



ORIGINAL ARTICLE

Seasonal Population Fluctuation of *Thrips tabaci* and *Scirtothrips dorsalis* (Thysanoptera: Thripidae) in Western Uttar Pradesh

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ABSTRACT

The highest population of onion thrips for all districts, it was noted on second half of March 2013 (beginning of summer season); on the other hand, it was recorded lowest on first half of February 2013 (beginning of winter season) for districts Agra, Mathura and Etah; while it was recorded lowest on second half of February 2013 (end of winter season) for district Firozabad and the lowest population was recorded on first half of May 2013 (end of summer season) for Aligarh. On the other hand, the population of *S. dorsalis* on chilli crop was noted at its peak as 465, 579, 501 and 683 at the beginning of autumn season (first half of October 2013) in district Agra, Mathura, Firozabad and Etah respectively; while the population was peak as 529 at the end of rainy season (second half of September 2013) in district Aligarh (Table 7). Lowest population of *S. dorsalis* in chilli crop was recorded in rainy season.

Keywords: *Thrips tabaci*, *Scirtothrips dorsalis*, population fluctuation

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INTRODUCTION

India is one of the largest producers of onion (*Allium cepa*) and chilli (*Capsicum annum*) in the world. These are most important commonly greenhouse vegetable crops of Western Uttar Pradesh and form a part of daily diet in almost all households [1]. These plants species are prone to heavy infestations with *T. tabaci* and *S. dorsalis* respectively. Due to fringed nature of wings, thrips belong to order Thysanoptera. Adults have two pairs of narrow fringed wings with long hairs; they readily fly and can easily migrate into and around the green houses. Thysanopterans have piercing and sucking type of mouthparts with vestigial right mandible [7-9].

METHODOLOGY

Five districts (Agra, Aligarh, Mathura, Firozabad and Etah) in Western Uttar Pradesh were selected for survey and sampling of thrips. Three villages were selected from each district for onion and chilli crops. Therefore total fifteen villages from Western Uttar Pradesh were selected i.e. village Garhi Vichitra, Barara and Nagla Sikarwar from district Agra; village Kajrauth, Karas and Kaimthal from district Aligarh; village Mahavan, Jataura and Mnoharpur from district Mathura; village Narkhi, Kathfauri and Bamai from district Firozabad; and village Jinawali, Churthara and Nagla Badha from district Etah. These villages have an important and specific scientific role for present research work because they have both *Allium cepa* and *Capsicum annuu* crops with similar size, weight of fruit/bulb and plant length. So this is the main region for selection of these villages for the present study.

Randomly sampling method was used for sampling of thrips. Using this method, an initial experimental unit was established and then sampling plants were chosen randomly, four in every direction (north, east, west and south) and fifth in central of the field. Thus, five plants from a field were selected for sampling the pests. A fauna of insect pests have been collected from both crops. Onion crop has been found to be highly infested by *Thrips tabaci* and chilli crop by *Scirtothrips dorsalis*.

RESULT

The obtained results of different selected sites are as given below-

At Agra:

At district Agra in onion field *T. tabaci* was observed remain active at Garhi Vichitra from second half of February 2013 to first half of May 2013, at Barara from second half of February 2013 to second half of April 2013 and at Nagla Sikarwar from first half of February 2013 to second half of April 2013. The highest population of *T. tabaci* at village Ghari Vichitra, Barara and Nagla Sikarwar was noted as 205, 196 and 159 per five plants respectively on second half of March 2013 (Table 1).

In chilli field highest population of *S. dorsalis* was recorded as 154 on first half of October 2013, 144 on second half of September 2013 and 168 per five plants on first half of October 2013 at Village Garhi Vichitra, Barara and Nagla Sikarwar respectively (Table 1).

At Aligarh:

In onion fields of village Kajrauth, Karas and Kaimthal, the highest population of *T. tabaci* was recorded as 178, 168 and 129 per five plants on second half of March 2013 respectively (Table 2). The population of *T. tabaci* started attack in the second half of February 2013 and remained active till the second half of April 2013 at Kajrauth and Karas while it remained active till on first half of May 2013 at Kaimthal.

In chilli field *S. dorsalis* was observed active from first half of July 2013 to second half of November 2013. On the other hand, it was observed active from first half of February 2013 to second half of February 2013. The highest population of *S. dorsalis* was observed 198, 173 and 158 per five plants on second half of September 2013 at village Kajrauth, Karas and Kaimthal respectively (Table 2).

At Mathura:

In onion fields, *T. tabaci* was attacked during first half of February 2013 to second half of April 2013 at village Jataura. Moreover, it infested from second half of February 2013 to second half of April 2013 at Mahavan and Manoharpur. The highest population of thrips was noted 91, 117 and 130 per five plants respectively (Table 3).

