



ORIGINAL ARTICLE

Study on Exploring the Diversity of Thrips Species (Thripidae: Thysanoptera) on Tomato Crops (*Solanum lycopersicum*) in Open Field Conditions in Aligarh District, Uttar Pradesh, India

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ABSTRACT

Tomato (*Solanum lycopersicum*) is a crucial crop for small-scale as well as large scale farmers in India, contributing significantly to both local diets and agronomy. Despite its adaptability to various climates, tomato cultivation faces substantial threats from thrips (Thysanoptera: Thripidae), a pervasive pest causing extensive damage. This study aimed to identify and quantify thrips species infesting tomato fields in the Aligarh district of Uttar Pradesh, India. A biological monitoring survey was conducted across five villages, encompassing 25 tomato fields. Thrips samples were collected using a tapping technique and preserved for laboratory analysis. Five thrips species were identified: *Frankliniella occidentalis*, *Frankliniella schultzei*, *Thrips tabaci*, *Scirtothrips dorsalis*, and *Aeolothrips fasciatus*. *Thrips tabaci* was the most prevalent, highlighting its significant impact on tomato cultivation in this region. The findings underscore the necessity for targeted pest management strategies to mitigate thrips infestations and safeguard tomato yields.

Keywords: Crucial crop, Pervasive pest, Monitoring, Thrips species, Tomato cultivation

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INTRODUCTION

Tomato (*Solanum lycopersicum*), a cornerstone in India's agronomy, is a fruit or vegetable of paramount importance for small-scale as well as large-scale farmers. The local marketability of tomatoes are unmatched, making them a staple in Indian diets (Kasenge *et al.*, 2002; Ssonko *et al.*, 2005). Beyond their contribution to a well-balanced diet through a rich supply of minerals, dietary fibers, essential amino acids, and sugars, tomatoes are also a significant source of vitamin B and C, iron and phosphorus. Fresh tomatoes enhance salads, while their processed forms are integral to various culinary creations, including tomato sauce. Tomato acts as an immunity booster in form of anti-cancer, anti-inflammatory, anti-allergic agents. Additionally, tomatoes are a natural reservoir of oxalic acid, which is pivotal in food processing. Despite the need for a relatively cool and dry climate for optimal yield and quality (Nicola *et al.*, 2009), tomatoes are versatile, growing under a wide array of climatic conditions, from temperate regions to the hot, humid tropics (Naika *et al.*, 2005). This adaptability, however, is tested by thrips (Thysanoptera: Thripidae), a significant pestilence to the agricultural sector, particularly for tomato crops. Thrips, with over 5,500 species identified 75 of which are detrimental to horticultural crops cause substantial yield losses worldwide (Lewis 1997). These pests, varying in color from light yellow to black and measuring up to 15 mm in

length, thrate to the cosmetic appearance of plants by feeding on fruits, leaves, and shoots. Their rasping and sap-sucking habits not only scarify plant tissues but also deplete vital resources, reducing photosynthetic capacity and causing blemishes on fruits (Welter *et al.*, 1990; Shipp *et al.*, 1998).

MATERIALS AND METHODS

A comprehensive biological monitoring survey was conducted during the peak growing season of the tomato crop, a period marked by highest agricultural productivity. The study encompassed five villages known for their robust tomato production: Jalali, Pikhloni, Harduaganj, Barota, and Tejpur. These locations were strategically chosen to reflect the high yield of tomato crops in this region. Within each village, five farmers were selected through a random sampling process, culminating in a total of 25 tomato fields included in this study. From each field, ten plants were chosen at random to serve as the basis for data collection on thrips prevalence. The area of each selected fields approximately 2700 to 2900 square feet. The average height of tomato plants for the study period 2022-2023 was in range 44.2 - 48.9cm, the number of lateral shoots was 4.0 - 5.0 pcs. The number of brushes 3.0 pcs. per 1 plant. In the fully flowering phase, a similar situation was observed. In the fruiting phase, the maximum height of 55.5 cm of plants and the number of lateral shoots and the number of brushes on 1 plant was approximately equal. The abundance of thrips was assessed on each plant by examining the underside of the three uppermost, fully-expanded tomato leaflets for the presence of these pests. Data were collected on thrips samples, from each selected plant, by counting and collecting performed during the early morning hours to capitalize on lower insect activity. A gentle tapping technique was employed to dislodge the thrips onto a white sheet of paper positioned beneath each plant. Subsequently, a fine camel hair brush was utilized to transfer the thrips into vials containing a preservative solution composed of 60% ethanol, glycerine, and Acetyl Glyceric acid (AGA) in a 10:1:1 ratio, respectively. This method, as outlined by Palmer *et al.*, (1989) and Palmer (1990), ensures the preservation of the thrips morphological features for further analysis. Once collected, the vials containing the thrips specimens were transported to the laboratory for meticulous counting and identification procedures. The thrips were mounted and examined under a compound light microscope following the protocol described by Palmer (1990), with a magnification of 40x. Identification of thrips species was conducted using the morphological characteristics detailed by Palmer (1990), and Mound *et al.*, (1976).

