



## ORIGINAL ARTICLE

**Monitoring the Infestation and Damage level of Onion thrips, *Thrips tabaci* on Onion Crop in Aligarh (U.P.)****Neetu Singh<sup>1</sup> and Virendra Kumar<sup>2</sup>**<sup>1</sup>J.J.T. University, Jhunjhunu, Rajasthan, India<sup>2</sup>Deptt. of Zoology, D.S. College, Aligarh, U.P., IndiaEmail: [neetu.singhrana03@gmail.com](mailto:neetu.singhrana03@gmail.com)Received: 28<sup>th</sup> April 2016, Revised: 11<sup>th</sup> May 2016, Accepted: 20<sup>th</sup> May 2016**ABSTRACT**

An experimental field survey was carried out at the time of favorable growing season of onion, *Allium cepa* crop during the February-April of 2016 in the selected locality of district Aligarh of Western Uttar Pradesh to evaluate the infestation and damage level of onion thrips, *Thrips tabaci* (Thysanoptera: Thripidae). *Thrips tabaci* is the key insect pest of onion and it is also identified as a pest of nation of India. Participated locality was the field of Ingraham Institute (G.T. Road). On the basis of high infestation level of onion thrips, data were collected from selected field. The population dynamics of onion thrips were monitored and population counts were made regularly after a week. *Thrips tabaci*, significantly attacked on young and mature plants (leaves and flowers) of the onions. Continuously infestation of onion thrips cause serious damage to the production of bulb by damaging the epidermal cell of leaves which resulting in necrosis of tissue, wilted growth of flower and fruits, causing longitudinal, silvery mottling or blotching on onions, increased incidence of bacterial and viral diseases and cause outright death of seedling and finally yield loss about 30- 55 percent in Aligarh

**Key words:** Favorable, Aligarh, Infestation, Thrips, Thysanoptera

**INTRODUCTION**

Onion, *Allium cepa* is the most popular and commercial bulbous vegetable crop which grown by wide range of latitude in the world. India is the second largest producer (Diaz, *et al*, 2014) and comes after the china in the world (FAOSTAT, 2008 and Jayanthi *et al*, 2014) production of onion. Onion occupied an area of about 8,34,000 hectares (Bandi, *et al*, 2012) which is 10.42% of total vegetables area (NHB, 2015). In India bulb onion can be consumed by low and high income communities. The yield of onion is very low due to several reasons, in which insect pest is major one. Various insect act as pest of onion, among which onion thrips comes first and it is key pest attacking on onion in huge amount. Onion thrips, *Thrips tabaci* Lindeman, is the most destructive pest (Waiganjo *et al*, 2008). It is identified as a pest of nation of India because it causes an annual reduction in yield of onion about 10-15 percent. Onion thrips cause direct and indirect damage to onion crop. Both larvae and adults attack at all stages (young and mature) of onion plant. Regular feeding of *Thrips tabaci* on onion crop cause silvery patches by sucking and puncture the cell sap of leaves. This damage reduces the photosynthetic ability of onion plant. Indirectly *Thrips tabaci* also act as a vector for viral disease like Iris Yellow Spot Virus (IYSV) of genus *Tospovirus* and resulting in the reduction of bulb weight and finally yields loss. Control of onion thrips, *Thrips tabaci* is very difficult due to its small size and cryptic habits (Lewis, 1997).

