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Identification of a new species, Marigold thrips "*Neohydatothrips samayunkur* Kudô" (Thysanoptera, Thripidae) on marigold in Egypt

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Abstract

Neohydatothrips samayunkur, a thrips species infest African marigolds, is recorded from Egypt for the first time. Detailed description are given of how to identify this thrips species. *Tagetes erecta* L. were grown in the experimental farm at Giza governorate, Egypt. The Sampling was carried out during mid April to late July and from early September to late December, (2013 & 2014). A weekly sample randomly selected and examined for the presence of thrips. Identification was based on the morphological characters. *N. samayunkur* adult body is bicolor, dark brown with abdominal segments 3-6 yellowish with brown antecostal ridge. Antenna 8 segments, Legs; Mid- and hind tarsi: 2-segmented, The hind leg tibiae is brown medially and otherwise yellow. Fore wings alternating bands of dark and light. Second larval instars is pale yellow to orange in colour, antenna and all tibiae is gray. Mesonotum with one pair of brown patches while Metanotum with 2 pairs of brown patches anterior pairs smaller and occasionally indistinct. Body setae are gray, dorsal setae on abdomen arising from a brown patch. Apical half of abdominal segment 10 and occasionally extreme apex of segment 9 grey.

Keywords: Thrips, *Neohydatothrips samayunkur*, Egypt, marigold, *Tagetes erecta* L.

1. Introduction

The genus *Neohydatothrips* John is the largest thrips genus belonging to order Thysanoptera, with 103 described species [1]. *Neohydatothrips* species are all phytophagous, feeding and breeding on leaves. *N. samayunkur*, feeds only on Marigold plants [2]. It is widely distributed in Asia, Central and South America, and Australia [3] and can cause damage on marigolds, *Tagetes* spp. (Asteraceae) [4], provide identification keys to 13 *Neohydatothrips* species recorded from central America, *N. samayunkur* a species from this genus has been reported in East Africa, Asia, Australia, New Zealand, Central and South America, North America, Kenya and Uganda, [5].

Very little is known about Thysanoptera in Egypt, especially the information related to the species *N. samayunkur*. The aim of this paper is to provide for the first time evidence of this species in Egypt based on taxonomical identification of adults and larval stages.

2. Materials and methods

Tagetes erecta L. seeds were grown in Experimental farm, Giza governorate, Egypt. The seed germinate 4-5 days after sowing and seedlings 3-5 true leaves transplanting after 3-4 weeks for sowing in 40 cm x 40 cm spacing between plants in plots, open field. The experimental area received all the standard agricultural practices except for any pest control measures. The survey was carried out during two periods, from mid-April to late July and from early September to late December (2013 & 2014). A weekly sample consisted of five plants randomly selected, using plant beating method. Plant samples were shaken on a white sheet, specimens were collected and picked off with a fine brush into the plastic eppendorf tubes contains ethyl alcohol 70% and transferred to the Lab.

For making permanent microscope slide mounts, the killing thrips individuals transferred and preserving in solution (AGA) of 10 parts 60% ethyl alcohol, 1 part glycerin and 1 part acetic acid to keep the limbs and body supple and distended for mounting [6, 7] and mounted in Canada balsam as described by [8]. Prepared slides were examined using a stereo light microscope (ZEISS) with magnifications ×10, ×40, ×100. Photographs were taken using digital camera with optical zoom ×4. Microphotographs were enhanced and plates were prepared by Adobe Photoshop [9, 5]. Identification of thrips species was based on the morphological characters of *N. samayunkur* [2, 5, 10].

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3. Results

Investigation showed that thrips infestation caused discoloration of leaves of marigolds (*Tagetes erecta* L.) which turned to purple patches, deformation and finally drying of the upper leaves. Flowers turned greenish yellow and plant growth was reduced, (Fig. 1).

