Annals of Science and Allied Research Vol. 3 (1) June, 2025: 24-29.
https://doi.org/10.5281/zenodo.15791666
ISSN – 2584-2307 (Online)

THE PREVALENCE OF SELECTED VEGETABLE PESTS IN THE LOCALITY OF GUMANIWALA, RISHIKESH, DEHRADUN – UTTARAKHAND

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ABSTRACT

Insect pest infestation causes damage to the production of vegetables in the agricultural fields. The major insect pests of the vegetables include red pumpkin beetle, whitefly, fruit fly, fruit borer, *Epilachna* beetle, etc. As far as our studies result concern maximum infestation have been found in brinjal (25%) then followed by bitter gourd (23%), okra (21%), tomato and pumpkin (20%). However moderate infestation has been noted in capsicum (20%) and bottle gourd (17%) while minimum infestation has been noted in pumpkin (15%). In this study, it was found that the frequency of insect pest species has positive correlation with temperature. However, negative correlation exists in between humidity and pest population. This occurs due to distinct locality and variation in environmental factors.

Key words: Infestation, Insect, Pest, Vegetables, Agriculture field, Prevalence.

INTRODUCTION

Agricultural entomology is the science which deals with the study of pests and insects found in the field of agriculture, where the farmers grow various kinds of crops and grains, vegetables, spices, groundnuts, fruits and pulses etc. It is believed that crop loss is due to insect pests, diseases and weeds range between 10-30 % annually, depending on severity of pests' attack. In India the vegetables, grains, pulses, etc. are grown in the agriculture field by the farmers. The vegetables are the most important part of food in earth and the pests infested the vegetables in all over the physical world. The scientists possess awareness regarding pest management and gave the many processes for mitigation of pest impact.

A study was conducted on the sequential occurrence of different insect pest affecting brinjal. The Solanaceae family of vegetables include potatoes, brinjal, capsicum, chilies, etc. Solanaceae vegetables are attacked by various insect pests. Kaundinya A.V.V.et al. (2019) and Tripura A(2018) observed the infestation of fruit and shoot borer in eggplant(brinjal) respectively. Pest infestation was also observed in brinjal by Nithar (2019). He observed and identified 17 pest species. Among the observed species, five were most damaging pests. Specially Capsicum pest infestation have been investigated by Gupta et al (2016) in Jaipur. However, Singh et al. (2011) worked out on the prevalence of diseases on capsicum in Himachal Pradesh. Furthermore, Mousumi Glose et.al (2017) studied seasonal incidence of Capsicum. Apart from above said workers, in abroad Champlain Djieto-Lordon et.al (2014) have also investigated assessment of capsicum pest insects.

Tomato is one of the major crops, the world over. But, pest infestation damages its productivity. Many workers provided the tomato pest prevalence information (Sapkal et al 2018; Wade et al. 2020; Caruso et al. 2024). Furthermore Ela et.al (2023) have also furnished information on the effect of climate change on the prevalence of tomato interfering insect pests in Uganda. However, Paola Sotelo-Cardano et al (2021) have studied overall effects on productivity, nutritional yield and pest incidence of tomato in Taiwan.

Fruit borer of Okra is the pest, as it bores into the shoot and fruits causing too much loss in yield in okra crops. As control measurement are concerned, insect pest complex of okra and the biology of the fruit borer has been examined by Kumar Upendra Singh et.al (2014). Similarly, seasonal occurrence of fruit borer of okra had been studied by Shweta Meena et.al (2015). However, Das et. al (2021) provide information on Succession of major pest and predator in okra and recently Ashutosh Singh Aman et.al (2022), studied related work on control measurement of okra.