**REVIEW OF LITERATURE**

Onion, *Allium cepa* (Lindeman) is one of the major vegetable crops grown in different parts of India mainly by small and marginal farmers. Generally, the onion seeds are sown in nursery and transplanted with row spacing of 15cm and plants to plants spacing of 7.5cm to get optimum yield (Chhina, *et al*, 2015). Onion mainly originated in Central Asia, which is its primary center of diversity. Through initially adapted to long day's temperature regions, it's highly cross-pollination nature has paved the way for short day adapted selection in India (Gopal Jai, 2015). India occupied second position in term of production of onion in the world. During 2010-11, India's share was 19.90 percent in total onion production in the world (Kapaa Kondal, 2014). Annual production of

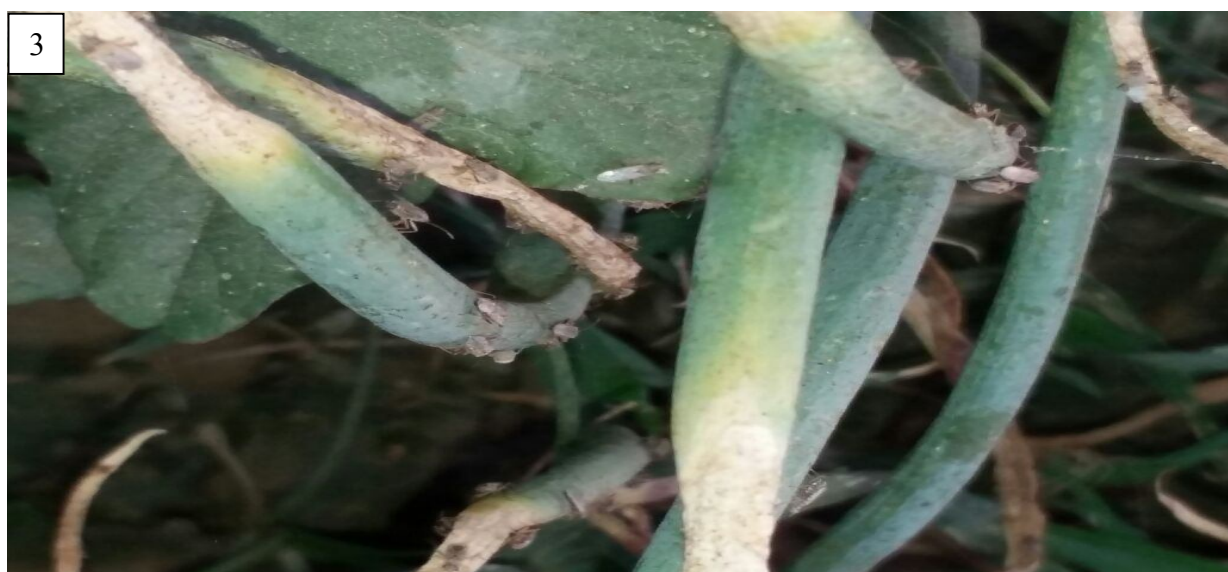
onion is estimated to be about 74.50 lakh tones. This quantity is enough to meet the present domestic requirement as well as export of onions. India is traditional exporter of onion in the world (Bendre, *et al.*, 2014). Among the several factors attributed to low productivity of onion, damage of crop due to onion thrips is substantially important. Neem seed extract, neem leaf extract or neem oil constitute the recommendation for managing the thrips (Mishra, *et al.*, 2007).

### **MATERIAL AND METHODS**

Field evaluations were carried out in Aligarh Region of Western Uttar Pradesh on favorable growing season of onion, during the time of February-April of 2016. Biological monitoring survey on population and infestation level of onion thrips on onion crops were carried out in field of agricultural farm of Ingraham institute on G.T. Road in Aligarh. The field purposely selected on the production level of onion crop.