Neohydatothrips samayunkur was recorded and described for the first time in Egypt as following (Figs 2-19):

The adult body of this thrips; is bicolor, dark brown with abdominal segments 3-6 yellowish with brown antecostal ridge; anterior margin of pronotum is yellow, median of abdominal tergites 1-3 and tergites 4-6 paler (Figs 2a&b). Head; with occipital ridge not close to eyes and wider than long. Ocellar triangle: with irregular lines of sculpture; 3 pairs of curved ocellar setae. Ocellar setae I present, ocellar setae (3); arising on anterior margin of, or in front of ocellar triangle; ocelli: Occipital apodeme with a distance to posterior margin of compound eyes. Very weak reticulation within the ocellar triangle rather than transverse striation (Fig.3).

Antenna 8 segments, antennal segments 1-2 brown, 3-5 yellow with apical brown area, and segments 6-8 brown, (Fig 4).



Fig.1: Natural infestation with thrips attacking marigold field, Giza Egypt (2013 & 2014). Marigold plants showing scarring, silvery and distortion, purple patches on leaves due to thrips infestation. Heavily infested plants by marigold thrips in late season (flowering period).

Thorax; Pronotum, has transversely elongate reticules on anterior half and one pair of

Long postero angular setae. Absent of blotch or internal apodeme is broadly rectangular with longitudinal reticulate sculpture (Fig. 5).

Meso and metafurca: with stout median spinal. Mesonotum: with an incomplete median division, Metanotum with dominant sculptured triangle medially: absent shape of metathoracic force: elongate and lyre-shaped (Figs 6& 7).

Legs; mid- and hind tarsi: 2-segmented, the hind leg tibiae are brown medially and otherwise yellow (Fig. 8).

Wings: more than half as long as abdomen (macropterous); veins present on fore wing. Fore wings: alternating bands of dark and light. Fore- and hind wing covered with microtrichia. Forewing with sub-basal, median and apical paler areas. The forewing has a pale apical band and lacks setae on the hind vein (Fig. 9).

Abdomen tergites 1-8 with many rows of fine and regular microtrichia (Fig. 10); tergites 1-6 with postero marginal comb of microtrichia present laterally, incomplete medially tergites 7-8 with complete comb of long and regular microtrichia; Transverse dark line on tergites 2-7 and 5-7 pairs of dark spots along the dark line on tergites 3-7. Abdomen tergites with rows of microtrichia laterally. Tergite 8 with posterior comb complete with regular and fine teeth, many

discal microtrichia and a pair of well developed median setae (Fig. 11). Tergites (1-8) with median pair of setae; median seta pairs longer than distance between their bases, sternites without discal setae but fully covered with rows of microtrichia; posterior margins with comb of long microtrichia between the marginal setae (Fig.12).

Second larval instars; is pale yellow to orange in colour, antenna and all tibiae is gray (Fig.13). Head uncultured, without brown area. Antenna 1.1-1.2 times length of head (Fig.14).

Pronotum almost entirely granulate with plaques. Mesonotum with one pair of brown patches. Metanotum with 2 pairs of brown patches anterior pairs smaller and occasionally indistinct (Fig.15). Mesothoracic spiracle transversely ovalar (Fig. 16). *N. samayunkur* 2nd instars larva, spiracle on abdominal segment 8 smaller than Mesothoracic one, peritreme not clearly divided into cells, spiracles opening obscure (Fig. 17). Abdominal terga with transverse rows of plaques which are thin and long medially and unlike laterally. Most dorsal setae moderately long and fan shaped (Fig. 18).

Body setae are gray, dorsal setae on abdomen arising from a brown patch. Apical half of abdominal segment 10 and occasionally extreme apex of segment 9 grey (Fig. 19).

4. Discussion

In Egypt, there are no previous studies on thrips infestation on marigold plants. The results of present study revealed, that occurred on marigold plants. *N. samayunkur* (Kudo) is the first record from Egypt on Marigold plants; *T. erecta* and occurs all the year round. Similar results obtained by [10]. *N. samayunkur* infesting marigold (*T. patula*, Compositae) in Brazil.

Also result goes in line with [11], who reported that, the similar species *N. pseudoannulipes*, a pest of African marigolds, is recorded from Australia for the first time. Another related species *N. ilamensis* was recorded on marigold in Iran [12].