In case of Cucurbitaceae family pumpkin, sponge luffa, bottle gourd and bitter gourd the most common edible vegetable. These vegetables were also infested by various pests, which causes enormous loss of these crops. Information regarding its control measurement and management certain workers studied various aspects of above said facts. In this context, seasonal incidence and management of important pests

of cucurbit vegetable studied by Rani Priyanka (2020). Host selection by the red pumpkin beetle on different cucurbits and status of pumpkin beetles worked by Khan et. al (2010). Likewise, study on squash and pumpkin production superseded and its infestational diseases have been noted by Jim Motes et al. (2007) and John Domicon et al. (2019), respectively. Population dynamic study of luffa gourd and pumpkin pest have also been noted by Walija Fayer et al. (2014) and Shankar et al. (2023). Regarding on bottle gourd pest infestation, seasonal incidence has been studied by Sandip Patra (2014) and J. Prakash et al. (2023). The other important vegetable bitter gourd has also been affected due to pest infestation. Information on its control measure, weather factor base incidence and nutritional management in relation to pest and disease have been investigated by Rahman et al. (2008), Mawtham et.al (2020) and Rekha (1999) respectively.

MATERIALS AND METHODS

To investigate various pests of vegetables, we visited directly in the agriculture field and vendor shop to check the infested vegetables, where some vegetables were infested. We took the photograph and the pest was collected in suitable preservative container. The sample was identified and then its Morphology, Habit and Habitat, etc. have been studied.

Study Area: Gumaniwala, adjoining area of Rishikesh which is the part of District Dehradun of Uttarakhand state in North of India. Geographical details is coordinates, 30.1033680 N latitude and 78.294754^0 E longitude. Rishikesh is situated bank of river Ganga. The minimum temperature of Rishikesh is 14^0C and maximum temperature is 35^0C . But in summer the maximum temperature is varies from 35^0 C - 45^0C. The study was focused on Amit Gram (Maya Market), Shyampur, Bhattowala. The vegetables, *viz*. Tomato, Brinjal, Bottle guard, Pumpkin, Sponge luffa, Bitter guard , Capsicum and Okra have been designated for studies on these vegetables pest infestation. For the said study, we used Sweep net, Brush, Scissors, Collection vials, Transparent envelop, Field guide book, Field notebook, Camera, Forceps, Hand Lens, 70% Alcohol and Knife during the field work.

RESULTS AND DISCUSSION

The current research investigates the identification and symptoms of pests typically observed on homegrown vegetables plants and farmer's agriculture and garden plants. Total 8 vegetables pests were identified on its host vegetable plants. Occurrence of vegetable wise pest have been illustrated in Table-1. Prevalence of infestation in selected vegetable pests were mentioned in a survey report locality wise (January 2024 to July 2024) in Table -2. However, we also visited other certain locality for survey work, because some vegetables were seasonal, but due to cold storage and greenhouse farming, these vegetables were available in all season. Vegetable wise infestation percentage have been shown in Table- 3 and Fig-1. Maximum and minimum infestation have been noted in Brinjal and Pumpkin respectively. Overall percentage wise vegetable infestation noted as total 679 brinjal were observed and 171 found infested (25%). Likewise, in case of capsicum 731 were observed, and 129 have been found infested (18%). Similarly, 875 tomato were observed and 172 were infested (20%). Other vegetable okra out 1344 were observed and 278 found infested (21%). Regarding pumpkin 235 were observed and only 35 considered infested (15%). 371 bottle squash have been observed and 73 found infested (20%). 355 bottle gourds have observed and only 61 bottle gourds were infested (17%). Finally, out of 235 bitter gourds were observed and 55 were infested (23%) have been reported. The survey of literature reveals, work done so far on prevalence of these vegetable pest infestation, it was noted that there is some variation in prevalence percentage, it is due to different locality. Pest infestation is controlled by environmental factors (biotic and abiotic factor). The biotic factors temperature, relative moisture and precipitation play the key role.

Table:1 - Showing pest infestation of certain vegetables.

S. No.	Common Name of Pest	Scientific Name of Pest	Infested Vegetables
1	Fruit borer	*Leucinodes orbanalis*	Brinjal
2	Fruit borer	*Helicoverpa armigera*	Tomato
3	White fly	*Aleurothrixus trachoides*	Capsicum
4	Fruit borer	*Earias fabia*	Okra
5	Red Pumpkin beetles	*Aulacophora foveicollis*	Pumpkin
6	Fruit fly	*Bactrocera cucurbitae*	Bottle gourd
7	Epilachna beetle	*Epilachna vigintioctopunchuata*	Bitter gourd
8	Fruit fly	*Bactrocera cucurbitae*	Sponge luffa/ Torai

