



**Effectiveness of baited traps for controlling oriental hornet *Vespa orientalis* (Hymenoptera: Vespidae) in Sohag Governorate apiaries**

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**Abstract:**

The oriental hornet *Vespa orientalis* L. (Hymenoptera: Vespidae) is one of the most important pests attacking apiaries in arab countries. The aim of this work is to modify a new effective trap and compared it with the beekeeper hornet traps. Also determine the best baits used and the population dynamics of the *V. orientalis* adults in Sohag Governorate. Data revealed that, hive new trap catches the high number of the hornet, *V. orientalis* followed significantly by the wooden trap, but plastic trap catch the lowest number of the hornet. The best bait attracts the hornet *V. orientalis* was honey followed not significantly by syrup (1sugar:1water) followed significantly with candy and sugar and the lowest number of hornet attracted to the pollen. The queens of *V. orientalis* appeared at the beginning of March and its number increased gradually to peak at the end of April. While, the workers of *V. orientalis* appeared during June and increased gradually to peak at November. It is concluded that hive trap with honey or syrup bait is the best way to control *V. orientalis* hornets at the apiaries.

**Introduction**

The oriental hornet *Vespa orientalis* L. (Hymenoptera: Vespidae) is one of the specific factors for the expansion of apiaries in the valley lands in Egypt. Where it affects the apiaries significantly, sometimes leads to the destroyed of the honeybees in areas severely infected with these hornets. Beekeepers refrain from the establishment of apiaries in places infected by the hornet and sometimes forced to transfer their apiaries

when the attack increased (Abdelaal and El-Defrawy, 2014).

Hornets attack a honeybee colony which considers an important source of carbohydrates (honey) and protein substances (adults, brood and pollen) (Mattu and Sharma, 2017). The hornets attack guard bees at hive entrances and foraging workers and resulted in weakening strong colonies (Matheson *et al.*, 1989). The hornets attack on the weak colonies, then attacks the

healthier ones (Ifantidis, 2003). Many methods had been done to find a way to control hornets like, the manual collection of the hornet queens and workers by using palm branches, destroying the hornet nest (Robin and Dupres, 1945); fumigating the nest with calcium cyanide, spraying it by insecticides (Subbiah and Mahadevan, 1958); burning it (Bhutani, 1950 and Singh, 1962); tried honey bait, mixed with different insecticides beside hornet nests (Aihara, 1980 and Walfa *et al.*, 1969); modificate the hive entrance to prevent the hornet from entering to the hive by using a queen guard or queens gate (Dave, 1943) or a large cuboid queen excluder (Abd Al- Fattah *et al.*, 2014); using a poison baits, like Fipronil insecticide mixed with the beef bait to control the oriental hornet (Al-Heyari *et al.*, 2016); dusting hornets by insecticides and releasing it to return to nests and destroyed it (Ghania and Abdel-Aziem, 2015) and finally using baited traps (Ibrahim and Mazeed, 1967; Longo, 1980 and Walfa *et al.*, 1969). But nowadays an effective control program for the oriental hornet has not been developed.

The aim of this work is to modify new effective trap and compared it with the beekeeper hornet traps. Also determine the best baits used, attract the largest number of hornets. Finally, to determine the population dynamics of the *V. orientalis* adults at Sohag Governorate.

### Materials and methods

The present study was carried out in three private apiaries in Sohag Governorate, during two seasons of 2017 and 2018.

#### 1. Traps description:

**1.1. Hive new trap:** was consisted of the Langstroth brood box where the base is replaced with a wire funnel that allows the hornets to enter and inhibit it to return again. The hive cover was replaced by a wire net with hole diameters that allow, the bees to exit and inhibit the hornets and placed on a wooden chair. A bowl of a bait is placed underneath the funnel (**Figure, 1**).

**1.2. Wooden trap:** was made of wooden bars and wire screen with diameters of 45 X 45 X 85 cm (Abdelaal and El-Defraw , 2014).

**1.3. Plastic trap:** A plastic bottle with piece of queen excluder at both sides ( Abdelaal and El-Defrawy, 2014).

#### 2. Efficacy of new designated traps in order to control *Vespa orientalis* adults:

In the first apiary three traps of each type were randomly distributed between the experimental colonies (60 colonies). These traps established and baited with 250ml of sugar syrup (1sugar:1water) from the first week of August until the last week of November through the two years of the study, 2017 and 2018 (Abdelaal and El-Defrawy, 2014). The time of the bait placement was early in the morning. The baits were changed regularly every three days (Bacandritsos *et al.*, 2006). Samples were collected weekly and the hornets attracted and caught within the given traps were counted and the average number of wasps/trap/week was calculated.



**Figure (1): Hive new trap**

### **3. Efficacy of some baits to attract *Vespa orientalis* adults:**

In the second apiary five baits were examined, honey, sugar syrup (1sugar:1water), candy, sugar (granules) and pollen 250 g. of each bait put in the bowl underneath the funnel of hive trap and replaced every three days. Each treatment replicated three times. The hornets caught within the traps were weekly collected and counted.

### **4. Population dynamics of the *Vespa orientalis* adults during seasons of 2017 and 2018:**

In the third apiary three hive traps were used to determine the population dynamics of the *V. orientalis* adults with the bait of 250 ml sugar syrup (1 sugar :1water) replaced every three days. Samples were collected weekly and the hornets attracted and caught within the trap were counted and the average number of wasps/trap/week was calculated.

### **5. Statistical analysis:**

The data obtained were subjected to regular statistical analysis (one way ANOVA) and mean comparison were carried out using L.S.D. at 5% (Snedecor, 1956).