In chilli field, population of *S. dorsalis* was concluded in highest number as 202 and 214 at village Mahavan and Jataura respectively on first half of October 2013 however; at Manoharpur it was noted 178 on second half of September 2013 (Table 3).

At Firozabad:

It was studied that the damage period of *T. tabaci* for onion was at Narkhi from first half of March 2013 to second half of May 2013, at Kathfauri from first half of March 2013 to first half of May 2013 and Bamai from second half of February 2013 to first half of May 2013. Highest population of *T. tabaci* was recorded as 104 on first half of April 2013, 90 and 113 on second half of March 2013 per five plants their respective villages (Table 4).

As far as population is concern, *S. dorsalis* on chilli attend their peak population was observed 186, 176 and 139 per five plants on first half of October 2013 at village Narkhi, Kathfauri and Bamai respectively. Thrips started attack on chilli crop from first half of February 2013 to second half of February 2013; on the other hand the attacking period was noted from second half of June 2013 to second half of November 2013 at the same sites (Table 4).

At Etah:

The highest population of *T. tabaci* on onion was recorded 96, 101 and 124 per five plants on second half of March 2013 at village Jinawali, Churthara and Nagla Badha respectively (Table 5). Thrips started their attack from second half of February 2013 to second half of April 2013 at Jinawali, from first half of February 2013 to first half of April 2013 at Churthara and from first half of February 2013 to second half of April 2013 at Nagla Badha.

In chilli field, *S. dorsalis* remained active at village Jinawali from first half of July 2013 to second half of November 2013 and first half of February 2013 to second half of February 2013; at Village Churthara from first half of July 2013 to first half of November 2013 and first half of February 2013 to second half of February 2013; and at Village Nagla Badha from second half of June 2013 to second half of November 2013 and first half of February 2013 to second half of February 2013 (Table 5). The highest population of *S. dorsalis* was concluded 215, 227 and 241 per five plants on first half of October 2013 at respective villages.

Table 1: Collection of thrips from District Agra during year 2013-14

Month		Population count of <i>T. tabaci</i> from onion field			Population count of <i>S. dorsalis</i> from chilli field		
		Garhi Vichitra	Barara	Nagla Sikarwar	Garhi Vichitra	Barara	Nagla Sikarwar
Jan. 13	II half	*	*	*	0	0	0
Feb. 13	I half	*	0	5	20	19	23
	II half	26	35	24	18	12	17
Mar. 13	I half	113	99	95	*	*	*
	II half	205	196	159	*	*	*
April 13	I half	95	87	43	*	*	*
	II half	32	45	22	*	*	*
May 13	I half	11	*	*	*	*	*

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	II half	*	*	*	*	*	*
June 13	I half	*	*	*	0	*	*
	II half	*	*	*	0	0	0
July 13	I half	*	*	*	11	27	13
	II half	*	*	*	30	35	44
Aug. 13	I half	*	*	*	18	12	7
	II half	*	*	*	4	0	0
Sept. 13	I half	*	*	*	38	54	70
	II half	*	*	*	131	144	112
Oct. 13	I half	*	*	*	154	143	168
	II half	*	*	*	39	34	40
Nov. 13	I half	*	*	*	19	20	28
	II half	*	*	*	8	11	9
Dec. 13	I half	*	*	*	0	0	0
	II half	*	*	*	0	0	0
Jan. 14	I half	*	*	*	0	0	0

* = Crop not available

Table 2: Collection of thrips from District **Aligarh** during year 2013-14

Month		Population count of <i>T. tabaci</i> from onion field			Population count of <i>S. dorsalis</i> from chilli field		
		Kajrauth	Karas	Kaimthal	Kajrauth	Karas	Kaimthal
Jan. 13	II half	*	*	*	0	0	0
Feb. 13	I half	*	*	*	31	34	29
	II half	64	51	26	28	22	30
Mar. 13	I half	120	113	99	*	*	*
	II half	178	168	129	*	*	*
April 13	I half	38	47	29	*	*	*
	II half	14	17	11	*	*	*
May 13	I half	0	*	2	*	*	*
	II half	*	*	*	*	*	*
June 13	I half	*	*	*	*	*	*
	II half	*	*	*	*	*	0
July 13	I half	*	*	*	16	21	19
	II half	*	*	*	45	62	79
Aug. 13	I half	*	*	*	2	4	1
	II half	*	*	*	11	1	3
Sept. 13	I half	*	*	*	68	57	72
	II half	*	*	*	198	173	158
Oct. 13	I half	*	*	*	146	130	99
	II half	*	*	*	52	49	58
Nov. 13	I half	*	*	*	21	29	35
	II half	*	*	*	6	8	3
Dec. 13	I half	*	*	*	0	0	0
	II half	*	*	*	0	0	0
Jan. 14	I half	*	*	*	0	0	0