While, [13], recorded, eleven thrips species on both melon and marigold plants in the intercropping system: *Neohydatothrips* sp., *N. samayunkur*, *Frankliniella* sp. *F. schultzei* (Trybom), *Scirtothrips* sp., *Caliothrips* sp., *Microcephalothrips* sp., *Frankliniella vespiformis* (Crawford), *Arorathrips* sp., *Ceratothripoides* sp., and *Haplothrips* sp. Therefore, *T. patula* is attractive to thrips and may be used as trap crop cultivation for several thrips species.



Fig 2a: Adults of marigold thrips *Neohydatothrips samayunkura* (Kudô) under stereomicroscope.



Fig 2b: Adult's body is bicolor, dark brown with abdominal segments 3-6 yellowish brown.

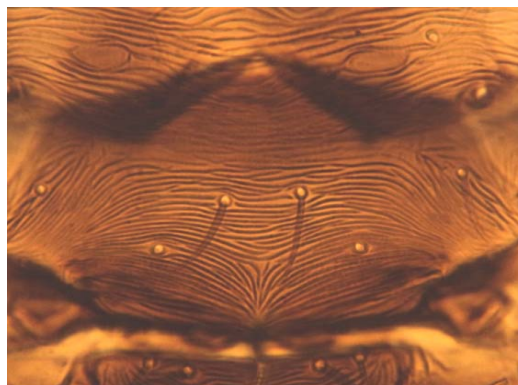


Fig 6: Meso- and metafurca with stout median spinula. Mesonotum with an incomplete median division.

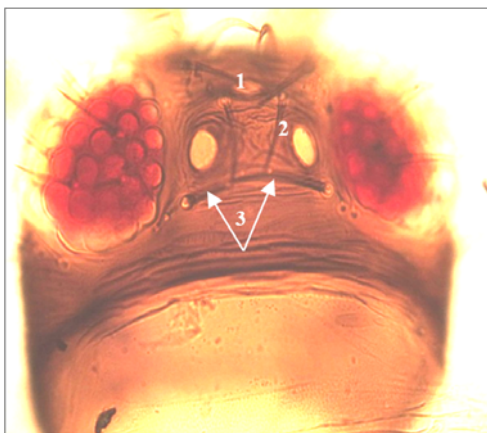


Fig 3: *N. samayunkura* head, with occipital ridge not close to eyes and wider than long, the occipital apodeme on the head separated from the compound eyes. Ocellar triangle with irregular lines of sculpture; 3 pairs of curved ocellar setae, Ocellar setae I present, ocellar setae 3; was arising on anterior margin or in front of ocellar triangle.

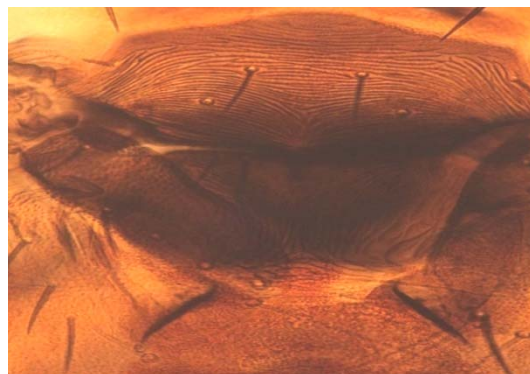


Fig 7: Meso and metanotum, median area with sculptured lines, transverse, with dominant sculptured triangle medially: absent shape of metathoracic furca: elongate and lyre-shaped.



Fig 4: Antennal segments 1-2 brown, 3-5 yellow with apical brown area, segments 6-8 brown.

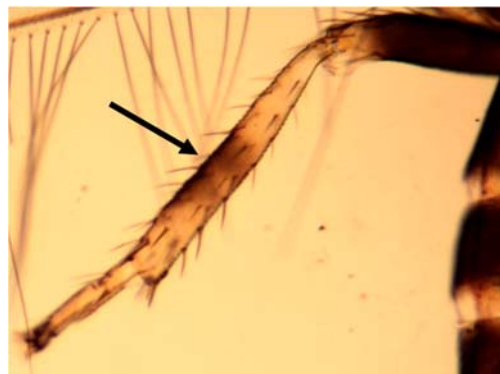


Fig 8: The hind leg tibiae is brown medially and otherwise yellow. Mid and hind tarsi two segments.

