# EVALUATION THE EFFICIENCY OF LOCAL TRAP DESIGN FOR TRAPPING *ZEUZERA PYRINA* IN EGYPT

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***Abstract***

In Egypt, the leopard moth *Zeuzera pyrina* (Lepidoptera: Cossidae) causes economic damage in fruit orchards. The effectiveness of different locally made trap designs, i.e. shape, size, height, color, and distance between traps were evaluated in severe infested pear orchard at Tokh district, Qalubia governorate throughout 7 moth's activity seasons (1996 to 2000). The relative effectiveness, the economic cost and the applicability were highly considered. Data concluded the following results:

**1.Trap shape:** Out of 8 commercially locally made and imported traps, transparent carbonated water bottle was the preferred and best trap shape for *Z. pyrina* under the Egyptian conditions. It was less expensive, easier to construct, use, store and transport, required less preparation and handling time in the field and had large capacity available for capturing mass numbers of males. However, large opaque ice cream cups, transparent or opaque mineral water or petroleum oil or vegetable oil bottles, or buckets, locally made or imported cardboard pyramid sticky traps, locally made or imported funnel traps were less effective and highly cost.

**2.Trap size:** out of 4 trap sizes (0.5, 1, 1.5 and 2 liters), 2 liters size was the most efficient trap.

**3.Trap height:** Out of 6 different heights (0, 0.5, 1, 1.5, 2 and 2.5 meters), the optimum trap height was 1.5 meters above the ground level.

**4.Trap color:** Out of 7 trap colors (yellow, red, white, blue, green, black and transparent), the optimum trap color was yellow but transparent was economical the best with almost equal effectiveness.

**5.Trap distance (numbers of traps per feddan):** Out of 4 trap distances (5, 10, 15 and 20 meters apart), represented 168, 42, 18 and 10 traps per feddan, the maximum trapping distance for trapping *Z. pyrina* was 20 meters apart (10 traps per feddan).

From all the previous results, and considering the economical and applicable aspects, 2 liters size transparent carbonated water bottle traps that were suspended on trees at 1.5 meters above the ground and placed at 20 meters between trees, were the optimum trap design and the best one for trapping *Z. pyrina*.

## INTRODUCTION

*Zeuzera pyrina* is one of the most destructive wood boring insect pests in fruit orchards in Egypt. Larvae bore tunnels inside the tree stem and branches and consume large amount of wood, reducing the production, causing weakness and finally death of trees.

To eliminate the environmental pollution with insecticides and magnify the role of the natural enemies, safe alternative means of control such as mass attraction with sex pheromone were used. The aim of this study was to increase the effectiveness of different trap designs (shape, size, height, color and distance between traps). The relative effectiveness, as well as the economic cost and the applicability were highly considered.

The present investigation is pioneer in Egypt as there were no other attempts to evaluate the effectiveness of different designs in trapping *Z. pyrina* in fruit orchards. However, some attempts were conducted in Italy such as Pasqualini *et al.* (1983), Pasqualini *et al.* (1992), Vettori and Pasqulaini (1997), Natale and Pasqualini (1999), Pasqualini *et al.* (1999) and Maini *et al.* (2000), on trap shape, height, and distance.

## MATERIALS AND METHODS

Experiments on *Z. pyrina* were conducted in an infested pear orchard (11 feddans and 9 years old) located at Tokh district, Qalubia governorate throughout 1996 to 2000 moths activity seasons.

**1. Trap shape experiments:** Considering the economic aspects, the following 8 different local and imported trap shapes were evaluated for its efficiency in trapping *Z. pyrina* during 1996 peak season of moths activity (June-August).

1.1. Large empty opaque ice cream cups, 10 cm high and 15 cm wide. The cup cover was fixed 3 cm above the cup by a wire. The inner surface of the cup was lined with a sticky sheet (Figure 1, a).

1.2. Empty transparent mineral water or carbonated water bottles, 25 cm high and 5 cm wide in the upside down position. Three windows were artificially made in the upper third of the bottle with a polyethylene bag fixed in its lower opening (its neck) (Figure 1, b).

