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Population dynamics of insect pests, natural enemies and pollinators of Fenugreek (*Trigonella foenum-graecum* L.)

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Abstract

Survey conducted on population build up pattern of various insect pests, natural enemies and pollinators of fenugreek crop during 2015-16 showed that sucking pests were major pest complex develop on the crop. Aphid (*Apis craccivora*) was the major pest of the crop and its peak activities was noticed from 6th to 10th standard week. Other important pests were leaf miner, thrips, jasids and white fly. Major natural enemies population comprises of predator *Coccinellids*, parasitoides *Aphidius* sp and were active from7th to 10th standard week. Among pollinators only wild honey bee (*Apis dorsata)* was recorded as flower visitor on the crop.

Key words : Fenugreek, insect-pests, Natural enemies, Pollinators

Introduction

Fenugreek (*Trigonella foenum-graecum* L.) is an important self pollinated seed spice crops have multipurpose uses as food, fodder & medicine and consumed as green leaves, pod and mature dry seed in various preparations. It is cultivated during Rabi season (winter) in India and Rajasthan state occupied largest area and production of fenugreek in India. Fenugreek attracts large number of insect pests during different stages of plant growth. The important pests of fenugreek include the aphids *Aphis craccivora* Koch, *Acyrthosiphon pisum* (Harris), whitefly, *Bemisia tabaci* (Genn.), jassids (Emopasca kerri), leaf miner (*Lyromyza* sp) etc. (Kalra *et al.*, 2002, Manjula *et al.*, 2015). Aphids, *Aphis craccivora* Koch., leaf miner (*Liriomyza* sp.), white fly*(Bemisia tabaci*) and jassids (*Empoasca* sp) are most damaging pest of fenugreek and develop on the crop during vegetative stages but heavy population develops during flowering and fruiting stages, thereby causes significant losses in yield at harvest of the crop (Kakani and Anwer 2012, Abro *et al.*, 2016, Selvaraj *et al.*, 2010). Besides, it secretes honey dew that provides suitable media for development of sooty mould which causes deteriotion of quality of leaves and hampers the process of photosynthesis. Present investigation was carried out to identify the insect pests, natural enemies and pollinators population on fenugreek crops in Rajasthan condition.

Materials and methods

The observation on population dynamics of different pests and natural enemies were recorded at field levels. The coriander variety Ajmer fenugreek-1 was sown on 15th of October at NRCSS field experimental field during 2015-16 and recommended agronomical practices were followed to raise good crop. There were no insecticides/fungicides/ weedicides applied on the crop till the maturity of the plants. The observations on different insect species were recorded right from first appearance on the crop till last presence. The average number of aphids population were recorded in fields by counting total number of population present on 5 cm twig of fenugreek plant. In case of thrips, leaf miner, Jassids, white fly and bugs were conducted per plant. The natural enemies population were recorded by counting total number of coccinellieds, syrphid fly and chrysperla larva on plant. In case of parasitoides *Aphidius* sp. total numbers of mummified aphids were counted on 5 cm Twig of the plant. The mummified aphids were also kept in the laboratory for emergence and identification of species. All observation on insect species on the plant was recorded at weekly interval and observation was taken between 9.00 am to 10.00 am. The observations recorded of each insect on three randomly selected plants. The selected plants were tagged and all observation were recorded on same plant till the last appearance of the insect. Data recorded on population were analyzed using randomized block design at weekly level for study of population dynamics of different insect pests on the crop.

Results and discussion

The data recorded on the fenugreek showed diverse group of insect pests develop on the crop (Table-1).The first appearance of aphids (*A. craccivora*) was noticed during

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vegetative stages of about 45 days old crop. The population of 0.67 aphids/ twig was noticed in 51th standard week. The population of aphids were gradually rise on the plants at flowering stages up to 5th standard week and from 6th to 10th standard week maximum growth of the aphids population were recorded in which peak population level of 52.0 aphids was noticed in the 9th standard week (Fig-1). The population of aphids steadily declined from 11th standard week and lasted only up to 12th standard week with population level of 1.0 aphids/ twig at the maturity stages of plant. *A. cracccivora* has been reported as a most serious pest of fenugreek in India that causes maximum yield losses to the crop at field level. (Brar, K.S. and Kanwar, J.S., 1994 and Pawar *et al.*, 2001). Thrips (*Thrips tabaci and Frankliniella schultzei*) population was observed from early vegetative stages to full of vegetative growth of plants. First record of thrips was noticed on 50th standard week with population of 0.67 thrips/ plant. Low population of thrips were observed throughout the period of its appearance on the crops. The last observation of thrips was noticed in 9th standard week with population of 1.0 thrips/plant. Abro *et al.*, 2016, Sagar and Mehta 1991 reported that thrips (*Thrips tabaci*) is a serious pest of fenugreek and other seed spice crops in India and Pakistan. Leaf miner (*Lyromyza* sp.) noticed from very early vegetative growth of the plant to pod maturity. First occurrence were noticed with the population level of 1.0 leaf miner /plant on 50th standard week and lasted up to 11th standard week. The peak activity of leaf miner were noticed on 9th standard week with 7.0 leaf miner/plant. Manjula *et al.*, 2015 found Leaf miner is an important pest of fenugreek and it starts to develop on the crop at very early stages. It continues to mine the leaves of fenugreek from vegetative stages to flowering stages. Jassids (*Empoasca sp.*) was first pest noticed on the crop during 49th standard week and lasted up to 8th standard week with peak population level was 3.0 jassids/ plant at 4th standard week. White fly (*Bemisia tabaci*) observed from 51th standard week to 6th standard week, and Cletus bug from 4th to 10th standard week. Mittal and Butani,1994 reported jassid is one of the serious pest of fenugreek at early stages of crop growth. Cletus bug (*Cletus* sp.) was noticed for the first time during 4th standard week and it was observed on the crop up to pod maturity of the crop till 10th standard week. *Lygus compestries* Linn has been reported on coriander, fennel and dill (Koraz,1977)

