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A pitfall trap for carrion ecology studies

Petr KOČÁREK*

Department of Ecology, Palacký University, Tř. Svobody 26, CZ-77146 Olomouc, Czech Republic; tel.: +420 68 5222 451, fax: +420 68 5225 737, e-mail: kocarek@email.cz.

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The design and use of a carrion baited pitfall trap is described. The trap was constructed particularly to quantify carrion visiting arthropods without disturbing decomposition processes during checking. The trap is easy and inexpensive to construct, is easy to service and experimental modifications can be made for selective isolation of various groups of arthropods.

Key words: Arthropoda, techniques, pitfall trapping, carrion, necrobiont insects, Coleoptera, Diptera.

Introduction

Pitfall trapping is one of the most widely used methods for collecting arthropods in entomological research (SOUTHWOOD, 1984). The resulting catches have been used to describe phenology, estimate abundance, elucidate diurnal activity cycles and to compare species assemblages (TOPPING & SUNDERLAND, 1992).

Many studies on carrion-visiting arthropods have been published which used carrion bait that was simply left on the ground (REED, 1958; PAYNE, 1965; TANTAWI et al., 1996, etc.). More recently, various trapping methods have been devised which increase the ease and efficiency of collecting and to permit control over many variables such as bait type, size and location.

The simpler types of pitfall traps usually consist merely of a jar into which small quantity of soil with a piece of carrion is placed (WALSH, 1931; KAUFMANN, 1937) or the bait is hung in small jar under a roof (WALSH, 1931; NOVÁK, 1964; NEWTON & PECK, 1975, etc.). BORNEMISSZA (1956) used the trap (proposed by WALSH, 1931) in which the carcass was placed on a wide-mesh wire screen suspended on cross-wires in a funnel put into the ground; the animals were collected in a jar placed under the funnel. A more complicated ground surface box-trap type which is protected from carrion feeding vertebrates and weather influences was described by SHUBECK (1976). The use of these pitfall traps in ecological studies, as in studies of succession or associations of decomposers with stages of decomposition, is problematic because many factors which play an important role in decomposition processes are influenced (soil moisture, rain, sunshine, access of soil fauna and decomposers, etc.).

PUTMAN (1978) used a trap made from two plastic plant pot drip-trays (one of diameter 23 cm, one of 15,5 cm) bonded together with contact adhesive and with a central disc removed. The carrion bait was put on the soil surface in the centre of the trap sunk into the ground and was protected with a wire-mesh cage. The trap proposed in this paper is based on the principle of the Putman's trap with possibilities for experimental isolation of the carcass from selective arthropods and observations of productivity, for example, of necrophagous Diptera or Coleoptera in natural conditions.

* Present address: Koblovská 93, CZ-71100 Ostrava 2, Czech Republic

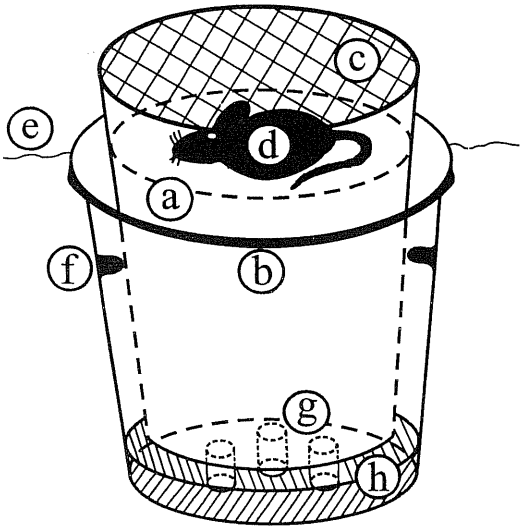

Fig. 1. Schematic diagram of the trap. a – internal vessel; b – external vessel; c – net; d – carrion bait; e – soil surface; f – rubber stabiliser; g – plastic pads; h – preservative solution.

Construction and installation of the trap

The trap was constructed from commercially available parts. The trap was based around two modified plastic garden vessels: the external width of the bottom outlet was 20 cm diameter and the upper outlet was 25 cm diameter (20 cm deep); the internal width of the bottom outlet was 15 cm diameter and the upper outlet was 20 cm in diameter (25 cm deep). The handles of the vessels were removed and the internal vessel was cut down such that the external one was 10 cm taller after installation. Three plastic pads (5 cm tall) were fixed to the bottom of the external vessel and three rubber stabilisers (2 cm tall) were fixed to its upper third. The lip of the internal vessel was protected by a net, in the basic version with a meshes diameter of 1.5 cm. The design of the trap is shown in Fig. 1.

