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Patil Shrenik P

Department of Entomology, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra, India

Sawant VP

Department of Entomology, Regional Agriculture Research Station, Karjat, Raigad, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra, India

Kale SN

Department of Entomology, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra, India

Sanap PB

Vegetable Improvement Scheme, Central Experiment Station, Wakawali, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra, India

Jalgaonkar VN

Department of Entomology, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra, India

Naik KV

Department of Entomology, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra, India

Varnekar SV

Department of Entomology, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra, India

Chavan KG

Department of Entomology, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra, India

Patil AA

Department of Entomology, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra, India

Sawant DD

Department of Animal Husbandry and Dairy Science, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra, India

Corresponding Author:

Patil Shrenik P

Department of Entomology, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra, India

Studies on seasonal incidence of aphids infesting yard long bean

Patil Shrenik P, Sawant VP, Kale SN, Sanap PB, Jalgaonkar VN, Naik KV, Varnekar SV, Chavan KG, Patil AA and Sawant DD

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Abstract

The field experiment was carried out at Vegetable Improvement Scheme, CES, Wakawali, Dist Ratnagiri to know the seasonal incidence of aphids on yard long bean *Vigna unguiculata* sub spp. *sesquipedalis* during Rabi 2023-24. The yard long bean variety, Konkan wali was found infested with aphids at various stages of crop growth and caused yield losses under field conditions. The population of aphids ranged between 3.01 to 58.12 aphids per leaf. The first incidence of aphids (16.83 aphids/leaf) was noticed in 49th SMW (04th - 10th December). In 8th SMW (19th February - 25th February) maximum population of aphids (58.12 aphids/leaf) was observed on the crop. Population of aphids in yard long bean gradually increased up to 8th SMW after that it gradually decreased till harvest of the crop. In 12th SMW (18th March 2024 - 24th March 2024), minimum population of aphids (3.01 aphids/leaf) was recorded. The incidence of aphids was significant and negatively correlated with the minimum temperature and evening relative humidity, whereas bright sunshine hours showed a significant and positive correlation with population of aphids.

Keywords: SMW, yard long bean, seasonal incidence, aphids

Introduction

Yard long bean, *Vigna unguiculata* sub sp. *sesquipedalis* is cultivated mainly for its long tender green pods belonging to the family Fabaceae. It is also known by different names such as asparagus bean, sting bean, long podded cowpea, snake pea, snap pea, snake bean and body bean (Purseglove, 1977) [4]. Middle West Africa or Southern China was the origin of yard long bean. Yard long bean is grown in warmer parts of South-East Asia, Southern China, Africa, South America and Bangladesh and in Australia as a fodder crop (Anonymous, 2014) [2].

In India, yard long bean is cultivated to a large extent in Kerala and adjoining districts of Karnataka, Tamil Nadu, Andhra Pradesh and Maharashtra. In case of both area and production, Kerala contributes a major share, accounting for nearly 90 per cent. The yard long bean is grown primarily for long immature green pods and has been used as green beans (Saurabh *et al.* 2018) [7]. This plant has a different genus from the common bean. Yard long bean is a vigorous climbing annual vine. The yard long bean has higher nutritional value. It consumed as green pod (vegetable) and also as dry seeds (pulse). The tender green pod is highly nutritious, rich in digestible protein (23 to 26 per cent), calcium (72 mg/100g), phosphorus (59 mg/100g), iron (2.5 mg/100g), carotene (564 mg/100g), thiamine (0.07 mg/100g), riboflavin (0.09 mg/100g) and vitamin C (24 mg/100g). It is also a good source of micronutrients containing 102.70 to 120.02 mg/kg of iron, 32.58 to 36.66 mg/kg of zinc, and 2.92 to 3.34 mg/kg of manganese and 0.330.57 mg/kg of cobalt (Ano and Ubochi, 2008) [1].

