

SUMMER SEASON SURVEY FOR INCIDENCE OF *MARUCA VITRATA* (G.) (Pyralidae: Lepidoptera) AND ITS NATURAL ENEMIES ON GREENGRAM AND OTHER ALTERNATIVE HOSTS IN MAIN PULSE GROWING TRACTS OF KHAMMAM DISTRICT 20

CH. SANDHYA RANI , G RAMACHANDRA RAO, MSV CHALAM,
ANIL KUMAR PATIBANDA and V SRINIVASA RAO

Agricultural Research Station, Acharya N.G. Ranga Agricultural University,
Madhira, Khammam District- 507 203

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ABSTRACT

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The survey, conducted for two consecutive years (2009-10 and 2010-11) in the twelve major greengram growing mandals of Khammam district during summer, at different growth stages of pulses from randomly selected five farmer's fields revealed that the *M. vitrata* larval incidence ranged from 05–15 larvae per twenty five plants in bud initiation, flowering and podding stages. The flower infestation ranged from 11.5-29% whereas pod damage ranged from 18–27.5%. Among the surveyed mandals, Thirumalayapalem (27.5%), Khammam Urban (24%) and Penubally (23%) recorded the highest pod damage, whereas Madhira (18%) & Bonakal(19.5%) recorded the lowest pod damage. Among the coccinellids, *Chilomenussexmaculata* species only observed in Pulses ecosystem. Among spiders, ground spiders viz., Urocteid species, *Sparassus pseudolamarckii*, *Lycosids*, *Arctosamulani* (Dyal); *Hippasasp.*, *Salticiussp.* in blackgram & greengram ecosystems. Other spiders, *Argiopesp.*, *Oxyopesp.*, *Thomisussp.*, *Chrysillassp.*, *Tetragnathasp.*, *Neosconatheisi*, *Telemoniadimidata*, *Curbasp.* *Peucetiaviridana*, *A. diadematus*, *A. anasuja* (Thorell) were noticed in pulses ecosystems. Predation or parasitism was not observed in the field conditions. *Physalis minima*, *Abutilon* sp. and *Tephrosia* sp. (Weeds), greengram, blackgram, cowpea, pigeonpea & Groundnut (Legumes), daincha and sunhemp (green-manuring crops) were found as alternative hosts for *Maruca vitrata*. Identification of *Physalis minima* and *Abutilon* sp., non-Leguminous plants as alternative hosts for *Maruca* in A.P is the first report.

INTRODUCTION

Pulses are well known as cheap & excellent source of dietary proteins of Indian sub-continent, feed and fodder for animals and also soil fertility restorers. Among the pulses, mung bean or greengram (*Vigna radiata* L.) is the important pulse crop of India and it occupies an area of about 3 m.ha with a production of 0.25 m.t and 425 kg ha⁻¹ productivity (NAIP report submitted by CRIDA, 2012). Andhra Pradesh is the 4th major state of India contributing about 15.5% of the national production of greengram with 351kg/ha average productivity. Khammam is the important district occupying the 3rd place in productivity, but 5th place in area & production of green gram. During summer, it is grown as a sole crop with adequate irrigation facilities. With the introduction of Bt cotton, most of the farmers are preferring greengram after completion of Bt cotton crop (February - April) by virtue of its short duration & drought tolerance in summer. Among the pod borers, legume pod borer, *Maruca vitrata* (G.) is the devastating pest of pulses. It is widely distributed in Asia, Africa, Australia & America. It feeds on plant species belonging to 20 genera & 6 families, the

majority of which belonging to Papilionaceae and is a major pest of cowpea, pigeonpea, mungbean, snapbean, common bean, soya bean, lima bean, faba bean, hyacinth bean & adzukibean. It infests pigeonpea, cowpea, mungbean, urd bean & field bean in southern zone of A.P (Sharma et al., 2000). In recent decades, it infested groundnut also (Babu et al., 2006). Because of its extensive host range & destructiveness, it became a persistent pest in pulses in A.P particularly on greengram, as it is cultivated throughout the year in different seasons / situations. In view of the scope for increase in summer greengram area, it is necessary to conduct the surveys on the *Maruca* occurrence, its natural enemy fauna and alternative hosts in summer season for preparing forewarning systems & management tactics against *Maruca*.

