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Short communication

Development of a modified aspirator for collecting insects

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Abstract

Mass and laboratory rearing of insects is a key component of several integrated pest management strategies. Indeed, aspirators were widely used in the past to collect malaria vectors. A car vacuum cleaner, which has been modified into an insect aspirator, is proposed for the capture of adults of *Ectomyelois ceratoniae* (Lepidoptera: Pyralidae) for biological experiments. It is powered by a 6 volts adapter transformer or by four 1.5 volt batteries. It is safe and effective to use. This device allowed to collect an average of 10.47 adults mn^{-1}. Also, based on visual observations, moths were apparently unharmed as they were mobile and population levels increase rapidly following infestation. Although initially designed for use with moths, this device might be used for collecting other small insects such as parasitoids of moths (*Bracon hebetor* Say and *Phanerotoma flavitestacea* Fischer). Consequently, the present aspirator and after further improvements, will allow the increase of the size of experiments on toxicity and other tests. Because of its portability, it will also permit efficient collection of wild insects in fields.

Key words: Aspirator, Pyralidae, Collecting methods, Toxicity tests.

Résumé

L'élevage en masse et en laboratoire des insectes est un élément clé de plusieurs stratégies de lutte intégrée contre les ravageurs. En effet, les aspirateurs étaient largement utilisés dans le passé pour collecter les vecteurs du paludisme. Un aspirateur de voiture a été transformé en aspirateur d'insectes. Il est proposé pour capturer des adultes d'*Ectomyelois ceratoniae* (Lepidoptera: Pyralidae) pour des expériences biologiques. Il est alimenté par un transformateur adaptateur de 6 volts ou par quatre piles de 1,5 volt. Il est sûr et efficace à utiliser. Cet appareil permettait de collecter en moyenne 10,47 adultes mn^{-1}. De plus, d'après les observations visuelles, les adultes sont apparemment indemnes car ils sont mobiles et les niveaux de population augmentent rapidement après l'infestation. Bien qu'initialement conçu pour être utilisé avec les adultes de la pyrale, ce dispositif pourrait être utilisé pour collecter d'autres petits insectes tels que les parasitoïdes (*Bracon hebetor* Say et *Phanerotoma flavitestacea* Fischer). Par conséquent, l'aspirateur actuel et après de nouvelles améliorations, va permettre d'augmenter la taille des expériences sur la toxicité et d'autres tests. En raison de sa portabilité, il permettra également une collecte efficace des insectes sauvages dans les champs.

Mots-clés : Aspirateur, Pyralidae, Méthodes de collecte, Tests de toxicité.

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1. Introduction

Mass and laboratory- rearing of insects is a key component of several integrated pest management strategies (Sørensen *et al*., 2012). In fact, this operation starts compulsory by collecting insects for biological experiments which usually can be done manually by simply catching insects with hands (sedentary or slow-moving arthropods) and putting them into some type of jar. As many insects and arachnids can fly, bite or sting which makes collecting hard and sometimes dangerous. Indeed, aspirators were widely used in the past to collect malaria vectors (Crans, 1989). They were originally developed to use mouth suction (Psota, 1916), they are also called 'pooter' and they are useful for collecting small specimens that need to be kept alive (Millar *et al*., 2000). However, some insects exude toxic or unpleasant odors when disturbed and the filters on the suction tubes will not exclude them (Upton and Mantle, 2010). Thus, different models of aspirators manually operated or using powered suction were developed since 1930 to protect workers from harmful inhalation of dust, insect parts, or pathogens which can pose a health hazard (Lim and Lim, 2008; Aldridge, 2012).

2. Apparatus description:

The present device, the "Adaptive Insect Aspirator" (AIA) was adapted to avoid the high prices of commercial aspirators and making capture of date moth adults easier and efficient without damaging the collected insects , and it saves considerable time. In fact, we adapted a secondhand car vacuum cleaner weighing 692 grams into insect aspirator for use in emergence chamber. It's connected to a removable collection vial (water bottle) by plastic tubes of 7 mm diameter and has an overall length of 36 cm when fully assembled (Figure 01). A piece of fine mesh was put on the tube leading to the device to prevent captured moths getting sucked into the aspirator. It's powered by a transformer that converts 220 volt AC (alternate current) into 6 volts DC (direct current). The transformer comes with a 89 cm long cord. It can be also powered by four batteries of 1.5 V.

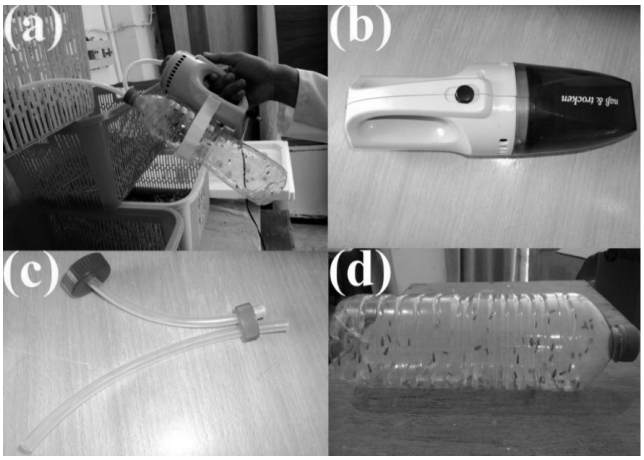

Figure 01: (a): fully assembled insect aspirator, **(b)**: car vacuum cleaner, **(c)**: plastic tubes, **(d)**: bottle containing collected adults.

3. Efficacy

To assess the efficacy of this aspirator, we compared the mean number of adults captured by the aspirator and manually (3 repetitions) by using a t test for equal variance (Spss, 20). Difference between two means was significant ($t = 9.39$, $df = 4$, $P<0.05$). In fact, using the apparatus allowed collecting an average of 10.47 adults mn^{-1} whereas 5.33 adults mn^{-1} individuals were captured with manual collection. Based on visual observations, moths are apparently undamaged, as they are mobile and population levels increase rapidly following infestation on date flour.

Although initially designed for use with moths, this device may be used for collecting other small insects such as parasitoids of moths (*Bracon hebetor* Say and *Phanerotoma flavitestacea* Fischer). Besides, the aspirator costs almost 15 dollars which is cheaper than commercially available portable aspirators. The AIA will permit to researchers to increase the size of experiments on insecticide efficacy and other tests such as studies on allelochemicals in plant-insect interactions. Because of its portability, it will also permit efficient collection of wild insects in fields.

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