Annals of Science and Allied Research Vol. 3 (1) June, 2025: 24-29.
https://doi.org/10.5281/zenodo.15791666
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Table -2: Survey Report Date And Month Wise

DATE	AREA	BRINJAL		CAPSICUM		TOMATO		OKARA		PUMPKIN		BOTTLE SQUASH		BOTTLE GOURD		BITTER GOURD	
		Note	Inv.	Note	Inv.	Note	Inv.	Note	Inv.	Note	Inv.	Note	Inv.	Note	Inv.	Note	Inv.
5/1/2024	Amit Gram	20	6	15	4	25	10	30	10	7	1	8	2	10	2	8	1
11/1/2024		25	7	30	6	30	4	30	6	10	-	15	6	7	-	7	-
20/1/2024		10	-	7	1	15	2	40	11	6	-	10	2	17	6	10	2
29/1/2024		18	4	15	2	25	10	42	8	9	2	15	6	19	5	5	1
2/2/2024		25	6	15	6	22	8	46	8	6	-	14	3	15	-	6	-
9/2/2024		16	2	18	4	26	7	40	6	10	1	6	-	15	2	10	2
15/2/2024		18	4	21	3	45	10	50	15	6	-	14	3	16	1	4	1
21/2/2024		18	4	21	3	45	10	50	15	6	-	14	3	16	1	4	1
1/3/2024		18	6	25	4	40	7	51	10	10	1	6	-	15	2	15	2
12/3/2024		30	8	20	6	30	7	43	15	8	-	10	3	16	1	16	3
19/3/2024		27	10	26	8	43	6	45	16	6	-	15	4	14	3	12	6
26/3/2024		20	2	29	4	25	3	60	15	10	2	16	-	15	-	10	-
3/4/2024	Shyampur	40	8	33	6	44	10	45	6	2	-	15	2	10	3	8	2
10/4/2024		46	10	53	6	28	4	47	6	12	2	18	1	15	6	20	8
15/4/2024		28	-	29	2	16	-	48	8	13	4	26	3	10	2	12	5
23/4/2024		33	5	39	6	28	5	49	1	16	6	28	5	5	-	8	-
1/5/2024		40	10	42	4	39	6	67	18	10	-	15	-	10	4	8	-
11/5/2024		41	12	53	15	16	-	72	16	12	2	16	2	13	2	6	3
18/5/2024		15	8	51	6	52	12	63	14	10	-	15	4	10	2	10	4
26/5/2024		21	6	15	-	18	-	55	10	4	1	15	2	17	3	6	-
2/6/2024	Bhattowala	22	2	16	1	18	2	49	6	16	3	18	2	11	1	8	2
11/6/2024		18	-	25	3	28	10	55	9	4	2	16	4	12	2	10	4
20/6/2024		29	15	26	9	45	8	81	21	6	-	10	2	16	2	6	-
29/6/2024		38	16	37	11	40	8	41	8	10	2	15	6	17	2	8	4
1/7/2024		15	-	26	3	43	4	39	2	10	3	11	6	11	2	6	1
5/7/2024		40	18	19	2	46	13	48	8	6	-	12	2	11	4	4	1
12/7/2024		26	2	25	4	43	6	58	10	10	3	4	-	12	3	8	2
	TOTAL	**679**	**171**	**731**	**129**	**875**	**172**	**1344**	**278**	**235**	**35**	**371**	**73**	**355**	**61**	**235**	**55**

(Note= Noted , Inv.=Invasion)

Table -3 : Prevalence Percentage of infestation of Vegetable Pests.

Veg. Name	Brinjal	Capsicum	Tomato	Okra	Pumpkin	Bottle Squash	Bottle Gourd	Bitter Gourd
Observed	**679**	**731**	**875**	**1344**	**235**	**371**	**355**	**235**
Infested	**171**	**129**	**172**	**278**	**35**	**73**	**61**	**55**
Percentage	**25 %**	**18 %**	**20 %**	**21 %**	**15 %**	**20 %**	**17 %**	**23 %**

The frequency of insect pest species tends to increase as the temperature increases. Frequency of insect pests exhibited an inverse relationship with relative humidity in this study. That means the frequency of insect pests decrease as the relative humidity increased. Increasing humidity exhibits a negative effect on vegetables pest population, increases fungal pathogen of insects when increases humidity which results into decrease their population. This happened to be one of the reasons why insect pest population vary from place to place.