MATERIALS AND METHODS

The survey was conducted in 12 mandals, to record the natural enemies viz., number of coccinellids, spiders, preying mantids on twenty five randomly selected *Maruca* infested plants at weekly interval in randomly selected five farmer's fields of

Khammam district and also to record alternative hosts for *Maruca* at Agricultural Research Station (A.R.S) Farm & farmers' fields. Observations were made by conducting destructive sampling on larval incidence, flower infestation and pod damage from the pulse crops (Greengram, blackgram, cowpea, pigeonpea (redgram) and green-manuring crops (namely daincha and sunhemp) grown in surroundings. For natural enemy population, by visual sampling, counted the number of natural enemies on twenty- five randomly selected *Maruca* infested plants. Visual sampling was done from weed plants available nearby/within the greengram fields in the A.R.S., Farm and farmers' fields at flowering stage. To record other natural enemies, *Maruca* larvae were collected from different farmers' fields and kept in separate jars for monitoring the presence of larval parasitoids.

RESULTS AND DISCUSSION

Survey for *M. vitrata* incidence

During summer, the survey was made in five randomly selected farmers' fields at different growth stages in twelve major greengram growing mandals in 2009-10 & 2010-11 based on the greengram cropped area. The summer survey report revealed that the *M. vitrata* larval incidence ranged from 5 – 20 larvae per twenty- five plants in different growth stages, i.e. bud initiation, flowering and podding stages. The flower infestation ranged from 10-30% & 10-28%, whereas pod damage ranged from 16–30 & 15–25 per cent in 2009-10 & 2010-11 respectively. *Maruca vitrata* infestation was noticed in all surveyed mandals. *Maruca vitrata* infestation starts from bud initiation stage in hidden nature.

Generally farmers are going for greengram cultivation in isolated areas with irrigation facilities during summer season. The Economic Threshold level for *Maruca* is one percent infestation at bud initiation stage /one larva per plant. Larval incidence recorded is lower in summer. Farmers are identifying the *Maruca* damage late due to its hidden nature and adapting to sprays after its damage. This might be the reason for *Maruca* population prevailing even under sprayed conditions and low productivity of greengram. Hence, it is necessary to forewarn about the *Maruca* management in greengram, a non-commercial, very short duration food crop.

Survey for Natural Enemies

In summer during surveys, except spiders and coccinellids, no other predators or parasitoids or entomopathogens were recorded from the *Maruca* infested plants in pulses ecosystem. The data on number of coccinellids and spiders per twenty- five *Maruca* infested plants was recorded on randomly selected *Maruca* infested plants from the farmer's fields ranged from 3.0 - 14.0 and 1.5 - 4.0 in 2009-10 and 4.0-10.0 and 1.0–3.0 in 2010-11 respectively. Few Coccinellids & Spiders were recorded in *Maruca* infested plants. The hidden behaviour of *Maruca* in webs (formed by leaves / bud / flowers & pods) might be the reason for lesser exposure to the natural enemies. One larva is enough to cause damage to one cluster by webbing 4-6 pods. Pod damage ranged from 18 – 27.5%.

Among the natural enemies, number of coccinellids and spiders from randomly selected *Maruca* infested pulse crops from the farmer's fields ranged from 4.5-12.0 and 1.75 - 3.25 respectively. Among the coccinellids, *Chilomenus sexmaculata* is the only species observed in Pulses ecosystem. Among spiders, especially ground spiders viz., Urocteid species, *Sparassus pseudolamarckii*, *Lycosids*, *Arctosamulani* (Dyal); *Hippasa* spp., *Salticus* spp. were noticed in blackgram & greengram ecosystems. Other spiders included *Argiope* sp., *Oxyopes* sp., *Thomisus* sp., *Chrysilla* sp., *Tetragnatha* sp., *Neoscona theisi*, *Telemoniadimidata* *Curba* sp. *Peucetiaviridana*, *A. diadematus* *A. anasuja* (Thorell). These findings are in conformity with the findings of Sudha (2008), who conducted a field survey for natural enemies of *M. testulalis* and reported that spiders viz., *Oxyopes shweta*, *Thomisus katrajghatus*, *Thomisus* sp., *Antilochus coquebertii*, *Salticus* sp. and *Hippasa* were the predominant predators. Predation or parasitism was not observed under both the field conditions in A.R.S Farm as well as in the farmers' fields. Durga Rao (2010) investigated the field efficacy of *Trichogramma* egg parasitoid on *Maruca* in rice fallow blackgram and reported that at seven days after sixth release of *Trichogramma chilonis* that there was only numerical difference, however, statistically there was non-significant difference between treated plot & control plot. As was survey conducted in the farmers' fields,

