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Shruthi CR

Student, College of Horticulture,
UHS, Udyanagiri, Bagalkot,
Karnataka, India

Narabenchu GB

Assistant Professor, College of
Horticulture, GKVK Campus,
Bengaluru, Karnataka, India

Asokan R

Principal Scientist, Indian
Institute of Horticultural
Sciences, Hesaraghatta,
Bengaluru, Karnataka, India

Patil HB

Dean, Professor of Vegetable
Sciences, College of Horticulture,
UHS, Udyanagiri, Bagalkot,
Karnataka, India

Amrutha S Bhat

Assistant Professor, RHREC,
Bengaluru, Karnataka, India

Nadaf AM

Assistant Professor, HRS,
Tidagundi, Vijayapura,
Karnataka, India

Corresponding Author:**Shruthi CR**

Student, College of Horticulture,
UHS, Udyanagiri, Bagalkot,
Karnataka, India

Relative abundance of thrips species recorded on tomato in major tomato growing areas of Karnataka

Shruthi CR, Narabenchu GB, Asokan R, Patil HB, Amrutha S Bhat and Nadaf AM

Abstract

A survey was carried out in eight major tomato growing districts of Karnataka viz., Chamarajanagara, Mysuru, Mandya, Bengaluru rural, Kolar, Haveri, Belagavi and Bagalkot during the months of June to August, 2016 to find out relative abundance of thrips by collecting them on tomato. Among the four different species occurring on tomato viz., *Thrips palmi*, *Scirtothrips dorsalis*, *Frankliniella schultzei* and *Thrips tabaci*, the *T. palmi* was more abundantly occurred on tomato in all localities where the survey was conducted (45.50%). The next dominant species was *S. dorsalis* (22.00%) in all localities except Mysuru and Belagavi districts, whereas, in case of Mysuru, Bengaluru rural, Haveri and Bagalkot regions, *F. schultzei* was abundant as compared to other species. Interestingly, in Mandya, Haveri and Bagalkot district *T. tabaci* was recorded up to 12.00, 12.00 and 16.00 per cent, respectively as compared to other districts surveyed. Other unidentified species also recorded from all localities surveyed.

Keywords: relative abundance, survey, thrips species and tomato

Introduction

Tomato, *Solanum lycopersicum* L. belongs to the genus *Solanum* under Solanaceae family. It is a native to Peruvian and Mexican region. Tomato is one of the most important "protective foods" as it is a rich source of minerals, vitamins and organic acids. The fruits are eaten as cooked. Large quantities of tomatoes are used to prepare soup, juice, ketchup, puree, pickle, paste and powder etc. It is also used as a vegetable. Tomato has very few competitors in the value addition chain of processing. It is the world's largest vegetable crop after potato and sweet potato [1].

Vegetable crops are attacked by a number of pests with whiteflies, mites and thrips being the most important. Thrips are very small, cosmopolitan insects, measuring 0.1 to 15 mm in length. They have long slender bodies ranging from pale white to dark brown in colour with 2 pairs of thin cilia-fringed wings that have bristles in the veins. Thrips have a singular buccal apparatus of which only the right mandible is fully developed [2-5].

So far, more than 7400 thrips species of the order Thysanoptera are described worldwide. Of which only a few are key pests on important horticultural crops and inflict substantial qualitative and quantitative losses due to their feeding, transmission of pathogens and their relevance as quarantine pests. India hosts about 700 thrips species [6, 7].

Efforts to prevent thrips-caused damage rely heavily on insecticides. However, control operations based on the increased use of insecticides have met with only limited success. One of the reasons for inefficacy of this strategy includes the emergence of insecticide resistance [8, 9]. Hence, there is a growing emphasis on reducing the use of insecticides. Accurate information regarding the identity of the main thrips pests, the peak of abundance of any thrips target, their spatial distributions and seasonal population variations has the potential to reduce the amount of product sprayed onto the crops [10]. Surprisingly, the relative abundance of thrips on tomato crop is poorly understood in India. In this study, we examined the relative abundance of thrips on tomato in different major tomato growing districts of Karnataka.

