



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(3): 2812-2813
Received: 08-03-2018
Accepted: 13-04-2018

Gouri Shankar Giri
Department of Entomology, G.
B. Pant University of
Agriculture and Technology,
Pantnagar, Uttarakhand, India

Sapna Tiwari
Department of Entomology, G.
B. Pant University of
Agriculture and Technology,
Pantnagar, Uttarakhand, India

Pramod Mall
Department of Entomology, G.
B. Pant University of
Agriculture and Technology,
Pantnagar, Uttarakhand, India

Renu Pandey
Department of Entomology, G.
B. Pant University of
Agriculture and Technology,
Pantnagar, Uttarakhand, India

Correspondence
Gouri Shankar Giri
Department of Entomology, G.
B. Pant University of
Agriculture and Technology,
Pantnagar, Uttarakhand, India

Thiamethoxam had negative impact on *Apis mellifera*, hence yield of *Brassica*

Gouri Shankar Giri, Sapna Tiwari, Pramod Mall and Renu Pandey

Abstract

Thiamethoxam directly or indirectly as residues in nectar and pollen from crop plants have been considered as one of the potential factors causing the declines of honey bee populations. It is widely used against sucking pests such as aphid in crop like Brassica which is highly attractive to honey bees which results in reduction in yield both in terms of quality and quantity. The present investigation was aimed to find out the interaction between three parameters that is honey bee thiamethoxam and yield. Various yield parameters are compared in between thiamethoxam treated semi-field, thiamethoxam treated open field and water sprayed open field condition. It was found that thiamethoxam treated open field condition provide better yield as compared to other conditions.

Keywords: thiamethoxam, *Apis mellifera*, yield, brassica

Introduction

Mustard is an important oilseed crop and major contributor accounting 13 per cent of total consumption of oil worldwide. Honeybees are the principal pollinators of mustard crop because it is highly attractive and provide both nectar and pollen which constitute the principal food source for them. But now day aphids have emerged as a major pest of mustard crop for which farmers use neonicotinoid insecticide such as imidacloprid and thiamethoxam as a remedial measure. Being systemic in action these compound exert toxic effect on honeybees for a longer period of time. Uses of these toxic chemicals affect the foraging activity of honeybees directly and yield of mustard crop both in terms of quality and quantity indirectly.

Chand and Singh (1995) ^[1] conducted experiment on mustard at Pusa Bihar, India. They found that the plot which remained totally free from insect pollinators including honeybees (cage without any pollinator) had the lowest yield (966 kg per hectare) and plots having free access to all the pollinators showed the maximum yield (1620 kg per hectare). Thus honeybee is alone contributing about 20% towards increasing the yield of crops.

Pratap *et al.* (1995) ^[2] reported that bee pollination in Indian mustard (*Brassica juncea*) enhanced fruit set by 6.1 and 5.2 per cent compared to control and open pollinated plant respectively. It increases the number of siliqua per plant by 38 and 14.2 per cent and seed weight by 48.4 and 17 per cent as compared to control and open pollinated plants respectively in Ludhiana.

Materials and Methods

The experiment was conducted at G. B. Pant University of Agriculture and Technology, Pantnagar (Uttarakhand). This experiment was conducted by taking three conditions i.e thiamethoxam treated semi-fields (caged field), thiamethoxam treated open-field and water treated open-field condition. Various yield parameters such as plant height, siliquae per plant, siliquae length, number of seeds per siliqua, seed yield and 1000 seed weight are compared at the time of maturation of pods. The data were subjected to the analysis of variance using simple Randomized block design (RBD) programme.