Table 1. Mandal (Block) wise greengram area survey on *M. vitrata* infested pulses (Summer, 2009-10 & 2010-11) in Khammam District

Sl. No	Name of the Mandal Block	Total No. of villages	No. of greengram cultivated villages	Greengram cropped Area (ha)	<i>M. vitrata</i> infestation (Mean data of 5 villages)			Natural enemies (Mean no./25 plants)	
					Larval incidence (No./PI)	Flower infestation (%)	% Pod damage	Coccinellids	Spiders
1	Madhira	25	3	4	5.0-14.0	15.0-27.0	18.0	5.0	3.0
2	Bonakal	18	8	27	6.5-11.0	12.0-20.5	19.5	4.5	3.25
3	Chintakani	16	5	40	9-13.5	17.5-22.5	21	9.5	2.25
4	Kusumanchi	18	4	15.5	6.5-11.5	16.0-23.5	21.5	8.0	1.75
5	Yerrupalem	24	8	4.5	5.5-10.0	11.5-24.5	22.5	5.0	3.25
6	Kalluru	23	2	18.5	8.5-13.0	16.5-25.0	22.5	5.0	3.25
7	Penuballi	21	7	21	6.5-12.0	17.5-25.0	23	7.0	2.75
8	Khammam (U)	17	12	66.5	10 -15	16.5-25.0	24	8.0	2.75
9	Tirumalayapalm	25	15	44.5	8.5-12.5	16.0-29.0	27.5	12.0	1.75

insecticide sprays influence the *Maruca* & natural enemy population. Very few natural enemies were encountered in survey during summer, an off-season and *Maruca vitrata*'s hidden nature also might be one of the reasons for escaping from natural enemies under field conditions.

Survey for Alternative Hosts of *M. vitrata*

During the summer season survey, it was found that blackgram, pigeonpea (redgram) (*Kharif & Rabi*), cowpea, daincha and sunhemp were the cultivated hosts and beans were found as alternative hosts. These observations are in agreement with the reports of Ingram (1998) who reported that *Sesbania* (Daincha) was one of the alternative host for *Maruca*. Huang (2004) surveyed *Sesbania* plants and reported that among the twenty- one species of insect pests attacked *Sesbania*, the bean pod borer, *Maruca* was recognized as the major serious pest. Sharma *et al.* (2000), Chandrayudu *et al.* (2006) and Kamakshi *et al.* (2008) reported that dolichos bean was the most preferred host for *Maruca*.

Among the various weeds in pulses ecosystem, three weeds namely, *Physalis minima* (Solanaceae), *Abutilon* sp. (Malvaceae), and *Tephrosia* sp. (Papilionaceae) were found as alternative hosts, as they are hosting early instar larvae at flowering stage. Arodokoun *et al.* (2003) reported that *Lonchocarpus* spp. and *Tephrosia platycarpa* serve as essential relay hosts for *Maruca*.

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Conclusion

The two summer seasons survey pooled data showed that the pod damage ranged from 18.0 – 27.5 per cent (Table 1). *Maruca vitrata* infestation was noticed in all most all pulse crops in the surveyed mandals. Among the 12 surveyed mandals, Thirumalayapalem (27.5%), Khammam Urban (24.0%) and Penuballi (23.0%) recorded highest pod damage, whereas Madhira (18.0%) & Bonakal (19.5%) recorded the lowest pod damage by *M. vitrata*.

Among the coccinellids, *Chilomenus sexmaculata* is the only species observed in Pulses ecosystem. Among spiders, especially ground spiders viz., Urocteid species, *Sparassus pseudolamarckii*, *Lycosids*, *Arctosamulani* (Dyal); *Hippasa* spp., *Salticus* spp. were noticed in blackgram & greengram ecosystems. Other spiders namely, *Argiope* sp., *Oxyopes* sp., *Thomisus* sp., *Chrysilla* sp., *Tetragnatha* sp., *Neoscona theisi*, *Telemoniadimidata*, *Curba* sp. *Peucetiaviridana*, *A. diadematus* A. *anasuja* (Thorell).

Greengram, blackgram, cowpea, pigeonpea (redgram) and green-manuring crops namely daincha and sunhemp were the cultivated hosts and three weeds namely, *Physalis minima*, *Abutilon* sp. and *Tephrosia* sp. (Papilionaceae) were found as alternative hosts. *Physalis minima* and *Abutilon* sp., the non-papilionaceous weeds identified as alternative hosts for *Maruca* and first time reported in A.P.

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