During cultivation, farmer faces different problems in pest management (Rashid, 1993) [5]. The major insect pests which severely damage asparagus bean during all growth stages are bean aphids, leaf hoppers, spotted pod borer, whitefly, stem fly, leaf minor, hairy caterpillars and Bihar hairy caterpillar. Among these, aphids have been reported as a cosmopolitan species causing direct and indirect (as vector) damage to the cultivated crops (Grubben, 1993) [3]. Aphid, *Aphis craccivora* (Koch) is small sap-sucking insect and member of the family Aphidoidea.

They are commonly known as plant lice. Aphids are tiny and have soft bodies that can be pear-shaped or oval. A distinctive feature is a pair of tube-like structures called cornicles on their abdomen, which they use to excrete a defensive fluid. Aphids feed by inserting their stylets (needle-like mouthparts) into plant tissues to suck out sap. This process can damage plants directly by depleting essential nutrients. They can cause yellowing, wilting, stunted growth, and leaf curling. Aphids also excrete a sticky substance called honeydew, which can lead to the growth of sooty mould on plants.

The yard long bean is one of the important pulse crops of Konkan region grown in *Rabi* season. It is severely infested by aphids. Since few years, considerable research work on seasonal incidence, biology and efficacy of insecticides on pests infesting yard long bean has been done in abroad and India, but not in Konkan region of Maharashtra. Considering the importance of yard long bean and seriousness of pest infestation, the present investigation was planned and conducted at the College of Agriculture, Dapoli, Dist. Ratnagiri, and Maharashtra.

Materials and Methods

The field experiment was carried out at Vegetable Improvement Scheme, CES, Wakawali, Dist. Ratnagiri, and Maharashtra during *Rabi* season 2023-24. The Konkan wali variety of yard long bean was used for studying seasonal incidence of aphids of yard long bean. The observations of aphids were recorded as soon as incidence was noticed. The details of experiment are given below.

Experimental details

1	Crop	:	Yard Long Bean
2	Variety	:	Konkan wali
3	Spacing	:	1m x 1m
4	Plot Size	:	10m x 10m
5	Season	:	<i>Rabi</i> 2023-24

Cultural operations

The land was prepared as per the requirements of yard long bean crop and cleared by removing the residues of the previous crop. The entire dose of fertilizers can be applied at the time of sowing. The experimental area was sown with good seed of yard long bean in plot. The gap filling was done seven days after sowing so as to maintain enough plant population in the plot.

The other agronomic operations *viz.*, inter-culturing and weeding were done as per recommendation.

Method of recording observations

From the experimental plot, ten plants were randomly selected for recording the observations of aphids. Observations of aphid were taken on weekly basis as per standard meteorological weeks (SMW). All recommended cultivation practices were followed. The observations of aphids were recorded as soon as infestation of aphid was noticed. The population of aphids were recorded at weekly interval during morning hours on ten randomly selected plants in plot. The population of aphids were counted on three leaves (top, middle and bottom) and pods and expressed as number on three leaves and pods. Then the average of pest population was carried out.

Results and Discussion

The study of incidence of aphids on yard long bean was carried out by raising the crop in *Rabi* season 2023-24 at Vegetable Improvement Scheme, CES, Wakawali, Tal Dapoli, Ratnagiri (M.S.) and following result were obtained.

Seasonal incidence of aphids infesting yard long bean

In yard long bean, infestation of aphids was observed from third week of cropping season. Aphids sucked the cell sap which affected the crop growth and yield adversely. It was observed that there were marked differences in population of aphids as regard to Standard Metrological Weeks (SMW). In *Rabi* season, first appearance of aphids (16.83 aphids/leaf) was noticed in the 49th SMW (04th December - 10th December 2023) and the population gradually started increasing till 8th SMW (19th February - 25th February 2024). In 8th SMW, maximum population of aphids (58.12 aphids/leaf) was recorded in crop. After 8th SMW, population of aphids in yard long bean was gradually decreased till harvest of the crop. Minimum population of aphids (3.01 aphids/leaf) was recorded in 12th SMW (18th March 2024 - 24th March 2024). (Table 1 and Figure 1).