**Fig. 1:** Irrigated field of seeded onions grown in the Aligarh District **Fig. 2:** Sentinel plots were monitored periodically for stage of crop development



**Fig. 3:** Enumeration of onion thrips, *Thrips tabaci* populations in an onion sentinel plot





**Fig. 4:** Larvae of thrips found inside the onion leaves

#### **EVALUATION OF POPULATION OF THRIPS AND DAMAGE LEVEL OF ONION**

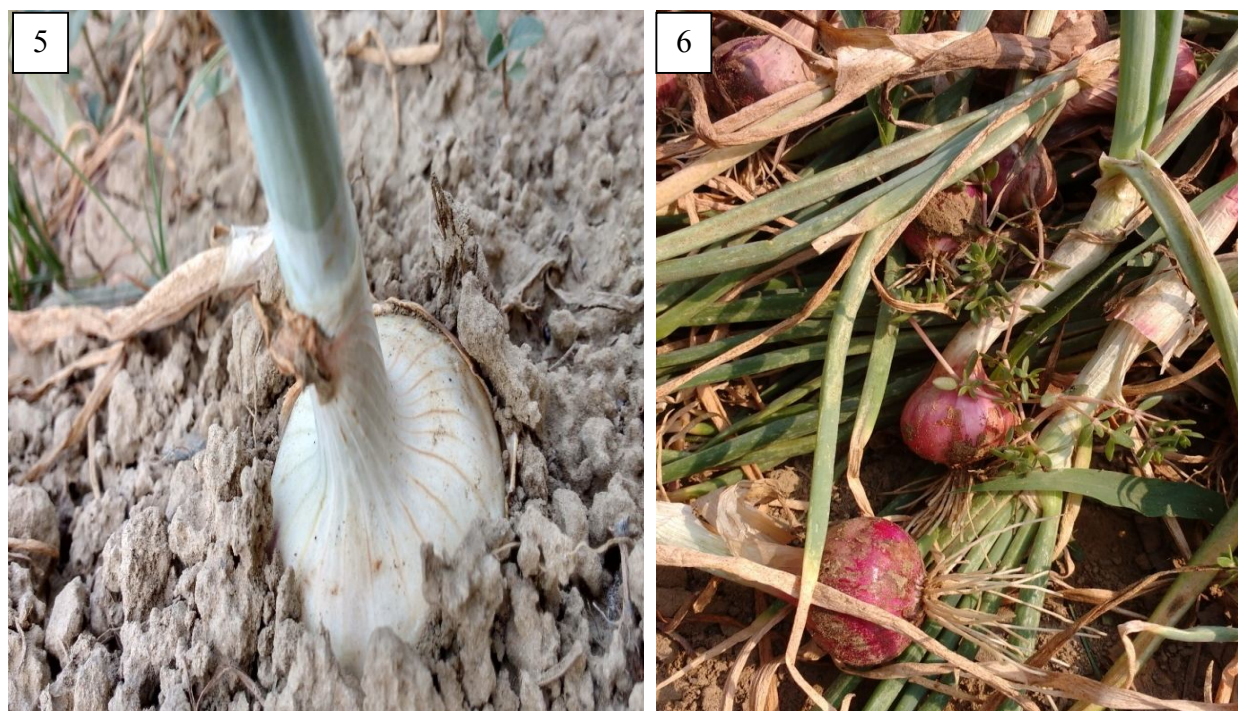
The most reliable method to detect the onion thrips was by either use yellow/ blue sticky paper traps method or by using a hand lens to see their larvae in underside the leaves of onion and also by regularly monitoring the adult thrips on upper side of onion leaves. During the evaluation of thrips population required random destructive sampling of 5 plants per selected field by random sampling method. Data were collected on the occurrence of thrips population from each selected plant by counting and collecting the thrips on found on the underside of 3- 4 top-most, fully expanded onion leaves. Thrips samples were collected in the early morning hours by gently trapping on the leaves, which dislodged the thrips from the leaves to white sheet placed under each selected plant. Count all the onion thrips on plant with emphasis placed on the area between newest leaves. Using fine hair brush to transfer the thrips into vials, containing 70% ethanol, glycerin and acetlyglyceric acid (AGA) fluid in the ratio of 10:1:1, respectively for preservation and features. The vials were taken to the laboratory for counting and identification of thrips. Note the number of onion thrips that are winged adults, thus, thus they indicating their capacity to disperse and increase the potential for future outbreaks. Thrips were mounted and identified under a compound light microscope using the procedure described by Palmer (1990), at magnification of 40 (Charles et al., 2013) Determine the severity of damage level by counting the number of damaged leaves per plant and the percentage of leaf with silvery - white blotches. Cut the stem of onion plant at the crown and transferred the whole shoot in a vial containing 70 percent ethanol for preservation.