The traps were installed by burying the external vessel in the ground with the lip flush with the soil surface. The internal vessels were filled by soil with the surface flush with the soil surface around the trap. The bait (carcass) was placed on the soil surface in the internal vessels and fixed on the pieces of metal net (for easy servicing i.e. during weighing). The external vessels were filled with a preservative solution (3–5 cm), with detergent.

Use and modifications

The trap can be easily modified for selective isolation of various groups of arthropods. The lip of the internal vessels can be protected by the net using a different mesh diameter. This net isolates the carcass from those groups which play roles in decomposition processes or the predation of decomposers. For example, the net with a mesh diameter of 5 mm isolate the carrion from carrion beetles (Silphidae); net with a mesh diameter < 1 mm isolates almost all groups important in decomposition – thus it can be used for comparison of decomposition processes with and without the presence of arthropod decomposers. The same net can also be used to observe the productivity of necrophagous Diptera without predation from other necrobionts (such as Staphylinidae, Histeridae) and parasites (Hymenoptera).

The traps were successfully tested in a year long research of arthropod succession during the decomposition of a rodent carcass and in experiments isolating various groups of decomposers (KOČÁREK, in prep.). The research was conducted in three one-month periods during which the carcass was weighed daily and the arthropods removed from the traps. The traps were very resistant to mechanical wear and the influence of natural conditions.

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New records of fungus gnats (Diptera, Mycetophilidae) from Slovakia

Jan ŠEVČÍK*

Department of Zoology, Natural Science Faculty, Palacký University, Tř. Svobody 26, CZ-77146 Olomouc, Czech Republic; tel.: + 420 68 5222 451, fax: +420 68 5225 737, e-mail: sevcikjan@hotmail.com.

In the recent check list by KOŠEL et al. (1997), 221 species of fungus gnats were reported from Slovakia. Further 14 species were added by ŠEVČÍK (1999) and ŠEVČÍK & MARTINOVSKÝ (1999). In this report, records of 20 additional species from Slovakia are presented. If not mentioned otherwise, all specimens were collected using a Malaise trap by M. Kozánek (Bratislava) and are deposited in the author's collection. Data on the distribution are given mostly according to HACKMAN et al. (1988).

Megalopelma nigroclavatum (Strobl, 1910)
Material examined: N Slovakia, Belianske Tatry Mts, Javorina env., Široká dolina valley (6786 = grid reference number of the Databank of the Slovak fauna), 25 July, 1992, 1 ♂. Distribution: Holarctic region.

Ectrepesthoneura pubescens (Zetterstedt, 1860)
Material examined: C Slovakia, Veporské vrchy Mts, Hriňová env. (7483), 27 June, 1995, 1 ♂; W Slovakia, Malé Karpaty Mts, Sološnica env. (7569), 7 July, 1994, 1 ♂. Distribution: W and N Europe. Recently recorded by ŠEVČÍK (1999) from the Czech Republic.

Docosia carbonaria Edwards, 1941
Material examined: SW Slovakia, Malé Karpaty Mts, Devín env., Devínska Kobyla NR (= Nature Reserve) (7867), 12–24 Apr., 1994, 2 ♂♂; W Slovakia, Považský Inovec Mts, Lúka env., Ihelník NR (7373), 25 Apr.–3 May, 1999, 1 ♂. Distribution: W and N Europe.

Docosia diutina Plassmann, 1996
Material examined: SW Slovakia, Malé Karpaty Mts, Devín env., Devínska Kobyla NR (7867), 12–18 Apr., 1994, 1 ♂; W Slovakia, Považský Inovec Mts, Lúka env., Ihelník NR (7373), 18–25 Apr., 1999, 1 ♂, 25 Apr.–3 May, 1999, 2 ♂♂. The holotype deposited in Zoologische Staatssammlung (München, Germany) has been studied to confirm the identity of this species. Distribution: Austria.

Docosia fuscipes (von Roser, 1840)
Material examined: W Slovakia, Považský Inovec Mts, Lúka env., Ihelník NR (7373), 18–25 Apr., 1999, 1 ♂. Distribution: Europe.

* Present address: Jan Ševčík, Horymírova 2912/104, CZ-70030 Ostrava 30, Czech Republic