



CONFERENCE/WORKSHOP ORGANISER'S REPORT

“Preparing Europe for invasion by the beetles emerald ash borer and bronze birch borer, two major tree-killing pests”

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Brief Description of what the conference/workshop was about

The Euphresco project PREPSYS, which organised the conference, focusses on two buprestid beetle pests (*Agilus* species) of trees that have potential to cause severe damage to trees in Europe. These are the emerald ash borer, *Agilus planipennis* (EAB) which originates in Asia and the bronze birch borer, *Agilus anxius* (BBB) which originates in North America. EAB has established in North America and in the European part of Russia and is causing significant damage to native and planted ash trees in both regions, especially in North America.

Although there is increasing information on the two pest species, further work especially from a European perspective is required to both anticipate and to react to incursions of the pests. PREPSYS is addressing key questions and gaps in our knowledge on the pests' biology, control, dispersal and economic/environmental impacts. The main objective is to gather and assimilate knowledge to underpin contingency planning, policy development and policy communication through assessment of the entry, establishment, spread, impact and management of the pests. Emphasis is, in the first instance, on reducing the likelihood of their establishment and, reflecting the high likelihood of spread of EAB into Europe, preparation for managing the pest and minimising its impacts. In summary, the key question is: ‘How can we best prepare for and manage the risks and impacts of EAB and BBB?’ The conference in Vienna was arranged to address this question through involvement of global expertise on both EAB and BBB.

Participation – details of total number of participants, countries they came from, backgrounds (academia, industry, etc.)

The conference was attended by 83 scientists, policy makers and representatives of regional and national plant protection organisations. Participants came from 27 countries (Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Hungary, Ireland, Italy, Latvia, Luxembourg, Netherlands, Norway, Russia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States) including those where invasion by emerald ash borer has had major impact on tree survival.

Major highlights from the presentations

There was excellent representation from those countries dealing with EAB as an invasive organism and this provided both a historical perspective and how knowledge has progressed to the current ‘state of the art’. It was noted by Scott Pfister and Deborah McCullough that, although EAB was first reported in the USA in 2002, it had been breeding in Michigan since the early 1990s. Yuri Baranchikov noted that EAB had also reached the Moscow region in the European part of Russia in the 1990s, but not recognised as such until 2003. This provides one of the truisms of dealing with cryptic invasive organisms and a repeated message at the conference; most pests go undetected following establishment and may expand beyond the potential to eradicate before they are found.



Arising from the history of delayed detection, several speakers emphasised the need for effective surveillance and early detection for both EAB and BBB. In the case of EAB, this is an urgent requirement given the information from Yuri Baranchikov and Marina Orlova-Bienkowskaja that EAB is now bordering Belarus in the west and Ukraine in the south-west of Russia.

Joseph Francese described various methods of surveillance, ranging from girdling trees to attract adult beetles (mimicking stressed trees) to different designs and colours of traps, with and without chemical attractants. Although green traps were best for EAB, there was also merit in continuing the use of purple traps, in part because of their potential for outreach. Lures consisting of a host tree volatile (3Z)-hexenol and EAB pheromone are recommended in Canada for optimal detection; (3Z)-hexenol alone is used in the USA for cost reasons. However, as confirmed by Peter Silk and Claire Rutledge, who reported improved trap/lure combinations for both EAB and BBB, none of the traps are as effective as girdling trees in low density beetle populations. When populations are known to be present, branch sampling is an effective strategy for quantitative assessment but is more expensive than deployment of traps. Preparedness is, therefore, essential, memorably summed up by Peter Silk; “*Visit EAB & BBB before they visit you!*”

Some of the European preparedness work was illustrated by Zoltan Imrei who is collaborating with researchers in the USA to assess traps and lures for a European buprestid species, *Agrilus biguttatus*. For this species, green traps were the most effective, with further work on strategies of adults for mate recognition and attraction. A similar theme of general surveillance was presented by Alain Roques who, again, confirmed that green traps were most effective for buprestid beetles, but not for cerambycid beetles. Specific surveillance using trained dogs provides a further option for detection and Ute Hoyer-Tomiczek described early success in training dogs to detect EAB.

In North America, the common theme is rapid expansion of the infested area such that 35 States in the USA and 5 Provinces in Canada are now infested. Whilst much of this spread has been attributed to movement of firewood in camping, the model approach described by Denys Yemshanov placed emphasis on analysis of vehicle traffic data and their loads to understand both the volumes of infested material being moved and their destinations. This approach can be used to optimise surveillance effort in areas most likely to receive infested host material. The main pathways for arrival of EAB in North America and Russia respectively, were thought to be wood packaging material/nursery stock (plants for planting) and lumber/timber for furniture production, reflecting the wide range of potential pathways. Hitchhiking on vehicles is thought to be a further significant pathway. Movement of firewood from eastern Russia and Eastern Europe to the EU is a significant pathway which requires urgent assessment and heightened regulation.