1.3. Empty opaque petroleum oil or vegetable oil bottles, 25 cm high and 5 cm wide. Three windows were made as in the previous item no. 2 (Figure 1, c).

1.4. Empty opaque petroleum oil buckets, 25 cm high and 10 x 20 cm base wide x length. Six windows were artificially made in the first third of the bucket (two on each wide side and one on each narrow side) (Figure 1, d).

1.5. The locally made of cardboard pyramid sticky traps (Figure 1, e).

1.6. The funnel traps, locally made of hard plastic with polyethylene bags fixed at its end (Figure 1, f).

1.7. The imported recommended pyramid sticky traps (Traptest) (Figure 1, g).

1.8. The imported funnel traps (Mastrap) (Figure 1, h).

**2. Trap size experiments:** As transparent carbonated water bottles were the best trap shape, therefore, bottles of 0.5, 1, 1.5 and 2 liters sizes were evaluated for its efficiency in trapping *Z. pyrina* moths during 1997-peak season of moths' activity (June-August).

**3. Trap height experiments:** As transparent carbonated water bottles with 2 liters size were the best trap shape and size, therefore, the efficiency of 6 traps heights (zero "on the ground", 0.5, 1, 1.5, 2 and 2.5 meters above the ground level) were evaluated in trapping *Z. pyrina* males during 1998 peak season of moths activity (June-August).

**4. Trap color experiments:** Yellow, red, blue, green, black, and, transparent bottles (transparent carbonated water bottles, 2 liters size, suspended on trees at 1.5 m above the ground) were evaluated for their efficiency of capturing *Z. pyrina* males during 1999 peak season of moths' activity (June-August).

**5. Trap distance experiments:** The efficiency of trap distances for capturing *Z. pyrina* males were evaluated during 2000 peak season of moths' activity (June-August). Transparent carbonated water bottles, 2 liters size, suspended on trees at 1.5 m above the ground were distributed at 5, 10, 15 and 20 meters apart (168, 42, 18 and 10 traps per feddan, respectively).

Pheromone traps were baited with a hard polyethylene vials, hanged in the middle of the upper part of each container as shown in Figure (1) and saturated with a blend of the following isomers active ingradiant (a.i.) of *Z. pyrina* sex pheromone: 1.50 mg a.i. of E-2, Z-13-octadecadien-1-ol acetate (E Z 2, 13-18:Ac) plus 0.08 mg a.i. of E-3, Z-13-octadecadien-1-ol acetate (E Z 3, 13-18:Ac). Ten traps of each shape, size, height, color and distance were randomly distributed on the trees (considering each trap as a replicate).

Trapped males were collected, counted and the sticky sheets or polyethylene bags of traps were replaced at weekly intervals. The hard polyethylene vials were replaced at 6-week intervals. Analysis of variance (F test) and least significant differences (LSD) were used for differentiation between treatments.

