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## A New Record of Safflower Fly *Acanthiophilus helianthi* (Rossi) of Genus *Acanthiophilus* Becker in Subfamily Tephritinae (Diptera: Tephritidae) from the Fauna of Pakistan.

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### Short Communication

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Family Tephritidae of order Diptera comprises with the greatest diversity and the largest number of fruit fly species, which impose quarantine restrictions for imports of fruits and vegetables from countries in which they occur. Various species of fruit flies (Tephritidae) are pests of highly important horticulture crops, inflicting serious damage of high economic values. Of them, fly species *Acanthiophilus helianthi* (Rossi) of genus *Acanthiophilus* Becker in Subfamily Tephritinae, now has been reported troublesome as an important pest on safflower (*Carthamus oxyacantha*) and the thistle (*Carduus nutans*) host plants for the fly fauna of Pakistan. This presents the interactions of fruit fly species with host plant species from this region recorded for the first time. It was discovered that the fruit fly was associated with host fruits inflicting sever injury. This is the first record of *A. helianthi* from this State and all of these associations are new records. The localities from which pest samples were collected are indicated in the manuscript. Knowledge of frugivorous Tephritoidea species richness and their interactions with the host plants is extremely important to integrated pest management stratagem.

#### ABSTRACT

#### INTRODUCTION

Tephritidae (true fruit flies) is a large family of the order Diptera with more than 4400 described species all over the world. Considering their damage on fruit plantations, they are important insects from the agricultural point of view [1]. The adults fly can be able to live for a period of few months and lay several eggs at a time into the host upto a few millimeters depth. The eggs hatch in a few days and the maggots (larvae) feed in the host internally. When larvae mature, leave the host and jump down to the ground to pupate in the top few centimeters of soil surface. The contaminated hosts usually ripe prematurely, get rot, and drop to the ground. When infestations of fruit fly are uncontrolled, attacked hosts may be damaged upto 100% level. The occurrence of fruit fly incidence in produces can furthermore result in the hammering of costly interstate and export market values [2, 3].

The safflower fly *Acanthiophilus helianthi* (Rossi) of genus *Acanthiophilus* Becker in subfamily Tephritinae is a polyphagous insect belonging to the Tephritidae family of order Diptera. The safflower fly and sometimes known as the shoot fly or capsule fly, *A. helianthi*, is one of the most important pests causing serious damages to safflower. The production of safflower is threatened by causing large scale economic damage to the safflower seeds and can result in complete seed loss if appropriate control measures are not taken [4, 5]. The losses are caused by larval feeding leading to disrupted plant activities, reduction in flower buds and ultimately decreased quality and quantity of the crop. Study on seasonal activity of *A. helianthi*, showed the damage of first and fourth generation was very low. The flower heads were mainly damaged by the second and third generation of fly that happened about ten days after the adult emergency [6]. In Asia, the fly devastates in a higher number of production areas in Pakistan [7] and India [8], and heavy infestations of safflower occur during the reproductive phase of the

plant throughout the flowering stage. This species is easily recognized by having the body black (although the black obscured by a dense gray microtrichia) with light brown legs and wing with characteristic diffused pattern, while, maggots are dirty white in color [9].

Pakistan houses a large number of native flora diversity which are considered potential plant hosts for the species of fruit flies, including various species of family Tephritidae. So far, the Tephritid fauna of *A. helianthi* have been registered by Norrbom et al. [10], Merz [11,12], Korneyev [13], and Carroll et al. [14] in the biosphere of world. The presence of *A. helianthi* fruit fly for fauna of Pakistan was studied by Talpur et al. [7] and Rahoo et al. [15]. For any fruit fly pest management strategy and wafthng the invasion of pest species to a pest free area, the correct identification of pest is compulsory. However, in fruit flies due to homoplasmy in their morphological characters, the accurate identification of species is very difficult for fruit fly researchers and farm workers who are not familiar with their taxonomic identity. This manuscript deals with new distribution records and description presented for species of fruit fly *Acanthiophilus helianthi* (Rossi). The help for identification of the fly specimens was taken by reviewing published literature and older records of deposited collections. All specimens, including paratypes and the holotypes are kept in the museum of Department of Entomology held in the University of Agriculture, Faisalabad.

## MATERIALS AND METHODS

### Sampling Techniques

For studying the occurrence of fruit flies associated with horticultural crops, an extensive survey in various localities of town Bahrain (Swat) located in Pakistan was conducted. For this purpose, various locations were selected in various constituencies of study site. Its height is not similar but varies with altitude of 850 meter and co-ordinates 34° 50'00" N and 72° 22'00" E. This valley is fascinating tract in the lap of vegetative sky-high mountains, with eternal snow on their lofty crests. Climate in summer (May-August) is 14-23, autumn (September-November) 18-5, winter (December-February) 10-5, and spring (March-April) 5-10 degree Celsius. Chiefly, the material was collected at study sites from some fruit collections and fly rearing, but also undertaken by means of Steiner fruit fly traps. Adult fruit fly specimens were captured in traps baited with protein hydrolyzed installed at 3-5 m above the ground on branches of tree. After survey conducted, the collected fruit fly specimens were preserved in 75% ethyl alcohol in plastic vials for detailed taxonomical work.