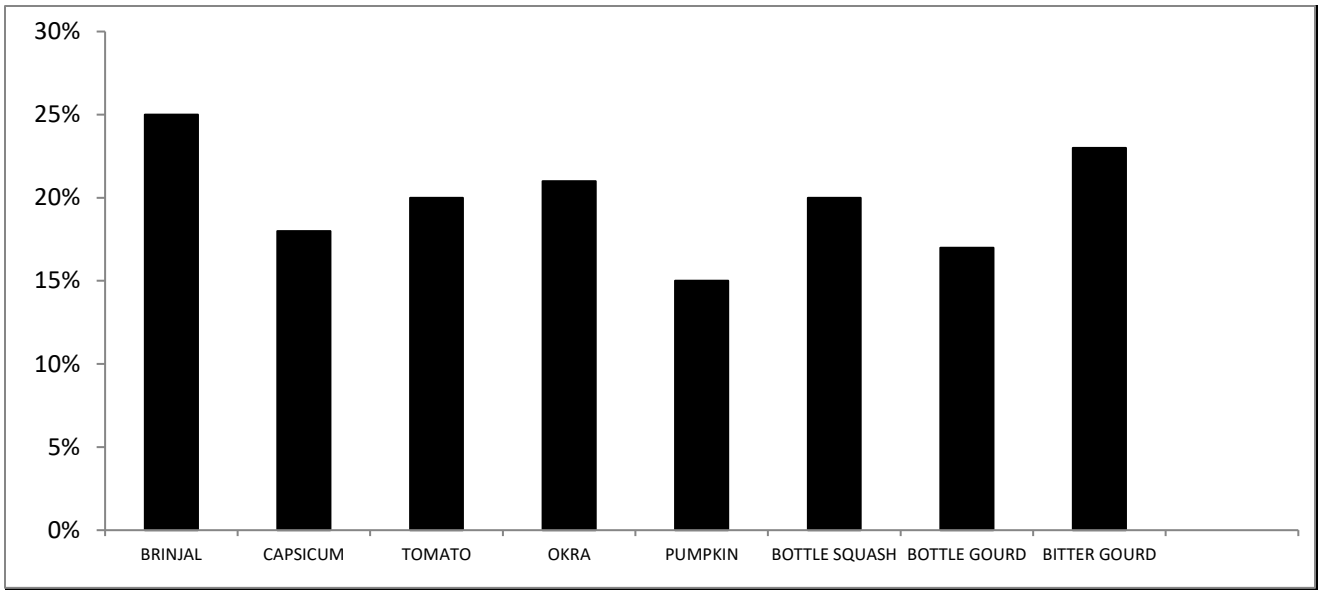

Fig.1: Percentage of Infestation in different vegetable's Pest

Annals of Science and Allied Research Vol. 3 (1) June, 2025: 24-29.
https://doi.org/10.5281/zenodo.15791666
ISSN – 2584-2307 (Online)

SOME PHOTOGRAPHS DURING SURVEY WORK

Conclusion

In this study brinjal, tomato and okra were infested by fruit borer, while bottle gourd, sponge luffa were infested by fruit fly. In contrast capsicum was infested by whitefly. In a similar manner red pumpkin beetle and *Epilachna* beetle infests pumpkin and bitter gourd. Among these vegetables maximum infestation occurs in brinjal and bitter gourd, while moderate infestation has been noted in okra, bottle squash and tomato. Minimum infestation recorded in bottle gourd and pumpkin. A strong negative correlation exists between humidity and pest population, *i.e.* as humidity increases resulting population of pest decreases. However, it was observed that moderate positive correlation occurs in between temperature and pest population. Prevalence infestation variation occur due to different locality, because every locality has distinct climatic and environmental factors.

Declaration of conflict of interest: We declare that there is no any conflict in between both authors.

Acknowledgement: We are thankful to Head & Research Director, Department of Zoology, Pt. L.M.S. Campus Rishikesh, Sri Dev Suman Uttarakhand University, for their valuable suggestion.

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