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Seasonal occurrence and management of green semilooper on soybean

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Abstract
The study on Seasonal Occurrence and Management of *Thysanoplusia orechalecea* on Soybean was carried out during *Kharif* season 2018-19 under field condition of the Entomology Section, College of Agriculture Nagpur. Seasonal incidence initiated during 29th standard week (0.10 larva/mrl) and gradually attained maximum (1.00 larva/mrl) during 34th standard week. Population was decreased from 36th standard week onwards. The treatment of Emamectin benzoate 5 SG @ 0.02% was found superior amongst other treatments at each of 3, 7 and fenvalerate 20 EC @ 0.01% 14 days. As regards to soybean grain yield, the application of spinosad 45 SC @ 0.01% and fenvalerate 20 EC @ 0.01% were found to be most effective treatments recording higher yield of 13.46 q/ha, 12.82 q/ha, respectively.

Keywords: *Thysanoplusia orechalecea*, seasonal incidence, management, soybean

Introduction
Soybean (*Glycine max* L.) belongs to the family Leguminaceae sub-family Papilionaceae. Soybean is native of Asia and the first known records, however, indicate that soybean emerged as a domesticated crop around the eleventh century BC in China (Hymowitz, 1970) [2]. Majority of the world's soybean has been cultivated in the United States as well as in South American countries. In India, soybean cultivation has picked up momentum during the past 15 years.

Thysanoplusia orichalcea (Fab) damages the crop from August to September during kharif and March to May during rabi season. The infestation can result into 30 per cent undeveloped pods and about 50 per cent yield loss. In case of heavy attack, the caterpillars are also found to feed on flowers and pods (Anon., 2007) [1].

It is often confused with the cabbage looper (*Trichoplusiani* (Hubner), which is extremely similar in appearance and size. It feeds on many other agronomic, vegetable, and floricultural crops. Larvae (caterpillars) are known to consume large amounts of foliage and occasionally feed on pods and fruits, while moths feed solely on flower nectar. After hatching, the soybean looper usually transitions through six instars, although five to seven instars have been observed. The first instar will last 3-4 days, while most other instars take 2-3 days to complete, with the exception of the final instar, which is 5-6 days (Shour and Sparks 1981) [5]. *T. orechalecea is* mainly a foliage feeder, but it will also feed on pods. Upon hatching hatched, the soybean looper feeds in the lower half of the canopy where the egg was laid. The soybean looper has an unusual defoliation pattern, feeding from the lower, inside canopy and then moving up and outwards (Smith *et al.* 1994) [6]. When scouting for pests, this type of feeding pattern can be easily overlooked, as the outer canopy appears undamaged until the top of the plant is defoliated. During early instars when *T. orechalecea* is small, foliage is not consumed in large amounts as it is by later instars. Most foliage is consumed by the fourth to sixth instars, during the last 4-5 days of the larval stage (Smith *et al.* 1994) [6].

Materials and Methods
Defoliatoron soybean (*Glycine max* L.) was conducted during Kharif season 2018-19 at the experimental field of Entomology Section, College of Agriculture Nagpur. It was laid out in randomized block design with eight treatments and three replicationsneem oil @ 2%, neem seed extract (NSE) @ 5%, quinalphos 25 EC @ 0.05%, fenvalerate 20 EC @ 0.01%, emamectin benzoate 5 SG @ 0.02%, indoxacarb 15.8 EC @ 0.01%, spinosad 45 SC @ 0.01%were used under field condition along with control (water spray) on soybean variety JS-335 during the course of present investigation.

Seed treatment with Thiram @ 3 g/kg and Rhizobium @ 2.50 g/kg of seed was done before sowing as well as other standard package of practices for crop production were followed. For recording seasonal incidence of *T. orechalecea* on soybean a separate plot of 5 x 5 m^2

area was sown and observations recorded from 15 DAS at 7 days interval till the harvest of crop. The treatments were imposed soon after the incidence of *T. orechalecea*. Total three sprays were given at an interval of 15 days after emergence of crop with the help of knapsack sprayer when. The observation on tobacco leaf eating caterpillar recorded on randomly selected one meter row length (mrl) at five places from each plot. Pre-treatment observations were recorded 24 hours before the application of treatments and the post-treatment observations were recorded at 3, 7 and 14 days after application of treatment.

