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Effectiveness of Some Local Baits for the Managment of Hornets in Apiaries of Kathmandu Valley

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ABSTRACT

An investigation of the effectiveness of some local baits for the management of hornets in apiaries of Kathmandu valley was carried out at Bhatkyapati-12 (Apiary A) and Tyangla-3 (Apiary B), Kirtipur Municipality under apiary conditions. Hornets were observed as most serious natural enemies of both house and field honeybees. Among four species of hornets viz: Vespa velutina Smith, Vespa tropica L., Vespa mandarina Smith, Vespa basalis Smith, V. velutina and V. mandarina were found to be the most abundant and serious enemies of honeybees in apiary conditions. A series of experiments were carried out to find out the efficacy of different baits for the management of hornets. Among them, the baits of rotten fish and pear attracted the highest number of hornets followed by rotten chicken bait. At apiary 'A' the highest numbers of hornets attracted were 8.600 and 8.667 per five minutes during September at rotten fish and pear baits respectively. Similarly, at apiary 'B' the highest number of hornets attracted by rotten fish and pear were 8.533 in September and 6.952 in August respectively. On the other hand, the experiment on efficacy of these baits to trap foraging honeybees showed that rotten fish and pear attracted the lowest number of honeybees as compared to the rest of the baits. The maximum number of honeybees trapped on rotten fish and pear baits were 0.500 in August and 0.700 in July respectively at apiary 'A' and 0.867 and 1.13 on rotten fish and pear baits respectively during September at apiary 'B'. It can be concluded that rotten fish and pear baits are the best attractants for the management of predatory hornets in apiary conditions.

Key words: Honeybees, Apiary management, Predators, Hornets, Baits, *Vespa spp.*

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1. INTRODUCTION

Hornets are recognized as serious predators of honeybees. It is estimated that in the course of the life, a single female hornet uses 60-80 bees as food while the males live entirely on nectar (Hirschfelder, 1952). Many species of Vespidae are serious enemies of honeybees and causing considerable damage (Akre and Davis 1978, Misha *et al,*. 1989, Sharma *et. al,*. 1985, Rye, 1986). *Vespa,* the largest of the social hornets, are physically capable of preying on honeybees with ease. They may attack in sufficient number to cause serious damage or even loss of entire colony. The Israel beekeepers association (1949) reported a loss of 2800 of among 3000 hives due to depredations of hornets. However one Asian honeybee species *A. dorsata,* appears to be free from attack by *Vespa* species, probably because of larger worker size, populous colonies and overwhelming defensive behaviors of bees (Seeley *et al*., 1982).

A number of methods have been suggested to protect Honeybees colonies from hornets. Destroying of hornets nests by burning (Bhutani 1950, Singh 1962), fumigation with calcium cyanide after plugging the entrance hole (Robin and Dupres, 1945: Subbiah and Mahadevan 1957; Singh, 1962) and spraying of insecticides (Subbiah and Mahadevan, 1957) have been advocated. Honey bait mixed with different insecticides has also been tried by Walfa *et al*. (1969) and Aihara (1980). A queen guard or queen gate of 12.7×5.1 cm (Dave, 1943) and elimination of the alighting board (Subbiah and Mahadevan, 1957) have been reported to be useful in reducing hornet attack. Different types of traps have been devised (Ibrahim and Mazeed, 1967; Wafa *et al,*. 1968; Kshirsagar, 1971; Reierson and Wanger, 1975; Longo, 1980)

and many organic chemicals have also been tested as lures, with varying degrees of attractiveness by McGovern *et al.* (1979). Sharma *et al*., 1979 tested different methods either alone or in combination and concluded that none of the methods could exclusively be relied upon; instead a combination of methods would be useful. However, an effective control program for most predatory hornet species has not been developed.

Keeping in view of the above facts, an investigation of the effectiveness of some local baits for the management of hornets in apiaries of Kathmandu valley was carried out to evaluate the effectiveness of some locally prepared baits for the management of *Vespa* spp.

2. METHODS

The evaluation of different locally available baits recommended by personal communication with people involved in honeybees and beekeeping were made for the possible management of *Vespa* spp. at both apiary sites. Similarly the effect of baits on trapping of honeybees was also studied.