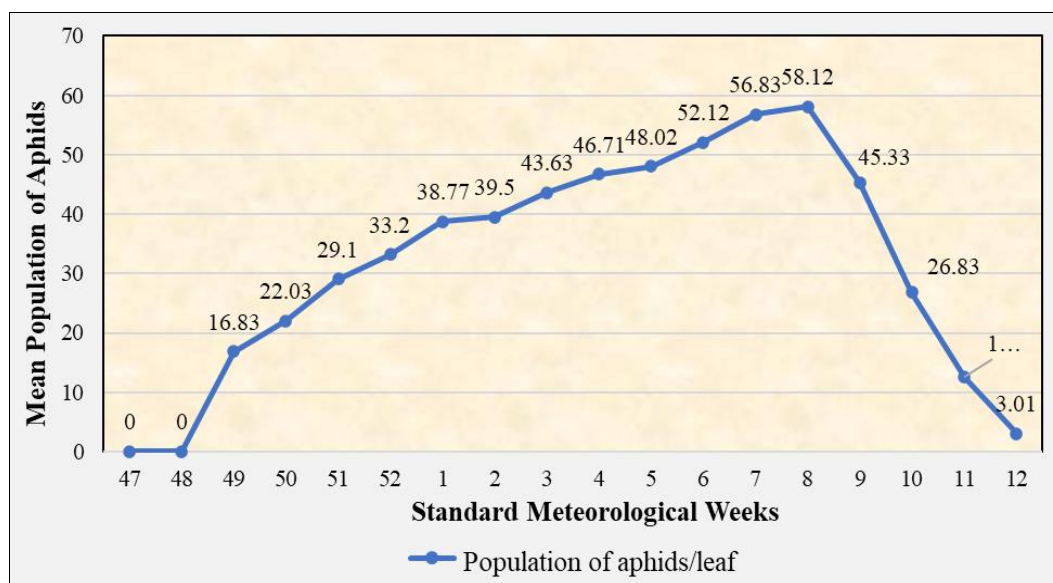
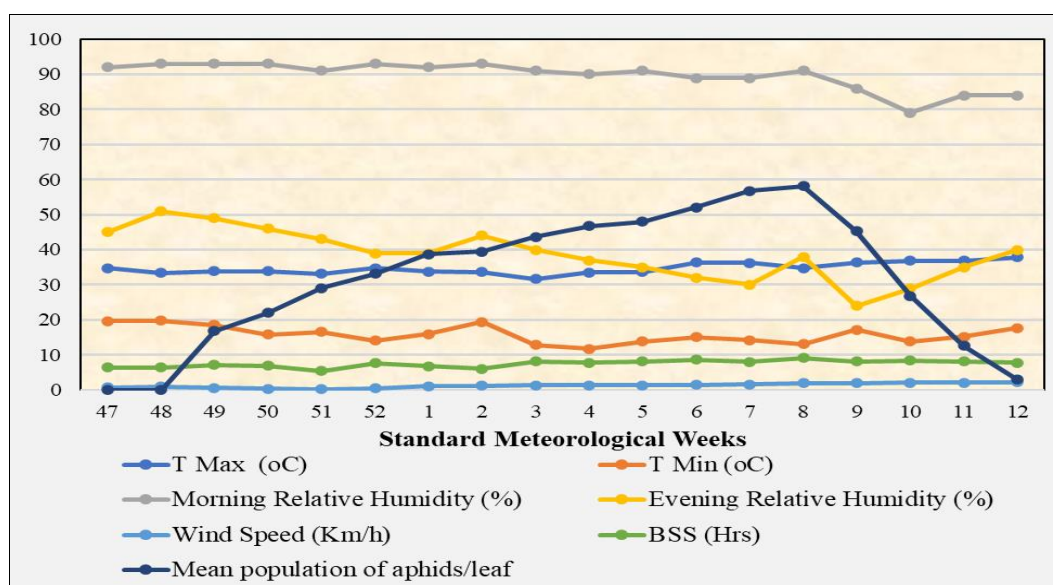
The results of the present investigation are more or less in accordance with Veeranna *et al.* (2019) ^[8]. They observed that population of aphids was started from 52nd SMW with 1.20 aphids per leaf and continued up to the 13th SMW and recorded 64.70 aphids per leaf.