Results and Discussion

The data regarding the various yield parameter of mustard in thiamethoxam treated semi field, thiamethoxam treated open field and water sprayed open field are representing in table 1. It was found that plant height was recorded to be maximum in thiamethoxam treated open field condition (118.84) followed by water sprayed open field (116.09) followed by thiamethoxam treated semi field condition (114.16). It was also found that siliqua per plant were found to be maximum in control field (171.92) followed by thiamethoxam treated open field condition (170.76) followed by thiamethoxam treated semi field condition (89.54). The siliqua length was found to be maximum in thiamethoxam treated open field condition (54.40) followed by

control field (52.09) followed by thiamethoxam treated semi field condition (47.41). Similarly numbers of seed per siliqua was found to be maximum in thiamethoxam treated open field condition (13.97) followed by control field (13.20) followed by thiamethoxam treated semi field condition (10.78). Similarly seed yield per plant and seed yield per plot was found to be maximum in thiamethoxam treated open field condition (4.71, 1310.00) followed by control field (4.58, 1260.00) followed by thiamethoxam treated semi field condition (4.18, 1010.00) respectively. The 1000 seed weight was found to be maximum in control field (4.69) followed by thiamethoxam treated open field condition (4.65) followed by thiamethoxam treated semi field condition (4.48).

From the above experiment it was found that the various yield parameters of Indian mustard such as plant height, siliquae length, numbers of seeds per siliqua, seed yield per plant and seed yield per plot were found to be maximum in thiamethoxam treated open field condition followed by in water sprayed open field and minimum in thiamethoxam

treated semi field condition. This is because of protection offered by thiamethoxam against mustard aphid and easy access to pollinators in thiamethoxam treated open field condition. However yield parameter such as siliqua per plant and 1000 seed weight were found to be maximum in water sprayed open field followed by thiamethoxam treated open field condition and minimum in thiamethoxam treated semi field condition. Kanika *et al.* (2017) studied the effect of different modes of pollination on yield parameters of Indian mustard and found that the maximum number of pods/plant, pod length, pod setting (%), number of seeds/pod, thousand seed weight, seed yield/ plot, seed germination (%), seed vigour and oil content (508.72 pods/plant, 5.69 cm, 86.32%, 15.66 seeds/pod, 6.87 g, 17.63 q/ha, 89.20%, 628.12 and 39.42%, respectively) were in open pollination followed by that in bee pollination (404.56 pods/plant, 4.92 cm, 78.33%, 14.26 seeds/pod, 6.39 g, 15.57 q/ha, 85.20%, 542.54 and 38.36%, respectively).

Table 1: Comparison of the various yield parameter of mustard between thiamethoxam treated semi field, thiamethoxam treated open field and control condition

| Parameter Treatment | Plant height (cm) | Siliqua per plant | Siliqua length (mm) | No. of seeds per siliqua | Seed yield per plant (g) | Seed yield per plot (g) | 1000 seed weight (g) | Seed yield per hectare (Kg) |
|---|-------------------|-------------------|---------------------|--------------------------|--------------------------|-------------------------|----------------------|-----------------------------|
| Thiamethoxam Treated semi field condition | 114.16 | 89.54 | 47.41 | 10.78 | 4.18 | 1010.00 | 4.48 | 2525 |
| Thiamethoxam Treated open field condition | 118.84 | 170.76 | 54.40 | 13.97 | 4.71 | 1310.00 | 4.65 | 3275 |
| Control condition | 116.09 | 171.92 | 52.09 | 13.20 | 4.58 | 1260.00 | 4.69 | 3150 |
| Grand mean | 116.36 | 144.07 | 51.30 | 12.65 | 4.49 | 1193.33 | 4.61 | 2983.33 |
| SEM | 1.92 | 5.58 | 1.58 | 0.35 | 0.11 | 71.29 | 0.52 | 6.88 |
| CD at 5% | 6.26 | 18.19 | 5.17 | 1.15 | 0.37 | 232.38 | 0.17 | 22.78 |
| CV | 3.69 | 8.66 | 6.92 | 6.27 | 5.72 | 8.33 | 2.56 | 0.516 |
| F value | NS | S | S | S | S | S | NS | S |

References

- Chand H, Singh R. Effect of pollination by *Apis cerena* on yield of mustard, *Brassica juncea* Linn. Indian Bee Journal. 1995; 57:173-174.
- Partap U, Verma LR. Vegetable seed production using Himalayan honey bee (*Apis cerena* F.) as pollinator on Indian mustard in Kathmandu, Nepal. Progressive Horticulture. 1995; 27(1-2):110-118.
- Nagpal K, Yadav S, Kumar Y, Singh R. Effect of pollination modes on yield components in Indian mustard (*Brassica juncea* L.). Journal of Oilseed Brassica. 2017; 8(2):187-194.