ORGANISATION EUROPEENNE ET MEDITERRANEENNE POUR LA PROTECTION DES PLANTES

EUROPEAN AND MEDITERRANEAN PLANT PROTECTION ORGANIZATION

Newsletter

of the EPPO Network of experts working on surveillance, monitoring, and control of the Emerald ash borer, *Agrilus planipennis*

NO. 6

PARIS, 2024-09

Contents of the Newsletter

The webpage of the Network:

https://www.eppo.int/RESOURCES/special_projects/agrilus_planipennis_network

Photo of *Agrilus planipennis* above: Courtesy of Eduard Jendek.

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1. Introduction

Welcome to the 6th issue of the Newsletter of the EPPO Network of experts working on surveillance, monitoring, and control of the Emerald ash borer, *Agrilus planipennis*. This Network was established by the European and Mediterranean Plant Protection Organization (EPPO) following the decision made in October 2022 by its Panel on Quarantine Pests for Forestry. The Network was established in association with an EPPO-EU project.

Following the release of the 5th issue of the Newsletter, the Network coordinator received a few notes from the members of the Network as well as information about new conferences, projects, dissertations and publications focused on *A. planipennis*. This information made it possible to prepare the 6th issue. Once again, the EPPO Secretariat would like to encourage participants to send all relevant information to the Network coordinator (Dmitrii Musolin, dm@eppo.int).

2. The Network is growing

In September 2024, the Network reached a new milestone – it has now more than **260 members (subscribers)** from more than **45 countries**. The EPPO Secretariat welcome you all. These numbers indicate a strong interest in the subject. Please encourage your colleagues to join the Network via the link https://forms.office.com/e/7GxvJkS0YT (registered email addresses will not be disclosed).

3. Demarcated areas for *Agrilus planipennis* in the Russian Federation in 2023

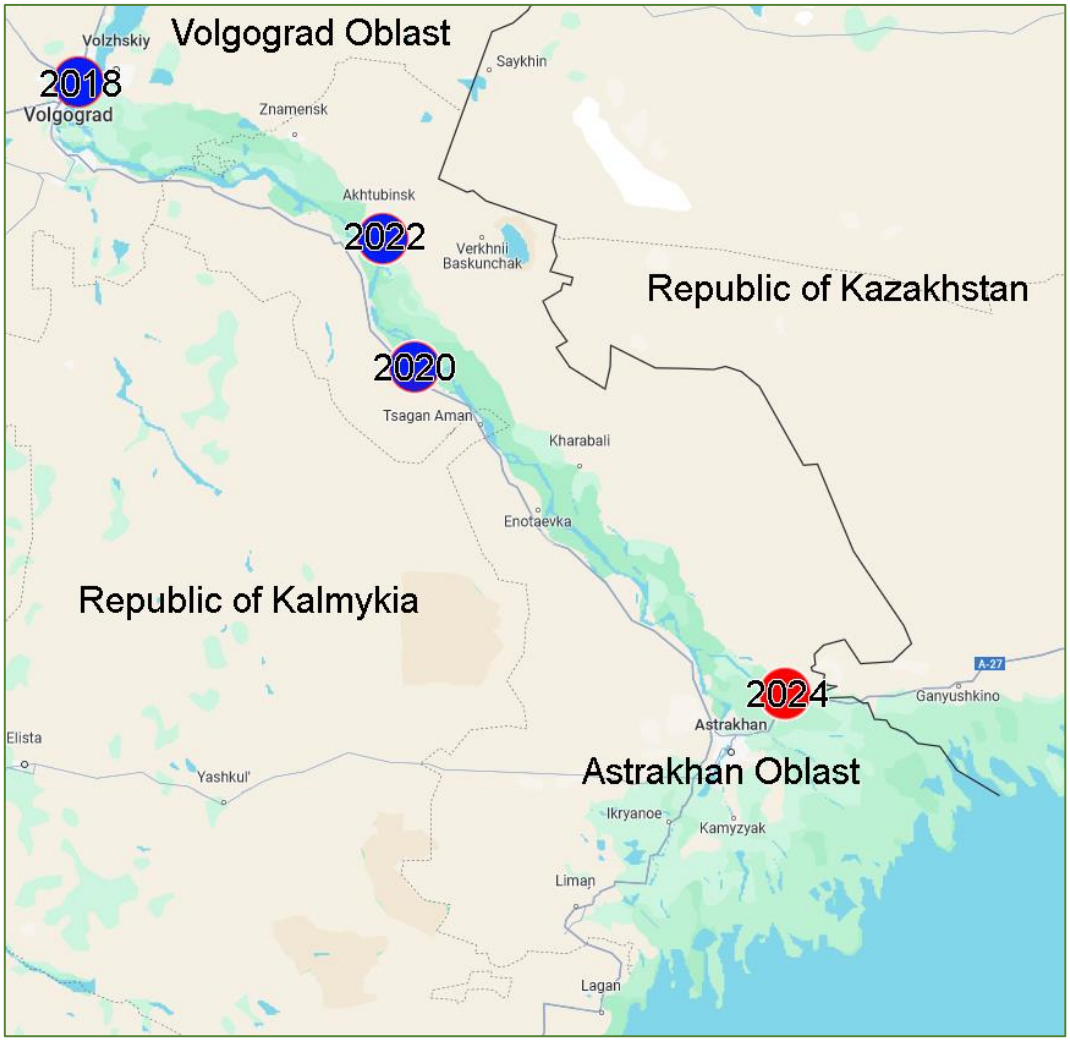
Rosselkhoznadzor
Federal Service for Veterinary and Phytosanitary Surveillance of the Russian Federation

Emerald ash borer was officially reported in **10 regions (oblasts) of the Russian Federation in 2023** in accordance with the information from the National report on the phytosanitary quarantine status (https://fsvps.gov.ru/files/nacionalnyj-doklad-o-karantinnom-fitosanitarnom-sostojanii-territorii-rossijskoj-federacii-v-2023-godu; National report on phytosanitary quarantine status of the territory of the Russian Federation in 2023. *Plant Protection and Quarantine* 2024, 7: 3–15 [in Russian]).

Detailed information on demarcated areas in the regions of the Russian Federation in which the eradication measures to prevent the spread and establishment of *Agrilus planipennis* are implemented is available (in Russian) on the website of the NPPO of the Russian Federation (https://fsvps.gov.ru/wp-content/uploads/2023/07/data-20240710-structure-20230315T0921.pdf).

(prepared by **Maria Yerokhova**, *All-Russian Phytopathology Research Institute, Moscow, Russia*)

4. *Agrilus planipennis* is present just 17 km away from Kazakhstan



The region of the survey in 2024 in the Astrakhan Region of Russia where the pest was found (a red symbol) and recent literature records in Russia (2018–2022, blue symbols).

In May 2024, Alexander Gubin (Donetsk Botanical Garden) conducted an entomological expedition to search for *Agrilus planipennis* in the Republic of Kalmykia and the Astrakhan Region, both in Russia. As a result, **the Emerald ash borer was first recorded in the south of the Astrakhan Region of Russia on 22 May 2024** (Krasnoyarsk district, Zaykovka village, 46°35'01" N, 48°18'01" E). The distance from the nearest earlier reported point of detection of the species in the region (13 August 2020, Yenotaevsky district, Nikolskoye village; Volkovitsh et al. [2021][1]) is 195 km.

Therefore, it can be concluded that *A. planipennis* has penetrated into the delta of the Volga River. Furthermore, this record signifies the extension of the species range **to the vicinity of the border with the Republic of Kazakhstan**, which is just **17 km** away from the new record in Zaykovka village. The Emerald ash borer was recorded on *Fraxinus pennsylvanica* trees growing near a highway on the left bank of the Akhtuba River. In total, 10 infested

[1] Volkovitsh MG, Bieńkowski AO, Orlova-Bienkowskaja MJ [2021] Emerald ash borer approaches the borders of the European Union and Kazakhstan and is confirmed to infest European ash. *Forests*, 12, 691. https://doi.org/10.3390/f12060691

trees were found. The damaged trees showed clear signs of weakening, a sparse crown, exit holes on the trunks and numerous larval galleries under the bark. One adult was collected, and identification was confirmed based on morphological characters. Adult specimens were also observed engaging in maturation feeding on the leaves of ash trees. Notably, the pest was absent on *Fraxinus excelsior* trees growing nearby.

