



Pest incidence on Yardlong bean grown under protected and open field conditions

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ABSTRACT: Investigations on incidence of major pests of Yardlong bean grown under protected (polyhouse and shadenet) and open field conditions were carried out during *kharif* 2016 at ZAHRS, Navile, Shivamogga. The variety used was 'Arka Mangala'. A total of four species of insects and one mite pest was recorded. Insect pests included Tobacco caterpillar (*Spodoptera litura*), Leaf miner (*Liriomyza trifolii*) and mite pest *Tetranychus urticae* (Koch) under polyhouse. In shadenet, *L. trifolii*, *T. urticae* (Koch) and black aphid (*Aphis fabae*) were reported. In open field condition *L. trifolii*, *T. urticae*, *A. fabae* and pod borer (*Maruca vitrata*) were noticed. Maximum incidence of *S. litura* (0.91 larvae per plant) was observed at seedling stage under polyhouse and no incidence in other environments. *L. trifolii* observed under all the three environments but high incidence in shadenet (16.40%). *T. urticae* was also recorded under all the environments whereas high incidence in polyhouse (24 adults per five leaves). Maximum incidence of *M. vitrata* (0-10%) was observed only in open field and there is no incidence under polyhouse and shadenet. Maximum incidence of *A. fabae* (10-25%) damage was noticed in open condition followed by shadenet but no incidence in polyhouse.

Keywords: Pest incidence, protected cultivation, Yardlong bean

INTRODUCTION

Yardlong bean (*Vigna unguiculata* subsp. *sesquipedalis*) is a legume cultivated for its green pods. It is known as the Yardlong bean, long-podded cowpea, asparagus bean and snake bean. Despite the common name, the pods are actually about half a yard long. It is originated in West Africa and it is a vigorous climbing vine. The plant is subtropical/tropical and most widely grown in the warmer parts of South Asia, South-East Asia, Southern China and India. It is a highly nutritive vegetable containing a good amount of digestible protein both in pods (23.5 - 26.3%) and in leaves (Ano and Ubochi, 2008). Nowadays due to high price of Yardlong bean many farmers are cultivating in polyhouse during rainy season and in shade net during summer season. A major problem for Yardlong bean and cowpea production is the severe infestation of various insect pests (Benchasri and Bairaman, 2010). Among those tobacco caterpillar, leaf miner, mites, black aphid and pod borers are the major (Sarutayophat *et al.*, 2007). The yield loss in Yardlong bean due to insect pests is reported to be about 12-30 per cent (Hossain and Awrangzeb, 1992). It is especially attractive to aphids (*Aphis craccivora*) and red spider mite (*Tetranychus* spp.). The insect pests have been reported as one of the serious problems to Yardlong

bean cultivation (Rashid, 1999). Reports on the insect pests incidence and their management techniques for the Yardlong bean are scanty. The present study was, therefore, undertaken to know the insect pests and their level of infestation under different conditions on Yard long bean.

MATERIALS AND METHODS

Investigations on incidence of major pests on Yardlong bean variety 'Arka Mangala' which was released from IIHR, Bengaluru, India grown under protected (polyhouse and shadenet) and open field condition were carried out during *Kharif* 2016 at ZAHRS, Navile, Shivamogga, Karnataka. All the agronomic practices and protection measures for management of pests followed for the crop was same for all the environments. Observations were recorded on 10 randomly selected and tagged plants at fortnightly interval from one week after sowing. The populations of mites (*T. urticae*) were recorded from five leaves (from upper, middle and lower positions) on tagged plants. Black aphid (*A. fabae*) population was scored by visual means as per the scale given by Benchasri 2009. Leaf miner (*L. trifolii*) damage was recorded by estimating as per cent mined leaves. The number of tobacco caterpillar (*S. litura*) larvae were

recorded from 10 randomly selected and tagged plants and expressed as number. The per cent pod damage by pod borer (*M. vitrata*) was calculated by number of infested pods per plant by total number of pods per plant. Pod borer damage was scored by calculating per cent pod damage where 1=0-10, 2=11-20, 3=21-30, 4=31-40, 5=41-50, 6=51-60, 7=61-70, 8=71-80, 9=81-90 (Jackai and Singh, 1988). In case of leaf miner per cent incidence was calculated by number of mined leaves per plant/total number of leaves per plant. Black aphid (*A. fabae*) aphid damage was scored based on the scale given by Wongkobrat, 1987; Benchasri, 2009 where visual damage on leaves and flower buds 0 = < 10 per cent, 1=10-25, 2=26-50, 3=51-75, 4=76-100.

RESULTS AND DISCUSSION

During the study period a total of four species of insect and mite pest were recorded *viz.*, tobacco caterpillar, leaf miner, pod borer, black aphid and mite. Pest status under different environments is depicted in Table 1 and scoring of different pests in Yardlong bean under different environments depicted in Table 2.