Materials and Methods

A survey was carried out in eight major tomato growing districts of Karnataka viz., Chamarajanagara, Mysuru, Mandya, Bengaluru rural, Kolar, Haveri, Belagavi and Bagalkot

during the months of June to August, 2016 to find out relative abundance of thrips by collecting them on tomato. In each district, eight fields belonging to two different taluks and two villages in each taluk were surveyed for collecting thrips. The thrips were collected by tapping the growing tips of tomato plants on a black board. The fallen thrips were collected with the help of a fine camel hair brush (Zero number) in a pre-labelled specimen vials containing 70 per cent ethanol.

The collection made on thrips during the survey was segregated in to different species based on the morphological characteristics to find out the abundance of each thrips species in relation to the total number of species present in the collection. For this, 25 thrips were selected randomly from each locality and the number of different species in the selected samples were counted by observing under stereo binocular microscope for their morphological characteristics. Similar procedure was also adopted for all the collections made in above mentioned localities to assess the relative abundance of the thrips species in respective localities.

Results and Discussion

Among the four different species occurring on tomato viz, *T. palmi*, *S. dorsalis*, *F. schultzei* and *T. tabaci*, the *T. palmi* was more abundantly occurred on tomato in all localities where the survey was conducted (45.50%). The next dominant species was *S. dorsalis* (22.00%) in all localities except Mysuru and Belagavi districts, whereas, in case of Mysuru, Bengaluru rural, Haveri and Bagalkot regions, *F. schultzei* was abundant as compared to other species. Interestingly, in Mandya, Haveri and Bagalkot district *T. tabaci* was recorded

up to 12.00, 12.00 and 16.00 per cent, respectively as compared to other districts surveyed. Other unidentified species also recorded from all localities surveyed (Table 1 & Figure 1).

Previous studies showed that, the survey carried out in Uganda to assess the relative abundance of thrips species on tomato indicated that, among the six thrips species identified such as *Frankliniella occidentalis*, *Thrips tabaci*, *F. schultzei*, *Scirtothrips dorsalis*, *Ceratothrips ericae* and *Megalurothrips sjostedti*. *T. tabaci* had the highest occurrence (27 samples), followed by *Ceratothrips ericae* (13 samples) and *F. occidentalis* (8 samples) whereas *F. schultzei* (5 samples) had the lowest occurrence [11].

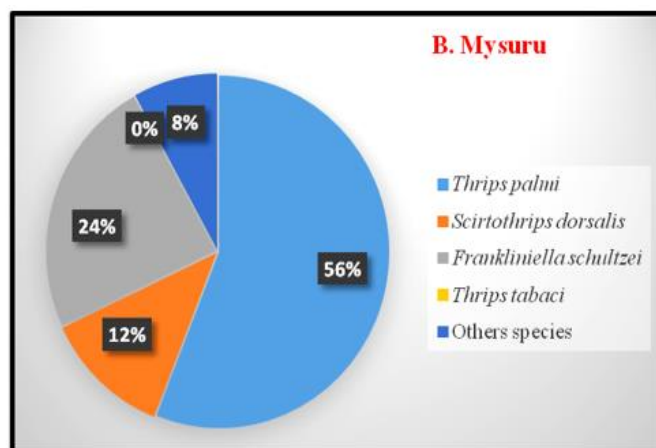
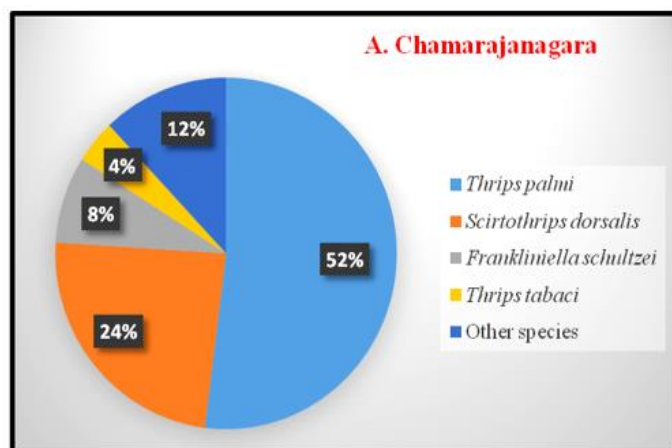
Among the two different species occurring on watermelon, *Thrips palmi* was more abundantly occurred in watermelon crop in major watermelon growing localities of Karnataka such as Bagalkot, Belgaum, Kolar and Mysore during February to April 2014. *T. palmi* was the only species found on the watermelon from Bagalkot region. Whereas in case of Belgaum, Kolar and Mysore regions, along with *T. palmi* the unidentified species also observed, however, the relative abundance of the *T. palmi* was about 94.00, 84.00 and 88 per cent, respectively [12].