Damaged *Fraxinus pennsylvanica* trees and exit hole of *A. planipennis* in the Astrakhan' Region of Russia (photos by A. Gubin).

Additionally, from late May until the end of June 2024, a few entomological surveys of ash trees were conducted in western and southern regions of the Republic of Kazakhstan (Atyrau, Aktobe, Kyzylorda, Turkestan, Zhambyl, and Almaty Regions) to assess the potential arrival of *A. planipennis* in these areas. The surveys revealed that ash trees are present only in large settlements, where they are commonly and extensively used in landscaping. Ash trees are absent outside urban areas, along roads and fields. ***Agrilus planipennis* was not found in the surveyed areas of Kazakhstan.** Given the considerable distances between cities (approximately 280 km in a straight line), it us believed that natural spread of *A. planipennis* from the Astrakhan' Region of Russia into Kazakhstan is unlikely. However, if inadvertently introduced (e.g. with vehicles), the pest can potentially enter Kazakhstan and establish in urban communities where hosts are available.

The work of Alexander Gubin was conducted within the framework of the state project FREG-2023-0001 'Invasions of alien organisms into anthropogenic and natural ecosystems of Donbass: development trends, environmental consequences, forecast'(Registration number 123101300197-6).

(prepared by **Alexander Gubin**, *Donetsk Botanical Garden*)

5. Search for *Agrilus planipennis* in Kazakhstan in 2024: Atyrau, Uralsk and their environs

In August 2024, in the framework of a biosecurity pilot project, ash trees (*Fraxinus* spp.) were surveyed in the Republic of Kazakhstan in the cities Atyrau and Uralsk (also called Oral) and in nearby settlements in order to check for the presence of *A. planipennis*.

On 5–9 August, areas planted with ash trees were examined in Atyrau (Atyrau Region; 47°07'00" N, 51°53'00" E) (Fig. 1 A–C). This city is located 350 km from Astrakhan (Russia), the region where *A. planipennis* was first recorded in 2020[2,3]. In Atyrau, mainly recently planted ash trees were present. No ash trees were found along intercity roads. Outside Atyrau, the valley of the left bank of the Ural River in the village of Akzhar (47°12'51" N, 51°56'36" E) was also visited, where trees of *Fraxinus* spp. were found. In total, in these two localities 440 ash trees were examined.

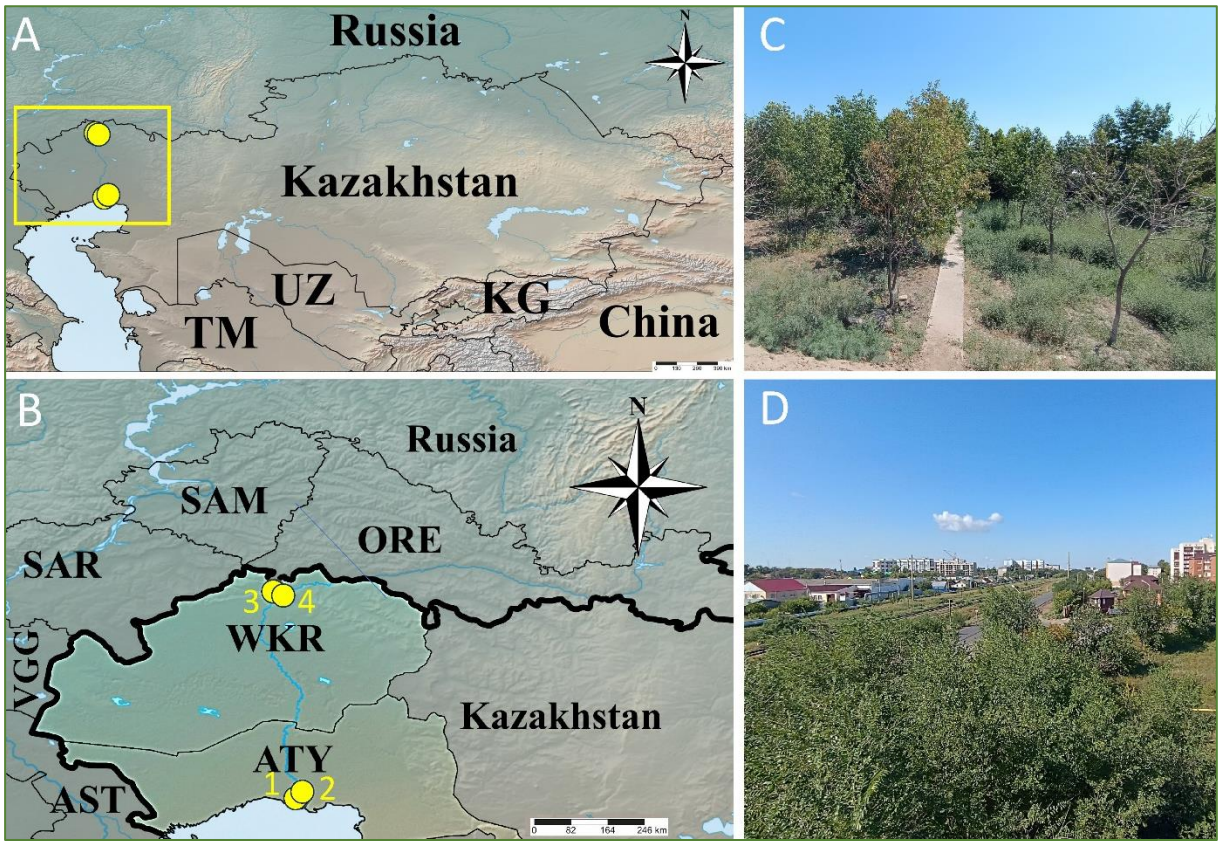


Figure 1. Studied localities in Kazakhstan (A, B) and a general view to *Fraxinus* spp. plantings in Atyrau (C) and Uralsk (next to the train station) (D). Abbreviation of the countries (TM – Turkmenistan, UZ – Uzbekistan, KG – Kyrgyzstan), the regions in Russia (AST – Astrakhan Region, VGG – Volgograd Region, SAR – Saratov Region, SAM – Samara Region, ORE – Orenburg Region), and in Kazakhstan (ATY – Atyrau Region, WKR – West-Kazakhstan Region). Points: 1 – Atyrau, 2 – Akzhar, 3 – Uralsk, 4 – Zherom. Photos by V.V. Rudoi.

[2] Volkovitsh MG, Bienkowski AO, Orlova-Bienkowskaja MJ (2021) Emerald ash borer approaches the borders of the European Union and Kazakhstan and is confirmed to infest European ash. *Forests* 12, 691. https://doi.org/10.3390/f12060691

[3] Martynov VV, Nikulina TV, Shokhin IV, Terskov EN (2022) Contributions to fauna of invasive insects of Astrakhan Region and Republic of Kalmykia. *Field Biologist Journal* 4(4): 329–343. (in Russian). https://doi.org/10.52575/2712-9047-2022-4-4-329-343

On 9–12 August, *Fraxinus* spp. plantations were examined in Uralsk (West Kazakhstan Region; 51°14'02" N, 51°22'02" E) (Fig. 1 A, B). This city is situated 425 km from Saratov (Russia), 280 km from Samara (Russia) and 286 km from Orenburg (Russia). In these regions, ash plantations were earlier examined for the presence of *A. planipennis* but the species was not detected[3]. In Uralsk, 2300 *Fraxinus* spp. trees were inspected. Particular attention was paid to the trees in areas adjacent to the bus and railway stations (Fig. 1D). In the vicinity of Uralsk, 56 ash trees were also examined in the Chagan River valley in the Zherom residential area (51°16'06" N, 51°23'01" E).

During the inspection of ash plantations in the listed localities in Kazakhstan in August 2024, **neither characteristic damage signs nor *A. planipennis* beetle and/or larvae were found**.

The study was conducted with the partial support of the Russian Science Foundation (grant no. 22-16-00075).

(prepared by **Valentin Rudoi**, *Altai State University, Barnaul, Russia, and* **Natalia Kirichenko**, *Sukachev Institute of Forest, SB RAS and All-Russian Plant Quarantine Center, Krasnoyarsk, Russia*)

6. EABRACE: A new project focused on *Agrilus planipennis*

Iryna Matsiakh (Swedish University of Agricultural Sciences) obtained financial support from the Svenska Institute (https://si.se/) to study the invasion of *A. planipennis*. The project **'EABRACE: Emerald ash borer invasion: exploring spread patterns and xylobiont beetle biodiversity dynamics for strategic conservation measures'** will run for two years – from November 2024 to November 2026.

