopolitan pest, causing considerable damage to stored commodities such as copra (dried coconut), cheese, dried fish, ham. The present study was undertaken to investigate the occurrence of these insects on pet store chain in Europe. In the last year *N. rufipes* was found associated with pet food, especially in Mediterranean countries, causing considerable economic damage and loss of product. The causes of such sudden diffusion are not known but some considerations are reported. Future studies will be needed to collect data on development on pet food and on the possibility to monitor *N. rufipes* in wharehouses and pet stores.?

Keywords: pet food, pest infestation, red-legged ham beetle, Cleridae.

Necrobia rufipes (De Geer) is a beetle, belonging to family Cleridae. Riley (1874) gave it the common name of red-legged ham beetle, while in the Pacific Island is known as copra beetle (Froggatt, 1911). Riley made the first economic investigation, citing cases of extensive injury to hams in St. Louis and Boston (USA). It is a cosmopolitan pest, associated to copra (dried coconut), cheese, dried fish, cured ham and bacon. However it is reported to feed on other pests that infest products or decaying animal matter (Simmons and Ellington, 1925; Ashman, 1963; Peck and Thomas, 1998). *N. rufipes* was also found on mummies (Panagiotakopulu, 2001), and it is considered in forensic entomology since it is usually found on carrion after most of the flesh has been remove, presumably feeding on other insects rather than on the carrion itself (Kulshresthaa and Satpathy, 2001).

In 2003 the red-legged ham beetle was found in retail pet store and in 2007 it was reported infesting pet food in Brazil, but the origin of infestation was unknown (Roesli et al., 2003; Gredilha and Lima, 2007).

In the present note we report the *N. rufipes* presence in Mediterranean countries, especially associated with pet food warehouses and retail pet stores. The first report dates back 2015 in Israel, in 2016 it was found in Southern Italy (Puglia region), in 2017 in Greece, Turkey, Montenegro, Germany and Czech Republic, Southern France, Spain, Northern Italy, all Southern regions and island.

The causes of such a wide spread of this pest are, for now, unknown. Pet food products are rich in animal protein content, particularly suitable for *N. rufipes* development, and pet food packaging are often not resistant to insect infestation. Different Authors suggest that the presence of *N. rufipes* is mainly linked to the predation of other pests (Kulshresthaa and Satpathy, 2001; Roesli et al., 2003). The red-legged ham beetle is reported as a facultative predator on larvae of *Lasioderma serricorne* (F.), *Oryzaephilus mercator* (Fauvel), *Carpophilus dimidiatus* (F.) (Simmons and Ellington, 1925; Ashman, 1963). In effect, in three cases of pet food infestation we verified the simultaneous presence of *N. rufipes* and the sawthoothed grain beetle, *Oryzaephilus surinamensis* (L.).

An important way of diffusion of the pests is represented by pallets and packaging materials. Several *N. rufipes* larvae were found on crevices of pallet wood and packaging like carton, protected in a white pupal chamber produced by themselves. Furthermore adults are able to fly and are attracted by food odors from long distance. We observed in several retail pet stores an incorrect management of waste material; broken pet food bags, pallets, cartons were stored near the entrance doors. We also verified that pallets and packaging are preferred by *N. rufipes* larvae for pupation and this is the way to spread infestation.

A critical point to manage *N. rufipes* infestation is that the monitoring is difficult, as there are no

commercial lures specifically available for baiting traps. A sexual attractant was identified and described in a Chinese patent, but not commercially available (Lei and Guangwei, 2016). *N. rufipes* larvae and adults were captured with commercial pitfall traps baited with food oil and pheromone lures (not specific for *N. rufipes*) from Trécé, in pet food retail stores (Roesli et al., 2003), but currently there is not a trap specifically set up for *N. rufipes*. This is a weak point for the management of infestations as it is not possible to constantly monitor the presence of the insect in industries, warehouses, pet stores.

Another aspect to take in account is the lack of specific information on control strategies. Only Roesli and Subramanyam (2002) reported that precision targeting using sanitation alone did not have an impact on *N. rufipes* adults, but reduced larval presence. Precision targeting with sanitation followed by cyfluthrin spray greatly reduced both larvae and adults.

We can conclude that the diffusion of *N. rufipes* is actually favored by a lack of specific monitoring traps, by incorrect application of pest prevention tecniques, combined with the incorrect management of storage warehouses and retail stores.

Further researches are needed to better understand food preference and behavior of this emerging pest associated with pet store chain.

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The orientation of *Tribolium castaneum* adults in the presence of aggregation pheromone 4,8-Dimethyldecanal and food oils

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Abstract

Monitoring of *Tribolium castaneum*, the red flour beetle, involves the use of aggregation pheromone 4,8-dimethyldecanal (4,8 DMD) and kairomones such as cereal oils. Despite their present use, certain information which maximizes the efficacy of these compounds is still lacking. These experiments tested the effects of distance from the pheromone and edible oils on the orientation of *T. castaneum* adults. The movement of adults toward the aggregation pheromone was determined by changing the distance from the pheromone or the air flow. The adults released inside a glass apparatus tested their orientation either toward the food oils or the empty vial. The maximum trap catch was recorded at distances up to 60 cm from the pheromone and with the presence of air flow. The oils having botanical origin successfully attracted adults than those of animal origin. It is concluded that the orientation of *T. castaneum* adults varies with the distance from pheromone, air flow and the nature of food oil.

Keywords: Aggregation pheromone, distance, Kairomone, air flow, Tribolium castaneum