* = Crop not available

Table 3: Collection of thrips from District **Mathura** during year 2013-14

Month		Population count of <i>T. tabaci</i> from onion field			Population count of <i>S. dorsalis</i> from chilli field		
		Mahavan	Jataura	Manoharpur	Mahavan	Jataura	Manoharpur
Jan. 13	II half	*	*	*	0	0	0
Feb. 13	I half	0	4	0	25	27	18
	II half	21	58	91	12	19	10
Mar. 13	I half	76	91	112	*	*	*
	II half	117	63	130	*	*	*
April 13	I half	74	41	30	*	*	*
	II half	18	22	15	*	*	*
May 13	I half	*	*	*	*	*	*
	II half	*	*	*	*	*	*
June 13	I half	*	*	*	0	*	0
	II half	*	*	*	21	11	8
July 13	I half	*	*	*	41	34	57
	II half	*	*	*	57	61	73
Aug. 13	I half	*	*	*	9	8	14
	II half	*	*	*	0	3	2
Sept. 13	I half	*	*	*	60	76	59
	II half	*	*	*	134	156	178

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Oct. 13	I half	*	*	*	202	214	163
	II half	*	*	*	70	101	86
Nov. 13	I half	*	*	*	27	20	22
	II half	*	*	*	0	12	0
Dec. 13	I half	*	*	*	0	0	0
	II half	*	*	*	0	0	0
Jan. 14	I half	*	*	*	0	0	0

* = Crop not available

Table 4: Collection of thrips from District **Firozabad** during year 2013-14

Month		Population count of <i>T. tabaci</i> from onion field			Population count of <i>S. dorsalis</i> from chilli field		
		Narkhi	Kathfauri	Bamai	Narkhi	Kathfauri	Bamai
Jan. 13	II half	*	*	*	0	0	0
	I half	*	*	*	23	0	27
Feb. 13	II half	*	0	11	11	9	14
	I half	23	35	31	*	*	*
Mar. 13	II half	82	90	113	*	*	*
	I half	104	73	86	*	*	*
April 13	II half	73	64	58	*	*	*
	I half	34	43	31	*	*	*
May 13	II half	6	*	*	*	*	*
	I half	*	*	*	0	0	0
June 13	II half	*	*	*	18	16	13
	I half	*	*	*	33	35	41
July 13	II half	*	*	*	52	54	62
	I half	*	*	*	19	26	18
Aug. 13	II half	*	*	*	4	2	5
	I half	*	*	*	53	92	79
Sept. 13	II half	*	*	*	138	149	106
	I half	*	*	*	186	176	139
Oct. 13	II half	*	*	*	62	53	79
	I half	*	*	*	23	25	30
Nov. 13	II half	*	*	*	8	4	14
	I half	*	*	*	0	0	0
Dec. 13	II half	*	*	*	0	0	0
	I half	*	*	*	0	0	0
Jan. 14	I half	*	*	*	0	0	0

* = Crop not available

Table 5: Collection of thrips from District **Etah** during year 2013-14

Month		Population count of <i>T. tabaci</i> from onion field			Population count of <i>S. dorsalis</i> from chilli field		
		Jinawali	Churthara	Nagla Badha	Jinawali	Churthara	Nagla Badha
Jan. 13	II half	*	*	*	0	0	0
Feb. 13	I half	0	12	5	24	30	35
	II half	23	35	44	19	13	18
Mar. 13	I half	64	72	71	*	*	*
	II half	96	101	124	*	*	*
April 13	I half	33	45	27	*	*	*
	II half	15	*	12	*	*	*
May 13	I half	*	*	*	*	*	*
	II half	*	*	*	*	*	*
June 13	I half	*	*	*	*	*	*
	II half	*	*	*	0	0	12
July 13	I half	*	*	*	28	25	33
	II half	*	*	*	63	51	85
Aug. 13	I half	*	*	*	24	21	23
	II half	*	*	*	2	2	6
Sept. 13	I half	*	*	*	54	72	92
	II half	*	*	*	182	173	160
Oct. 13	I half	*	*	*	215	227	241
	II half	*	*	*	73	94	117
Nov. 13	I half	*	*	*	28	23	25
	II half	*	*	*	17	0	12
Dec. 13	I half	*	*	*	0	0	0
	II half	*	*	*	0	0	0
Jan. 14	I half	*	*	*	0	0	0