#### **INTENSITY OF THE DAMAGE LEVEL**

At the end of the field experiment, the degree of onion thrips infestation was evaluated. The intensity of the damage level of onion was established by using the formula  $R = \sum (n \cdot b) / N$ . Where  $n$  = number of plants damaged at the same level,  $b$  = level of damage (according to 0.5 point scale),  $N$  = numbers of plants in sample (5).

#### **ASSESSMENT OF ONION BULBS**

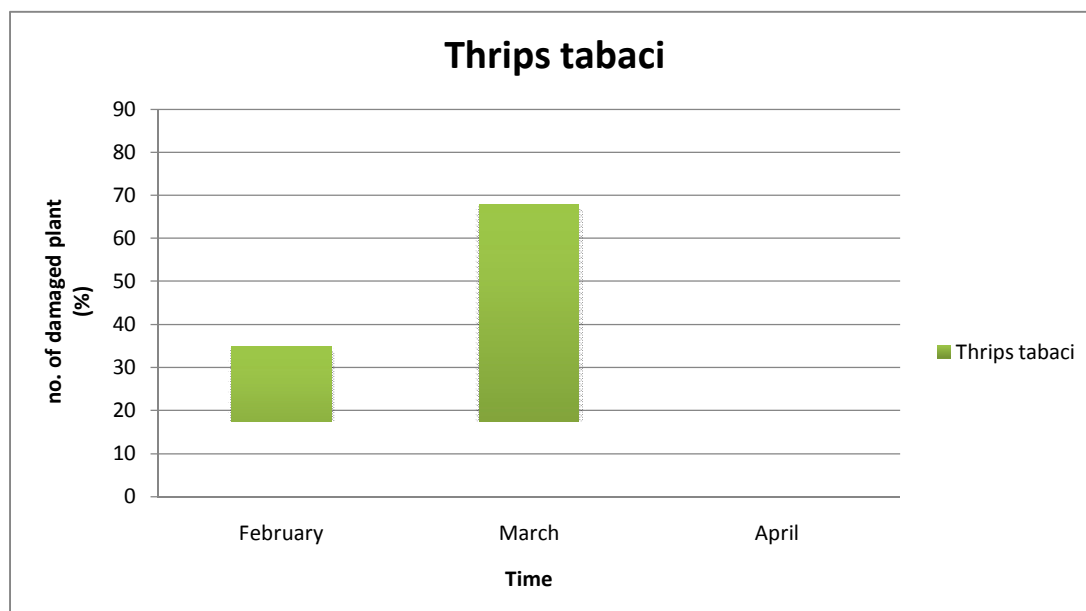
Onion were harvested by hand at physiological matured condition when foliage had fallen over 50% to 85%. Roots and tops of onion were cut off. The bulbs of onion were not marketable that were not properly grown. Onion bulbs not achieve their full sizes (diameters) and not in proper weight. The total yield of onion is very low as compared to estimated yield.