The details of the layout of the experiment are as under:

i. Design : Randomized Block Design (RBD)

ii. Number of treatments : 8 (Eight)

iii. Number of replications : 3 (Three)

iv. Distance between colony (length): 3 (Three) m

v. Distance between colony (breadth): 3 (Three) m

vi. Total number of colonies : 24 (Twenty Four)

The eight different baits (treatments) tested for the attractiveness to hornets were: rotten fish, rotten chicken, fermented honey syrup, fermented sugarcane syrup, fermented sugarcane juice, macerated apple fruit (cv. Royal Delicious), macerated pear fruit (cv. Naspati) and macerated mango fruit. These baits were made by consultation with honeybee experts and beekeepers. These baits were placed in petri-plates, which were then placed on a platform attached to the alighting board of the colony. These baits were changed once in a week. Observation on hornets and honeybees trapped in different baits were recorded twice a week for 5 minutes at different hours of the day viz: 08.00 to 10.00 hours, 10.00 to 12.00 hours and 12.00 to 14.00 hours. In each of the two hours duration three different observations were made and mean of these observations were taken as Value. The data were pooled for statistical analysis.

3. RESULTS

3.1 Hornet attracted to different baits at apiary 'A' and 'B' (Effectiveness of different baits for hornet management)

The evaluation of different types of baits for the management of predatory hornets was studied in all experimental months. The results of predatory hornets attracted in eight different baits (treatments) are presented in the table 1 and 2. According to the table 1 , in apiary 'A', the results were found highly significant in all treatments. The number of hornets attracted during all the experimental months was found highest in pear and rotten fish baits whereas the other treatments were even not at par to these two treatments. The rotten chicken baits also show some good results as compared to other treatment.

The best attractant was observed as rotten fish and pear which attracted 2.152 and 2.606 honeybees during the month of July, 7.333 and 6.417 at August and 8.600 and 8.667 during the month of September respectively. Similarly, rotten chicken attracted 1.697 in July, 4.750 in August and 3.533 in September. The other attractants like honey syrup and sugarcane syrup was found less effective and attract less number of hornets.

Similar results were observed in apiary ‘B’ also. The treatments were highly significant with rotten fish and pear baits giving the best results of hornet attraction. The rotten chicken also performed well during all months whereas mango at the month of August and honey syrup in September also gave similar result as that of rotten chicken. The honey syrup during the month of august was at par with these results. Rotten fish and pear, the best attractants at apiary 'B' attracted 3.889 and 3.056 hornets during the month of July, 5.667 and 6.952 hornets in August and 8.533 and 6.333 hornets in September. Likewise, rotten chicken attracted 2.278 hornets in July, 2.762 hornet in August and 3.733 hornets during the month of September (Table 2).

3.2 Honeybees attracted to different baits at apiary 'A' and 'B'

Different types of baits were evaluated for the attractiveness to honeybees and are presented in the table 3 and 4 for apiary 'A' and 'B' respectively. The result shows that the treatments are highly significant in all experimental months except in apiary ‘B’ during the month of September where the treatment shows only significant result.

The attractions of honeybees were observed higher in sugarcane syrup bait during all the months. Likewise, honey syrup bait also attracted higher numbers of honeybees in the month of July and August. The pear bait along with rotten chicken and mango attracted less number of honeybees

during the month of July. Likewise, rotten fish, rotten chicken and mango baits during August and apple baits during the month of September trapped less number of honeybees.

In apiary honey syrup and sugarcane syrup attracted the highest numbers of Honeybees, 2.515 and 2.001 in July, 3.083 and 3.542 in August and 3.133 and 4.867 during the month of September. Sugarcane juice attracted 2.122 in July, 1.542 in August and 1.867 in the month of September. The rotten fish and pear attracted the lowest number of Honeybees 1.091 and 0.700 in July, 0.500 and 1.625 in August and 1.267 and 1.200 during the month of September.

Similar results were observed in apiary 'B', where rotten fish and mango attracted less number of honeybees in the month of July, rotten fish and pear along with rotten chicken, apple and mango baits in the month of August and pear, rotten fish and rotten chicken baits in the month of September. Sugarcane juice, sugarcane syrup and honey syrup trapped more number of honeybees during the all experimental months. The lowest numbers of honeybees attracted were 0.867 in rotten fish bait during the month of September and 1.133 in pear bait during same September (Table 4). It was evident from the above data that rotten fish and pear act as best attractants to the predatory hornets which in turn trapped less number of the honeybees as compared to other baits throughout the experimental months.

4. DISCUSSION

The evaluation of some local baits for the management of *Vespa* spp. revealed that attraction of hornets was more in the baits made of rotten fish and pear at both apiaries during all the months of observation, followed by rotten chicken, mango, apple, honey syrup, sugarcane syrup and sugarcane juice baits respectively in decreasing order. The best attractants, rotten fish and pear

attracted 2.152 and 2.606 hornets in the month of July, 7.333 and 6.417 hornets in August and September months. In apiary 'A' similarly, rotten fish and pear attracted 3.889 and 3.056 hornets in July, 5.667 and 6.333 hornets in August and 8.553 and 6.333 hornets during the month of September. Among these attractants the highest number of hornets (8.667) was attracted to pear in the month of September at apiary 'A'.