The aim of the project is to monitor the spread of *A. planipennis* towards the EU border and to assess the dynamics of the xylobiont beetles' biodiversity during the invasion of *A. planipennis*.

The research conducted within the EABRACE project will enhance our understanding of the spread of the emerald ash borer in Europe and help to develop effective monitoring tools. This effort aligns with the work of our Network of experts, as the Network's objectives include exchange of data on monitoring, gain insights into the current distribution and spread of *A. planipennis* in the EPPO region, and development of effective trapping and management options for the EU quarantine pest.

Damaged *Fraxinus* sp. trees in Kyiv, Ukraine in June 2024 (photos by I. Matsiakh).

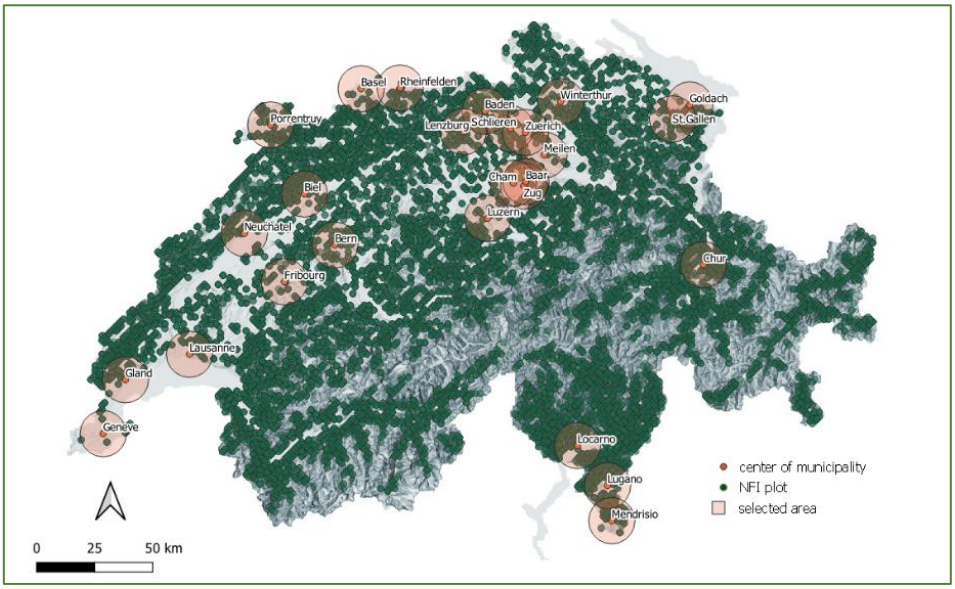
The inclusion of **Poland, Sweden, Ukraine, and Lithuania** in the formal partnership in this project brings together countries with diverse geographic, economic, and ecological contexts, which enriches the partnership's efforts to address the threat of the Emerald ash borer in the Baltic Sea region. The initiative's partnership is a cooperative network comprising experienced scientists including entomologists, and experts in forest damage. It will focus on practical tools for biodiversity protection against quarantine invasive species in the Baltic Sea region.

EABRACE offers excellent opportunities to cooperate with the NPPOs of participating countries. The study of border forests, which are particularly vulnerable to invasive pests, will prioritize opportunities for all applicants to be involved in designing and testing effective and reliable methods for early detection of pests. By assessing insect diversity and population dynamics and comparing forest conditions along the borders of Baltic Sea countries under similar environmental conditions, an enhancement of forest biodiversity knowledge will be achieved. The primary challenge lies in assessing the current situation regarding the presence of *A. planipennis* by continuous monitoring and coordinating efforts among the international research community to mitigate its further spread.

(prepared by **Iryna Matsiakh**, *Swedish University of Agricultural Sciences, Sweden*)

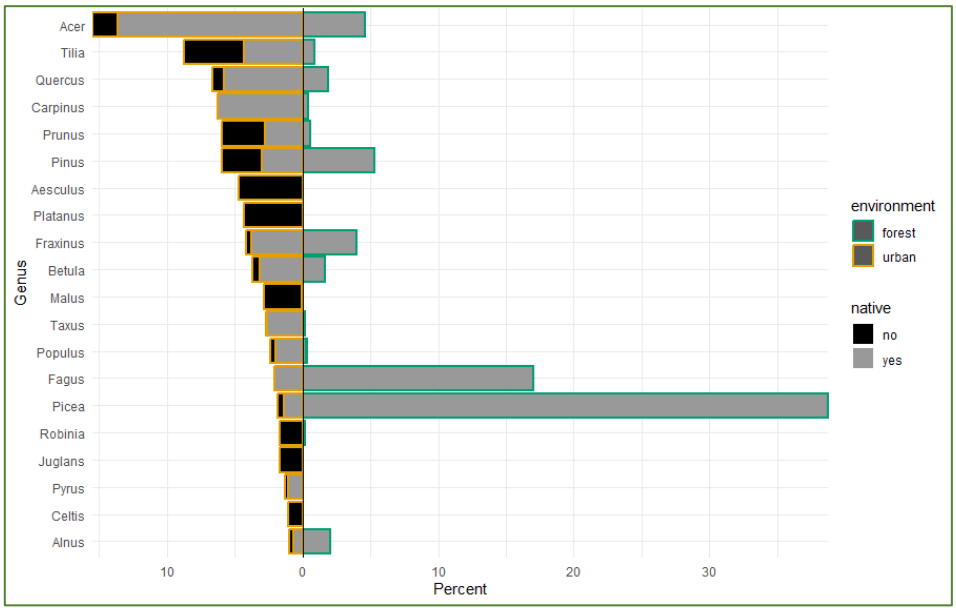
7. New research: Urban ash trees as monitoring opportunity for *Agrilus planipennis*

Invasive forest pests often first arrive in urban or peri-urban environments and spread from there into surrounding forests. To investigate which tree species invasive forest pests encounter once they arrive, Benno Augustinus (Swiss Federal Research Institute, WSL) and colleagues (Meinrad Abegg, Valentin Queloz and Eckehard Brockerhoff) collected 26 Swiss urban tree inventories, and compared the tree species composition in cities with the tree species composition in surrounding forests. They found that urban environments have a vastly higher species richness than surrounding forests (>1300 vs. 76 species in total).



Locations of urban and forest tree inventories (NFI is Swiss National Forest Inventory) (Augustinus et al., 2024).

While urban environments are dominated by few woody plant genera, this trend is much more pronounced in nearby forests. Tree genera in forests close to urban environments were almost always represented in the urban environment. For recommended forest quarantine pests (pests on the EPPO A1 and A2 Lists that would find hosts in Swiss forests), urban environments provided a higher percentage of hosts. More importantly, urban environments were characterized by hosts for different pests than forest environments. This means that invasive pests with active host-searching behaviour would have a greater choice of hosts when arriving at the interface of the urban and the surrounding forest due to the extremely high tree species diversity in urban environments. Consequently, this study can be seen as a call to join forces between forest health professionals and managers of urban green: both would benefit from as early as possible detections of invasive forest pests.



Percentage of trees per genera in urban tree inventories (left) and the Swiss National Forest Inventory (NFI) (right) (Augustinus et al., 2024).

For the Emerald ash borer, there are hosts in every city investigated: 4.14% of the total number of all trees in the urban areas were *Fraxinus* trees vs. 3.96% in the surrounding forests. Roughly 2.2% of the ash trees planted in urban environments belong to North American species (mostly *Fraxinus americana* and *Fraxinus pennsylvanica*). These species are now planted more often in urban environments in Europe because they are considered somewhat more resistant against ash dieback. However, they are preferred hosts of *A. planipennis* and therefore they are prime locations for monitoring for this destructive beetle in Europe.