OBSERVATIONS

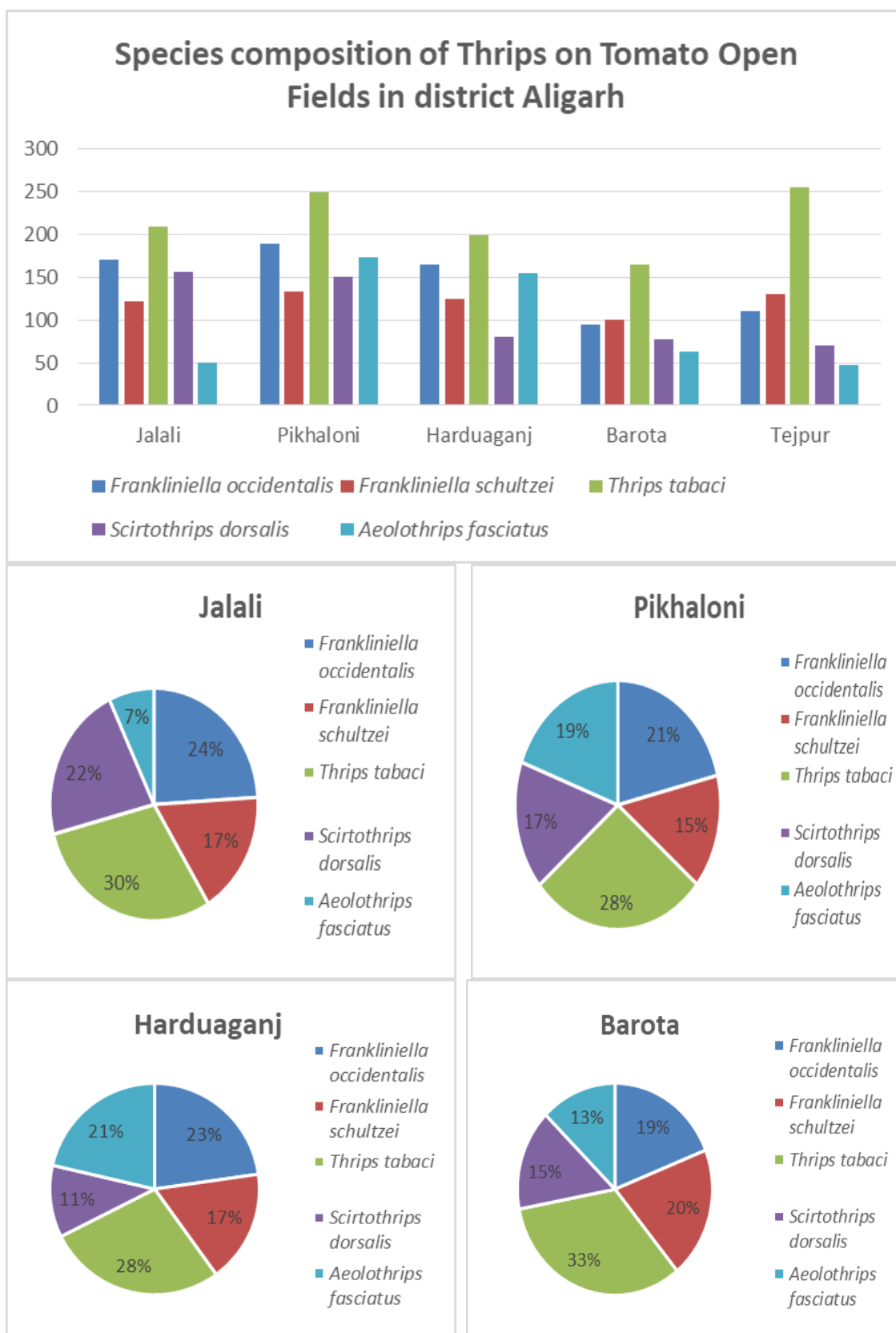
Table 1: Species composition of Thrips on Tomato Open Fields in district Aligarh