In contrast, rotten fish and pear attracted less numbers of honeybees at both apiaries during all the months of observation. The rotten fish and pear baits attracted 1.0191 and 0700 in the month of July, 0.500 and 1.625 in August and 1.267 and 1.200 in September at apiary 'A'. Similarly, the lowest number of honeybees attracted in apiary ‘B’ was 0.867 in rotten fish bait at the month of September and 1.133 in bait made by pear in the month of September. So from the above facts, it can be concluded that the bait made by rotten fish and pear act as best baits in comparasion to others. These baits attracted more number of predatory hornets and less number of foraging honeybees during the study period.

This result was in accordance to the earlier observation made by Akre and Mayer (1984). They mentioned that with the use of pears in combination with insecticide would result as best attractant. In contrast, Aihara (1980) found honey mixed with methomyl as an effective control method for trapping giant hornets. Likewise, Mishra *et al.*, 1989 had evolved a new technique in controlling hornets where he trimmed the gelatin capsule to make small cups and mixed with fenetrothion which were attached to the thorax of live hornets with adhesive. This technique controlled the number of hornet nest at the surroundings of apiary. They also tried fruit baits for attracting the hornets and found that *Vespa velutina* were attracted in more number to overripe pear as compared to that of apple, pulm, peach and mango.

5. CONCLUSION & RECOMMENDATION

The experimental results of this investigation entitled “effectiveness of some local baits for the management of hornets in apiaries of Kathmandu valley.”are summarized as:

- Among the different baits tested for their effectiveness to attract and trap more number of predatory hornets, the baits made from rotten fish and pear were at par and gave significant results as compared to other baits. These baits trapped more number of hornets followed by rotten chicken bait.

- Also the bait made from rotten fish and pear trapped less number of honeybees than other baits tested.

Based on my investigation, I have derived following recommendations:

- The baits made of rotten fish and pears were recommended as the best baits for the management of predatory hornets as these baits trapped more number of hornets and less number of honeybees than other baits tested.

REFERENCES

Aihara, S. 1980. Control of giant hornets by mixture of honey and agrichemical (In Japanese). *Honeybee Sci.* **1:** 23 -24.

Akre, R. D. and Mayer, D. F. 1984. Bees and Vespine hornets. *Bee Wld*., **75:** 29-37.

Bhutani, D. K. 1950. The hornet menace. *Indian Bee J.,* **12:** 129-130.

Hirschfelder,H.1952.Control of the bee killer wasps.*Germany Anz. Shadlingsk.,* **25:**122-23.

Ibrahim, M. M.; Mazeed, M. M. 1967. Studies on the oriental hornet; *Vespa orientalis* F. *Agric. Res. Rev., Cairo,* **45:** 163-180.

Kshirasagar, K. K. 1971. A hornet trap to control predatory hornet in apiary. *Indian bee J*., **33:** 56-58.

Longo, S. 1980. The Control of hornets that are injurious to honeybee colonies (In Italian). *La difesa dalle Vespa. Apicalt. Mod*. **71:** 109 -112.

McGovern, J. P.; Davis, H. G.; Berzoa, M.; Ingangi, J. C.; Eddy, G. W. 1971. Esters highly attractive to *Vespula* spp. *J. Econ. Entom*, **63:** 1534 – 1536.

Mishra, R. C., Kumar, J. and Gupta, J. K. 1989. A new approach to the control of predatory Hornets *(Vespa* spp.*)* of the Honeybees *Apis mellifera* L. *J. Apic. Res*., **28:** 126-131.

Reierson, D.A.; Wanger, R. E. 1975. Trapping yellow jackets with new standard plastic wet trap. *J. Econ. Ent*., **68:** 395.

Robin, F. and Dupres, R. 1945. La lutte les frelons etles guepes dans les rergers. *C.R. hebd. Seanc. Sci., Paris*, **31:** 104-107.

Rye, B. 1986. Hornets Control for beekeepers. *Australian Bee J.*, **67:** 14-16.

Seeley, T. D., Seeley, R. H. and Akratanakur, P. 1982. Colony defense strategies of the honeybees in Thailand. *Ecological Monographs,* **52:** 43-63.

Sharma, O. P., Thakur, A. K. and Garg. R. 1985. Control of hornets attacking bee colonies. *Indian Bee J.*, **47:** 27-29.

Singh, S. 1962. *Beekeeping in India.* ICAR, New Delhi, India.

Wafa, A. K.; El Borolossy, F. F.; Charkawi, S. G. 1969. Studies on *Vespa orientalis* F. *Bull. Ent. Soc. Egypt,* **11:** 9-27.