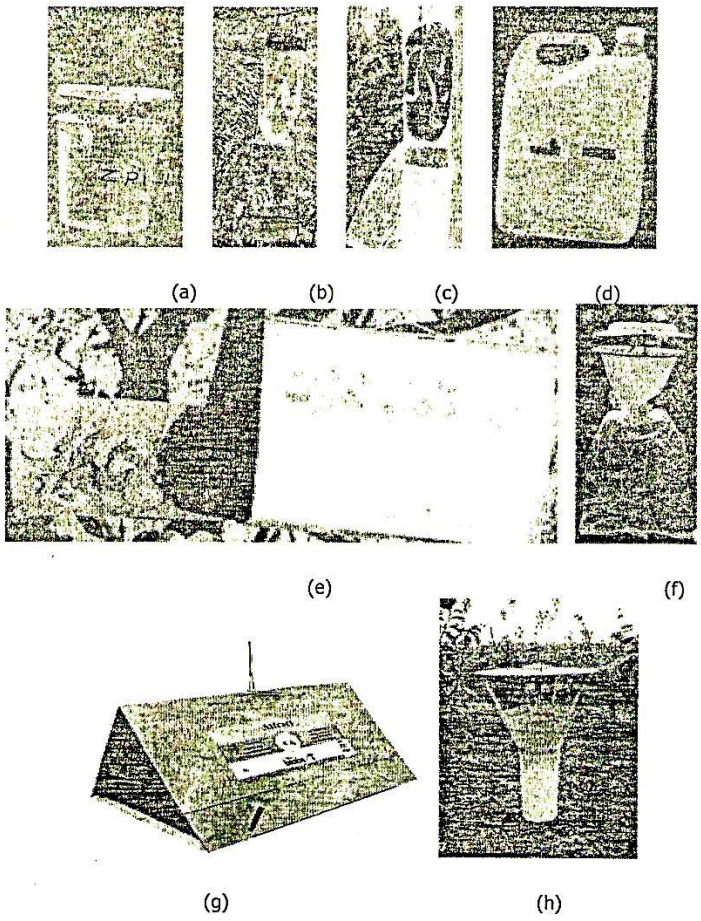


Figure 1. Locally made trap shapes: (a) ice cream cup, (b) transparent carbonated water bottles, (c) opaque oil bottles, (d) petroleum oil buckets, (e) sticky trap and (f) funnel trap and imported trap shapes: (g) sticky trap and (h) funnel trap.

## RESULTS AND DISCUSSION

As imported pheromone traps are very expensive, as well as trap shape, size, height, color and distance between traps are limiting factors of increasing the efficiency of trap attraction, several local and imported trap designs were evaluated for their comparative efficiency for trapping *Z. pyrina* moths considering the economic and applicable points of view.

### 1. Trap shape experiments:

Table (1) clarified that the least moths capture was in sticky pyramid traps either imported or locally made (0.57 ± 0.33 and 0.50 ± 0.33 males / trap / week, respectively). Ice cream cup sticky traps captured 0.66 ± 0.51 males / trap / week. Imported and locally made dry funnel traps captured the maximum number of moths (1.10 ± 0.68 and 0.82 ± 0.55 males / trap / week, respectively). However, these two trap shapes were favorable to be thrift or lost by children. Dry carbonated water bottle or dry oil bucket traps also captured large numbers of moths where the opaque carbonated water bottle, transparent carbonated water bottle and opaque bucket trapped 0.72 ± 0.59, 0.80 ± 0.70 and 0.86 ± 0.73 males / trap / week, respectively.

Statistical analysis (Table 6) indicated that insignificant differences were recorded between the mean numbers of catches in the 8 different trap shapes. Imported funnel trap was the most efficient shape with insignificant differences with the opaque bucket, local funnel, transparent bottle, opaque bottle and ice cream cup traps. Local or imported sticky pyramid traps were significantly the least, due to the dusty period of "Khamasien". This dust together with the trapped moths covered the sticky material (Stikem) and spoil the sheet and moths land and took off safely. Accordingly, from the statistical, economic, and applicable points of view, the locally made transparent carbonated water bottle was the best shape under the Egyptian conditions.

This trap shape almost priceless, easier to construct, prepare, handle, use, store and transport, and had more surface area (polyethylene plastic bags) available for capturing mass numbers of males than sticky traps.

### 2. Trap size experiments:

As shown in Table (2), the mean number of trapped males during the peak activity season of 1997 (June-August) in different trap sizes (0.5, 1, 1.5 and 2 liters) was ascendingly increased as the total bottle size increased. The least numbers of males / trap / week (0.56 ± 0.29) were captured in 0.5-liter size bottle (the smallest size). While the maximum numbers were captured in 2 liters size bottle (the biggest size) showing 1.39 ± 0.74 males / trap / week. The rest trap bottles sized 1 and 1.5 liters were intermediate (0.92 ± 0.60 and 1.18 ± 0.73 males per trap per week, respectively).