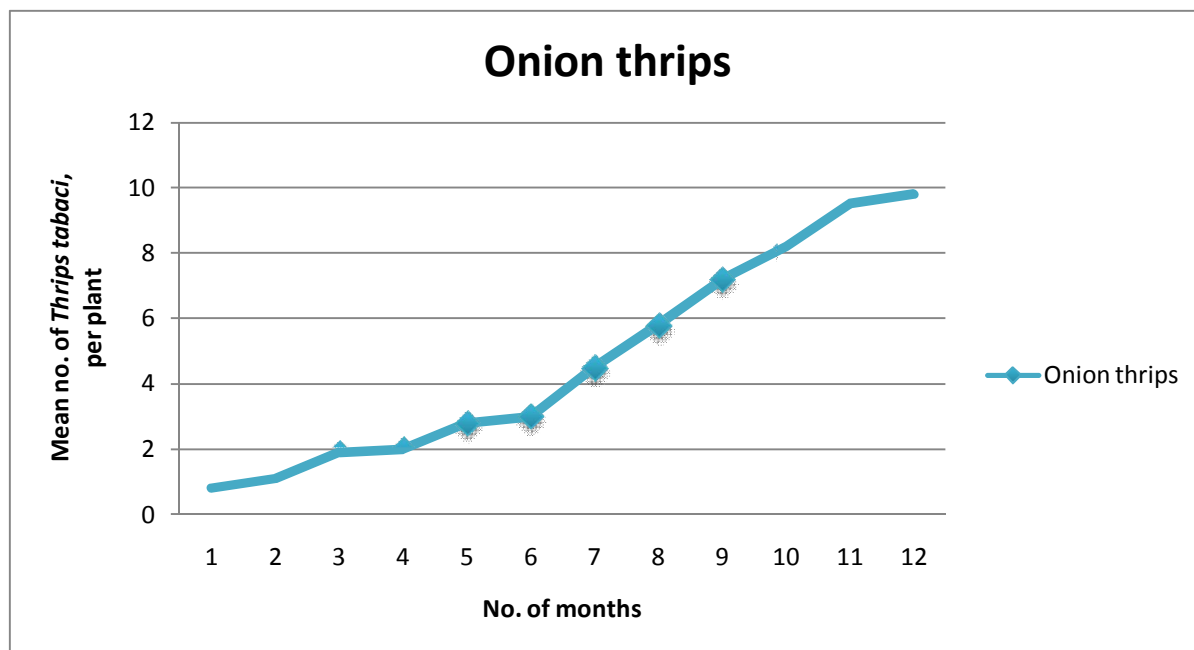
**Fig. 5:** Onion bulbs ready for harvesting (2<sup>nd</sup> week of April 2016) **Fig. 6:** The onions were harvested at the end of April 2016

### RESULT

Onions were damaged by onion thrips, *Thrips tabaci* in favorable growing season February–April of 2016. In the beginning of April 80% onion plants were infested by onion thrips (Fig. 7).