Read more in the (open access) publication in Landscape and Urban Planning:

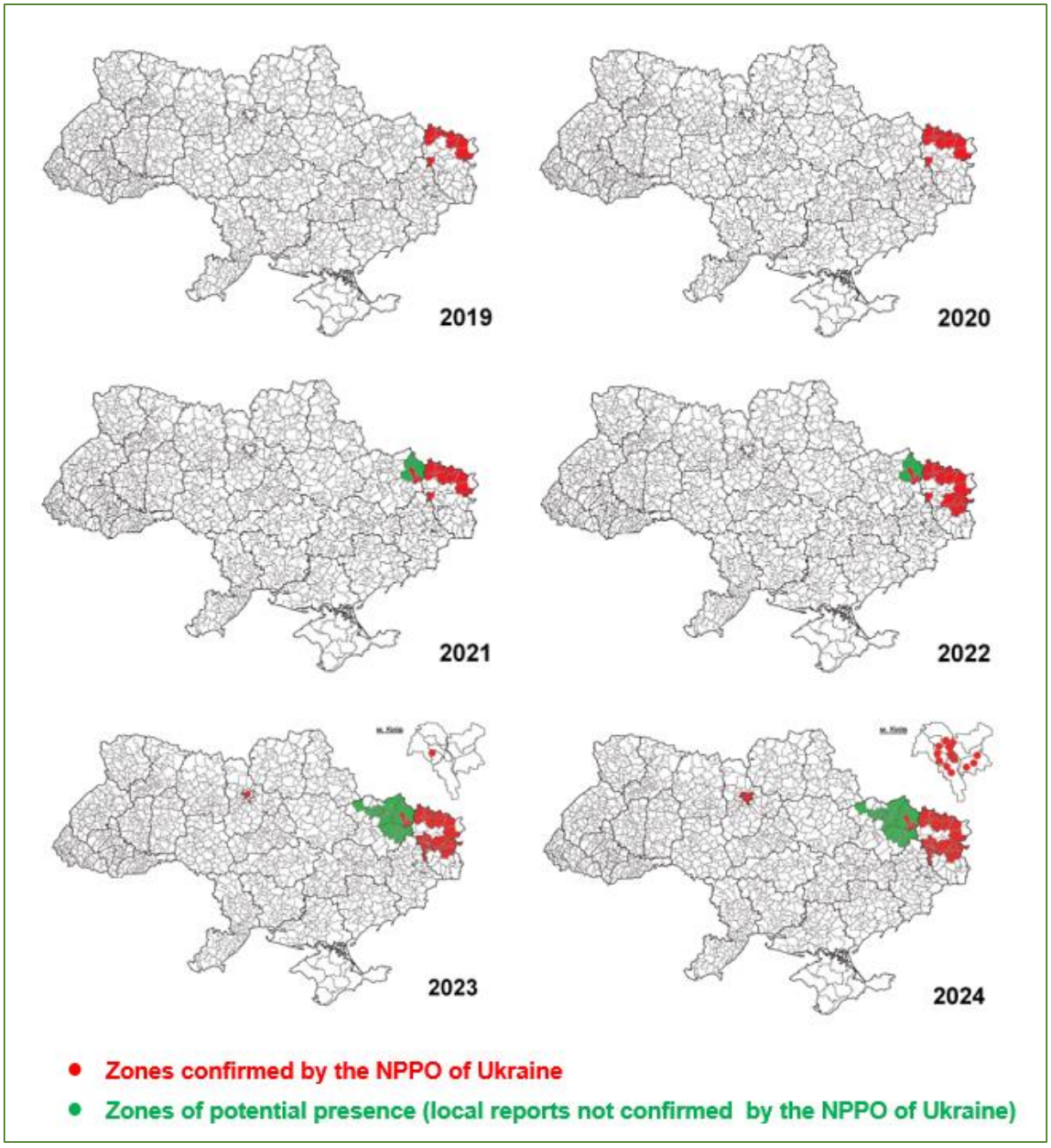
Augustinus BA, Abegg M, Queloz V, Brockerhoff EG (2024) Higher tree species richness and diversity in urban areas than in forests: Implications for host availability for invasive tree pests and pathogens. *Landscape and Urban Planning* 250, 105144, https://doi.org/10.1016/j.landurbplan.2024.105144

(prepared by **Benno A. Augustinus,** Swiss Federal Research Institute, Switzerland)

8. A dynamic map of distribution of *Agrilus planipennis* in Ukraine: an update

In August 2024, the Ukrainian State Specialized Forest Protection Enterprise DSLP "Kharkivlisozakhist" updated a dynamic map showing the change of the range of *A. planipennis* in Ukraine in 2024 (https://lisozahyst.at.ua/index/agrilus-planipennis/0-17).

The map shows now not only districts where the presence of the pest is confirmed by the NPPO, but also districts with local reports that are not yet confirmed by the NPPO. For 2023 and 2024, an insert for the capital city of Kyiv is added.



The dynamics of the invasive range of *A. planipennis* in Ukraine in 2019–2024 (Courtesy: The Ukrainian State Specialized Forest Protection Enterprise DSLP "Kharkivlisozakhist"; units: administrative districts; for 2023 and 2024, an insert for Kyiv is added. https://lisozahyst.at.ua/index/agrilus-planipennis/0-17; accessed on 26 August 2024).

9. The first EPPO webinar on *Agrilus planipennis*: 5 December 2024

In October 2023, the EPPO Panel on Quarantine Pests for Forestry agreed to organize, in the framework of this Network, the first half-day online workshop in a form of webinar. The webinar will focus on the current distribution of *A. planipennis* in the EPPO region, control measures undertaken by the EPPO countries in which this pest is already present, and preparedness of other EPPO counties to possible arrival of this pest in their country in the near future. The webinar is planned for **half a day on 5 December 2024**. For the first webinar, EPPO invited presentations from NPPOs of the countries in which *A. planipennis* is present (the Russian Federation and Ukraine) and the countries located near the current limits of the distribution of *A. planipennis* in the EPPO region. By September 2024, participation was confirmed by the Russian Federation, Belarus, Finland, Estonia, and Latvia).

The target groups of the webinar will be NPPOs, contingency planning specialists, pest risk management experts and decision making authorities; however it will be open to all interested participants. The working language of the webinar will be English. We expect a 15-min presentation and plan 5 min for questions/answers per country followed by a general discussion at the end of the webinar.

The programme and all details will be published later on the webpage of the Network and sent to all the members of the in the Network (subscribers of the in the Newsletters).

10. A review of biological control of *Agrilus planipennis* in Canada

A new review paper is published on biological control of *Agrilus planipennis* in Canada.

Biological control is an important component of integrated and ecological pest management programmes. Its importance continues to increase as plant protection is challenged with climate change, invasive species, pesticide resistance, de-registration of pesticide active ingredients, and increasing consumer demands for sustainably produced food and fibre. Canada continues to be a world leader in biological control research, development of biological control policy, and implementation of biological control programmes.

CABi just published the sixth volume of a series of books reporting on the status of biological control research and on biological control programmes employed in Canada (https://www.cabidigitallibrary.org/doi/book/10.1079/9781800623279.0000). The volume features 58 case study chapters that describe the research and progress in implementation of biological control for pests including insects, mites, weeds, and plant pathogens. Topics important to biological control, including policy, emerging technologies, biological control in urban landscapes and future targets for biological control are reviewed. Although the volume focusses on the Canadian biological control experience, the chapters will be of interest to a global audience of researchers and students of biological control, risk assessment, ecology, and pest management. The book offers a detailed analysis of the state-of-the-art of biological control in Canada and explains how biological control research is responding to challenges including climate change and invasive alien species. It gives insights in effective risk assessment and pest management. It is a valuable resource for students and researchers of pest management and biological control, and for practitioners and policy-makers needing analysis of the practical implications of using this approach.

PDFs of individual chapters and the whole book are freely available online: (https://www.cabidigitallibrary.org/doi/book/10.1079/9781800623279.0000).

The chapter on *Agrilus planipennis*:

MacQuarrie CJK, Ryall K, Jones G, Martel V, Sweeney J, Gaudon JM, Smith SM (2024) *Agrilus planipennis* Fairmaire, Emerald Ash Borer / Agrile du frêne (Coleoptera:

Buprestidae). In: Vankosky MA and Martel V (Eds.). Biological Control Programmes in Canada, 2013–2023. CABI Books, ISBN: 978-1-80062-325-5600. P. 88–102. https://www.cabidigitallibrary.org/doi/10.1079/9781800623279.0009

Abstract of the chapter: Emerald ash borer, *Agrilus planipennis*, was introduced to North America in the 1990s; it attacks and can kill host trees, including black ash, *Fraxinus nigra*, green ash, *Fraxinus pennsylvanica*, and white ash, *Fraxinus americana*, in a relatively short period of time. Monitoring is required for early detection; once detected, chemical and mechanical control options are available. Biological control is also an option and three parasitoids have been released in Canada: *Tetrastichus planipennisi*, *Spathius galinae* and *Oobius agrili*. Post-release monitoring has shown that *T. planipennisi* is established and has spread from its original release sites and that *O. agrili* has established at some release sites. The impact of the imported parasitoids is currently unknown. The chapter also reviews efforts to use native natural enemies for conservation and augmentative biological control.