Table 1. Mean numbers of *Z. pyrina* male moths trapped in different trap shapes in a pear orchard at Qalubia governorate during 1996 season.

| Date of inspection | Mean no. of male moths per trap caught in different trap shapes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Ice cream cup | Trans-parent bottle | Opaque bottle | Opaque bucket | Local sticky pyramid | Imported sticky pyramid | Local funnel | Imported funnel |
| May 30 | Suspending traps | | | | | | | |
| June 6 | 0.6 | 0.8 | 0.5 | 0.7 | 0.5 | 0.7 | 0.9 | 1.1 |
| June 13 | 0.2 | 0.3 | 0.1 | 0.4 | 0.2 | 0.3 | 0.6 | 0.9 |
| June 20 | 0.5 | 0.4 | 0.4 | 0.6 | 0.1 | 0.2 | 0.5 | 0.4 |
| June 27 | 0.4 | 0.2 | 0.7 | 0.3 | 0.3 | 0.5 | 0.8 | 1.0 |
| July 4 | 0.5 | 0.2 | 0.3 | 0.5 | 0.7 | 0.6 | 0.5 | 0.8 |
| July 11 | 0.6 | 0.7 | 0.5 | 0.6 | 0.5 | 0.4 | 0.7 | 1.0 |
| July 18 | 0.3 | 0.6 | 0.7 | 0.9 | 0.3 | 0.5 | 0.4 | 1.2 |
| July 25 | 1.4 | 2.0 | 1.8 | 1.7 | 0.9 | 0.8 | 1.1 | 1.4 |
| August 1 | 2.0 | 2.4 | 2.1 | 2.8 | 1.3 | 1.5 | 2.3 | 3.1 |
| August 8 | 0.9 | 1.4 | 0.9 | 1.5 | 0.4 | 0.7 | 1.5 | 1.5 |
| August 15 | 0.4 | 0.5 | 0.7 | 0.6 | 0.5 | 0.3 | 0.6 | 0.8 |
| August 22 | 0.5 | 0.6 | 0.3 | 0.4 | 0.6 | 0.5 | 0.3 | 0.5 |
| August 29 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.4 | 0.5 | 0.6 |
| Total | 8.6 | 10.4 | 9.3 | 11.2 | 6.5 | 7.4 | 10.7 | 14.3 |
| Average | 0.66 ±0.51 | 0.80 ±0.70 | 0.72 ±0.59 | 0.86 ±0.73 | 0.50 ±0.33 | 0.57 ±0.33 | 0.82 ±0.55 | 1.10 ±0.68 |
| | ab | ab | ab | ab | b | b | ab | a |

Table 2. Mean numbers of *Z. pyrina* male moths trapped in different trap sizes in a pear orchard at Qalubia governorate during 1997 season.

| Date of inspection | Mean no. of male moths per trap caught in different trap sizes | | | |
|---|---|---|---|---|
| | 0.5 liter | 1 liter | 1.5 liters | 2 liters |
| May 29 | Suspending traps | | | |
| June 5 | 0.2 | 0.5 | 0.7 | 0.6 |
| June 12 | 0.6 | 0.4 | 0.9 | 1.3 |
| June 19 | 0.3 | 0.6 | 0.8 | 1.4 |
| June 26 | 0.7 | 0.8 | 1.4 | 0.9 |
| July 3 | 0.5 | 1.1 | 1.5 | 1.1 |
| July 10 | 0.8 | 2.0 | 1.4 | 1.7 |
| July 17 | 0.4 | 1.3 | 0.8 | 1.3 |
| July 24 | 0.9 | 0.7 | 1.6 | 1.5 |
| July 31 | 1.2 | 2.2 | 3.1 | 2.6 |
| August 7 | 0.6 | 0.6 | 1.4 | 3.1 |
| August 14 | 0.4 | 1.0 | 1.2 | 1.0 |
| August 21 | 0.5 | 0.3 | 0.5 | 1.2 |
| August 28 | 0.2 | 0.4 | 0.1 | 0.4 |
| Total | 7.3 | 11.9 | 15.4 | 18.1 |
| Average | 0.56±0.29 | 0.92±0.60 | 1.18±0.73 | 1.39±0.74 |
| | b | ab | a | a |