### **Results and discussion**

#### **1. Efficacy of hivenew designated traps in order to control *Vespa orientalis* adults:**

Data in Table (1) showed that hive trap catch the highest number of the hornet, *V. orientalis* with averages (1478.7 and 1063.7 hornets) during the two seasons, respectively. However, plastic trap catches the lowest number of the hornet with averages (229.33 and 175.33 hornets) during the two seasons, respectively. While, wooden trap catches the moderate number of the hornet with averages (665.67 and 397.00 hornets) during the two seasons, respectively. There was a significant difference between all traps.

These data are in partial agreement with those of Dwara and Hatom (2013) who tested the effect of three types of traps on reducing the damage of red wasp (*V. orientalis*) on bees, the used traps were small trap, cylindrical trap and a trap consisted of a hive with honey chamber trap. Results showed that hive with honey chamber trap was the best, with a mean catch of 1191.94 insects per two months and the worst was the cylindrical trap, with a mean catch of 925.17 insects per two months. Abdelaal and El-Defrawy (2014) studied the efficiency of three traps, the wooden trap, plastic bottles (20L. water bottle with piece of queen excluder in the end) and a small plastic bottle(2 L. plastic bottle with piece of queen excluder in both sides). They found that the plastic bottle 20L. was the best trap for the *V. orientalis*.

**Table (1): Efficacy of three traps on hornet attraction during 2017 and 2018 seasons in Sohag Governorate.**

Traps	2017	2018
Hive trap	1478.7	1063.70
Wooden trap	665.67	397.00
Plastic trap	229.33	175.33
F. value	87.10	67.63
L.S.D.	235.10	194.57

**2. Efficacy of some baits to attract *Vespa orientalis* adults:**

The data in Table (2) showed that the best bait attracts the hornet *V. orientalis* was honey with hornet averages (826.67 and 713.33 hornets) followed insignificantly by syrup (1:1) with hornet averages ( 811.00 and 688.33 hornets) followed significantly with candy with hornet averages (344.33 and 275.67 hornets) and sugar with hornet averages (209.00 and 182.00 hornets) and finally the pollen with hornet averages (122.00 and 100.33 hornets) during the two seasons, respectively.

These data were in partial agreement with those of Spurr (1996) who found that both meat-based and sugar-based food materials can be used to trap many species of social wasps. Dwara and Hatom (2013) found that cow lungs were significantly the best attractive bait to *V. orientalis* and the poultry guts was the least attractive bait. Al Antary *et al.* (2016) studied the acceptance of the oriental hornet for the baits (beef, chicken, liver and sardine) and found that the best percentage of baits consumed by the hornet after two hours was beef meat.

**Table (2): Number of hornets attracted to different baits during 2017 and 2018 seasons.**

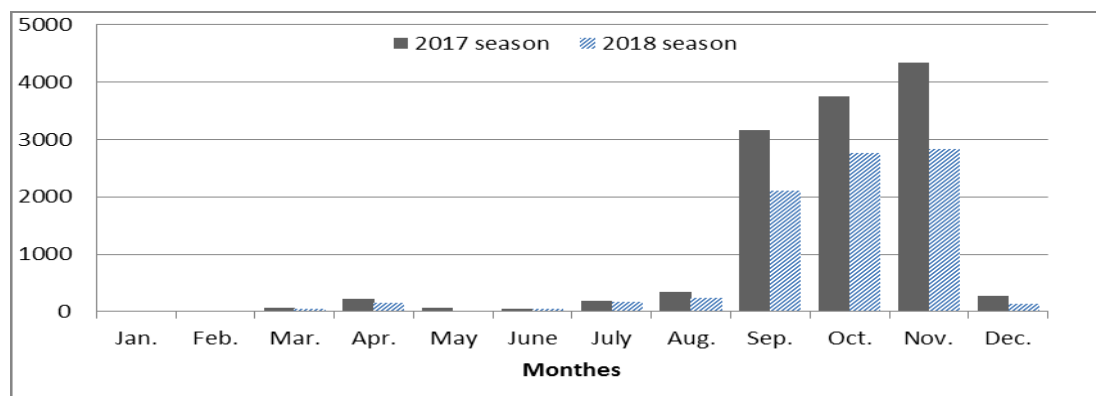
Baits	2017	2018
Honey	826.67	713.33
Syrup	811.00	688.33
Candy	344.33	275.67
Sugar	209.00	182.00
Pollen	122.00	100.33
F. value	33.5	73.9
L.S.D.	235.10	194.57

**3. Population dynamics of the *Vespa orientalis* adults during 2017 and 2018 seasons:**

Data illustrated in Figure (2) showed that during the two seasons, *V. orientalis* queens appeared at the beginning of March and its number increased gradually and peaked at the end of April, then decreased through May. At June the *V. orientalis* workers appeared and increased gradually and peaked at November then decreased through December and disappeared during January and February.

the second week of August (51 hornets/trap) to the fourth week of September (3301 hornets /trap). Taha (2014) revealed that *V. orientalis* queens were starting to appear from January to May, with a peak of activity during May. While *V. orientalis* workers were collected from June to February, with a peak in October, then November, respectively. Also, Islam *et al.* (2015) showed that *V. orientalis* were found attacking honeybees, *Apis mellifera* during June to November and reached to the highest number during the second week of October (220 hornets/week).

The obtained results confirmed partially the findings of Gomma and Abd El-Wahab (2006) who reported that there is marked increase in the hornets from



**Figure (2):** Population dynamics of *Vespa orientalis* adults during 2017 and 2018 seasons.

It is concluded that hive trap with honey or syrup bait is the best way to control *V. orientalis* hornets at the apiaries.

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