11. New MSc thesis using *Agrilus planipennis* as a model

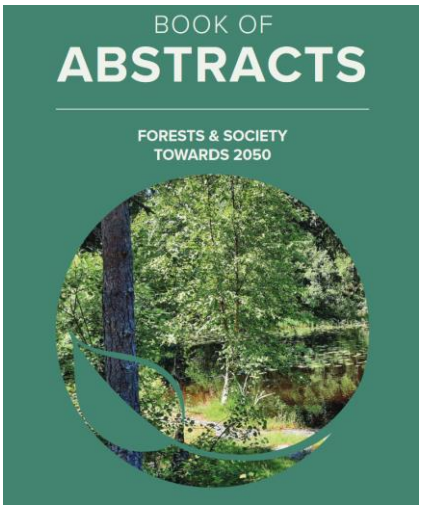
Recently, a MSc thesis, in which *A. planipennis* was used as a model, was prepared and publicly presented in Canada the USA:

Abby D (2004). Stewarding floodplain forests in a changing climate: assisted migration and spring tree phenology in an urban climate change experiment and monitoring for floodplain tree regeneration. A thesis submitted to the faculty of the University of Minnesota in partial fulfillment of the requirements for the degree of Master of Science University of Minnesota ProQuest Dissertations & Theses, 2024. 31337343. Available at: https://www.proquest.com/openview/b77dad94943b6995aa02271e7badff17/1?pq-origsite=gscholar&cbl=18750&diss=y

Original abstract: As climate change continues to affect the world's ecosystems, land managers seek to determine the best actions to maintain or adapt their forests to the current and projected climatic shifts. Floodplain forests are an ecosystem of interest for mitigating the effects of climate change, primarily through increased critical habitat and biodiversity, reduced nutrient input in riverine systems, and carbon sequestration. These unique forests are critical in climate action plans, but they are also facing increasing stressors due to severe weather events, nonnative species, and landscape alterations, resulting in the need to support these forests through a changing climate. Chapter 1 of this thesis focuses on the spring phenology of trees planted in an urban floodplain forest climate change experiment in Saint Paul, MN. Specifically, we examined the bud break and leaf out of trees in the Adaptive Silviculture for Climate Change (ASCC) project to determine if resident tree species, southern tree species, and populations of trees from USDA Hardiness Zones 4, 5, and 6 differed in the timing of these phenophases. We found that novel southern tree species who were moved northward via assisted species migration and range expansion leafed out significantly later than all other species. We did not find many significant differences among trees within the same species who were sourced from different hardiness zones, with the exception of eastern cottonwood (*Populus deltoides*) trees from hardiness zone 5 breaking bud and leafing out later than those from zone 4. Our findings suggest that the movement of species northward from outside of their natural range may have implications for their successful growth and survival due to the potentially altered timing in key leaf phenological

events and subsequent mismatch with the growing season at the site of relocation. Chapter 2 is focused on a collaboration with Prairie Island Indian Community to monitor floodplain forests to support the Tribe's reforestation efforts. The overarching goal of monitoring was to support healthy and resilient floodplain forests through providing information that will assist in identifying successful tree planting locations for diverse and climate-resilient tree species derived from the 'Resilience' management approach of the ASCC project. Planting of diverse tree species in canopy openings was desired to maintain a forest canopy and other ecosystem services after the removal of green ash (*Fraxinus pennsylvanica*) trees impacted by the nonnative insect emerald ash borer (***Agrilus planipennis***). We developed a monitoring plan to sample the understory vegetation and overstory light levels at sites deemed a priority for planting or for management actions to reduce reed canary grass (*Phalaris arundinacea*) abundance. While specific results and management recommendations will not be shared in this published thesis, we assessed the potential success of enrichment plantings as well as the impacts of reed canary grass in 19 canopy gaps. These included gaps where ash were harvested, where ash will be harvested, and pre-existing canopy gaps. We identified suitable sites and locations within gaps to plant a diverse set of floodplain tree species that will create and maintain forest canopy, provide habitat, and potentially increase resilience to the impacts of climate change.

12. *Agrilus planipennis* in talks presented at the IUFRO 2024 World Congress



The International Union of Forest Research Organizations (IUFRO) World Congress is one of the largest global forest events, held every five years since 1893.

The congress gives a unique opportunity to gather worldwide leading scientists and top leaders to contribute and co-create for a sustainable future within forestry, climate and society.

The 26th IUFRO World Congress was held in Stockholm, Sweden, on 23–29 June 2024. *Forests & Society Towards 2050* was the theme of the congress.

Book of abstracts of the Congress contains 3320 abstracts that were presented orally or as posters during the World Congress. It is available online at https://iufro2024.com/book-of-abstracts/.

At least four presentations focused on *A. planipennis*:

– Davydenko K: Biodiversity conservation of ash forest in the face of an alien species invasions;

– Hudgins EJ: Forecasting invasion patterns to minimize the impacts of invasive forest insects and pathogens at large scales;

– Peterson DL, Tolio B, Sherwood P, Liziniewicz M, Cleary M: Performance of emerald ash borer (*Agrilus planipennis*) on three European *Fraxinus* species;

– Schulz A, Havill N, Thomas K, Aoki C, Ayres M, Gandhi K, Herms D, Hoover A, Hufbauer R, Liebhold A, Maco S, Marsico T, Raffa K, Tobin P, Uden D, Mech A: i-Tree Pest Predictor: a "crystal ball" to foretell future forest invaders?

Full references and abstracts of these presentations are given at the end of this Newsletter.

13. New publications on *Agrilus planipennis*

After the release of the previous Newsletter, information on **18 new publications** on *A. planipennis* and on other relevant species has been received (12 journal papers, 5 conference abstract, and a review book chapter; in addition to the data on a new thesis - see Section 11).

The range of topics is very wide and includes the following:

– *A. planipennis* in Russia (Baranchikov & Ponomarev, 2024; Kholenko et al., 2024; Sergeeva, 2023; Smirnova, 2024);
– Performance of *A. planipennis* on three European *Fraxinus* species (Peterson et al., 2024);
– Monitoring for detection of *A. planipennis* in Belarus (Sinchuk, 2024);
– Design of an eDNA sampling method for detection of *A. planipennis* (Kyle et al., 2024);
– Buprestidae monitoring in Europe (Kuhn et al., 2024);
– Links between tree species richness and invasive tree pests in urban areas and forests (Augustinus et al., 2024);
– No evidence for pronounced mate-finding Allee effects in A. planipennis (Caouette et al., 2024;
– Biodiversity conservation of ash forest (Davydenko, 2024);
– Ash dieback disease in Britain (Combes et al., 2024);
– Long-term effects of a tornado (Culley et al., 2024);
– Biological control of *A. planipennis* in Canada (MacQuarrie et al., 2024);
– Morphological indicators of ash-keys of healthy and weakened ash trees (Marchenko & Plotnikova, 2024);
– *A. planipennis* and endophyte community of *Fraxinus bungeana* (Wang et al., 2024);
– Development of a tool to predict next high-impact insect invaders (Schulz et al., 2024);
– Forecasting invasion patterns (Hudgins, 2024).

A reference list and an abstract of each of these publications are given at the end of this Newsletter. Most of the papers are available as full text via the provided links; others may be made available on request to the authors.

14. A closing remark

That is about all for the 6th issue of the Newsletter. The EPPO Secretariat looks forward to receiving your notes, news and publications, links to recently published papers and conference abstracts by you and your colleagues, any other relevant pieces of information and announcements on Emerald ash borer so the Network can distribute them via these Newsletters.

Please inform your colleagues in your country and around the world about the Newsletter. The email for correspondence is dm@eppo.int (Dmitrii Musolin).

15. References received (September 2024; with original abstracts)

Augustinus BA, Abegg M, Queloz V, Brockerhoff EG (2024) Higher tree species richness and diversity in urban areas than in forests: Implications for host availability for invasive tree pests and pathogens. *Landscape and Urban Planning* 250, 105144, https://doi.org/10.1016/j.landurbplan.2024.105144.