### Observational Techniques

The materials collected in alcohol containing vials were shifted to Department of Entomology, University of Agriculture at Faisalabad for identification of taxonomical characteristics studied. Collected specimens were identified by using taxonomic keys, species descriptions and records of published literature. The photographs of identified specimens were taken with digital camera fixed with stereo zoom microscope. The drawings of different body parts were drawn on plain paper with the required magnification using a binocular microscope. Finally, a diagnostic key was consulted and description of species made based on the illustrations of taxonomic characters. The identified specimens were deposited in the collections at the Department of Entomology, University of Agriculture, Faisalabad.

## RESULTS AND DISCUSSION

### Genus *Acanthiophilus* Becker

1908 *Acanthiophilus* Becker, Dipt. Kanar. Ins., p. 136.

Type: *Tetanocera walkeri* Wollaston

Three collected males of a single species completely agree with the published description by Kapoor (1993) [9] of this genus and largely with Freidberg and Kugler [16] except 3<sup>rd</sup> antennal segment pointed at apex.

### *Acanthiophilus helianthi* (Rossi) (Figs. 1-2)

1790 *Musca helianthi* Rossi, Fauna Etrusca: Mant. Inns., 2: 73.

1826 *Trypeta eluta* Meigen, Syst. Besch. der bekann. europ. zweif. Insek., Vol. 5, Hamm., xii + 412 pp.

1843 *Acinia helianthi* Macquart, Luc. Explor. Alg. Zool., 3: 497.

1856 *Trypeta helianthi* Frauenfeld, Sitzgsbr. Ak. Wien., 22: 556.

1905 *Urellia helianthi* Becker, Kat. Pal. Dipt., 4: 142.

1966 *Acanthiophilus helianthi* Avidov and Kotter, Scrip. Hieroso., 18: 9-26.

### MALE

Body length 3.64-3.94 mm. Body coloration black.

## Head

Length 0.59 mm. Width 1.82-2.49 times greater than length; frons 1.12-1.52 times wider than eye, its lower part narrower than upper, upper part grey with light yellow coloration while area along eye margins light yellow; frontal stripe bare, yellow; 3 pairs of inferior and 2 pairs of superior frontal orbital bristles; inferior pairs, lower superior pair and inner vertical bristle pairs acuminate, brown to black, while upper superior pair, postocellar, postvertical, outer vertical pair and postorbital bristles lanceolate, pale yellow; ocellar triangle black, with bristles well developed, black; vertex light yellow; lunule yellow; face concave, yellow without any spot or band, 1.27-2.12 times longer than antenna; epistome projecting forward, yellow; gena narrow, 0.75-0.82 times shorter than 3<sup>rd</sup> antennal segment width, with 1 black bristle pair; subocular spot absent; mouthparts capitate; antennal segments yellow except apex and outer surface of 3<sup>rd</sup> dark brown, 2<sup>nd</sup> with brown to black hair, 3<sup>rd</sup> pointed at apex (Fig. 1) which is 1.42-1.55 times longer than wide, arista with short pubescence, black, fulvous basally; occiput black, while area along eye margins yellow.

## Thorax

Length 1.29-1.53 mm. Shorter than abdomen (1.77-1.88 mm), 1.47-1.63 times longer than wide, ground color black, with grey pollinosity, hair pale yellow; small notopleural area light yellow; scutellum triangular; post pronotal lobe, mesopleural stripe, anatergite, katatergite, mediotergite and postnotum black; haltere yellow; scapular setae absent.

## Setae

*Hm. 2, a.npl. 2, p.npl. 2, mpl. 2, pt. 2, st. 2, a.sa. 2, p.sa 2, prsu. 2* (situated close to suture), *psu. 2* (situated close to suture), *prsc. 2, la. 2, sc. 4* (apical pair almost half as basal), all acuminate, brown to black except posterior notopleural seta lanceolate and pale yellow.

## Legs

Yellow, with hair yellow to brown, fore tibia with pale brown bristles ventrally, mid tibia with 1 black apical spur.

## Wings

(Fig. 2). Length 3.94-4.00 mm. Slightly longer than body (3.64-3.94 mm); hyaline except subapical spot which starting from stigma apex and covering almost the upper half; vein CuA1 with isolated brown spot medially; cross vein dm-cu with brown spot on posterior part; subcostal cell brown at apex, comparatively long; vein R 4+5 with setulae only at node; posterior cubital cell with short extension; supernumerary lobe not developed.

## Abdomen

Length 1.77-1.88 mm.

Ground colour black, sparsely pollinose, with pale yellow hair, tergum III without pecten, III-IV with brownish-yellow bristles, densely on last one.

