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Communication

Record of the Emerald Ash Borer (*Agrilus planipennis*) in Ukraine is Confirmed

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Abstract: *Agrilus planipennis* is a devastating invasive pest of ash trees. This wood-boring insect native to Asia and established in European Russia about 20 years ago poses a serious threat to ash trees all over Europe. In 2019 we first detected *Agrilus planipennis* in Ukraine. More than 20 larvae have been collected from under the bark of *Fraxinus pennsylvanica* trees on 5 September 2019 in Markivka District of Luhansk Region. Coordinates of the localities of collection: 49.614991 N, 39.559743 E; 49.614160 N, 39.572402 E and 49.597043 N, 39.561811 E. The photos of damaged trees with larval galleries, exit holes and larvae are presented. There is no doubt that the pest is established in Ukraine. This fact is important for development of quarantine protocols to prevent or at least slow the further spread of this invasive pest in Europe.

Keywords: Emerald Ash Borer; EAB; Ukraine; Europe; *Fraxinus pennsylvanica*; ash trees; invasive pest; plant quarantine

1. Introduction

Emerald ash borer (EAB) *Agrilus planipennis* (Coleoptera: Buprestidae), a pest of ash trees (*Fraxinus* spp.), is native to China, Russian Far East, Japan and Korea [1]. Since its accidental introduction to North America in the 1990s, this devastating pest has widely spread in Canada and United States and killed hundreds of millions of ash trees [2]. Similarly the introduction of EAB into Moscow, again back in the 1990s, has likewise led to widespread ash tree mortality in an ever expanding outward range [3; 4]. The spread of *A. planipennis* should be carefully monitored, because it poses a serious threat to ash trees all over Europe [5]. Before 2019 the pest was recorded only in European Russia. In 2018, it was recorded near the border of Luhansk Region of Ukraine: in the very south of Voronezh Region of Russia [6]. Information about spread *A. planipennis* to another country is crucial for plant quarantine protocols. So we decided to look for the pest in Luhansk Region of Ukraine.

2. Materials and Methods

On June 20–22, 2019 ash trees in Starokozhiv Forest and field shelter belt in its vicinity (Markivka District of Luhansk Region of Ukraine) were examined by A.N. Drogvalenko. This locality was chosen for the survey because it is just about 25 km from the nearest known locality in Russia [6]. The stems of about 250 ash trees (*Fraxinus pennsylvanica*) were examined for characteristic D-shaped exit holes. Three trees of *F. pennsylvanica* damaged by *A. planipennis* were detected. These trees are situated at the edge of the forest belts and have the diameter of 7–10 cm. Characteristic D-shaped exit holes are situated at a height of 50-200 cm. The infested trees had dying of upper branches, foliage density reduced (small leaves) and fewer seeds. This information was included to the paper submitted as a preprint to bioRxiv [7].

Immediately following the appearance of this preprint on the Internet, National Plant Protection Organization of Ukraine conducted an official survey in the same area and did not detect the pest. And since we had no specimens or photos for confirmation, our record of *A. planipennis* in Ukraine was considered unreliable [8]. Description of the forest provided in the report of the Ukrainian Plant Protection Organization indicates that the employees of this organization didn't find the infested forest belt. Unfortunately, they didn't ask A.N. Drogvalenko to show them these trees or indicate the exact coordinates of his finding.

On September 4–6 2019 A.N. Drogvalenko visited Markivka District of Luhansk Region of Ukraine again and repeated the survey of ash trees. His aim was to make photos of exit holes, larval galleries, and larvae of the pest and collect larvae from under the bark.

3. Results

The same three infested trees and more than 40 other trees of *F. pennsylvanica* heavily infested with *A. planipennis* were found in this region (Figure 1). More than 20 larvae have been collected and preserved in alcohol. The larvae under the bark were found to be of different instars including the last instar. The coordinates of trees, where the larvae were collected: 49.614991 N, 39.559743 E; 49.614160 N, 39.572402 E and 49.597043 N, 39.561811 E (roadside plantation). The larvae are in the collection by A.N. Drogvalenko in Kharkiv.

(**a**) (**b**)

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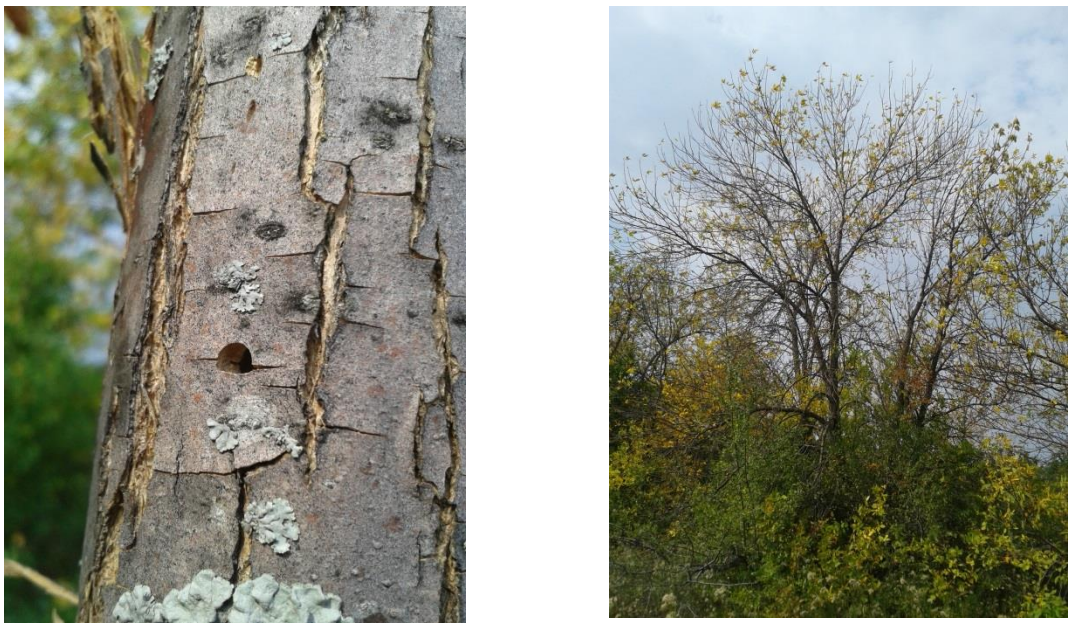

(c) (d)

Figure 1. Symptoms of EAB infestation on ash trees (*Fraxinus pennsylvanica*) in Markivka Disrtict of Ukraine. (**a**) and (**b**) Larvae of *A. planipennis;* (**c**) Exit hole; (**d**) Damaged tree.

4. Discussion

Since the examined trees are heavily infested and some larvae are of the last instar, it is obvious that the infestation is at least two years old. The finding of EAB in Ukraine is not surprising. By 2019 EAB has spread to 14 regions of European Russia: Bryansk, Kaluga, Lipetsk, Moscow, Orel, Ryazan, Smolensk, Tambov, Tula, Tver, Vladimir, Volgograd, Voronezh and Yaroslavl [7]. The distance between the entry point of invasion (Moscow) and the most remote known EAB locality (officially declared phytoquarantine zone in Volgograd [9]) is about 900 km. The distance from Moscow to the locality of EAB detection in Ukraine is about 700 km. Therefore it is not excluded that EAB is already widespread in Ukraine.

5. Conclusions

There is no doubt that *Agrilus planipennis* is established in Ukraine. It should be taken into account in plant quarantine protocols of European countries.

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