Methods for managing established populations of EAB and BBB received close attention at the conference. As pointed out by Deborah McCullough, EAB increases slowly initially then enters an exponential growth phase which, only then, results in widespread symptom expression. Keeping populations low at the tree level has been achieved by trunk injection of the insecticide emamectin benzoate in the USA, which provides 3 years protection and, through assessment studies, has been shown to have only minor non-target impacts. These measures are applied principally in the urban environment where costs of treatment are balanced against the high costs of tree removal. Buying time through use of insecticide treatment also enables municipalities to factor in ecosystem services and gradual replacement of ash with a mixture of species. Similarly, in Canada, use of trunk injection of the insecticide azadirachtin, is employed to slow tree mortality in towns and cities, as described by Christian MacQuarrie.



The same message was provided by Kathleen Alexander in describing measures being employed in Boulder, Colorado, the location of the newest and most westerly infestation of EAB in the USA. Insecticide application and close planning of tree replacement strategies in Boulder have been applied on the basis of evolving experiences in municipalities across the USA.

An increasingly promising tool for longer-term management and containment of EAB is the use of natural enemies (classical biological control) to reduce populations locally, but not for eradication. Juli Gould described exploration for natural enemies of EAB in its native range of China, bringing species with potential to the USA, carrying out host specificity testing and commencing with field releases of candidate species. Several parasitoids species have been selected for mass rearing and field release in both the USA and later in Canada. Increasingly positive results suggest that two larval parasitoids, *Spathius agrili* (Hymenoptera: Braconidae) and *Tetrastichus planipennisi* (Hymenoptera: Eulophidae), and the egg parasitoid *Oobius agrili* (Hymenoptera: Encyrtidae) are establishing and are particularly promising on younger, thin-barked trees. Climate matching also indicates that *Spathius agrili*, will not establish in more northerly locations. A further species, *Spathius galinae*, from Russia has a better climate fit to the north and is increasing slowly after release. As reported by Marina Orlova-Bienkowskaja and Yuri Baranchikov, further promise, in a European context, is indicated by increasing parasitism of EAB by the native *Spathius polonicus*. Additional natural enemy activity from generalist native species, especially woodpeckers, adds to population suppression.

The interfaces between science, policy and outreach were apparent in most of the presentations. Commencing with the perspectives of EPPO (Francoise Petter) and EFSA (Giuseppe Stancanelli), the wider context of preparing for invasion by EAB or BBB was linked to pathway management, with increasing emphasis on commodity risk assessment. The capacity to manage is, however, constrained by budget and resource limitations which both Denys Yemshanov and Glyn Jones addressed in considering how to optimise resources and what the costs and benefits of actions are likely to be. Such factors need to be addressed in contingency planning since there is inevitably a gap between an 'ideal' and a 'real world' strategy. A central message was how to allow for false negatives in surveys emphasising the need for effective surveillance for early detection. A clear message from Glyn Jones, but one that does not appear to be achieved in practice, was that the cost effectiveness of biosecurity spend is greatest if committed before the pest actually establishes. Too often, budget allocation is reactive and responsive to public awareness rather than the intrinsic threat posed by a pest. The reaction to ash dieback fungus, *Hymenoscyphus fraxineus* in the UK was cited as an example.

Stakeholder awareness and influence was explored by Mariella Marzano with emphasis on preparedness and coordination which requires development of an understanding of risk and the social acceptability of management and of who is responsible. An interesting comparison was made between differing perceptions in the twin cities of Minneapolis and St Paul in the USA. Minneapolis has adopted a no insecticide regime accompanied by extensive felling, whereas St Paul is employing the full toolbox to retain trees for as long as possible. These factors are important in developing and 'selling' a management strategy at the local, urban scale. Understanding who the key stakeholders are at different scales and identifying the best ways to engage was emphasised. Perceptions are important and Arne Arnberger described an exercise using visual preferences for residents of St Paul (USA), affected by EAB, and the Danube area of Vienna, affected by ash dieback. Preferences were for a more natural backdrop and absence of high rise buildings, indicating a trade-off between biophysical and social aspects.

Although EAB is not yet present in Europe, lessons can be learned from campaigns to manage other invasive species and this was described by Mariangela Ciampitti in relation to Asian and citrus longhorn beetles in Italy.