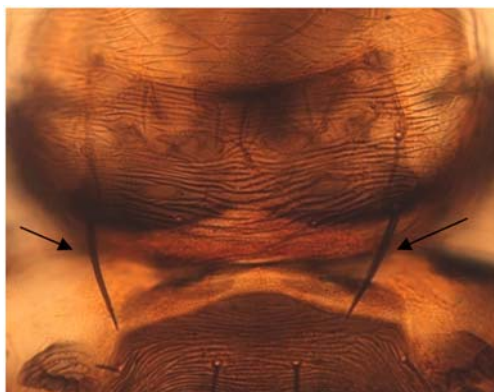


Fig 5: Pronotum, has transversely elongate reticules on anterior half and one pair of long posterior angular setae.

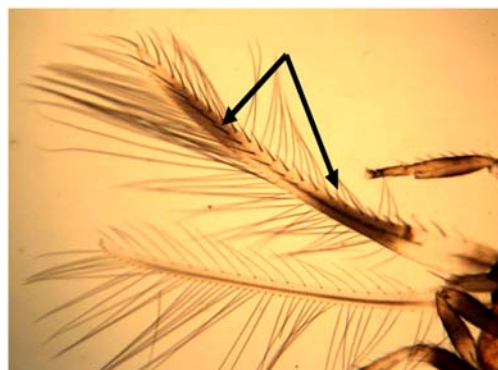


Fig 9: The forewing has a pale apical band. Veins present on forewing. Fore- and hind wing covered with microtrichia.



Fig 10: Abdomen:1-8 with many rows of fine and regular microtrichia.



Fig 14: Antenna of the second instars larva.

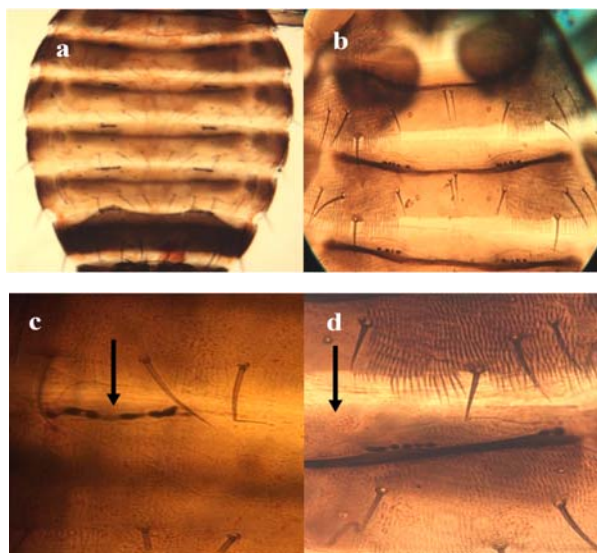


Fig 11: (a & b); Tergites1-6 with posteromarginal comb of microtrichia present laterally, incomplete medially. (c & d); transverse dark line on tergites 2-7 and5-7 pairs of dark spots along the dark line on tergites 3-7.)

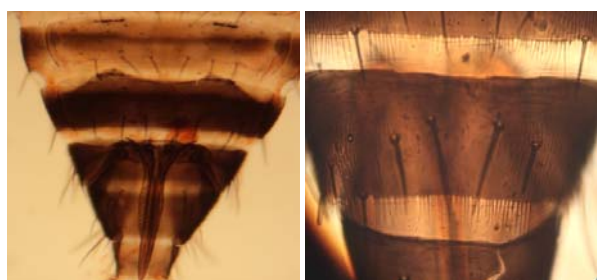


Fig 12: (a); Tergites7-8 with complete posterior comb. Sternites without discal setae (b): Tergite 8 postero-marginal comb of microtrichia: present and complete medially, fine teeth and a pair of well-developed median setae.

