RESEARCH PAPER | Agriculture | Volume : 5 | Issue : 8 | August 2015 | ISSN - 2249-555X

Diversity, Economic Importance And Control Strategies of Thrips (Thysanoptera) on Crop Plants

KEYWORDS: Thrips, diversity, economic importance, control.

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ABSTRACT *Small, slender and fringe winged Thrips (Thysanoptera) caused damage to economic plants by sucking cell sap and affecting growth and yield of the crops. A total of 29 species of thrips belonging to 20 genera have been reported damaging agricultural crops like wheat, paddy, maize, sorghum, pulses, oil seeds, vegetables and forest plants. Important genera refer to Thrips, Scirtothrips, Caliothrips, Taeniothrips, Anaphothrips, Chloethrips, Haplothrips, Sorghithrips, Heliothrips, Panchaetothrips, Frankliniella, Dolichothrips, Meghaleurothrips, etc. The thrips were controlled by spraying the crops with 0.03% Malathion/ Azadirachtin or 0.02%Phosphamidon/ 0.15 Carbaryl*

INTRODUCTION

The industrial revolution, globalization and international trade liberalization lead vast opportunities for invasive insect species to establish in new territories (Haseeb *et al.*, 2011). Thrips are among invasive insects due to their high degree of polyphagy, wide host range and easy dispersal. Hence, survey and resurveys of thrips are essential components of their control. Thrips are slender bodied and small insects with two pairs of fringed wings. Their larvae are miniatures and strikingly resembles with adults by appearance but without wings and smaller in size. (Sathe, 2005; Sathe & Mithari, 2015). There are more than 8800 species of thrips in the world (Kumar *et al.*, 2013). They are destructive pests of several horticultural, floricultural, agricultural and forest crop plants (Sathe, 2009; 2012). Thrips suck the cell sap from tender parts of the crop plants by rubbing their mouth parts and causing brownish or whitish speaks or streaks on leaves, flowers and fruits and affects the yield of the crops adversely. Any advance knowledge on the diversity, occurrence, damage and control of thrips will add great relevance for their integrated pest management from Kolhapur regions since Kolhapur is visualized as best agricultural farming area of India. Out of 8,800 species of thrips have been reported from the world about 3000 species have been well described with their diverse life cycle and habitat (Grimaldi *et al.*, 2004). In past, Rahman (1952), Anantkrishnan (1969), Anantkrishnan & Sen (1980), Mound & Kibby (1998), Eaon & Burfield (2006), Sathe & Mithari (2015), etc contributed on diversity, occurrence, ecology and damage of thrips from India.

MATERIALS AND METHODS

Diversity and occurrence of thrips were studied by visiting and collecting thrips from fields of crop plants from Kolhapur region, India at 15 days interval during morning hours 8.00am-9.00am. Observations on diversity, occurrence and damage by thrips to crop plants were also studied by spot observations on different crop plants. The thrips have been collected on white paper by beating flowers/ 1ft twig of host plants. Such types of thrips were used for morphological studies. The damage to the crop plants like yellowing and curling of leaves, brownish speaks/streaks on leaves, flowers and fruits have been recorded by spot observations in the field.

RESULTS

Results recorded in table-1 and figs 1 to 3 indicated that a total of 29 species of thrips were associated with various types of crops such as wheat, paddy, maize, sorghum, pulses, oilseed, crops, vegetable crops, horticultural, floricultural and forest crop plants. Thrips damage above mentioned crop plants by rubbing mouth parts on tender parts like leaves, flowers, fruits and sucking cell sap/juice resulting formation of white or brownish speaks or streaks on plant parts and finally affecting the quality, quantity and marketability of fruits adversely. The fruits of horticultural crops were stained with brownish spots and disfigured which affected the quantity and marketability of the fruits. The details of diversity of thrips and crop plants and damage aspects are summarized in table -1. The thrips were controlled by spraying the edible crops with 0.03% Malathion or Azadirachtin or 0.03% Rogor and 0.15 % Carbaryl on non edible crops.