> Urban and forest trees provide valuable ecosystem services. However, they are increasingly threatened by invasive forest pests and pathogens. Trees in urban areas are often the first potential hosts non-native tree-feeding insects and tree pathogens ("pests") encounter after introduction in a novel region. If the trees encountered are suitable hosts, these pests can establish and become invasive – eventually also in surrounding forests. Here, we compared tree species and genus composition between urban areas and surrounding forests and examined the implications for host availability for forest pests and potential effects on invasibility. We compiled and standardised 26 urban tree inventories, containing ~ 500.000 individual trees. We used multivariate analyses to compare urban tree composition with forest tree composition from forests surrounding each municipality (10 km radius), derived from the Swiss National Forest Inventory. With > 1300 different tree species, species richness of urban trees was 17 times higher than species richness in surrounding forests. Linear models and multivariate analyses revealed that host availability for forest quarantine pests is significantly higher in urban areas than in forests, with large differences in host suitability for different quarantine pests between urban and forest tree assemblages. This indicates that differences in species composition in urban and forest trees can result in increased host availability, possibly facilitating the establishment of quarantine forest pests.

Baranchikov YN, Ponomarev VI (2024) Emerald ash borer (*Agrilus planipennis* Fairmaire, 1888) has reached the Caucasus. *Industrial Botany* 24 (1): 69–72. DOI:10.5281/zenodo.10845636

> Emerald ash borer (*Agrilus planipennis* Fairmaire, 1888) was found on common and Pennsylvania ash trees in the streets of Pyatigorsk and in forest belts in its immediate vicinity. Judging by the number of infested ash trees with exit holes in the lower part of trunks, foci of mass reproduction of the pest have been active in the city for at least 5 years.

Caouette AP, Rutledge CE, Heard SB, Pureswaran DS (2024) No evidence for pronounced mate-finding Allee effects in the emerald ash borer (*Agrilus planipennis* Fairmaire). *NeoBiota* 95: 165–179. https://doi.org/10.3897/neobiota.95.127287

Allee effects are density-dependent barriers that can impact species establishment and population growth, such as through reduced mating success at low population densities. The emerald ash borer, *Agrilus planipennis* Fairmaire, has been extremely successful at rapidly expanding its North American range. The impact of mate-finding Allee effects (an important type of component Allee effect) early in the invasion period of the emerald ash borer remains unknown. We measured mating success in females as a function of beetle abundance in Halifax, Canada, where the emerald ash borer was recently discovered, and in Connecticut USA, where it has been established for over a decade. We measured relative population abundance and sampled beetles using different strategies. In Halifax, we placed clusters of prism traps along an invasion gradient of emerald ash borer abundance, and in Connecticut, we collected beetles from foraging Cerceris fumipennis females. We dissected female reproductive tracts to measure mating success. We fit a linear regression to the mating success of females as a function of beetle abundance. We found that emerald ash borer did not present a pronounced mate-finding Allee effect as there was no positive relationship between female mating success and abundance. Lack of pronounced component Allee effects that impede population growth may explain rapid range expansion in species that are highly invasive, such as the emerald ash borer.

Combes M, Webber J, Boddy L (2024) Current understanding and future prospects for ash dieback disease with a focus on Britain. *Forestry: An International Journal of Forest Research* cpae040. https://doi.org/10.1093/forestry/cpae040

Hymenoscyphus fraxineus is an introduced ascomycete fungus which causes ash dieback and has resulted in widespread mortality of ash throughout Europe. Although *H. fraxineus* has been present on the continent for at least four decades, it was not identified until 2006. The first record of the pathogen in Britain came in 2012 although it was probably present a decade earlier. The most common host European ash (*Fraxinus excelsior* L.) is economically and ecologically important to Britain where the cost of ash dieback is estimated at billions of pounds. The impact of ash dieback has stimulated a major research response which we review with the aim of providing up-to-date information relevant to Britain and identifying knowledge gaps where research would contribute to improved disease mitigation. *Hymenoscyphus fraxineus* is an outcrossing fungus with high genotypic diversity; ascospores produced via sexual reproduction are critical to aerial dispersal and infection. Temperature, moisture, and ground cover influence pathogen fruit body development, the timing of ascospore release, and extent of ascospore germination; they also interact together to affect the likelihood of infection. In addition, stand characteristics, including tree density, tree height, and landscape fragmentation, affect disease dynamics with increased disease severity on moist sites with high ash density. Efforts at finding natural resistance in ash have identified genetic markers associated with disease tolerance, and gene expression analysis is providing insights into the basis of that resistance. Mainland European findings indicate that ash dieback makes trees more vulnerable to other pathogens, whilst endophytes in the ash phyllosphere can suppress infection by *H. fraxineus*. Possible tools for long-term control of ash dieback include (1) deployment of resistant ash, (2) quantitatively informed management practices based on microclimate models and better understanding of the pathogen life cycle, and (3) manipulation of biocontrol agents from the ash microbiome or pathogen mycoviruses.

Culley TM, Bécus MS, Cameron GN (2024) Long-term effects of a tornado: Impacts on woody native vegetation and invasive Amur honeysuckle (*Lonicera maackii*) in an urban forest. *Ecology and Evolution*, 14, e10890. https://doi.org/10.1002/ece3.10890

As tornados become increasingly common with global climate change, recovery of the woody vegetation in temperate forests is imperative to maintain an intact ecosystem. In many urbanized landscapes, invasive species are also increasing and could interfere with natural recovery from environmental disturbance. We quantified the impact and 17-year recovery from a major tornado in a temperate deciduous forest. We used vegetational surveys in southwestern Ohio at the Harris M. Benedict Nature Preserve, where approximately a third of this site was damaged by a tornado in 1999. Plots were established in the tornado-damaged area and the nearby undisturbed forest to examine forest recovery of trees/saplings, shrubs and vines, and tree seedlings during 2003, 2006, 2010, and 2016/2017. The number of tree saplings, shrubs, and vines increased immediately after the tornado, but then declined by 2010, relative to the undisturbed forest. Forest tree recruitment was lower in tornado-damaged sites with fewer tree seedlings, but more saplings. Tree diversity was also affected by *Agrilus planipennis* (Emerald Ash borer) which targeted native ash trees within this time period. Despite an initial increase in shrubs and vines in the damaged area, the diversity and density of shrubs approached equality in both sites by 2016. Most shrubs in both sites were the invasive *Lonicera maackii* (Amur honeysuckle). In tornado sites, honeysuckle thinned out over time, leaving larger shrubs with greater mean basal diameter compared to the undisturbed forest. Other woody invasive species were also more prevalent in the damaged area, but increased in number in both locations by 2017. The forest has the capability to begin to recover from the initial tornado, but its future composition may differ from its initial trajectory due to invasive species, loss of ash trees, and anthropogenic impacts within the urban landscape.

Davydenko K (2024) Biodiversity conservation of ash forest in the face of an alien species invasions. In: Forests & Society towards 2050: Book of Abstracts of the 26th IUFRO World Congress in Stockholm, Sweden, 23–29 June 2024. P. 2147. https://iufro2024.com/book-of-abstracts/

Due to global change and human activity, forests are exposed to unprecedented threats from non-native pests and pathogens. The European ash (*Fraxinus excelsior*) is a commercially, ecologically and culturally important tree species in woodland and urban greeneries. Currently, irreversible economic and ecological losses of ash (*Fraxinus*) species related to ash dieback fungus (*Hymenoscyphus fraxineus*) in Europe and the emerald ash borer (*Agrilus planipennis*) in North America, both of which are indigenous to Asia. Recently, both of these invasive species were found in Ukraine, where they were overlapping in a forest area on the same trees of *Fraxinus exselsior* and *F. pennsylvanica*. Therefore, Fraxinus species, particularly *F. excelsior* and its associated species in Europe will be at a high risk for decline or extinction. Moreover, emerald ash borer-associated mycobiome could play a crucial role in ash mortality and structural failure of wood, at the same time beetles act as vector aggressive pathogens and pioneer wood degraders which contribute significantly to the tree mortality and loss of wood integrity in ash trees. Therefore, both invasive species may induce shifts in biodiversity in ash forests, but the direction of these shifts largely depends on tree resistance and fungal communities vectored by emerald ash borer. There are only a few fungal species, belonging to the phylum Basidiomycota have the capacity to degrade lignified polysaccharides, therefore, the study of the effect of new wood decomposers on local fungi is crucial. Most of the research on emerald ash borer has focused on its biology and management, and only a few studies have been published with a focus on the fungal community associated with the beetles in North America. However, tree-killing pathogens associated with xylophagous beetles represent one

of the most significant contributors to forest health deterioration and may cause large-scale forest disturbances followed by loss of biomass and carbon storage, and degradation of ecosystem services Identifying the fungal community associated with emerald ash borer helps in understanding the importance these fungal species on European ash and whether new-coming species impact on local biodiversity before invasion spread through Europe.