Statistically, there were highly significant differences between the mean numbers of trapped moths in the four trap sizes (Table 6). However, insignificant differences were recorded between the mean numbers of caught moths in 1, 1.5 and 2 liters trap sizes. Accordingly, from the statistical and applicable points of view, 2 liters transparent carbonated water bottles were the most efficient trap size.

**3. Trap height experiments:**

Table (3) showed the relative efficiency of traps suspended at different heights (0.0, 0.5, 1.0, 1.5, 2.0 and 2.5 meters above the ground) during *Z. pyrina* moths activity season (June-August) of 1998. Data indicated that the maximum number of trapped males was at 1.5 meters high (1.49 ± 0.81 males / trap / week). Almost equal numbers were caught in traps at 1 meter high (1.44 ±0.69 males / trap / week). The average numbers of caught males were in traps at 2 and 0.5 meters high with 1.34 ± 0.85 and I.31 ± 0.54 males / trap / week, respectively. Lower numbers of males were captured in traps at 2.5 meters above the ground and the least numbers in traps placed on the ground surface (0 meter) where the respective numbers averaged 1.00 ± 0.72 and 0.90 ± 0.58 males / trap / week.

From the statistical point of view, insignificant differences which recorded between the mean numbers of trapped moths in traps suspended at different heights from those placed on the ground surface to those 2 meters height (Table, 3). It could be recommended that the optimum trap height for *Z. pyrina* was 1.5 meters above the ground

**4. Trap color experiments:**

The efficiency of 6 different colors (transparent, yellow, green, blue, red and black colors) was evaluated during *Z. pyrina* peak moths activity season of 1999 (June-August). Table (4) clarified that the highest number of males was captured with yellow traps (1.74 ± 1.01 males/ trap / week). Transparent and green traps aggregated a large numbers (1.23 ± 0.73 and 1.19 ± 0.91 males / trap / week, respectively). Less numbers (0.99 ± 0.62 and 0.84 ± 0.65 males / trap / week) were caught with blue and black traps followed by red traps (0.69 ± 0.51 males / traps / week).

Statistical analysis (Table 6) clarified that there were significant differences between the mean numbers of captured moths in different trap colors. Although yellow traps was superior in capture, yet insignificantly differed from transparent

Table 3. Mean numbers of *Z. pyrina* male moths trapped in different trap heights in a pear orchard at Qalubia governorate during 1998 season.

| Date of inspection | Mean no. of male moths per trap caught in different trap heights (in meters) | | | | | |
|---|---|---|---|---|---|---|
| | 0 | o.5 | 1 | 1.5 | 2 | 2.5 |
| May 28 | Suspending traps | | | | | |
| June 4 | 0.1 | 0.6 | 0.5 | 0.2 | 0.3 | 0.3 |
| June 11 | 0.7 | 0.5 | 0.6 | 0.8 | 0.7 | 0.4 |
| June 18 | 0.3 | 1.0 | 0.9 | 1.5 | 0.4 | 0.7 |
| June 25 | 0.8 | 0.8 | 1.5 | 1.4 | 1.6 | 0.5 |
| July 2 | 1.3 | 1.9 | 1.9 | 2.0 | 2.3 | 1.6 |
| July 9 | 0.9 | 1.3 | 1.8 | 1.9 | 1.1 | 0.7 |
| July 16 | 0.4 | 1.7 | 1.4 | 1.6 | 0.8 | 0.8 |
| July 23 | 1.7 | 1.8 | 1.9 | 2.2 | 2.5 | 1.5 |
| July 30 | 1.9 | 1.6 | 2.3 | 2.8 | 1.9 | 1.8 |
| August 6 | 1.5 | 2.0 | 2.5 | 2.4 | 2.7 | 2.6 |
| August 13 | 1.2 | 1.5 | 2.0 | 1.7 | 1.8 | 1.4 |
| August 20 | 0.6 | 1.7 | 0.9 | 0.4 | 1.0 | 0.3 |
| August 27 | 0.3 | 0.6 | 0.5 | 0.5 | 0.3 | 0.4 |
| Total | 11.7 | 17.0 | 18.7 | 19.4 | 17.4 | 13.0 |
| Average | 0.90 ±0.58 | 1.31 ±0.54 | 1.44 ±0.69 | 1.49 ±0.81 | 1.34 ±0.85 | 1.00 ±0.72 |
| | a | a | a | a | a | a |