* = Crop not available

Table 6: Population fluctuation of *T. tabaci* on onion fields

Season	Month		Population count of <i>T. Tabaci</i>					
			Agra	Aligarh	Mathura	Firozabad	Etah	
Winter	Jan. 13	II half	*	*	*	*	*	
	Feb. 13	I half	5	*	4	*	17	
Summer		Mar. 13	I half	85	141	170	11	102
	II half		307	332	279	89	207	
	April 13	I half	560	475	310	285	321	
		II half	225	114	145	263	105	
	May 13	I half	99	42	55	195	27	
		II half	11	2	*	108	*	
Rainy	June 13	I half	*	*	*	*	*	
		II half	*	*	*	*	*	
	July 13	I half	*	*	*	*	*	
		II half	*	*	*	*	*	
	Aug. 13	I half	*	*	*	*	*	
		II half	*	*	*	*	*	
	Sept. 13	I half	*	*	*	*	*	
		II half	*	*	*	*	*	
	Autumn	Oct. 13	I half	*	*	*	*	*
			II half	*	*	*	*	*
Nov. 13		I half	*	*	*	*	*	
		II half	*	*	*	*	*	
Winter	Dec. 13	I half	*	*	*	*	*	
		II half	*	*	*	*	*	
	Jan. 14	I half	*	*	*	*	*	

* = Crop not available

Table 7: Population fluctuation of *S. dorsalis* on chilli fields

Season	Month		Population count of <i>S. dorsalis</i>					
			Agra	Aligarh	Mathura	Firozabad	Etah	
Winter	Jan. 13	II half	0	0	0	0	0	
	Feb. 13	I half	62	94	70	50	99	
Summer		Mar. 13	II half	47	80	41	34	50
	I half		*	*	*	*	*	
	April 13	II half	*	*	*	*	*	
		I half	*	*	*	*	*	
	May 13	II half	*	*	*	*	*	
		I half	*	*	*	*	*	
Rainy	June 13	II half	0	*	0	0	*	
		I half	0	0	40	47	12	
	July 13	I half	51	56	132	109	86	
		II half	109	186	191	168	199	
	Aug. 13	I half	37	7	31	63	68	
		II half	4	15	5	11	10	
	Sept. 13	I half	162	197	195	224	218	
		II half	387	529	468	393	515	
	Autumn	Oct. 13	I half	465	375	579	501	683
			II half	113	159	257	194	284
Nov. 13		I half	67	85	69	78	76	
		II half	28	17	12	26	29	
Winter	Dec. 13	I half	0	0	0	0	0	
		II half	0	0	0	0	0	
	Jan. 14	I half	0	0	0	0	0	

* = Crop not available

DISCUSSION AND CONCLUSION

Collected data was tabulated according to collection sites/ villages (Table 1-5). Simple tabular analysis from table 1-5 was made to work out of seasonal population fluctuation of selected thrips species according to districts.

T. tabaci on onion:

The highest population of onion thrips for all districts, it was noted on second half of March 2013 (beginning of summer season); on the other hand, it was recorded lowest on first half of February 2013 (beginning of winter season) for districts Agra, Mathura and Etah; while it was recorded lowest on second half of February 2013 (end of winter season) for district Firozabad and the lowest population was recorded on first half of May 2013 (end of summer season) for Aligarh. The highest population of *T. tabaci*

was noted on second half of March 2013 as 560, 475, 310, 285 and 321 in district Agra, Aligarh, Mathura, Firozabad and Etah respectively (Table 6). The population of *T. tabaci* is positively affected by increased temperature [2].

S. dorsalis on chilli:

The population of *S. dorsalis* was noted at its peak as 465, 579, 501 and 683 at the beginning of autumn season (first half of October 2013) in district Agra, Mathura, Firozabad and Etah respectively; while the population was peak as 529 at the end of rainy season (second half of September 2013) in district Aligarh (Table 7). Lowest population of *S. dorsalis* in chilli crop was recorded in rainy season. Varadharajan and Veeraval [3] and Bagle [4] stated that rainfall had a negative correlation with the activity of chilli thrips. It was noted on second half of August 2013 as 4, 5, 11 and 10 in district Agra, Mathura, Firozabad and Etah respectively; while it was reported on first half of August 2013 as 7 in district Aligarh. The observations was almost similar to Patel [5], who reported that the population of chilli thrips remains low during July-August due to rains and showed a peak in September- October. Similar findings were also made by Krantz *et al.* [6] who reported that, the number of thrips on onion crop increased rapidly during dry weather and decreased rapidly after rain.

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