**FEMALE:** Not found.

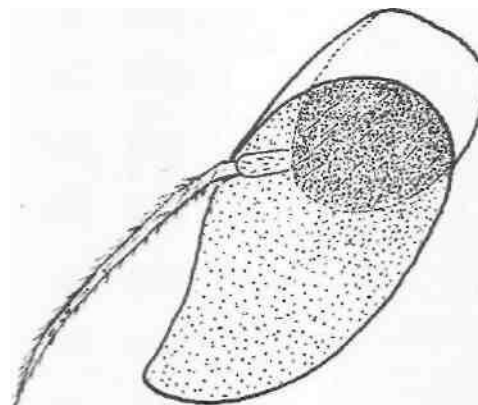


Figure 1: *Acanthiophilus helianthi* (Antenna on head)

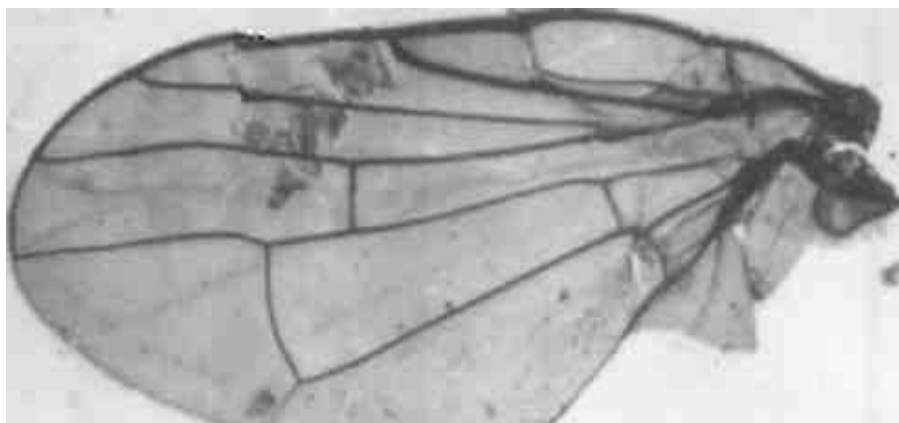


Figure 2: *Acanthiophilus helianthi* (Wing)

Measurements (mm): 3 males collected.

Male body parts	Range	Mean	S. D.
B.L.	3.64-3.94	3.84	0.14
H.L.	0.59	0.59	-
H.H.	0.59-0.71	0.67	0.06
H.W.	1.24-1.47	1.33	0.10
FR.W.	0.47-0.53	0.51	0.03
E.W.	0.35-0.47	0.41	0.05
A.L.	0.29-0.34	0.32	0.03
A.S3.L.	0.17	0.17	-
A.S3.W.	0.11-0.12	0.12	0.01
F.L.	0.36-0.45	0.42	0.04
G.W.	0.09-0.12	0.10	0.02
T.L.	1.29-1.53	1.43	0.10
T.W.	0.88-0.94	0.92	0.03
W.L.	3.94-4.00	3.97	0.03
P.A.L.	1.77-1.88	1.80	0.05
H.W./H.H.	1.75-2.49	1.93	0.29
H.W./H.L.	1.82-2.49	2.14	0.28
H.H./H.L.	1.00-1.21	1.07	0.10
FR.W./E.W.	1.12-1.52	1.25	0.19
F.L./A.L.	1.27-2.12	1.69	0.43
A.S3.L./A.S3.W.	1.42-1.55	1.49	0.07
G.W./A.S3.W.	0.75-0.82	0.79	0.04
T.L./T.W.	1.47-1.63	1.55	0.07

#### Material examined

Bahrain (Swat) 2 males, 30- 5- 1995; 1 male 15- 5-96.

## Habitat

Adult males of this species were reared from maggots feeding in the flower heads of safflower (*Carthamus oxyacantha*) and the thistle (*Carduus nutans*).

Formerly, the hosts and distribution records of fruit fly *A. helianthi* had been reported from several countries of this planet. In this state *A. helianthi* fly species captured previously had been reported from Sindh province of Pakistan. Our findings extend the range of this *A. helianthi* fly to the Federally Administered Tribal Areas on the northwestern countryside bordering two of Pakistan's provinces on the east and south, and Afghanistan to the west and north.

The record of this species from this locality is probably due to the fact that in these regions there are remnants of their plant hosts, where species of *Acanthiophilus* (Tephritidae) are found. Plant species safflower (*C. oxyacantha*) and the thistle (*C. nutans*) produce the preferred host fruits of *A. helianthi* species in high abundance.

The species of *A. helianthi* usually occurs in these natural environments, but represented by few individuals. In native afforestation, there is greater diversity of hosts, with a tendency of having greater evenness among the different co-occurring species<sup>[17]</sup>. It is unknown whether these host plants are more attractive to the fly or more susceptible to fly damage. The use of biological models to link insect and plant developmental data has been effectively used as a tool to address these questions in other crops<sup>[18]</sup>. As a consequence, state organizations should carry on maintaining of vigilance against introduction of the further fruit flies in this locality.

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