and green traps. On the contrary, red, black and blue trap colors were significantly the least, yet insignificantly differed from green and blue traps. Accordingly, from the statistical, economical and applicable points of view, yellow traps were the most suitable but transparent was of equal effect in capturing *Z. pyrina* males.

**5. Trap distance experiments:**

The efficiency of 4 distances (5, 10, 15 and 20 meters apart) between traps was evaluated during *Z. pyrina* moths peak activity season (June-August) of 2000.

Table (5) indicated that traps distributed at 15 and 20 meters apart captured the maximum numbers of male moths showing 1.57 ± 0.84 and 1.58 ± 0.85 males / trap / week, respectively. Traps distributed at 10 meters apart between trees caught 1.25 ± 0.81 males / trap / week. The least average number of males was captured when traps were distributed at 5 meters apart showing an average of 1.02 ± 0.69 males / trap / week.

Statistical analysis (Table, 6) indicated that insignificant differences were recorded between the mean numbers of recaptured moths in traps distributed at 5 to 20 meters apart. According to statistical, economical and applicable points of view, 20 meters apart considered the optimum distance between traps.

Table 4. Mean numbers of *Z. pyrina* male moths trapped in different trap colors in a pear orchard at Qalubia governorate during 1999 season.

| Date of inspection | Mean no. of male moths per trap caught in different trap colors | | | | | |
|---|---|---|---|---|---|---|
| | Yellow | Trans-parent | Green | Blue | Red | Black |
| May 27 | Suspending traps | | | | | |
| June 3 | 0.3 | 0.1 | 0.2 | 0.0 | 0.0 | 0.1 |
| June 10 | 0.9 | 0.4 | 0.5 | 0.4 | 0.2 | 0.3 |
| June 17 | 1.4 | 0.9 | 0.7 | 0.5 | 0.3 | 0.2 |
| June 24 | 1.7 | 1.2 | 0.1 | 0.7 | 0.6 | 0.5 |
| July 1 | 2.5 | 1.6 | 1.3 | 0.9 | 0.9 | 0.8 |
| July 8 | 3.1 | 2.2 | 2.5 | 1.4 | 1.1 | 1.2 |
| July 15 | 3.2 | 1.9 | 2.0 | 1.6 | 1.3 | 1.7 |
| July 22 | 1.8 | 2.0 | 1.6 | 1.4 | 1.0 | 1.3 |
| July 29 | 2.4 | 1.7 | 2.9 | 2.3 | 1.8 | 1.6 |
| August 5 | 2.6 | 2.1 | 1.7 | 1.5 | 0.7 | 2.0 |
| August 12 | 1.9 | 0.8 | 1.2 | 0.8 | 0.4 | 0.7 |
| August 19 | 0.5 | 0.7 | 0.5 | 0.9 | 0.5 | 0.4 |
| August 26 | 0.3 | 0.4 | 0.3 | 0.5 | 0.2 | 0.1 |
| Total | 22.6 | 16.0 | 15.5 | 12.9 | 9.0 | 10.9 |
| Average | 1.74±1.01 | 1.23±0.73 | 1.19±0.91 | 0.99±0.62 | 0.69±0.51 | 0.84±0.65 |
| | a | ab | ab | b | b | b |