Hudgins EJ (2024) Forecasting invasion patterns to minimize the impacts of invasive forest insects and pathogens at large scales. In: Forests & Society towards 2050: Book of Abstracts of the 26th IUFRO World Congress in Stockholm, Sweden, 23–29 June 2024. P. 3508. https://iufro2024.com/book-of-abstracts/

Urban and forest trees are crucial to future global wellbeing, but are at high risk of mortality from invasive insects and pathogens. To plan effective mitigation, managers must know which tree species in which communities will be at the greatest risk, as well as the likely impact of possible management intervention options. This presentation will cover recent projects relating to forest health in the face of forest insect and pathogen invasions and climate change. Firstly, I will discuss a recent optimal control framework to determine the ideal management strategy for urban tree persistence in the face of emerald ash borer (*Agrilus planipennis*). We found that the best management strategy always included a combination of site-focused (biological control) and spread-focused (quarantine) management measures, and that failing to use a mixed strategy could result in losses of upwards of one million street trees in the next 30 years. Secondly, I will discuss a game-theoretic approach used to understand the optimal interprovincial transfer of funds to control cross-border spread of a climate-assisted expanding species, the mountain pine beetle (*Dendroctonus ponderosae*), in Western Canada. I will end with more recent work on forecasting native forest tree range shifts in response to climate change, for use to plan effective protection measures via combined forecasts of the impact of invasive pests and pathogens and climate change. We expect that the northward movement of many tree species will facilitate the acquisition of effective protected areas minimizing these dual risks in less costly regions in the future. We highlight the need for ground-truthing of tree distributions to minimize uncertainty in these predictions.

Kholenko MS, Semenishchenkov YA, Panasenko NN (2024) Analysis of invasion and questions of diagnostics of the damage by emerald ash borer of green ash within the secondary area in the Bryansk region. *Industrial Botany* 24 (1): 192–197 (in Russian). https://zenodo.org/records/10845753

In the Bryansk region, intensive spread of *Agrilus planipennis* Fairmaire, 1888 was recorded within the urban area of Bryansk. Artificially created plantings of the North American introduced species *Fraxinus pennsylvanica* Marsh. are most susceptible to damage in urban xero-mesophytic habitats. In ash stands in the river valleys of the urban area and in tree communities with spontaneous dispersal of this species we noted uneven damage caused by *A. planipennis*. The damage index based on the number of exit holes has shown its low effectiveness.

Kuhn A, San Martin G, Hasbroucq S, Beliën T, Bonte J, Bouget C, et al. (2024) Enhancing Buprestidae monitoring in Europe: Trap catches increase with a fluorescent yellow colour but not with the presence of decoys. *PLoS ONE* 19(7): e0307397. https://doi.org/10.1371/journal.pone.0307397

This study investigated the efficacy of various traps differing in colour (green or yellow), presence or absence of decoys (dead *Agrilus planipennis*) or design (commercial MULTz or multifunnel traps, and homemade bottle- or fan-traps) for monitoring European Buprestidae in deciduous forests and pear orchards. Over two years, we collected 2220 samples on a two-week basis from 382 traps across 46 sites in Belgium and France. None of the traps proved effective for monitoring *Agrilus sinuatus* in infested pear orchards (17 specimens captured in 2021, 0 in 2022). The decoys did not affect the catch rates whatever the trap model, colour, buprestid species or sex. The fluorescent yellow traps (MULTz and yellow fan-traps) tended to be more attractive than the green traps (green fan-traps and, to a lower extent, multifunnel green traps). Most *Agrilus* species showed similar patterns in mean trap catches, with the exception of *Agrilus biguttatus*, which had the largest catches in the green multifunnel traps. Finally, we observed a high variation in catch rates between localities: the site explained 64% of the catches variance, while the tree within the site and the type of trap explained only 6–8.5% each. In many sites, we captured very few specimens, despite the abundance of dying mature trees favourable to the development of Buprestidae. For the early detection of non-native Buprestidae, it therefore seems essential to maximise the number of monitoring sites. Due to their cost-effectiveness, lightweight design, and modularity, fan-traps emerged as promising tools for buprestid monitoring. The study's findings extend beyond European fauna, as a preliminary trial in Canada suggested that yellow fan-traps could also improve captures of non-European buprestid species and catch species of interest such as *Agrilus bilineatus* (a species on the EPPO A2 list of pests/pathogens recommended for regulation in the EU).

Kyle KE, Allen MC, Siegert NW, Grabosky J, Lockwood JL (2024) Design of an eDNA sampling method for detection of an endophagous forest pest. *NeoBiota* 95: 149–164. https://doi.org/10.3897/neobiota.95.118267

Invasive wood-boring insects are a major economic and ecological concern worldwide as they impact native woody plant populations. These pest species are increasing in prevalence, with devastating impact, as global trade leads to higher rates of introduction and establishment. The emerald ash borer (*Agrilus planipennis*; EAB) is one such species, which has caused widespread damage across much of the United States and is now spreading across Europe. Non-indigenous woodborers such as EAB are difficult to detect at early stages of invasion, which is when management and eradication efforts are most effective and cost efficient. Environmental DNA (eDNA) surveys have demonstrated power in detecting invasive species when rare in the landscape due to their ability to detect trace amounts of DNA and identify to species. Here, we trialled a novel eDNA method for collecting environmental samples within host trees where invasive pest larvae are feeding, using EAB as a case study. We extracted tree cores approximately 1 cm in length using an increment hammer to assess detectability of eDNA from larvae feeding under the bark. In trees visibly infested with EAB, we observed a seasonal peak in EAB DNA detection probability (~ 64%; towards the end of the growing season), indicating a potential impact of ash tree phenology or EAB phenology on detection. When we trialled the method in a site with ash trees of low or uncertain EAB abundance, we did not record positive EAB eDNA detections. This outcome may have resulted from differing EAB phenology at the northern latitude of this survey site or because larval galleries were less numerous causing EAB DNA to be scarcer within the tree. Our results, however, provide preliminary evidence that increment hammer tree cores can be used to detect eDNA of EAB and, perhaps, other wood-

boring pests. Further work is needed to clarify false negative survey detections at ash trees showing little to no signs or symptoms of infestation, as well as investigating the deposition, transport and persistence dynamics of EAB eDNA within trees.

MacQuarrie CJK, Ryall K, Jones G, Martel V, Sweeney J, Gaudon JM, Smith SM (2024) *Agrilus planipennis* Fairmaire, Emerald Ash Borer / Agrile du frêne (Coleoptera: Buprestidae). In: Vankosky MA and Martel V (Eds.). Biological Control Programmes in Canada, 2013–2023. CABI Books, ISBN: 978-1-80062-325-5600. P. 88–102. https://www.cabidigitallibrary.org/doi/10.1079/9781800623279.0009

Emerald ash borer, *Agrilus planipennis*, was introduced to North America in the 1990s; it attacks and can kill host trees, including black ash, *Fraxinus nigra*, green ash, *Fraxinus pennsylvanica*, and white ash, *Fraxinus americana*, in a relatively short period of time. Monitoring is required for early detection; once detected, chemical and mechanical control options are available. Biological control is also an option and three parasitoids have been released in Canada: *Tetrastichus planipennisi*, *Spathius galinae* and *Oobius agrili*. Post-release monitoring has shown that *T. planipennisi* is established and has spread from its original release sites and that *O. agrili* has established at some release sites. The impact of the imported parasitoids is currently unknown. The chapter also reviews efforts to use native natural enemies for conservation and augmentative biological control.