The population of predator Coccinella species first appeared on the crop in 7th standard week with population of 2.0 adult /plant. The coccinellids population were noticed for six week with maximum activities recorded from 7th to 10th standard week (Fig-2). Other predators was noticed was shryphid fly (*Episyrphus* sp.) and green lace wing (*Chrysoperla carnea*). The population of theses preadators were very low and active only for three week from 8th to 10th standard week. Aphids parasitoids *Aphidius* sp. was noticed during peak period of aphids population on the crop from 6th to 10th standard week and maximum activity recorded during 9th standard week with 6 mummified aphids/twig. *Aeolothrips sp, a* thrips predatros wes also noticed in very small numbers. Honey bee (*Apis dorsata*) recorded on the crop for collection of nectar from 6th to 9th standard week, with maximum population of 0.66 bee/ plant . Gupta and Yadav 1986 reported Coccinellieds consist of major predators found feeding on various sucking pests of seed spices. Major coccienellids found preyting on seed spice crops are *Coccinella septempunctata* L.,*Bromoides suturalis* F. *Menochilus sexmaculatus* and *Adonia* sp. Predatory bird myna (*Acridotheres tristis*) was also found feeding on the aphid. Pareek *et al.*, (2014) recorded three coccinellid species, viz., *C. septempunctata* L.,*M. sexmaculatus* (Fab.) and *Adonia variegata* (Geoze), prey upon *Hyadaphis coriadri* coriander crop in Rajasthan, India. Ali, 2014 reported that *colemani* Viereck causes more than 25% parasitisation of A.craccivora on faba bean . Parasitoids *Aphelinus* sp

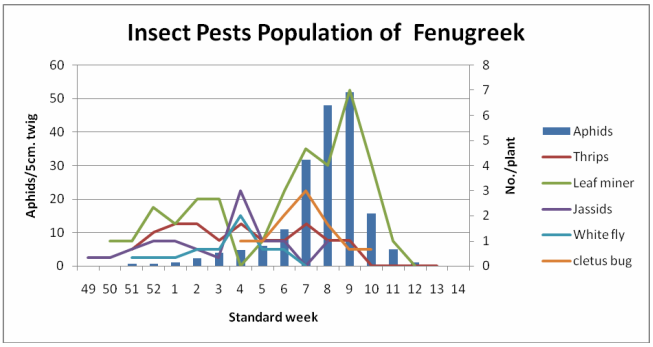

Fig.1. Insect pest population on fenugreek

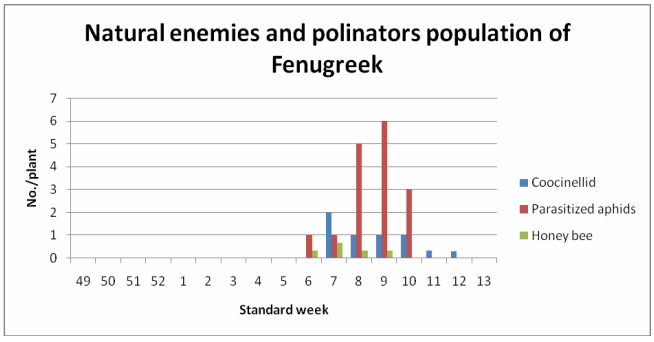

Fig.2. Natural enemies and pollinator population on fenugreek.

Table 1. Population development pattern of Insect pests, Natural enemies and Pollinators of Fenugreek.

Std. Week	Aphids	Thrips	Leaf miner	Jassids	White fly	Lebus bug	Coccinellid	Parasitized aphids	Syphid fly	*Chrysoperla carnea*	Honey bee
49	..	..	..	0.33	..	..	..	..	..	..	..
50	..	..	1.00	0.33	..	..	..	..	..	..	..
51	0.67	0.67	1.00	0.67	0.33	..	..	..	..	..	..
52	0.67	1.33	2.33	1.00	0.33	..	..	..	..	..	..
1	1.00	1.67	1.67	1.00	0.33	..	..	..	..	..	..
2	2.33	1.67	2.67	0.67	0.67	..	..	..	..	..	..
3	4.00	1.00	2.67	0.33	0.67	..	..	..	..	..	..
4	4.67	1.67	0.00	3.00	2.00	1.00	..	..	..	..	0.33
5	6.00	1.00	1.00	1.00	0.67	1.00	..	..	..	..	0.33
6	11.00	1.00	3.00	1.00	0.67	2.00	..	1.00	..	..	0.33
7	31.67	1.67	4.67	0.00	0.00	3.00	2.00	1.00	0.00	0.00	0.33
8	48.00	1.00	4.00	1.00	..	1.33	1.00	5.00	0.33	0.33	0.33
9	32.00	1.00	7.00	..	..	0.67	1.00	6.00	0.33	0.00	0.33
10	15.67	0.00	4.00	..	..	0.67	1.00	3.00	0.33	0.33	..
11	5.00	0.00	1.00	..	..	..	0.33	0.00	..	..	..
12	1.00	0.00	0.00	..	..	..	0.33	..	..	..	..
13	0.00	0.00	..	..	..	..	0.00	..	..	..	..
S M	1.30	0.65	0.12	0.04	0.03	0.06	0.04	0.15	0.01	0.01	0.02
CV@%	225	0.14	0.33	0.11	0.09	0.18	0.11	0.44	0.04	0.03	0.03

found parasitizing on *A. craccivora* on alfalfa crop (Pones *et al.*, 2011).

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