Table 5. Mean numbers of *Z. pyrina* male moths trapped in different trap distances in a pear orchard at Qalubia governorate during 2000 season.

| Date of inspection | Mean no. of male moths per trap caught in different trap distance (in meters) | | | |
|---|---|---|---|---|
| | 5 | 10 | 15 | 20 |
| May 27 | Suspending traps | | | |
| June 3 | 0.3 | 0.2 | 0.5 | 0.4 |
| June 10 | 0.4 | 0.5 | 0.9 | 0.8 |
| June 17 | 0.7 | 0.9 | 0.7 | 1.6 |
| June 24 | 0.8 | 1.5 | 1.6 | 1.3 |
| July 1 | 1.7 | 1.8 | 2.4 | 1.9 |
| July 8 | 1.6 | 2.3 | 2.1 | 2.6 |
| July 15 | 1.8 | 1.6 | 1.8 | 2.3 |
| July 22 | 1.5 | 1.4 | 1.9 | 1.5 |
| July 29 | 2.1 | 2.7 | 3.2 | 2.8 |
| August 5 | 1.4 | 1.9 | 2.5 | 2.7 |
| August 12 | 0.5 | 0.5 | 1.3 | 1.5 |
| August 19 | 0.3 | 0.6 | 0.8 | 0.5 |
| August 26 | 0.1 | 0.3 | 0.7 | 0.6 |
| Total | 13.2 | 16.2 | 20.4 | 20.5 |
| Average | 1.02±0.69 | 1.25±0.81 | 1.57±0.84 | 1.58±0.85 |
| | a | a | a | a |

These results somewhat are in agreement and sometimes disagree with the studies carried out in Italy. Pasqualini *et al.* (1992), Vettori and Pasqulaini (1997), and Maini *et. al* (2000) recommended funnel traps as effective in trapping *Z. pyrina* than sticky traps. However, Natale and Pasqualini (1999) stated that the best results were obtained using trunk pyramidal traps. Maini *et. al* (2000), Pasqualini *et al.* (1992) and Natale and Pasqualini (1999) recommended the positioning of traps over the canopy,

by about half a meter and 1 m above the foliage,. Pasqualini *et al.* (1983) and Natale and Pasqualini (1999) recommended 1 trap / 0.06 or 0.01 hectare and 5 or 10 traps / hectare, respectively. The disagree was due to the different environment between Egypt and Italy.

Table 6. One way ANOVA completely randomized attraction *Z. pyrina* trap designs in pear orchards at Qalubia governorate during 1996 to 1999 activity seasons.

| Trap design | Shape | | Size | | Height | | Color | | Distance | |
|---|---|---|---|---|---|---|---|---|---|---|
| "F" test | 1.401 | | 4.392 | | 1.513 | | 3.067 | | 1.516 | |
| Probability | 0.214 | | 0.008 | | 0.197 | | 0.015 | | 0.222 | |
| SL 0.05 | NS | | S** | | NS | | S* | | NS | |
| LSD 0.05 | 0.4454 | | 0.4871 | | 0.5522 | | 0.5928 | | 0.6286 | |
| Means 1 | 1.1 | a | 1.392 | a | 1.492 | a | 1.738 | a | 1.577 | a |
| Means 2 | 0.862 | ab | 1.185 | a | 1.438 | a | 1.231 | ab | 1.569 | a |
| Means 3 | 0.823 | ab | 0.915 | ab | 1.338 | a | 1.192 | ab | 1.246 | a |
| Means 4 | 0.8 | ab | 0.562 | b | 1.308 | a | 0.992 | b | 1.015 | a |
| Means 5 | 0.718 | ab | - | | 1.0 | a | 0.838 | b | - | |
| Means 6 | 0.662 | ab | - | | 0.9 | a | 0.692 | b | - | |
| Means 7 | 0.569 | b | - | | - | | - | | - | |
| Means 8 | 0.5 | b | - | | - | | - | | - | |

where: S* : Significant at SL (Significance level) 0.05
S**: Highly significant at SL 0.05
NS : Insignificant at SL 0.05
LSD (0.05): Least significance difference at 0.05

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# تقييم فعالية التصميمات المحلية لمصايد الفرمونات الجنسية لجذب حفار ساق التفاح *Zeuzera pyrina* في مصر.

