



Original Research Article

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Impact of Farmscaping on Abundance of *Campoletis chlorideae* (Uchida) on Gram Pod Borer

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The investigation on, "Impact of farmscaping on abundance of *Campoletis chlorideae* on gram pod borer" was conducted on Instructional Farm and Department of Entomology, Rajasthan College of Agriculture, Udaipur during rabi 2018. Gram variety GNG-1581 was sown with different farmscaped treatments to compare the impact of bordered plants viz., mustard, marigold and sunflower along with bio-pesticide protectants on the abundance of associated larval parasitoid *C. chlorideae* on gram pod borer. Gram bordered with marigold recorded significantly maximum parasitisation (75.00 %) as compared to that in gram without farmscape treatment (25.00 %) at 40 DAS. Similarly, 60 DAS the maximum parasitisation (66.66 %) was recorded in gram bordered with marigold and minimum (40.00 %) parasitisation in gram without farmscape treatment.

Introduction

Chickpea (*Cicer arietinum* L.) is among the most widely consumed legumes in the world, particularly in tropical and subtropical areas. Bengal gram, gram or *chana* is an important rabi pulse crop of India and has been considered as 'King of Pulses' (Bhatt and Patel, 2001). In India the major insect pest of chickpea is the gram pod borer, *Helicoverpa armigera* (Hubner) (Lepidoptera: Noctuidae) which is polyphagous, multivoltine and is cosmopolitan pest. It is known to feed on 182 species of plants belonging to 47 families in India (Sithanantham, 1987 and Panwar, 1998) and on more than 250 crop species (Kranthi *et al.*, 2002 and Jiirgen *et al.*, 1977). The gram pod borer, *H. armigera* (Hubner) is known to

cause about 29 per cent yield losses in chickpea at national level. High polyphagy, mobility, reproduction rate, and diapause are major factors contributing to its serious pest status (Fitt, 1989). The gram pod borer begins infestation at the seedling stage and later feeds on the flower and developing seeds in pods until crop maturity (Mandal and Roy, 2012). Over 250 natural enemies have been recorded on *H. armigera* (Romeis and Shanower, 1996), of which, the egg parasitoids, *Trichogramma* spp. and the larval parasitoids, *Campoletis chlorideae* Uchida (Hymenoptera: Ichneumonidae), *Carcelia illota* Curran, *Palexotista* spp., and *Goniozus* spp. are predominant parasitoids of *H. armigera* in different agro-ecosystems. However, the activity and abundance of natural enemies

varies across crops (Pawar *et al.*, 1986). Farmscaping is a holistic approach to manage insect pests on farms that focus on increasing biodiversity in order to maintain healthy populations of beneficial insects, birds and other wildlife as part of an ecological pest management program.

Materials and Methods

The present investigation was conducted at Instructional Farm of Rajasthan College of Agriculture, Udaipur, during 2017-18. Sowing of gram variety GNG-1581 with different farmscaped plants *viz.*, mustard, marigold and sunflower was done (table-1). This experiment was laid down in a RBD with three replications. The associated natural enemies Observations were taken by collecting second instar or early third instar larvae of pod borer from the tagged rows at 40 DAS and 60 DAS interval. The field collected larvae were maintained in glass jars covered with muslin cloth held by rubber bands in laboratory. The larvae were reared on fresh leaves and pods of gram until pupation or emergence of the parasitoid. The effective parasitization (%) was computed using the methodology adopted by Hugar *et al.*, (2014) and Tian *et al.*, (2008).

$$\text{Parasitization (\%)} = \frac{\text{No. of parasitoids emerged}}{\text{No. of larvae collected}} \times 100$$

Foliar applications of NSKE (5%) as prophylactic spray after one month of germination and Ha NPV @ 250 LE/ ha (when 1-2 larvae per m-row was observed) were given in the treated plots.

Results and Discussion

The maximum parasitization was observed in the gram farmscaped with marigold followed by that in gram bordered with mustard and then in gram bordered with sunflower. Gram

without farmscape had minimum per cent parasitization. Out of 95 fields collected larvae reared in laboratory 45 larvae were parasitized which worked out to be 43.15 per cent parasitisation.

From tables (2-3) it can be observed that farmscaping treatments were best along with bioprotectant. The per cent parasitisation was maximum in farmscaped treatments. It was found that at 40 DAS gram bordered with marigold with bioprotectant had maximum (75.00 %) parasitisation; whereas it was minimum (25.00 %) in gram without farmscape treatment.

Similarly, 60 DAS the maximum parasitisation (66.66 %) was recorded in gram bordered with marigold and minimum (40.00 %) parasitisation in gram without farmscape treatment.

Similar to our findings, Bisane *et al.*, (2009) showed that among early instar larvae, 34.55 per cent mortality was noticed, in which highest parasitization (14.89 per cent) was due to *Eriborus argenteopilosus* Cameron and 8.94 per cent due to *C. chlorideae* Uchida. According to Pandey (2009) parasitization by *C. chlorideae* did not vary among the intercrops during pre-winter months of rabi 2004-05; however parasitization was higher in chick pea + linseed (4:2).

Studies by Pandey *et al.*, (2012) revealed that mean larval parasitization ranged from a maximum of 30.16 per cent in chickpea + coriander (4:1) to minimum of 15.73 per cent in chickpea + barley (6:1) as compared with 15.98 per cent in chickpea sole crop. Similarly, Agnihotri *et al.*, (2011) observed *C. chlorideae*, a larval parasitoid of *H. armigera* (Hubner), in chickpea crop during 3rd SMW of the year in both the cropping seasons with parasitization of up to 78.57 and 80.00 per cent, respectively.

Table.1 different farmscaping treatments

| Treatment | Details |
|----------------|--|
| T ₁ | Gram without farmscaping (Untreated) |
| T ₂ | Gram without farmscaping(Treated) |
| T ₃ | Gram bordered with Mustard (Untreated) |
| T ₄ | Gram bordered with Mustard (Treated) |
| T ₅ | Gram bordered with Marigold (Untreated) |
| T ₆ | Gram bordered with Marigold (Treated) |
| T ₇ | Gram bordered with Sunflower (Untreated) |
| T ₈ | Gram bordered with Sunflower (Treated) |

Table.2 Parasitization of *H. armigera* by the larval parasitoid *C. chlorideae* under different farmscape treatments at 40DAS during rabi, 2017-18

| Framscape treatments in gram | Parasitization (%) 40 DAS | |
|--------------------------------------|---------------------------|-----------|
| | Treated | Untreated |
| Without any farmscaping | 25.00 | 33.33 |
| Bordered with mustard as farmscape | 33.33 | 50.00 |
| Bordered with marigold as farmscape | 50.00 | 75.00 |
| Bordered with sunflower as farmscape | 25.00 | 33.33 |

Table.3 Parasitization of *H. armigera* by the larval parasitoid *C. chlorideae* under different farmscape treatments at 60DAS during rabi, 2017-18

| Framscape treatments in gram | Parasitization (%) 60 DAS | |
|--------------------------------------|---------------------------|-----------|
| | Treated | Untreated |
| Without any farmscaping | 40.00 | 42.00 |
| Bordered with mustard as farmscape | 64.00 | 66.66 |
| Bordered with marigold as farmscape | 69.00 | 75.00 |
| Bordered with sunflower as farmscape | 57.00 | 60.00 |

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