Results and Discussions

Incidence of *Thysanoplusia orichalcea* initiated during 29th standard week (0.10 larvae/mrl) and gradually attained maximum during 34th standard week (1.00 larvae/mrl). After 36th standard week population steeply declined.

The results on efficacy of botanical and chemical insecticides practiced against T. Orechalecea observed the cumulative mean number larvae of T. orechalecea./mrl recorded at 3, 7 and 14 DAT after three treatments, respectively and were presented in Table 2 and graphically illustrated in numerically minimum cumulative average number of semilooper larvae (T5:0.10 larvae/mrl) after 3 days of treatment was recorded in treatment of emamectin benzoate 5 SG @ 0.02% and found superior over the other treatments. The next effective treatments were of spinosad 45 SC @ 0.01% (T7:0.13 larvae/mrl), fenvalerate 20EC @ 0.01% (T4:0.13 larvae/mrl), and were found to be at par with above mentioned treatment followed byindoxacarb 15.8 EC @ 0.01% (T6:0.24 larvae/mrl) quinalphos 25 EC @ 0.05% (T3:0.39 larvae/mrl). However, The treatments of neem oil @ 2% (T1:0.74 larvae/mrl) and neem seed extract (NSE) @ 5% (T2:0.81 larvae/mrl) were found to be least effective in reducing larval population per mrl. Maximum mean larval population (T8:1.03 larvae/mrl) was recorded in control (water spray).

Numerically minimum cumulative average number of semilooper larvae (T5:0.07 larvae/mrl) after 7 days of treatment was recorded in treatment of emamectin benzoate 5 SG @ 0.02% and found superior over the other treatments. The next effective treatments were spinosad 45 SC @ 0.01% (T7:0.09 larvae/mrl), fenvalerate 20EC @ 0.01% (T4:0.09 larvae/mrl), and were found to be at par with above mentioned treatment followed by indoxacarb 15.8 EC @ 0.01% (T6:0.20 larvae/mrl) quinalphos 25 EC @ 0.05% (T3:0.36 larvae/mrl). However, the treatments of neem oil @ 2% (T1:0.80 larvae/mrl) and neem seed extract (NSE) @ 5% (T2:0.92 larvae/mrl) were found to be least effective in reducing larval population per mrl. Maximum mean larval population (T8:1.22 larvae/mrl) was recorded in control (Water spray).

After 14 days of treatment, the minimum cumulative average number of semilooper larvae (T4:0.03 larvae/mrl) was recorded in treatment of fenvalerate 20 EC @ 0.01% and found superior over the other treatments. The next effective treatments were of emamectin benzoate 5 SG @ 0.02% (T5:0.06 larvae/mrl), spinosad 45 SC @ 0.01% (T7:0.08 larvae/mrl), indoxacarb 15.8 EC @ 0.01% (T6:0.14 larvae/mrl) and were found to be at par with above mentioned treatment followed by quinalphos 25 EC @ 0.05% (T3:0.35 larvae/mrl). However, the treatments of neem oil @ 2% (T1:0.90 larvae/mrl) and neem seed extract (NSE) @ 5% (T2:1.07 larvae/mrl) were found to be least effective in reducing larval population larvae/mrl. Maximum mean larval population (T8:1.37 larvae/mrl) was recorded in control (water spray).

The results are in comparisons with Kothalkar (2014) recorded that Fenvelerate 20 EC@ 0.01% (0.67%) followed by Spinosad 45 SC @0.018% (0.71%) were found to be significantly most effective in minimizing the cumulative average per cent infestation of leaf miner at 14 days after spray. Matti and deotale (2015) [4] their result of the data on cumulative mean number of larvae of semilooper/mrl recorded at 7 DAT is presented in Table 1. The result was found statistically significant. However, numerically minimum cumulative average number of semilooper larvae (0.07/mrl) was recorded in treatment of Fenvalerate 20 EC @ 0.50 ml/lit (T7) and found superior compared to other treatments. The next effective treatments were of Spinosad 45 SC @ 0.25 ml/lit (T3:0.09/mrl), Emamectin benzoate 5 SG @ 0.3 g/lit (T6:0.11/mrl) Indoxacarb 15.8 EC @ 0.60 ml/lit (T5:0.12/ mrl) which were of found to be at par with above mentioned treatment.

