



FIRST REPORT OF VEGETABLE LEAFMINER *LIRIOMYZA SATIVAE* BLANCHARD (DIPTERA: AGROMYZIDAE) THROUGH DNA BARCODING FROM BANGLADESH

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ABSTRACT

The vegetable leafminer *Liriomyza sativae* Blanchard is being reported from Bangladesh for the first time by confirming its identification through DNA barcoding method. Previously the species was mentioned as *L. munda* Frick 1957 infesting Tomato in Bangladesh, which is a junior synonym of *Liriomyza sativae*. During a survey between October 2008 and September 2011, *L. sativae* was found to infest many vegetable and cereal crops around the country. High intensity of infestation has been found on Tomato and maximum damage was recorded to occur near coastal areas including the offshore islands.

Key words : Agromyzidae, *Liriomyza sativae*, vegetable leafminer, new record, DNA barcoding, Bangladesh.

INTRODUCTION

The vegetable leafminer *Liriomyza sativae* Blanchard is a polyphagous pest of vegetables and flower crops (Spencer 1973, 1990). It is the dominant agromyzid pest of vegetables in lowland areas (Andersen *et al.*, 2002; Rauf *et al.*, 2000). In Bangladesh leaf miners (*Liriomyza* spp.) have appeared as a major threat in recent years. Although the infestation of vegetable leaf miners on tomato was studied in Bangladesh at BARI (Bangladesh Agricultural Research Institute, Annual Report, 2007-2008) but no species ID was mentioned in the report. In another report the species was mentioned as *L. munda* infesting Tomato in Bangladesh (Alam and Kabir, 2008) which is a junior synonym of *L. sativae*. During the present study this species was identified by morphological characters and the identification was confirmed by amplification of its mitochondrial COI gene in a US lab. The main objective of this work is to confirm the identity of the leafminer reported in Bangladesh, detail of the DNA analysis will be published elsewhere. This pest was recorded from 45 vegetable crops in Bangladesh including Tomato, Potato, Long bean, Common cowpea, Bush bean, French bean, Common bean, Ground nut, Okra, Onion, Snake gourd, Bottle gourd, Cucumber, Sweet cucumber, Watermelon, Cauliflower, Mustard, Cabbage, Egg plants, Squash, and Red spinach (Bhuiya *et al.*, 2010).

MATERIALS AND METHODS

Specimens were collected by sweep net and Malaise Traps from 44 Districts of Bangladesh during 2008 - 2010. Some specimens were reared in the laboratory from collected leaves with mines. Adults were dried

with HMDS in biosafety cabinet and then mounted dry on pins and card points. Three Dimensional images of the adult fly were taken with Entovision Imaging System of Microvision, France, at the Department of Zoology, University of Chittagong. *L. sativae* was identified by morphological characters under a high power stereoscopic microscope following Spencer (1965, 1973), Dempewolf (2004), Shiao (2004) and OEPP/EPPO (1992, 2005). For DNA barcoding, live specimens were preserved in 95% ethanol and kept at -20°C for DNA amplification. DNA extraction and the amplification of its mitochondrial COI gene was done at the BARC (Beltsville Area Research Centre), USDA, Maryland, USA. Extractions of DNA from larval, pupal or whole insects were done by using DNeasy insect protocol (QIAGEN Blood and Tissue kit, cat no. 69506) and the amplification of the DNA was performed using PCR and the primers C1 - J- 1535 (Scheffer and Wiegmann 2000) which will be reported in a separate paper.

RESULTS AND DISCUSSION

Taxonomy

Liriomyza sativae Blanchard 1938, An. Soc. Cient. Santa Fé, 126: 352

Agromyza subpusilla Frost 1943

Lemurimyza lycopersicae Pla & de la Cruz 1981

Liriomyza canomarginis Frick 1952

Liriomyza guytona Freeman 1958

Liriomyza minutiseta Frick 1952

Liriomyza munda Frick 1957

Liriomyza propepusilla Frost 1954

Liriomyza pullata Frick 1952

Liriomyza verbenicola Hering 1951

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Diagnosis (Figs 1, 2, 3)

Head with frons and orbits yellow, third antennal segment small, round and yellow, femora bright yellow, mesonotum black, shining, both outer vertical bristle on black ground and inner vertical bristle on yellow. Wing with last section of CuA1 3-4 times length of penultimate section, wing length 1.3-1.7 mm. Dorsum of abdomen with a median stripe on the 2nd tergite (Fig. 3). Aedeagus: distiphallus with one distal bulb with a slight constriction between upper and lower halves. Females slightly larger than males. Scutellum bright yellow, outer vertical setae standing on black, inner vertical setae usually standing on yellow ground.

Specimen studied: BANGLADESH, Chittagong, 6 females and 4 males, 30.i.2010, (S. Mazumdar) on Common Bean; Rajshahi, 4 females and 3 males, 25.ix.2008, (W. Islam) on Tomato; Saint Martin's Island, 5 females and 2 males, 22.iii.2010, (M I Miah) on Cowpea.

Depository: The specimens have been deposited at the Insect Museum, Department of Zoology, University of Chittagong (IMCUZD).

Damage: Adult female flies make tiny punctures in the upper side of the leaf with their pointed ovipositor. Puncture wounds cause a stippled and yellowish appearance to the leaves and are easily seen in heavy infestation.

Host Plants: *L. sativae* is highly polyphagous, attacking many truck crops (Spencer and Steyskal, 1986; Andersen, *et al.*, 2002; Walker, 2005). Host plants under the families Amaranthaceae, Asteraceae, Brassicaceae, Cucurbitaceae, Liliaceae, Malvaceae, Papilionaceae and Solanaceae were recorded for this pest in Bangladesh. The most affected crops are Tomato, Potato, Long bean, Common cowpea, Bush bean, French bean, Common bean, Ground nut, Okra, Onion, Snake gourd, Bottle gourd, Cucumber, Sweet cucumber, Water melon, Cauliflower, Mustard, Cabbage, Egg plants, Squash, Red spinach and many others.

Distribution: *L. sativae* was originally described from Argentina in 1938 (Spencer, 1973; Parella, 1982). Although the species is New World in origin (Blanchard, 1938, Freeman, 1958; Martinez and Bordat, 1996), it has spread worldwide as a result of global trade of vegetables (Minkenberg, 1988; Rauf, *et al.*, 2000, Deeming, 1992). Previous records are from North, Central and South America, Africa, South and South-East Asia, and Australasian-Oceanian region (Spencer, 1965, 1973; Frick, 1952; Deeming and Mann, 1999). Other countries where *L. sativae* have been specifically reported are Turkey (Civelek, 2002), Japan (Lawasaki, *et al.*, 2000), Malaysia (Sivapragasam and Syed, 1999), Vietnam (Tran *et al.*, 2005, Hofsvang, *et al.*, 2005), Iran (Asadi *et al.*, 2006), China (Chen and Kang, 2005), The Philippines (Sheffer *et al.*, 2006) and India (Singh and Ipe, 1973).



Fig. 1. Male & Female *L. sativae*



Fig. 2. Lateral view of *L. sativae*.



Fig. 3. Dorsal view of abdomen of *L. sativae*

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