DISCUSSION

Thrips have been recorded as a polyphagus pest on the tender succulent parts of crop plants. They have also been reported under the bark of dead and dying twigs or among decaying leaves of grasses or feeding on fungal spores (Bailey, 1939; Ananthkrishnan, 1969). Thrips were susceptible to environmental change and thriven under specific or microclimatic situations including temperature and humidity (Ananthkrishnan, 1969).According to Bailey (1939) most of the thrips he reported were phytophagus but several were also predatory.

Based on the habitat, Watson (1923) divided thrips into following groups, Anthophilus- flower feeding, Phyllophilus- leaf inhibiting, Phaeophilus- bark inhibiting and cecidogenous –gall inhibiting. Monophagy was comparatively rare and met with species like *Helionothrips kadaliphilus* schmutz. on banana. The cecidogenous species reported by Ananthkrishnan (1969) were all strictly monophagous. Oligophagy reported in *Microcephalothrips abdominalis*

Volume : 5 | Issue : 8 | August 2015 | ISSN - 2249-555X

Crawford. was restricted to family Compositae while, polyphagy was seen in *Caliothrips indicus* Bagnall, *Scirtothrips dorsalis* Hood, *Thrips tabaci* Lindeman and *Taeniothrips distalis* Karny. where in these species liked different plant species of different families for feeding. Recently, Sathe & Mithari (2015) reported 10 host plants from Maharashtra for *T. tabaci*.

According to Cederbolm (1963) localized temperature, humidity, light, wind speed, vegetation and host species diversity were responsible for influencing the occurrence of thrips on crop plants. According to him, there was considerable change in the numbers caught at different time of the day. Samples of *Anaphothrips sudanensis* Trybom. collected at an interval of every two hours between 8.00am to 9.00am on *Panicum maximum* Jacq. were found reduced in the subsequent time (Ananthkrishnan & Jagadish, 1968). In the present study, collections were made during the morning hours, 8.00am to 9.00am from different agroecosystems. Mound & Palmer (2012) studied the occurrence of *Scirtothrips dorsalis* Hood on different plants. According to them, prior to introduction of this species to new World, 100 host plants belonging to 40 families was to its credit for feeding choice. Butani & Verma (1976) reported *S. dorsalis* as very serious pest of chili in India. Recently, Sathe & Mithari (2015) noted *T. tabaci* migrating from onion, garlic and bottle gourd from dry months to cabbage and castor in monsoon moths. Almost all species of thrips reported in the present text were serious pests of crops and damaged crucial parts of crops such as tender leaves, buds, flowers and fruits by rubbing their mouth parts and feeding on oozing cell sap of plants which resulted into formation of white or brown speaks or streaks on leaves or fruits and affected photosynthesis, growth of plant and finally, the yield of the crops. The fruits were stained with brownish spots and disfigured which affected the quality, quantity and marketability of the horticultural fruits. For control of thrips, 0.03% Malathion or Azadirachtin and 0.15% Carbaryl or 0.03% Rogor for nonedible crops were used and gave good control of thrips. Ecological and biological control of this group is neglected, therefore, in future above aspects need to study as ecofriendly control of thrips since pesticides lead several serious problems and cannot solve the pest problems permanently (Sathe, 2001; 2004; Sathe & Patil, 2014; Sathe *et al*., 2014).

The majority of scientific literature related to economics of thrips deals with four important thrips species namely, *T. tabaci*, *T. palmi* Karny, *Frankliniella occidentalis* (Pergande) and *S. dorsalis* (Morse & Hoddle, 2006). In India, *S. dorsalis* is one of the limiting factors for chili production. Similarly, *S. dorsalis* is major economic threat to grape and citrus production in Japan and mango production in India (Masui, 2007).

ACKNOWLEDGEMENT
Authors are thankful to Department of Zoology, Shivaji University, Kolhapur for providing facilities during research.

Fig. 1 Occurrence of thrips on crop plants.