The treatment spinosad 45 SC @ 0.01% recorded maximum yields of 13.46 q/ha with an increase of 10.83 q/ha yields over control. The performance of fenvalerate 20 EC @ 0.01% yielded 12.82 q/ha. The treatment emamectin benzoate 5 SG @ 0.02% recorded yields of 12.25 q/ha with 9.62 q/ha increase in yield over control followed by indoxacarb15.8 EC @ 0.01%, Quinalphos 25 EC @ 0.05%, neem oil @ 2% and Neem seed extract (NSE) @ 5%.

The present findings on soybean yield are in line with the yield reports of Matti and Deotale (2015) [4] the application of fenvalerate 20 EC recorded maximum yield of 21.05 q/ha with an increase of 10.69 q/ha yield over control. The application of indoxacarb 15.8 EC exhibited the yield of 20.10 q/ha of with an increase 9.74 q/ha grain yield over control, followed by spinosad 45 SC which recorded yield of 19.02 q/ ha with 8.66 q/ha increase yield over control. The treatment of emamectin benzoate 5 SG recorded 18.30 q/ha yields with 7.94 q/ha increase yield over control.

Conclusion:

During *Kharif* 2018, T. orechalecea incidence was recorded on soybean at Nagpur (MH). Maximum incidence was observed during 34th standard week (1.00 larvae/mrl). Emamectin benzoate 5 SG @ 0.02% was superior At 3, 7 days after treatment and fenvalerate 20 EC @ 0.01% was superior after 14 days after treatment.

Table 1: Seasonal incidence of *T. orichalcea* on soybean on JS-335 during Kharif 2018

Std. MT Week	*T. orichalcea*
(jul)27	0.00
(Jul)28	0.00
(Jul)29	0.10
(Jul)30	0.20
(Aug)31	0.60
(Aug)32	0.40
(Aug)33	0.60
(Aug)34	1.00
(Sept)35	1.00
(Sept)36	0.80
(Sept)37	0.80
(Sept)38	0.60
(Sept)39	0.40
(Oct)40	0.20
(Oct)41	0.10
(Oct)42	0.00

Table 2: Cumulative mean population of semilooper larvae in different treatments at 3, 7 and 14 days after three spraying

Tr No.	Treatments	3 DAT				7 DAT				14 DAT			
		1st Spray	2nd spray	3rd spray	Mean	1st spray	2nd spray	3rd spray	Mean	1st spray	2nd spray	3rd spray	Mean
T_1	Neem oil @ 2%	0.52 (0.72)	0.77 (0.87)	0.93 (0.96)	0.74 (0.86)	0.56 (0.74)	0.82 (0.90)	1.01 (1.00)	0.80 (0.89)	0.69 (0.83)	0.92 (0.95)	1.09 (1.04)	0.90 (0.30)
T_2	Neem seed extract (NSE) @ 5%	0.53 (0.72)	0.80 (0.89)	1.10 (1.04)	0.81 (0.90)	0.66 (0.81)	0.87 (0.93)	1.22 (1.10)	0.92 (0.44)	0.79 (0.88)	1.12 (1.05)	1.29 (1.13)	1.07 (1.03)
T_3	Quinalphos 25 EC @ 0.05%	0.47 (0.68)	0.39 (0.62)	0.30 (0.54)	0.39 (0.62)	0.44 (0.66)	0.36 (0.60)	0.29 (0.53)	0.36 (0.60)	0.37 (0.60)	0.34 (0.58)	0.33 (0.57)	0.35 (0.59)
T_4	Fenvalerate 20 EC @ 0.01%	0.26 (0.50)	0.08 (0.28)	0.04 (0.20)	0.13 (0.36)	0.18 (0.42)	0.04 (0.20)	0.06 (0.24)	0.09 (0.30)	0.10 (0.31)	0.04 (0.20)	0.01 (0.10)	0.05 (0.22)
T_5	Emamectin benzoate 5 SG @ 0.02%	0.21 (0.45)	0.06 (0.24)	0.02 (0.14)	0.10 (0.31)	0.16 (0.40)	0.02 (0.14)	0.02 (0.14)	0.07 (0.26)	0.12 (0.34)	0.05 (0.22)	0.00 (0.00)	0.06 (0.24)
T_6	Indoxacarb 15.8 EC @ 0.01%	0.32 (0.56)	0.22 (0.46)	0.18 (0.42)	0.24 (0.48)	0.27 (0.51)	0.16 (0.40)	0.17 (0.41)	0.20 (0.44)	0.20 (0.44)	0.17 (0.41)	0.05 (0.22)	0.14 (0.37)
T_7	Spinosad 45 SC @ 0.01%	0.25 (0.50)	0.11 (0.33)	0.03 (0.17)	0.13 (0.36)	0.17 (0.41)	0.05 (0.22)	0.04 (0.20)	0.09 (0.30)	0.14 (0.37)	0.09 (0.30)	0.02 (0.14)	0.08 (0.28)
T_8	Control (water spray)	0.82 (0.90)	1.06 (1.02)	1.20 (1.09)	1.03 (1.01)	0.89 (0.94)	1.39 (1.17)	1.39 (1.17)	1.22 (1.10)	1.00 (1.00)	1.30 (1.14)	1.82 (1.34)	1.37 (1.17)
F Test		Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig
SEm(±)		0.02	0.03	0.04	0.03	0.03	0.04	0.05	0.04	0.03	0.04	0.05	0.04
CD @ 5%		0.08	0.11	0.13	0.10	0.09	0.12	0.15	0.12	0.11	0.13	0.16	0.13