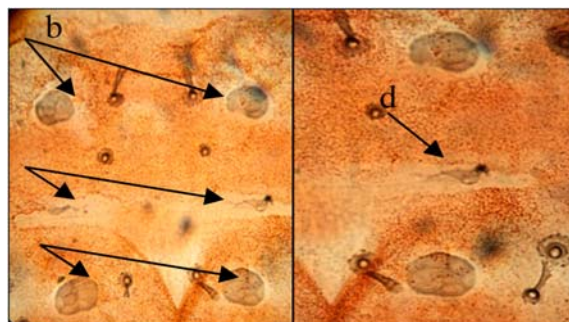


Fig 15: a: Thourax with brown patches (b & c): Mesonotum with one pair of brown patches. b: Metanotum with 2 pairs of brown patches, d: anterior pairs smaller and occasionally indistinct.



Fig 13: Second instars larva pale yellow to orange.

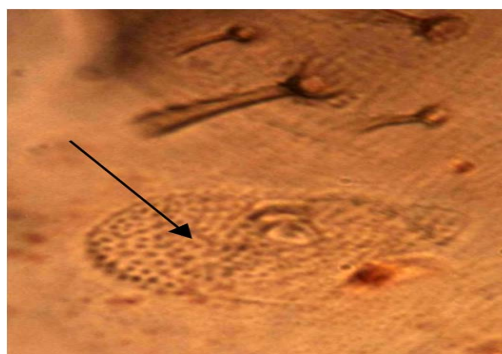


Fig 16: Mesothoracic spiracle transversely ovular.

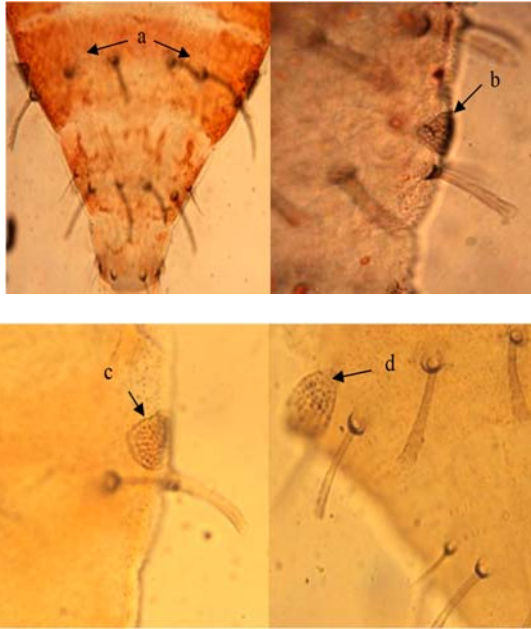


Fig 17: *N. samayunkur* 2nd instars larva, spiracle (a,b,c & d): spiracle on abdominal segment 8 smaller than meso-thoracic one, peritreme not clearly divided into cells, spiracular opening obscure.



Fig 18: Dorsal setae moderately long and fan shaped.



Fig 19: Apical half of abdominal segment 10 and occasionally extreme apex of segment 9 grey.

The description of *N. samayunkur* larvae recorded in the present study is similar to that given by [14, 2] some of these characters may overlap but many are still useful to separate some species. The differences between *N. samayunkur* and its close relative *N. variabilis*. But *N. samayunkur* only feeds on marigold (*Tagetes* spp., Compositae).

This is preliminary study requires to be complete in further detailed investigation in order to determine the role of this thrips species and others as vectors of tospoviruses especially the plant host *T. erecta* as source of both thrips and virus. Many previous studies have tested and recorded *Tagetes* spp. As host and source of tospoviruses, parallels studies reported that, *Helianthus annuus* (sunflower) and *T. patula* (marigold) could act as sources of Tobacco streak virus (TSV) inoculum, which are transmitted by different species of thrips [15].

In conclusion the results of the present study revealed that *N. samayunkur*, recorded first time in Egypt, was the most dominant thrips species on marigold throughout the growing season [16] under publication. Therefore, the list of thrips species so far confirmed in Egypt contains 127 species (<http://anic.ento.csiro.au/thrips/resources/Egypt.htm>). The recently recorded thrips species in Egypt are known as vectors of important plant virus diseases, hence, it is worth determining their impact in Egypt as direct pests as well as vectors and the range of their host plant species beside marigold.

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