Table 1: Mean population of aphids infesting yard long bean in relation to weather parameters

SMW*	Period	Temperature (°C)		Relative Humidity (%)		Wind Speed (Km/h)	BSS** (Hrs)	Mean population of aphids/leaf
		Max	Min	Morning	Evening			
47	20/11/2023 - 26/11/2023	34.7	19.6	92	45	0.7	6.4	0
48	27/11/2023 - 03/12/2023	33.4	19.8	93	51	1.0	6.4	0
49	04/12/2023 - 10/12/2023	33.9	18.5	93	49	0.6	7.2	16.83
50	11/12/2023 - 17/12/2023	33.9	15.8	93	46	0.4	6.9	22.03
51	18/12/2023 - 24/12/2023	33.2	16.6	91	43	0.2	5.4	29.10
52	25/12/2023 - 31/12/2023	34.8	14.1	93	39	0.5	7.7	33.20
1	01/01/2024 - 07/01/2024	33.8	16.0	92	39	1.1	6.8	38.77
2	08/01/2024 - 14/01/2024	33.6	19.4	93	44	1.2	6.1	39.50
3	15/01/2024 - 21/01/2024	31.6	12.9	91	40	1.3	8.2	43.63
4	22/01/2024 - 28/01/2024	33.5	11.8	90	37	1.4	7.8	46.71
5	29/01/2024 - 04/02/2024	33.7	13.8	91	35	1.4	8.1	48.02
6	05/02/2024 - 11/02/2024	36.4	15.1	89	32	1.5	8.7	52.12
7	12/02/2024 - 18/02/2024	36.3	14.2	89	30	1.6	8.0	56.83
8	19/02/2024 - 25/02/2024	34.7	13.1	91	38	2.0	9.1	58.12
9	26/02/2024 - 03/03/2024	36.4	17.2	86	24	2.0	8.2	45.33
10	04/03/2024 - 10/03/2024	36.8	13.8	79	29	2.1	8.4	26.83
11	11/03/2024 - 17/03/2024	36.9	15.2	84	35	2.1	8.1	12.56
12	18/03/2024 - 24/03/2024	37.8	17.7	84	40	2.2	7.8	3.01

Table 2: Correlation coefficient of aphids infesting yard long bean in relation to weather parameters

Sr. No.	Weather parameters	Correlation coefficient (r)
	Aphid	
1	Maximum Temperature (Tmax)	-0.119
2	Minimum Temperature (Tmin)	-0.665**
3	Morning Relative Humidity (RH I)	0.064
4	Evening Relative Humidity (RH II)	-0.585*
5	Wind Speed	0.217
6	Bright Sunshine Hours (BSS)	0.490*

**Fig 1:** Seasonal incidence of aphids infesting yard long bean**Fig 2:** Mean population of aphids infesting yard long bean in relation to weather parameters

Correlation between mean population of aphids infesting yard long bean and weather parameters.

The mean population of aphids infesting yard long bean exhibited highly significant negative correlation with minimum temperature ($r = -0.665$) and significant negative correlation with evening relative humidity ($r = -0.585$). Bright sunshine hours ($r = 0.490$) showed significant and positive correlation with mean population of aphids. Other weather parameters viz., maximum temperature, morning relative humidity and wind speed were found to be non-significant. (Table 2 and Figure 2). The present observations are in accordance with the results

obtained by Swati Yadav *et al.* (2015) [6]. They revealed that minimum temperature ($r = -0.613$) and evening relative humidity ($r = -0.705$) showed significant negative correlation with mean population of aphids. Wind speed ($r = 0.065$) and sunshine hours ($r = 0.238$) showed positive correlation with mean population of aphids.

Conclusion

The study on the seasonal incidence of aphids infesting yard long bean (*Vigna unguiculata* subsp. *sesquipedalis*) in the Konkan region highlights the significant impact of these pests on

crop health and yield. The findings indicate that aphid populations began to rise in the third week of the cropping season, peaking at 58.12 aphids per leaf during the 8th Standard Meteorological Week. This research underscores the necessity for effective pest management strategies to mitigate aphid infestations, ensuring the sustainability and productivity of yard long bean cultivation. Given the crop's nutritional value and economic importance, further studies are essential to develop integrated pest management practices tailored to local conditions.

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