Tobacco caterpillar: Tobacco caterpillar incidence was noticed early in the season 10 days after transplanting of the crop. Its incidence appeared in I fortnight of September with a mean population of 1.70 larvae per plant and reached its peak activity during II fortnight of September with a mean population of 2.40 larvae/plant. Later it was in decreasing trend of 1.00 larvae/plant in II-fortnight of October. The present findings are in confirmation with findings of Nandini *et al.* (2012) who reported the peak incidence of *S. litura* was noticed during August to September months. In the present study, incidence of *S. litura* on Yardlong bean was due to shifting of pest from chilli which was raised inside the polyhouse which may be the source infestation of *S. litura*.

Leaf miner: It was observed in all the three environments *viz.*, polyhouse, shadenet and open field.

Table 1. Pest status under open and protected conditions in Yardlong bean.

Open condition (E ₃)	Protected condition	
	Polyhouse (E ₁)	Shadenet (E ₂)
<i>Liriomyza trifolii</i>	<i>Liriomyza trifolii</i>	<i>Liriomyza trifolii</i>
<i>Tetranychus urticae</i>	<i>Tetranychus urticae</i>	<i>Tetranychus urticae</i>
<i>Aphis fabae</i>	<i>Spodoptera litura</i>	<i>Aphis fabae</i>
<i>Maruca vitrata</i>		

But the damage is more in shadenet as compared to other environments. Leaf miner noticed early in the open field (II-fortnight of September) condition. The mean damage per cent ranged from 6.00 to 29.54 and peak incidence was noticed in I-fortnight of November. The infestation gradually decreased to 11.36 per cent at the end of crop period. In case of shadenet the incidence of leaf miner noticed in I-fortnight of October and damage ranged from 7.41 to 39.58 per cent which was the peak level of infestation noticed in I-fortnight of November. Later, it was gradually decreased however, noticed throughout the cropping period. In polyhouse condition it was also occurred in the I-fortnight of October, the peak infestation in I-fortnight of November (33.33%) and damage level ranged from 8.33 to 33.33 per cent.

Mites: Mite incidence was observed under all the three environments, but the more damage was noticed in polyhouse as compared to other environments. It is occurred in II-fortnight of September and peak mite population of 58.00 adults per five leaves noticed at the II-fortnight of October. The population level ranged from 18.00 to 58.00 adults per five leaves and it was noticed throughout the crop period (Fig 1). In case of shadenet, it occurred at I-fortnight of October and the peak population of 45.00 per five leaves noticed during II-fortnight of October and gradually decreased throughout the crop period and in open field the incidence occurred in II-fortnight of September. The population ranged from 10.00 to 28.00 per five leaves and peak population (28.00) was noticed in II-fortnight of October. The present findings are in concord with the findings of Sanap *et al.*, (1985) who reported the peak infestation of mite during October (132-235mites/30 leaves). Similarly, Nandini *et al.* (2012) also recorded the peak mite population during September (22.32 mites/5 leaves) and November (17.35 mites/5 leaves). Eswarareddy and Krishnakumar (2006) reported that it was a serious pest under both protected and open condition, which supports the present findings.

Black aphid: The black aphid infestation was more under shadenet and open field condition as compared to shadenet. It was noticed at I-fortnight of October in both the environment and the peak infestation of 50 to 75 per cent in open field and 26 to 50 per cent in shadenet during II-fortnight of October. This result supported by Thaker *et al.*, (1984) who reported that Aphid, another destructive pest of beans, causes damage by sucking sap from flowers, buds, pods and tender branches of the plants and reduces the viability of plant.

Monitoring of pest incidence on yardlong bean

Table 2. Pest scoring of different pests in Yardlong bean under different environments.

Period	<i>Spodoptera litura</i> (No. / plant)			<i>Liriomyza trifolii</i> (% leaf damage)			<i>Tetranychus urticae</i> (No. / 5 leaves)			<i>Aphis fabae</i> (% damage by score)			<i>Maruca vitrata</i> (% damage by score)		
	E ₁	E ₂	E ₃	E ₁	E ₂	E ₃	E ₁	E ₂	E ₃	E ₁	E ₂	E ₃	E ₁	E ₂	E ₃
II FN AUG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I FN SEP	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
II FN SEP	2.40	0.00	0.00	0.00	0.00	6.00	18.00	0.00	11.00	0.00	0.00	0.00	0.00	0.00	0.00
I FN OCT	2.20	0.00	0.00	8.33	7.41	6.81	34.00	22.00	20.00	0.00	1.00	1.00	0.00	0.00	2.00
II FN OCT	1.00	0.00	0.00	25.80	29.16	20.50	58.00	45.00	28.00	0.00	2.00	3.00	0.00	0.00	5.00
IFN NOV	0.00	0.00	0.00	33.30	39.58	29.50	44.00	32.00	22.00	0.00	1.00	2.00	0.00	0.00	1.00
II FN NOV	0.00	0.00	0.00	29.80	35.41	22.50	25.00	22.00	18.00	0.00	0.00	1.00	0.00	0.00	0.00
I FN DEC	0.00	0.00	0.00	15.00	19.79	11.40	13.00	15.00	10.00	0.00	0.00	1.00	0.00	0.00	0.00
Mean	0.91	0.00	0.00	14.00	16.40	12.10	24.00	17.00	13.60	0.00	0.50	1.00	0.00	0.00	1.00
SD±	1.06	0.00	0.00	14.10	16.74	11.00	20.60	16.60	10.20	0.00	0.75	1.06	0.00	0.00	1.77