Budget constraints and no implementation of EU Directive 2000/29 hampered early efforts but later outreach was increasingly effective. This included stakeholder communications through various media, including very effective poster campaigns on transport routes. The latest development is a web application called FitoDetective to report finds of the beetles called Tarlo Asiatico in Italy.

Major outcomes/conclusions in terms of policy relevance

Taken together, the range of measures for developing a European ‘toolbox’ is providing more cause for optimism with a marked shift from great pessimism in 2006 to a more positive stance currently. Efforts to improve early advice and to avoid the ‘easy option’ of simply felling trees are now building on the suite of tools available for early intervention and management. The opportunity is now there for Europe to benefit from this accumulated experience and prepare detailed plans to include all the measures in the ‘toolbox’.

There must now be early investment in the various tools in the toolbox so that Europe becomes pre-emptive as it waits for the inevitable arrival of EAB and the possible arrival of BBB. Research collaboration must continue and increase along with more pre-emptive changes in policy at all levels from regulatory (EU and National legislation), plant protection (EPPO and NPPOs) and local (municipalities) scales. Equipping the toolbox in Europe is an urgent requirement and must include at least the following key points:

Key Point for Europe 1:

Surveillance effort needs to be very high to have any chance of early detection of EAB or BBB invasion and establishment.

Key Point for Europe 2:

Girdling trees is best for detection of low populations of EAB/BBB. Augment with traps (green for EAB, purple for BBB) and host volatile and pheromone lures. Trained dogs can add a further option on infested trees and on imported wood and wood products. **Build in to contingency planning now!**

Key Point for Europe 3:

Increase analysis of types of pathways, their scale and their end points to develop a risk-based optimal surveillance strategy for Europe. Place scarce survey resources in the places of highest risk of arrival of EAB or BBB.

Key Point for Europe 4:

Slowing tree mortality through use of trunk injection of insecticides is an effective ‘baseline’ approach underpinning other strategies. Extensive experience indicates that emamectin benzoate is the most effective active ingredient. **Urgent steps should be taken in the EU to test and register emamectin benzoate for this purpose.**

Key Point for Europe 5:

Natural enemies are showing considerable promise but have a long development and build-up phase. Urgent assessment for Europe, including host-range testing and development of mass-rearing capacity should be carried out. A European approach is required. **Inclusion in EU and National contingency planning and policy development is essential and urgent.**



Key Point for Europe 6:

Outreach has great value and should commence before the pest(s) arrive in Europe. This should be done at many scales from national through regional to local. A resource of information should be compiled and made available for advance and ongoing awareness campaigns.

Key Point for Europe 7:

The recent overlap in range between ash dieback and EAB in Russia presents a unique opportunity for study of the interaction before EAB reaches Europe. Support for joint research into this interaction should be provided urgently, building on existing projects such as PREPSYS and EMERALD.

Key Point for Europe 8:

The tools for the toolbox are becoming more effective and sophisticated. However, there needs to be greater coordination and 'ownership' of the toolbox. DG Santé and EFSA, along with EPPO, are ideally placed to guide action plans and to provide financial and logistic support. There is little time left to fill the toolbox!

Papers from the conference and from other contributors will be published in a special issue of *Forestry – An International Journal of Forest Research* in 2020.

Relevance to CRP theme(s)

The principal theme addressed by the conference was Theme 2 - Managing Risks in a Connected World, although there are strong implications for Theme 1 - Managing Natural Capital for the Future.

The sharply defined focus on potential invasion of European forests and woodlands by two aggressive pests, one of which - emerald ash borer - has a strong track record of successful invasion and subsequent spread fits directly to three topics within Theme 2 - Risk Assessment; Invasive Species and Biosecurity; Climate Risks to Production.

Arising from this threat-driven focus, the conference addressed topics in Theme 1 through the capacity of the pests to compromise the ability to 'make secure the availability and managing the quality of natural resources'. Threats to the sustainable management of forests as a core aim in Theme 1 was a primary focus for the conference, bringing a high degree of interdisciplinarity to the presentations and discussions.

By addressing how the pests relate to a wide spectrum of environmental and social drivers, the conference delivered an integrated evaluation of knowledge and provided a series of outcomes relevant to a broad range of practitioners, policy and applied researchers across all relevant disciplines.

Website for further details – please also indicate if the presentations are/will be available on the website

Details of the conference including the presentations are available on the BFW website: www.bfw.ac.at/emeraldashborer

Details of the PREPSYS project are on <https://www.forestresearch.gov.uk/research/prepsys/>