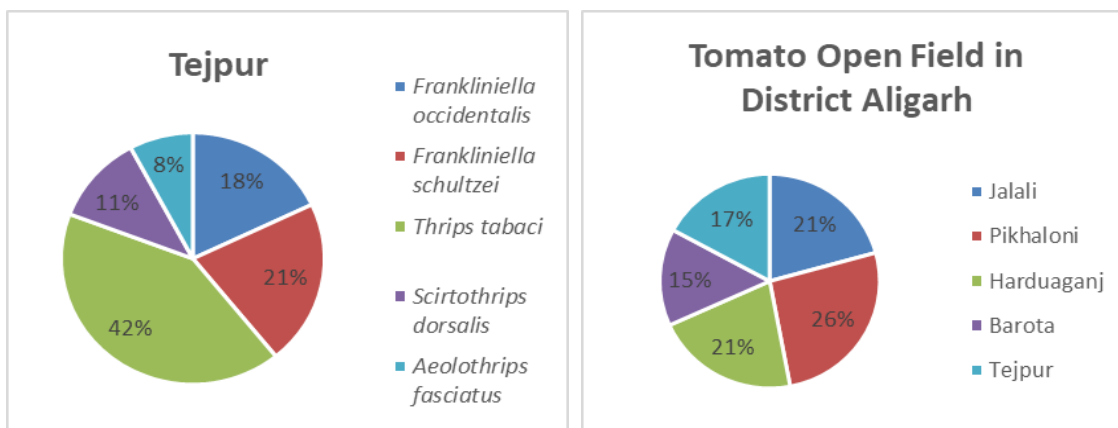
Species of Thrips	No. of collected Thrips samples from different localities									
	Jalali		Pikhloni		Harduaganj		Barota		Tejpur	
	No.	%	No.	%	No.	%	No.	%	No.	%
<i>Frankliniella occidentalis</i>	170	24	190	21	165	23	95	19	110	18
<i>Frankliniella schultzei</i>	122	17	133	15	125	17	100	20	130	21
<i>Thrips tabaci</i>	210	30	250	28	200	28	165	33	255	42
<i>Scirtothrips dorsalis</i>	156	22	150	17	80	11	77	15	70	11
<i>Aeolothrips fasciatus</i>	50	7	174	19	155	21	63	13	48	8
Total no. of Thrips	707	21	897	26	725	21	500	15	583	17

RESULTS

Upon meticulous examination in the laboratory, the thrips samples collected from tomato fields were identified to species level, as delineated in Table 1. The survey revealed the presence of five thrips species: *Frankliniella occidentalis*, *Frankliniella schultzei*, *Thrips tabaci*, *Scirtothrips dorsalis*, and *Aeolothrips fasciatus*. Notably, *Thrips tabaci* emerged as the most prevalent species, with 1050 instances recorded, while *Scirtothrips dorsalis* was

the least encountered, with 490 samples. The predominance of *Thrips tabaci* underscores its status as the most common thrips species affecting tomato plants in the Aligarh district of Uttar Pradesh, India.





DISCUSSION

The study's findings corroborate the significant presence of five thrips species on tomato plants, with *Thrips tabaci* being particularly abundant. This species' dominance aligns with historical data, as reported by Nyitra (1973), NARO (1990), and Kagezi *et al.* (2001), further emphasizing its impact on tomato cultivation. The prevalence of *Thrips tabaci* necessitates targeted pest management strategies to mitigate its impact and improve tomato yield and quality in the region.

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