Pod borer: The pod borer damaged only noticed under open field condition. The damage was noticed during I-fortnight of October and peak damage occurred at II-fortnight of October (41 to 50%) damaged pods, and later it was decreased to 10 per cent during I-fortnight of November and there is no incidence in later stages. This result supported by Dutta *et al.*, 2004 who reported that one of the major constraints for this bean production is the attack of pod borer *M. vitrata*. Legume pod borers populations have been found to reduce up to 100 per cent of crop yields in pigeon pea (Rahman *et al.*, 1981).

Due to improper opening and closing the doors of the structures, movement of labours and implements the

observed pests might have entered the polyhouse/shadenet. The congenial conditions in protected condition further helped for build-up of pests. Hence, defoliators and borers have noticed in the protected structures.

In conclusion from this study, incidence of *S. litura* was observed in seedling stage under polyhouse only and in other conditions there is no incidence. The mites (*T. urticae*) and leaf miner (*L. trifolii*) were observed under all the environments but high incidence of mite noticed under polyhouse followed by shadenet and open field. Leaf miner incidence was high in shadenet followed by polyhouse and open field. Black aphid (*A. fabae*) damage was high in open condition and followed by shadenet but no incidence in polyhouse. Pod

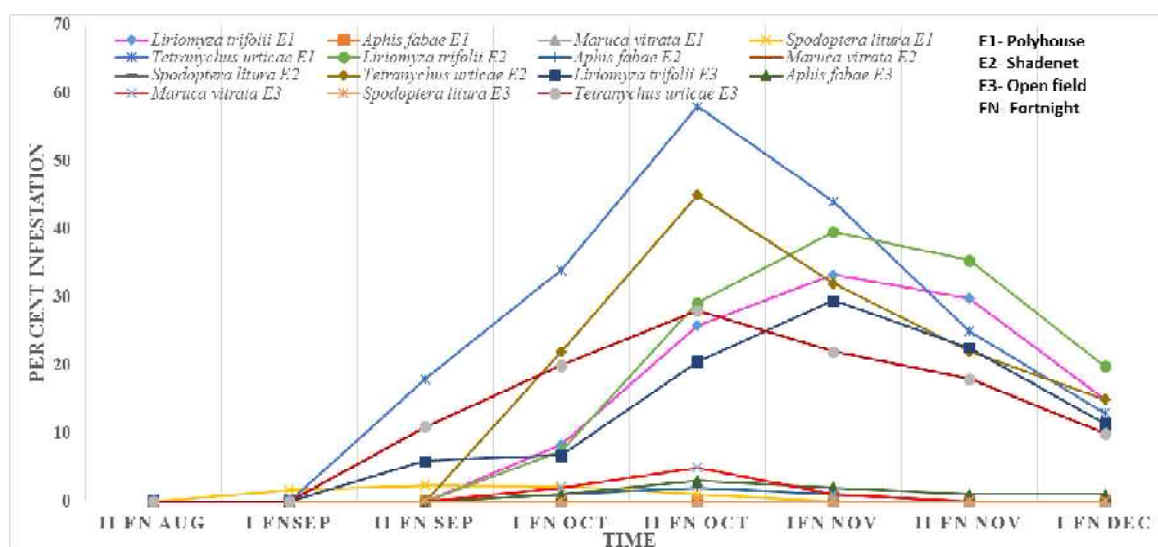


Fig. 1. Status of pest incidence of Yardlong bean under different environments

borer (*M. vitrata*) was observed only under open field cultivation and there is no incidence under polyhouse and shadenet. In the present study the incidence of sucking pests (mite, aphid and leaf miner) noticed throughout the cropping period which may be due to changes in the microclimate of the plants grown inside the naturally ventilated polyhouse. These results are in line with results of Sandeep *et al.*, (2010) who reported that microclimate with high temperature and humidity inside polyhouse provides a congenial environment for faster multiplication of pests like thrips, aphids, whitefly and mites. From the preliminary study it is indicated that the pest population in two environments (polyhouse and shadenet) was high as compared to open field condition. Further studies in this line are required.

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