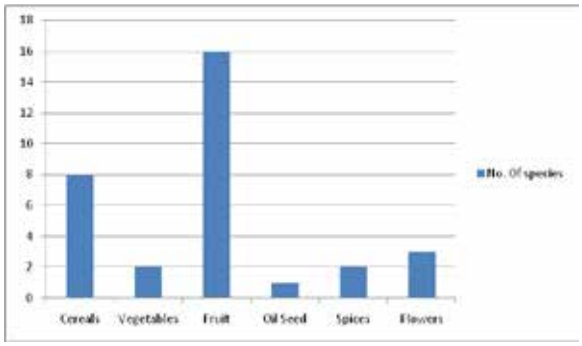

Fig. 2 *Thrips tabaci*

Fig. 3 *Thrips* **sp**

Volume : 5 | Issue : 8 | August 2015 | ISSN - 2249-555X

Table-1 Diversity and occurrence of thrips on crop plants

Sr. no.	Thrips	Family	Crop plants	Damaging parts of crop
1.	*Anaphothrips flavicinctus* Kar.	Thripidae	Wheat	Tender, inflorescence, leaves
2.	*Chloethrips oryzae* (Williams)	Thripidae	Paddy	Tender, inflorescence, leaves
3.	*Haplothrips ganglabauri* Schmutz.	Thripidae	Paddy	Tender, inflorescence, leaves
4.	*H. gowdeyi* (Franklin)	Thripidae	Maize	Tender, inflorescence, leaves, corn
5.	*C. indicus* Begnall	Thripidae	Pulses	Tender, flower, pods, buds, leaves
6.	*Florithrips traegardhi* (Try.)	Thripidae	Sorghum	Tender heads, leaves, buds
7.	*A. sudanensis (*Try.)	Thripidae	Sorghum	Tender heads, leaves, buds
8.	*Sorghithrips jonnaphilus* (Ram.)	Thripidae	Sorghum	Tender heads, leaves, buds
9.	*Caliothrips graminicola* (B. & C.)	Phlaeothripidae	Maize	Tender corn, leaves, inflorescence
10.	*H. kadaliphila* Ramak.	Thripidae	Banana	Tender flowers, leaves
11.	*Scirtothrips signipennis* Begnall.	Thripidae	Banana	Tender flowers, leaves
12.	*Chaetanaphothrips signipennis* Begnall.	Thripidae	Banana	Tender flowers, leaves
13.	*T. tabaci* Lind.	Thripidae	Cabbage, Cauliflower, Fig, Potato, Onion, Garlic, cotton, tobacco, tomato, cucumber.	Tender leaves, flowers
14.	*Thrips florum* Schmutz.	Thripidae	Jamun	Tender leaves, flowers, fruits
15.	*Thrips orientalis* Bagnall.	Thripidae	Jamun	Tender leaves, flowers, fruits
16.	*Caliothrips indicus* Bagnall.	Thripidae	Linseed	Tender leaves, flowers
17.	*Sciothrips cardamomi* (Ramk.)	Thripidae	Cardamom	Tender leaves, flowers
18.	*Panchaothrips traegardhi* Tryban.	Thripidae	Turmeric	Tender leaves, flowers
19.	*Taeniothrips traegardhi* Trybom	Thripidae	Jasmine	Flowers
20.	*Frankliniella dampti* Presner.	Thripidae	Sapota	Tender leaves, flowers
21.	*Megalurothrips usitatus* (Bagnall).	Thripidae	Litchi	Tender leaves, flowers
22.	*Dolicothrips indicus* Hood.	Thripidae	Litchi	Tender leaves, flowers
23.	*Scirtothrips dorsalis* Hood.	Thripidae	Tamarind	Tenders, fruits, flowers, leaves
24.	*Ramaswamichiella submudula* Karny.	Thripidae	Tamarind	Tenders, fruits, flowers, leaves
25.	*Haplothrips ceylonicus* Schmutz.	Phlaeothripidae	Tamarind	Tenders, fruits, flowers, leaves
26.	*Heliothrips* sp.	Thripidae	Loquat	Flowering, tender leaves
27.	*Psedodendrothrips divivasna* (R. & M.)	Thripidae	Jackfruit	Tenders, fruits, flowers, leaves
28.	*Gigantothrips elegans* Z.	Phlaeothripidae	Fig	Tenders, fruits, flowers, leaves
29.	*Rhipiphorothrips cruentantus* Hood.	Heliothripidae	Jamun, Grapevine, rose, *Calotropis*	Tenders, fruits, flowers, leaves
30.	*T. tabaci* Lind.	Thripidae	Tobacco, Tomato, Cotton, Onion, Garlic	Streak virus disease vector.

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