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FEEDING CHAMBER FOR *MYZUS PERSICAE* CULTURE (HEMIPTERA: APHIDIDAE)

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Aphids are phytophagous insects and constitute a major worldwide problem for crops because of their rapid growth and ability to spread. Therefore, these insects are considered to be among the most destructive pests affecting agricultural economies. Aphids may attach to both sides of the host leaf and feed on phloem tissue. As a consequence, it is difficult to evaluate insecticides, plant extracts, or other types of control agents that should be ingested by these insects. However, the use of an artificial diet and an appropriate feeding system would facilitate testing under controlled conditions in the laboratory. Although some artificial diets (Mittler & Dadd 1964; Auclair 1965; Dadd & Krieger 1968; Febvay et al. 1988) and feeding systems (Wille & Hartman 2008; Sadeghi et al. 2009) have been evaluated for aphids with excellent results, their costs are often high.

In this report, we propose a feeding chamber for *Myzus persicae* (Sulzer) (Hemiptera; Aphididae), that is simple, rapid, and inexpensive to construct. Moreover, it is practical, mechanically stable, and suitable for short-term studies. A chamber can be used several times and the system facilitates observations of probing-activity, growth, and other aspects of the aphid's behavior within its cage. We compared the percentage mortality of *M. persicae* in our feeding system with that in a feeding chamber designed for *Bemisia argentifolii* Bellows & Perring (Hemiptera: Aleyrodidae) (Jancovich et al. 1997). Our feeding chamber should prove useful in studies to test the effects of growth factors, nutrients, hormones, and chemical compounds on aphids, and it also might be used for other sucking insects.

The feeding chamber (Figs. 1 and 2) was constructed with 2 plastic tumblers of double-nought number [40 × 20 mm (Envases Cuevas, Mexico)] (Fig. 1a), one of which was open on both sides (Fig. 1b), 2 pieces of Parafilm, one of which was larger and more narrow than the other (Fig. 1c), a rubber band (Fig. 1d) and a piece of thin fabric (Fig. 1e). All the materials should be sterilized by UV light. The food sachet was produced under sterile conditions. A 2,500-µL aliquot of the artificial diet was pipetted onto the plastic tumbler and covered with the Parafilm that was stretched across the opening at the top of the plastic tumbler. The edge of the Parafilm was then pressed firmly against the plastic tumbler so that it was open on both sides, and a strip of Parafilm was placed over the sealed edges of the sachet around the edge of the second plastic tumbler. Aphids were then placed on top of the diet sachet with a camel's hair brush and covered with a piece of thin fabric, which was affixed firmly with the rubber band. Finally, the feeding chamber was inverted and placed on a plate. The humidity was maintained by placing a piece of wet cotton fabric on the bottom of the plate (Fig. 2).

A standard diet for *B. argentifolii* (Jancovich et al. 1997) was used as the basic diet to test our feeding chamber. The basic diet consisted of 5% yeast extract in 30% sucrose in distilled water. After adding all the components, the pH was adjusted to 7 with 5M KOH and the preparation was autoclaved sterilized.

Native populations of *M. persicae* were collected in Morelos, Mexico, and transferred to the laboratory. They were subjected to a quarantine to eliminate parasitoids. All stages of the insects were maintained on chili plants (*Capsicum annuum* L. var. *aviculare* (Tepin); Solanales: Solanaceae). The ability of the aphids to probe and feed through Parafilm was evaluated in each feeding chamber. The mortality was recorded at 12, 24, 48, and 72 hours and the mortality percentage was analyzed by Student's *t* test.

We observed that the aphids more easily inserted their proboscises through the Parafilm membrane than through a Teflon membrane (OSMONICS INC. Tefsep, Teflon, Laminated, 1.0 Micron, 47 mm). Furthermore, the mortality of the former was below 10% at 72 hours (Table 1), while that of the latter was about 45%. We observed offspring and exuviae during the bioassay. Other systems we tested were significantly less efficient, according to Student's *t* test and to our observations during the bioassay.

Assays with aphids can be difficult and are often unreliable and may involve unstable devices. We attempted to assemble an improved feeding chamber for bioassays involving aphids fed with an artificial diet. The advantages of this feeding

Fig. 1. Material for the assembly of a feeding chamber for *Myzus persicae.* The feeding chamber was constructed of the following items: 2 plastic tumblers of double-nought number [40 × 20 mm] (1a), one of which is open on both sides (1b), 2 pieces of Parafilm, one of which is larger and more narrow than the other (1c), a rubber band (1d) and a piece of thin fabric (1e).

Fig. 2. Assembled *Myzus persicae* feeding chamber.

system in comparison with the previous techniques reported by Mittler & Dadd (1964), Auclair (1965), Dadd & Krieger (1968), Febvay et al. (1988), Wille & Hartman (2008), and Sadeghi et al (2009) include its relative simplicity, inexpensive construction, and easy implementation. The results obtained with this technique indicated that each aphid is able to survive and reproduce in the feeding chamber with the diet proposed by Jancovich et al. (1997).

TABLE 1. PERCENTAGE MORTALITY OF *MYZUS PERSICAE* IN THE FEEDING CHAMBERS TESTED.

Feeding chamber	Mortality percentage at 72 hours
Plastic tumbler	8.3 ± 4.40*
Teflon membrane	45 ± 8.66

Mean ± (standard error). *denotes a significant difference according to Student's t test ($\alpha = 0.05$).

SUMMARY

Some feeding systems have been previously developed for aphids with excellent results, nevertheless, their costs are often high and they are difficult to construct. We developed a feeding chamber for *Myzus persicae* that is simple, rapidly assembled, and inexpensive. The system consisted of 2 plastic tumblers, one of which was covered with stretched Parafilm and the other with a piece of thin fabric, the diet consisted of 5% yeast extract and 30% sucrose in distilled water. We observed offspring and exuviae during the bioassay, furthermore, the mortality was below 10% at 72 hours. The results obtained with this feeding system indicated that aphids were able to survive and reproduce. This feeding chamber should prove useful

in studies to test the effects of growth factors, nutrients, hormones, and chemical compounds on aphids, and it also might be used for other sucking insects.

Key Words: Aphid; survive; reproduce

Resumen

Previamente se han desarrollado algunos sistemas de alimentación para áfidos con excelentes resultados, sin embargo, los costos son elevados y su elaboración es complicada. Nosotros desarrollamos una cámara de alimentación para *Myzus persicae*, la cual es simple, económica y fácil de ensamblar. El sistema consiste de dos vasos de plástico, uno de ellos cubierto con parafilm y el otro con organza, la dieta consiste de extracto de levadura al 5% y sacarosa al 30% disueltos en agua destilada. Durante los bioensayos se observó la presencia de exuvias y de ninfas de primer estadio de desarrollo, además a las 72 horas la mortalidad fue menor al 10%. Los resultados obtenidos con esta técnica, indican que los áfidos son capaces de sobrevivir y reproducirse. Este sistema de alimentación puede ser una herramienta muy importante en estudios donde se evalúen los efectos de factores de crecimiento, nutrientes, hormonas y compuestos químicos en áfidos, además, también podría utilizarse con otros insectos chupadores.

Palabras Clave: Pulgón; sobrevivir; reproducirse

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