Marchenko SI, Plotnikova DS (2024) Morphological indicators of ash-keys of healthy and weakened ash trees. *Current Issues of Forest Complex* 65: 115-118 (in Russian). https://elibrary.ru/item.asp?id=67316869

A comparison was made of the morphometric parameters of ash-keys formed in 2023 in healthy and weakened common ash trees (*Fraxinus excelsior* L.). It has been shown that a healthy tree has significantly higher indicators of the length and area of ash-keys. In a weakened tree, the variation in the morphometric parameters of ash-keys (length, width and area) is 2 or more times higher compared to similar indicators in a healthy tree.

Peterson DL, Tolio B, Sherwood P, Liziniewicz M, Cleary M (2024) Performance of emerald ash borer (*Agrilus planipennis*) on three European *Fraxinus* species. In: Forests & Society towards 2050: Book of Abstracts of the 26th IUFRO World Congress in Stockholm, Sweden, 23–29 June 2024. P. 736. https://iufro2024.com/book-of-abstracts/

Emerald ash borer (EAB - *Agrilus planipennis*) is a wood-boring beetle native from East Asia that following its accidental introduction into North America in the early 1990s, caused widespread mortality of millions of ash (*Fraxinus* spp.) trees. In Europe, EAB was first detected in Moscow in 2003 and shown to have the potential to kill native European ash (*F. excelsior*). Since then, the beetle has spread westward and in 2019 it was confirmed in Ukraine. EAB is expected to further spread across Europe due to both natural dispersal and anthropogenic activities. Meanwhile, in the last few decades, large-scale decline and mortality of European ash has resulted because of the invasive fungal pathogen *Hymenoscyphus fraxineus*. The combined effect of these two threats could prove to be highly destructive, posing a serious risk of extinction for European ash. Additionally, other European *Fraxinus* species are affected by ash dieback, including *F. angustifolia* and *F. ornus* to a lesser degree, but may be severely impacted by EAB. In this study, we aimed to: i) investigate the volatile profiles of the three native European *Fraxinus* spp. to explore potential host selection cues for EAB and how it influences EAB performance, and ii) characterize host tree defences involved in the interaction of EAB

and in trees with dual stressors *H. fraxineus* and EAB. The study utilizes saplings of three European ash species: *F. excelsior*, *F. angustifolia* and *F. ornus*. For each species, 10 replicate trees were subjected to one of three treatments i) healthy controls, ii) *H. fraxineus* inoculated, and iii) trees infested with EAB and inoculated with *H. fraxineus*. Volatile organic compound emission will be analysed using gas chromatography-mass spectrometry to examine quantitative and qualitative variation among host volatile profiles in relation to larval survival and development. To look for interspecific differences in host chemical defences, phenolic metabolite extracts from phloem tissue will be analyzed using liquid chromatography–mass spectrometry. The results of this study provide insight into the performance of EAB on European native *Fraxinus* species and the phytochemical traits involved in the interaction between EAB and *H. fraxineus*.

Schulz A, Havill N, Thomas K, Aoki C, Ayres M, Gandhi K, Herms D, Hoover A, Hufbauer R, Liebhold A, Maco S, Marsico T, Raffa K, Tobin P, Uden D, Mech A (2024) i-Tree Pest Predictor: a "crystal ball" to foretell future forest invaders? In: Forests & Society towards 2050: Book of Abstracts of the 26th IUFRO World Congress in Stockholm, Sweden, 23–29 June 2024. P. 1214. https://iufro2024.com/book-of-abstracts/

All around the world, there has been an interest in fostering interconnectedness among continents that has led to rising rates of international biotic interchange that threaten the health and resilience of our global forest ecosystems. Though most result in little ecological impact, introduced insects pose a significant threat to forest ecosystems due to the small, but mighty, proportion that cause significant impacts, such as regional host mortality or functional host extinction. Robust forecasts of insects that are likely to cause substantial impacts have largely remained elusive, though they would improve biosecurity measures and could help prevent the introduction of some potentially catastrophic insect species akin to the emerald ash borer (*Agrilus planipennis*) and hemlock woolly adelgid (*Adelges tsugae*) in eastern North America. For this study, we used data from introduced insects currently established in North American forests to identify drivers of impact and develop models and a tool that can predict impact of insects that have not yet arrived in North America. We considered four submodels – (i) insect traits, (ii) host traits, (iii) host evolutionary history, and (iv) insect evolutionary history – and found that the significant submodels varied by insect host type and breadth but, overall, evolutionary history of the native and novel hosts was significant irrespective of insect host type and breadth. The significant submodels were consolidated into five composite models and built into an i-Tree Pest Predictor tool that can help forecast which non-native insects have a high probability of causing tree mortality on 360+ hardwood and 50+ conifer trees native to North America should they establish. Ultimately, the tool, now available through i-Tree, is being used to develop a risky insects database. Along with sentinel trees and other risk assessments, this tool will help predict the next high-impact insect invaders in North American forests before they invade, which will aid decision-making and help provide directed feedback to improve biosecurity measures. Similar tools can be developed for other countries or continents to better predict the risk that non-native forest insects pose to forest ecosystems around the world.

Sergeeva ES (2023) Invasion of the emerald ash borer in the ecosystems of protected areas in the south-east of the middle part of European Russia. *Scientific Notes of the 'Cape Martyan' Nature Reserve* 14: 343-347 (in Russian). https://www.elibrary.ru/item.asp?id=67256201

> The emerald ash borer, *Agrilus planipennis*, continues to spread throughout the European part of Russia. The paper presents the results of surveys of ash forest stands in the southeast of the middle belt within the protected areas and their environs.

Sinchuk AV (2024) Monitoring tree plantings for the purpose of identifying *Agrilus planipennis* Fairmaire, 1888 in Belarus. *Phytosanitary. Plant Quarantine* S1 (18): 73-74 (in Russian) https://elibrary.ru/item.asp?id=65007700

> Monitoring of natural forest plantations and green spaces was carried out from 2018 to 2023 in the Vitebsk, Mogilev, Minsk, Gomel and Brest regions of Belarus. For this purpose, a visual inspection of the trunks of possible host plants was carried out: *Fraxinus*, *Juglans*, *Pterocarya*, *Ulmus*. Plants with dried branches and peeling bark on the trunk were examined. In the surveyed forest ecosystems and green spaces, *Agrilus planipennis* was not detected in Belarus. However, due to the active spread, it is possible to identify foci of this invasive quarantine phytophage in the Vitebsk, Mogilev and Gomel regions as early as in 2024–2025.

Smirnova SP (2024) Influence of *Agrilus planipennis* on ash plants in Tver. In: Proceedings of the XXII Scientific Conference of Postgraduates, Master's Students and Students: Collection of Conference Papers, Tver, April 01–30, 2024. Tver: Tver State University, 83–84 (in Russian). https://www.elibrary.ru/item.asp?id=67926922

> Abstract is not available

Wang H-L, Chen Z-Z, Koski T-M, Zhang B, Wang X-F, Zhang R-B, Li R-Q, Wang S-X, Zeng J-Y, Li H-P (2024) Emerald ash borer infestation-induced elevated negative correlations and core genera shift in the endophyte community of *Fraxinus bungeana*. *Insects* 15: 534. https://doi.org/10.3390/insects15070534

> Endophytes, prevalent in plants, mediate plant–insect interactions. Nevertheless, our understanding of the key members of endophyte communities involved in inhibiting or assisting EAB infestation remains limited. Employing ITS and 16S rRNA high-throughput sequencing, along with network analysis techniques, we conducted a comprehensive investigation into the reaction of endophytic fungi and bacteria within *F. bungeana* phloem by comparing EAB-infested and uninfected samples. Our findings reveal that EAB infestation significantly impacts the endophytic communities, altering both their diversity and overall structure. Interestingly, both endophytic fungi and bacteria exhibited distinct patterns in response to the infestation. For instance, in the EAB-infested phloem, the fungi abundance remained unchanged, but diversity decreased significantly. Conversely, bacterial abundance increased, without significant diversity changes. The fungi community structure altered significantly, which was not observed in bacteria. The bacterial composition in the infested phloem underwent significant changes, characterized by a substantial decrease in beneficial species abundance, whereas the fungal composition remained largely unaffected. In network analysis, the endophytes in infested phloem exhibited a modular topology, demonstrating greater complexity due to an augmented number of network nodes, elevated negative correlations, and a core genera shift compared to those observed in healthy phloem. Our findings increase understanding of plant–insect–microorganism relationships, crucial for pest control, considering endophytic roles in plant defense.