Facultative blood-sucking lace bugs, Corythucha sp., in Romania

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Facultative blood-sucking lace bugs, *Corythucha sp.*, in Romania

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INTRODUCTION

The earliest mentions of biting and stinging caused by lace bugs, *Corythucha* sp. date back to the 50s, in the United States of America, but these were not very common. The first cases of biting in Europe have been mentioned in northern Italy since 2010 and the confirmation of the hematophagous behaviour of the lace bugs was done in 2015 in France by DNA barcoding.

In Romania *C. ciliata* was first time reported in 1990 in Craiova and then in 2011 in Sibiu, while *C. arcuata* was spotted for the first time in 2015 in Arad. In 2017 and 2018, in many cities across the country, but especially in Bucharest, many citizens, especially children, arrived at the hospital with allergic reactions such as bloating, itching and reddened skin. Although the scientific mentions are poor, in the online media many references might be found, starting 2011, regarding *C. ciliata* and *C. arcuata*, proving that citizen science is a tool that cannot be neglected. Instead, it should be wisely used. The purpose of our study was to review the information available in the media about the two pests and to raise few questions about the patterns that determines the insects biting on humans, as well as the possible causes of allergic response. In addition, the first DNA barcoding trials have been performed and compared with the already existing data in BOLD and NCBI.

MATERIALS AND METHODS

*Reviewing the spread of *Corythucha* sp. in Romania, the information available on the online media was gathered through a deep search with Google engine.

*To identify the possible causes that could make some people more susceptible than others to allergic reactions, a questionnaire was given to people that acknowledged that were bitten by lace bugs, during the Researchers night, Bucharest edition, in 29 September 2017. The questionnaire had only 20 respondents,

*For the DNA barcoding, 4 specimens of Corythucha sp. were barcoded, of which two kept dry since autumn 2017 and two catched with sticky traps, in March 2018, in a gerbera crop, in greenhouse. The 658-bp barcode region of the mitochondrial cytochrome c oxidase subunit 1 (COI) gene (Hebert et al. 2003) was amplified using Lepidoptera and Folmer primer cocktail (C_LepFolF/C_LepFolR, 1:1) (Hernández-Triana et al. 2014) and sequenced with ABI Hitachi 3730XL DNA analyzer. Traces analysis and interpretation were performed with CodonCode and Mega7 software.

RESULTS AND DISCUSSIONS

Reports about lace bugs invasions in Romanian cities

Timisoara – 1990. The scientific papers do not mention the fact that Bella Kiss found the pest in 1990 in Timisoara. The paper was published in „Analele Banatului", Ştiinţele Naturii. Vol.II.

Oradea – 2011, 2015. The online press is full of references regarding *Corythucha ciliata* invasion in Oradea, in 2011. The authors are stating that in the hot summers, the insect populations develop very fast, in huge numbers. Newspapers as *ebihoreanul.ro*, *bihon.ro*, *agroromania.manager.ro*, *2011*, etc. were announcing in September that the Plant Protection Laboratory of Agriculture Direction Bihor and the National Phytosanitary Laboratory have both confirmed the presence of *C. ciliata* in the campus of Oradea University. The authorities mentioned that because the pest is not mentioned in our country before, there were no approved PPP, so they were advising hygiene measures. The same situation repeated in 2015, when another lace bugs invasion disturbed Oradea. The second generation of lace bugs destroyed the London planes from a famous boulevard (Sf. Andrei, foto 1), information given by the Warning service of the Phytosanitary office Bihor (crisana.ro, evenimenteoradea.ro, 2015)

Baia Mare – 2014. Due to huge infestation levels, in 7-12 May 2014, phytosanitary treatments are advertised, mostly in Millennium Plaza and the green areas around. The name of the company (SPAU) and the hours 5-7 a.m. are also given. Strangely, adevarul.ro mention that approved PPP will be used.

Bucharest – 2017, **2018**. More than 100 articles mention directly the stinging and biting effect caused by lace bugs in the Romanian capital. All the articles are clearly over-reacting, using words as "monsters", "invasion", "terror", "havoc" etc. Although in all articles only *C. ciliate* is mentioned, in many pictures and movies *C. arcuata* can be observed. Also, one blog (sutu.ro) depicts a huge population of *C. arcuata* on *Fragaria x ananassa* plants, a new host plant record. (pictures by Cristian Şuţu).

Causes for higher biting incidence and susceptibility to an allergic reaction

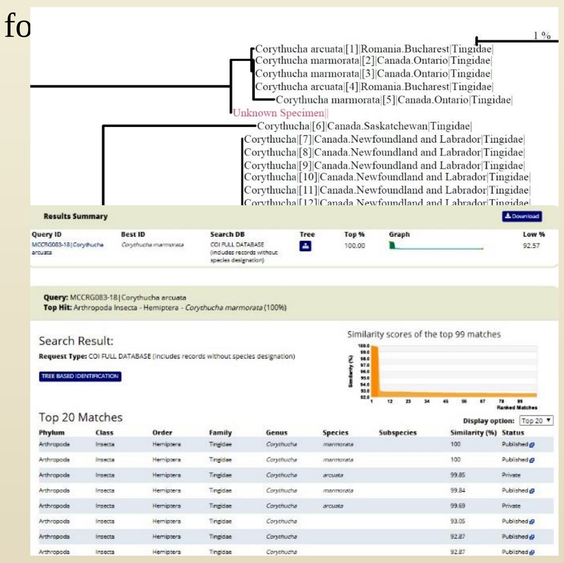
In 2017 and 2018, in Bucharest, many citizens, especially children, arrived at the hospital with allergic reactions such as bloating, itching and reddened skin. Preliminary results of our questionnaire showed that citizens were bitten especially at noon, 50% of those with symptoms having A2 blood group and 30% blood group 01. The blood sucking behavior seems to be triggered by the excessive heat. It had been sugested that the persons with type I hypersensitivity might be the one affected by lace bugs stings.

The DNA barcoding

High quality traces were obtained for three out of four specimens, while the seqencing failed on the one specimen for which the abdomen was used as tissue for sampling.

All details regarding taxonomy and vouchers fo Life Datasystem (BOLD) website (Ratnasingham and Hebert 2007) in the "Insects of economic importance from Romania" dataset (MCCRG) and inside the BIN ACJ7209.

The fact that all three nucleotide sequnces were different between them and the highest sequence similarity was obtained for two *Corythucha marmorata* entries, a species that is not know to occur in Europe, leads to the conclusion that either the used primers or the tissue sampling were not performed corectly. Only 5 data records gave a similarity% above 99%.



CONCLUSIONS

Citizens and journalist reports of lace bugs in Romania should have been considered since their beginig (at least 2011) both by the researchers and authorities, a fact which might possibly contributed to an effective control for the spread of Corythucha sp. in Romania.

Fragaria x ananassa was found as a host plant for C. arcuata through a citizen report.

Blood type

Altghough high quality traces were obtained, the lack of similarity with other sequences, except a species which is not known to ocur in Europe, lead to uncertain conclusion and the DNA barcoding analysis need to be repeated.

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Available on request.