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يسبب حفار ساق التفاح أضرارا اقتصادية في حدائق الفاكهة في مصر. تم تقييم الفعالية النسبية للعديد من أشكال وأحجام وألوان وارتفاع المصايد بالإضافة إلي المسافات بين هذه المصايد المحلية الصنع أو المستوردة، مع مراعاة الكفاءة النسبية والتكلفة الاقتصادية وسهولة التطبيق. أجريت التجارب في حدائق كمثري شديدة الإصابة في منطقة طوخ، محافظة القليوبية خلال ٧ مواسم لنشاط الحفار (١٩٩٦ - ٢٠٠٠).

أظهرت النتائج ما يلي:

أ- **شكل المصيدة:** تم تقييم الفعالية النسبية لثمانية أنواع من أشكال المصايد المصنعة محليا والمستوردة في اصطياد فراشات الحفار. أظهرت النتائج أن زجاجة المياه الغازية الشفافة هي أفضل أشكال المصايد تحت الظروف المصرية فهي اقل تكلفة وأسهل في التركيب والاستعمال والتخزين والنقل وتتطلب اقل وقت ومجهود للتجهيز والتداول في الحقل كما أن لها مسطح كبير لاصطياد أعدادا كبيرة من الفراشات. في حين أظهرت علبة الآيس كريم الكبيرة المعتمة وزجاجات المياه المعدنية الشفافة.وزجاجات أو جراكن زيت الذرة أو الزيوت البترولية المعتمة والمصايد اللاصقة الهرمية الورقية محلية الصنع أو المستوردة والمصايد القمعية المحلية الصنع أو المستوردة كفاءة أقل أو عالية التكلفة.

ب- **حجم المصيدة:** تم تقييم الكفاءة النسبية لأربعة إحجام للمصايد (٠,٥ و ١ و ١,٥ و ٢ لتر)، وأتضح أن زجاجات المياه الغازية الشفافة سعة ٢ لتر هي أكثر الإحجام فعالية في اصطياد ذكور الفراشات.

ج- **ارتفاع المصيدة:** تم تقييم الفعالية النسبية ل ٦ ارتفاعات مختلفة هي (صفر و ٠,٥ و ١ و ١,٥ و ٢ و ٢,٥ متر)، حيث أتضح أن الارتفاع المثالي لتعليق المصائد هو ١,٥ متر فوق سطح الأرض.

د- **لون المصيدة:** تم تقييم الفعالية النسبية ل ٧ ألوان للمصايد هي الأصفر والأحمر والأبيض والأزرق والأخضر والأسود والشفاف، حيث أتضح تفوق المصيدة الصفراء في اصطياد الفراشات إلا

أنها لم تختلف معنويا عن أعداد الفراشات التي تم اصطيادها في المصيدة الشفافة التي تعتبر من الناحية الاقتصادية الأفضل

**هـ- المسافة بين المصايد (عدد المصايد في الفدان):** تم تقييم الحد الأدنى لعدد المصايد في الفدان (١٦٨ و٤٢ و١٨ و١٠ مصايد) والموزعة على مسافات ٥ و١٠ و ١٥ و٢٠ مترا بين المصيدة والأخرى. دلت النتائج على أن المسافة القصوي بين هي ٢٠ متر بين المصيدة والأخرى (١٠ مصايد في الفدان).

من كل ما تقدم يتضح أن أفضل التصميمات للمصيدة الفرمونية من وجه النظر الإحصائية والاقتصادية والتطبيقية هي زجاجات المياه الغازية الشفافة سعة ٢ لتر على أن تعلق على ارتفاع ١,٥ متر وبين المصيدة والأخرى ٢٠ متر.