A survey carried out on tomato crops in Mendoza during 2002 revealed that, among the identified species, the *F. occidentalis* was the most frequently occurred species (43.0%), followed by *F. schultzei* (35.6%), *T. tabaci* (10.1%) and larvae (11.0%). Other species found were *F. australis*, *F. gemina*, *F. valdiviana* Sakimura, *Arorathrips mexicanus* Crawford and *Haplothrips trellesi* Moulton at 4.0 per cent [13].

Table 1: Relative abundance of different thrips species observed on tomato during survey carried out in major tomato growing areas of Karnataka

Locality (Districts)	<i>Thrips palmi</i>		<i>Scirtothrips dorsalis</i>		<i>Frankliniella schultzei</i>		<i>Thrips tabaci</i>		Other <i>Thrips</i> spp.	
	Number	%	Number	%	Number	%	Number	%	Number	%
Chamarajanagara	13.00	52.00	6.00	24.00	2.00	8.00	1.00	4.00	3.00	12.00
Mysuru	14.00	56.00	3.00	12.00	6.00	24.00	0.00	0.00	2.00	8.00
Mandya	11.00	44.00	8.00	32.00	1.00	4.00	3.00	12.00	2.00	8.00
Bengaluru Rural	10.00	40.00	5.00	20.00	5.00	20.00	1.00	4.00	4.00	16.00
Kolar	15.00	60.00	8.00	32.00	1.00	4.00	0.00	0.00	1.00	4.00
Haveri	9.00	36.00	3.00	12.00	8.00	32.00	3.00	12.00	2.00	8.00
Belagavi	11.00	44.00	6.00	24.00	3.00	12.00	0.00	0.00	5.00	20.00
Bagalkot	8.00	32.00	5.00	20.00	7.00	28.00	4.00	16.00	1.00	4.00
Total	91.00	45.00	44.00	22.00	33.00	16.50	12.00	6.00	20.00	1.00

N=25 thrips samples observed from each district



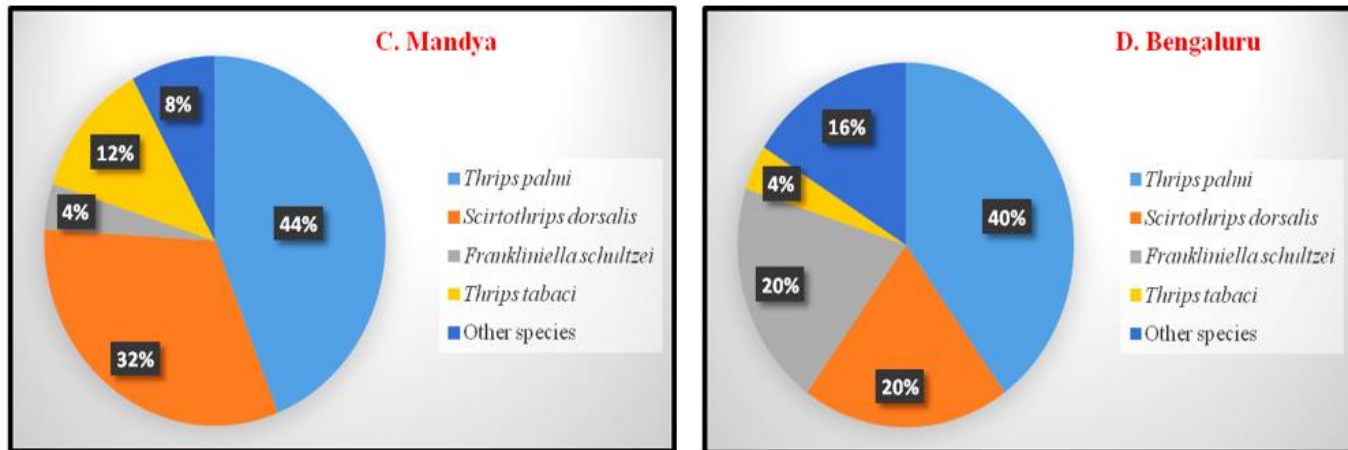


Fig 1: Relative abundance of thrips species found on tomato in major tomato growing districts of Karnataka