Table 1. Number of hornets observed attracted in different types of bait at apiary 'A' during different months (July, 2004 – September, 2004)

Bait types	July	August	September
Rotten fish	2.152 (1.537) a	7.333 (2.750) a	8.600 (2.984) a
Rotten chicken	1.697 (1.369) b	4.750 (2.134) b	3.533 (1.959) b
Honey syrup	0.455 (0.928) c	1.292 (1.236) de	2.400 (1.614) c
Sugarcane syrup	0.455 (0.921) c	2.083 (1.515) c	3.533 (1.928) b
Sugarcane juice	0.485 (0.931) c	0.917 (1.104) de	2.000 (1.489) cd
Apple	0.758 (1.033) c	0.708 (1.037) e	1.867 (1.465) cd
Pear	2.606 (1.638) a	6.417 (2.570) a	8.667 (2.989) a
Mango	0.636 (1.003) c	1.292 (1.271 d	1.400 (1.227) d
F-test	**	**	**
CV (%)	8.30	7.03	8.25

- Values are mean of 3 replications
- Figures inside parenthesis indicates square root transformed values
- Means followed by the same letter are not statistically different at 5% level tested by DMRT

Table 2. Number of hornets observed attracted in different types of bait at apiary 'B' during different months (July, 2004 – September, 2004)

Bait types	July	August	September
Rotten fish	3.889 (1.950) a	5.667 (2.391) a	8.533 (2.914 a
Rotten chicken	2.278 (1.512) b	2.762 (1.713) b	3.733 (1.946) b
Honey syrup	0.972 (1.133) c	2.524 (1.647) bc	2.933 (1.734) b
Sugarcane syrup	0.889 (1.108) c	1.238 (1.241) cd	1.333 (1.277) c
Sugarcane juice	0.806 (1.072) c	1.476 (1.332) bcd	1.675 (1.263) c
Apple	0.861 (1.080) c	1.619 (1.371) bcd	1.133 (1.209) c
Pear	3.056 (1.789) a	6.952 (2.667) a	6.333 (2.571) a
Mango	0.833 (1.096) c	1.190 (1.192) b	0.867 (1.108) c
F-test	**	**	**
CV (%)	8.76	13.50	12.83

- Values are mean of 3 replications
- Figures inside parenthesis indicates square root transformed values
- Means followed by the same letter are not statistically different at 5% level tested by DMRT

Table 3. Number of honeybees observed attracted in different types of bait at apiary 'A' during different months (July, 2004 – September, 2004)

Bait types	July	August	September
Rotten fish	1.091 (1.156) bc	0.500 (0.946) d	1.267 (1.294) cd
Rotten chicken	0.697 (1.020) c	0.792 (1.074) d	1.267 (1.250) cd
Honey syrup	2.515 (1.630) a	3.083 (1.746) a	3.133 (1.843) b
Sugarcane syrup	2.061 (1.484) a	3.542 (1.914) a	4.867 (2.239) a
Sugarcane juice	2.212 (1.575) a	1.542 (1.343) bc	1.867 (1.487) c
Apple	1.273 (1.231) b	0.917 (1.121) cd	0.667 (1.015) d
Pear	0.700 (1.018) c	1.625 (1.390) b	1.200 (1.181) cd
Mango	0.758 (1.039) c	0.875 (1.082) d	1.00 (1.141) cd
F-test	**	**	**
CV (%)	7.37	10.30	13.08

- Values are mean of 3 replications
- Figures inside parenthesis indicates square root transformed values
- Means followed by the same letter are not statistically different at 5% level tested by DMRT

Table 4. Number of honeybees observed attracted in different types of bait at apiary 'B' during different months (July, 2004 – September, 2004)

Bait types	July	August	September
Rotten fish	1.000 (1.161) d	1.048 (1.182) b	0.867 (1.123) c
Rotten chicken	1.444 (1.315) cd	1.524 (1.376) b	1.067 (1.190) c
Honey syrup	2.778 (1.722) ab	2.905 (1.765) a	3.000 (1.809) a
Sugarcane syrup	3.778 (1.948) a	3.190 (1.763) a	2.467 (1.593) ab
Sugarcane juice	1.917 (1.499) bc	2.571 (1.704) a	1.667 (1.369) bc
Apple	1.278 (1.248) cd	1.143 (1.205) b	1.600 (1.401) bc
Pear	1.528 (1.344) cd	1.381 (1.264) b	1.133 (1.210) c
Mango	1.111 (1.180) d	1.524 (1.341) b	1.400 (1.322) bc
F-test	**	**	*
CV (%)	10.31	12.30	14.25

- Values are mean of 3 replications
- Figures inside parenthesis indicates square root transformed values
- Means followed by the same letter are not statistically different at 5% level tested by DMRT