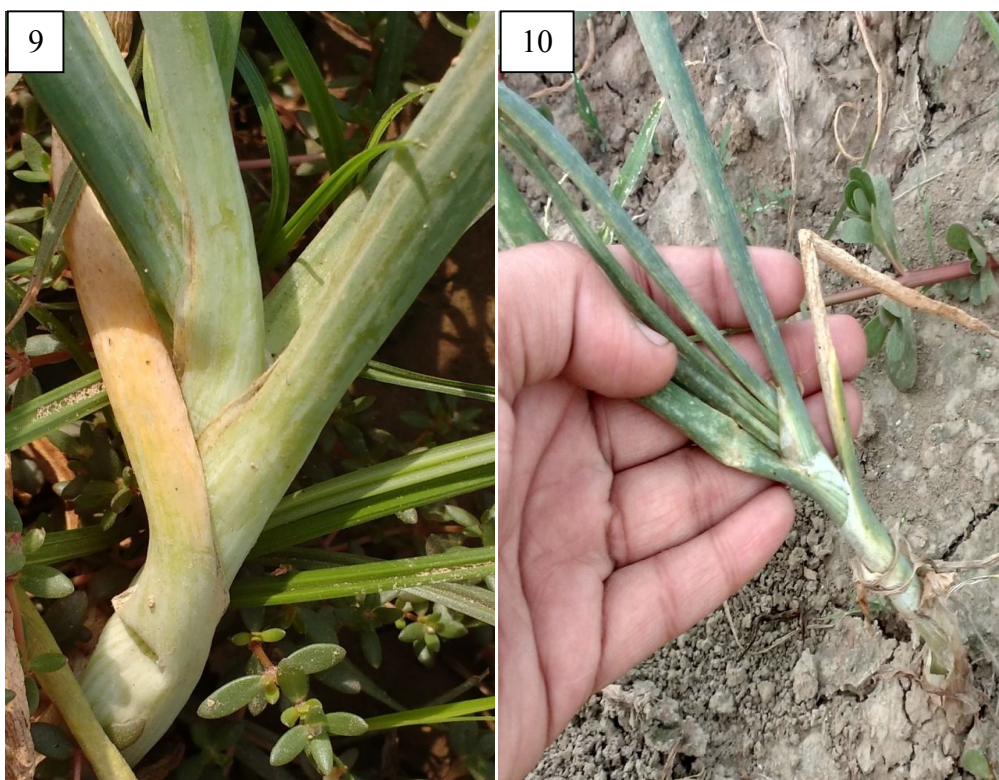


**Fig. 7:** Number of onion plants damaged by onion thrips, *Thrips tabaci* in time of mass infestation in Aligarh



**Fig. 8:** Population dynamics of onion thrips, *Thrips tabaci* in onion crop, Aligarh 2016

In Aligarh First peak was observed at the end of March but the maximum number of onion thrips was researched in the April of 2016. It confirms the results that maximum number of onion thrips on onion found in end of March and beginning of April of 2016 in Aligarh District. Infestation on onion crop results in the form of necrosis of tissues (Duchovskiene, 2006), curling leaves, silvery patches on leaves, distortion and discoloration of plant and finally reduces the bulb size and bulb weight.



**Fig. 9:** Onion plant was damaged by onion thrips, *Thrips tabaci* in Aligarh 2016 **Fig. 10:** Symptoms of damage (lesions and foliage death) typical of Iris yellow spot in onion plant



Prolonged feeding of onion thrips transmitted the virus and bacterial infection and infected plant by reducing the photosynthetic ability of onion plant and finally yields loss up to 30% to 55%. Observation also indicated that onion thrips feed in high enough densities insufficiently in dry climates, the process results in the desiccation and death of their host plant. Symptoms of infestation of onion thrips, *Thrips tabaci* to onion crops occurs at all developing stages on onion plant. These symptoms must be monitored at early stages in favor to reduce the infestation level of onion thrips.



**Fig. 11:** (A) Disfigure of onion bulb yield (B) Devastate onion blubs (C) White and Red Variety of Onion Bulb





**Fig. 12:** Phytoplasma symptoms of chlorotic and twisted leaves on an onion plant **Fig. 13:** Bacterial infection (*Botrytis acalada*) caused by onion thrips in the neck and blub tissue of onion



**Fig. 14:** Iris Yellow Spot Virus infection in leaves of onion transmitted through onion thrips



**Fig. 15:** Symptoms of damage caused by onion thrips, *Thrips tabaci*.

## CONCLUSION AND RECOMENDATIONS

This study shows that when of onion thrips, *Thrips tabaci* increases frequently then infestation level also increase and finally yield lost in huge amount by reduction of bulb weight and quality also.

The continues occurrence of onion thrips on onion crops confined the need of proper pest management in all growing seasons to reduced the infestation level. So we try to use the better IPM management strategies in the favor of onion crop against onion thrips, Growers can easily discover the onion thrips by regularly sampling method or by monitoring on upper side of top most 3- 4 leaves of onion. Grower can discovered the onion thrips when they first infested onion plant so immediate action can be taken against onion thrips by using IPM management strategies to control of onion thrips.

## ACKNOWLEDGEMENT

Authors are grateful to Ingraham Institute and Dr. Anjana Bansal D.S. College, Aligarh for providing necessary facilities to conduct the research successfully.

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