Table 3: Effect of different treatments on average grain yield of soybean crop

Sr. No.	Treatments	Yield kg/plot				
		R1	R2	R3	Mean	Yield q/ha
T_1	Neem oil @ 2%	0.85 (0.92)	*0.82 (0.90)*	0.87 (0.93)	0.85 (0.92)	9.04
T_2	Neem seed extract (NSE) @ 5%	0.80 (0.89)	0.77 (0.87)	0.79 (0.88)	0.79 (0.88)	8.40
T_3	Quinalphos 25 EC @ 0.05%	0.88 (0.93)	0.85 (0.92)	0.90 (0.94)	0.88 (0.93)	9.36
T_4	Fenvalerate 20EC @ 0.01%	1.21 (1.10)	1.30 (1.14)	1.09 (1.04)	1.20 (1.09)	12.82
T_5	Emamectin benzoate 5 SG @ 0.02%	1.15 (1.07)	1.20 (1.09)	1.03 (1.01)	1.13 (1.06)	12.25
T_6	Indoxacarb 15.8EC @ 0.01%	0.98 (0.98)	0.86 (0.92)	0.84 (0.91)	0.89 (0.94)	9.54
T_7	Spinosad 45 SC @ 0.01%	1.23 (1.10)	1.35 (1.16)	1.20 (1.09)	1.26 (1.12)	13.46
T_8	Control (Water spray)	0.26 (0.50)	0.20 (0.44)	0.28 (0.52)	0.25 (0.50)	2.63
	F Test				Sig	
	SE(m)±				0.03	
	CD @ 5%				0.11	

References

1. Anonymous. Soybean, 2007, 1-7. www.ikisan.com
2. Hymowitz T. On the domestication of the soybean. Econ. Bot. 1970; 24(4):408-421.
3. Kothalkar RR, Thakare AY, Salunke PB. Effect of newer insecticides in combination with Triazophos against insect pest of soybean. Agric. Sci. Digest. 2014; 35(1):46-50.
4. Matti MV, Deotale RO. Evalution of different insecticides against green semilooper *Thysanoplusia orichalcea* (Fab.) in soybean ecosystem. Int. J. Pl. Prot. 2015; 8(2):338-342.
5. Shour MH, Sparks TC. Biology of the soybean looper *Pseudoplusia includens*: Characterization of last-stage larvae. Annals of the Entomological Society of America. 1981; 74: 531-535.
6. Smith RH, Freeman B, Foshee W. Soybean loopers: Late season foliage feeders on cotton. Alabama Extension. Circular ANR-843, 1994.