COMPARISON OF GLASS AND PLASTIC McPHAIL TRAPS IN THE CAPTURE OF THE SOUTH AMERICAN FRUIT FLY, *ANASTREPHA FRATERCULUS* (DIPTERA: TEPHRITIDAE) IN BRAZIL

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McPhail traps have been used throughout the new world for many decades to detect and monitor for fruit flies of genus *Anastrepha*. Since no sexual lures or host attractant have been developed for *Anastrepha* spp., a food lure containing protein hydrolysate, torula yeast and carbohydrate has been used for bait in McPhail traps (Lopez & Hernandez Bacerril 1967, Lopez et al. 1971, Malavasi & Morgante 1981). Many modifications in the original design of McPhail have been proposed in recent years but none have substantially increased effectiveness. The traditional glass McPhail has two problems. First, it is expensive when compared with polyethylene made traps, and second, it is fragile, heavy and difficult to handle. Its lifetime is short compared with other models. Under extreme conditions, for example when the temperature reaches over 40°C inside the trap, spontaneous breakage is common.

In regions where large *Anastrepha* spp. monitoring and detection programs have been conducted for certification of fruit fly-free areas, the large number of traps required is a major expense. In an attempt to replace the original glass McPhail trap with a more economical plastic model of identical shape and similar size, we tested the efficiency of both models in trapping the South American fruit fly, *Anastrepha fraterculus* (Wiedemann).

The experiments were conducted in a non-commercial grove, where previous studies had determined large populations of *A. fraterculus* were found (Malavasi & Morgante 1980, Amaral 1987). The experiment was conducted in Itaquera, 30 Km east São Paulo city where there are more than 15 species of *Anastrepha* host trees. Traps were suspended in guava (*Psidium guajava*), Surinam cherry (*Eugenia uniflora*) and loquat (*Eryobotrya japonica*) during 8 consecutive weeks in March-May 1989.

Two traps models were tested. The traditional McPhail glass trap was made in Mexico, and the plastic model made in Brazil. Both were similar in shape, the glass trap with 19 cm diameter and the plastic trap with 17 cm diameter. Both traps were the same height (14 cm) and had a similar entrance hole (glass 4.5 cm, plastic 4.0 cm diameter). All traps were baited with 250 ml of 3% protein hydrolysate solution with borax added to prevent decomposition. Two traps (one of each model) were placed in opposite quadrants of each tree. Traps were hung at 1.7 to 2.0 m high, in the peripheral canopy with a minimum of 2.0 m between each trap. Trap positions were alternated, the bait was changed and the adults were collected and counted weekly.

Ten sets of the two traps were hung up in 5 loquat, 3 guava, 1 grumixama and 1 Surinam cherry trees. Statistical comparisons of means were made with t tests, and by analysis of variance (ANOVA) (SAS Institute 1987).

A total of 7,148 *A. fraterculus* flies were caught in the grove. No statistical difference between glass and plastic traps was observed using t test analysis ($F = 1.18$; $df = 15$; $p > 0.7450$) (Table 1). There were no significant differences in the sex ratios of the trap catches between trap models. More females were captured than males. Females may require more frequent feeding than males and so may be captured in greater numbers in food-baited traps (Davis et al. 1984).

TABLE 1. NUMBER OF *ANASTREPHA FRATERCULUS* CAPTURED IN MCPHAIL TRAPS IN ITAQUERA, S. PAULO, BRAZIL.

Trap type	Total catch			Mean ± SE flies captured/trap/week[1]		
	♂	♀	total	♂	♀	Total
glass	1335	1941	3296	16.9 ± 12.6a	24.3 ± 16.6a	41.2 ± 28.9a
plastic	1687	2165	3852	21.1 ± 15.3a	27.1 ± 17.1a	48.2 ± 31.8a

[1]Means in the same column followed by the same letter are not significantly different at the 5% level by paired t test.

There were sharp variations in weekly captures related with host availability, climatic conditions and generation time. The range was 102 to 845 *A. fraterculus* for glass traps and 98 to 915 for plastic traps per week. There was no significant difference between mean number of flies captured in each trap model throughout all weeks, according to an analysis of variance ($F = 2.83$; $df = 3$; $p > 0.0305$). The importance of weekly variation in trap catch affecting the results of trap efficiency tests was pointed out by Mason & Baranowski (1989).

Nakagawa et al. (1975) designed a trap made from a plastic tube with 8 lateral holes as a substitute for the McPhail trap in Hawaii in monitoring Oriental and melon fruit fly. However, that trap, as well as several other trap designs, was significantly less effective in capturing Caribbean fruit fly, *Anastrepha suspensa* in Florida (Witherell 1982). In Brazil, small scale experiments for *A. fraterculus* have been conducted using different designs and kinds of material (Amaral unpublished data). However, when compared with standard McPhail trap, most are less effective in capturing *A. fraterculus*.

Our results have demonstrated that the plastic trap is as effective as glass in capturing wild *A. fraterculus*. When cost is an important factor as in large detection programs, the use of plastic McPhail traps will be more economical. Studies on additional fruit fly species should be done to determine the effectiveness of plastic traps in other situations.

The technical assistance of Lourivaldo dos S. Pereira is greatly appreciated. We thank John Sivinski (IABBBRL, ARS, USDA, Gainesville, Florida) for reviewing an earlier draft of this manuscript; João Morgante (Dep. Biologia, USP) for his suggestions and Jose Claudio Giusti for permitting the use of his orchard. This study was supported by grants from FAPESP to MDB and from CNPq to PMA and AM.

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