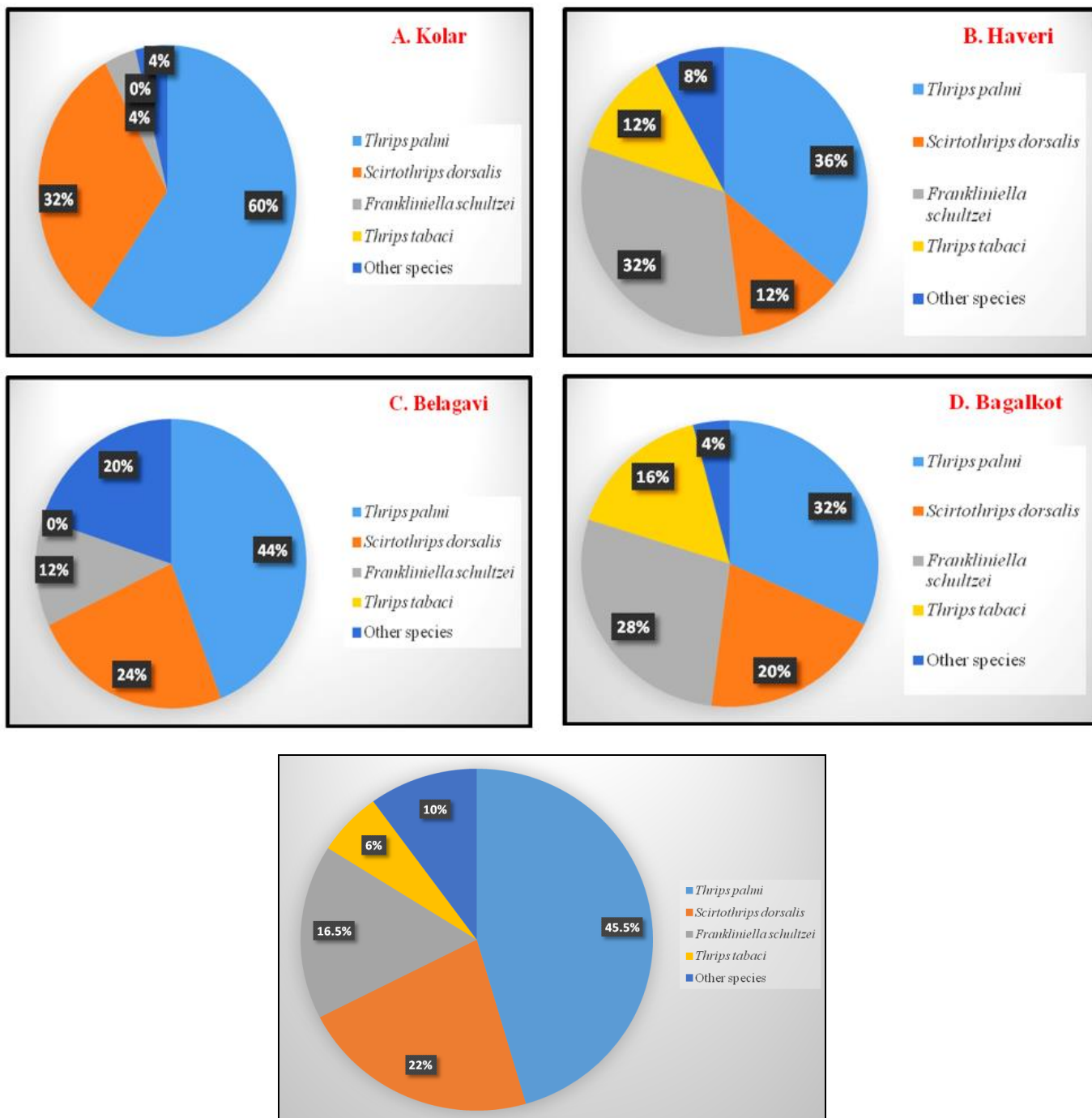


Fig 2: Pooled mean of surveyed districts indicating relative abundance of thrips species found on tomato in major tomato growing areas of Karnataka

Conclusion

Among the different species of thrips observed on tomato, the *T. palmi* was the one which occurred more abundantly in all localities where the survey was conducted (45.50%). The next abundant species was *S. dorsalis* (22.00%) in all localities except Mysuru and Belagavi districts (Figure 2).

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