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# EFSA guidelines for emerald ash borer survey in the EU

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The European Food Safety Authority (EFSA), by request of the European Commission, develops pest survey cards for pests of relevance for the European Union (EU) member states, summarizing key biological, epidemiological and diagnostic information relevant for the detection and identification of these pests by inspectors and laboratory technicians in the EU member states. For three pilot pests, including emerald ash borer (*Agrilus planipennis*), detailed guidelines are being prepared for the survey planners in the EU member states. Interaction with experts on the relevant organisms and the member states is needed before and after implementation of the surveys to ensure they are fit for purpose and can be harmonized across the EU. An important feature of the survey cards is the identification of risk factors, to focus the surveys on the most likely areas to find the pest if it is present and thus being able to apply a risk-based surveillance. Since 2014, ash wood and bark (from countries where *A. planipennis* is known to occur) are subjected to specific requirements laid down in Council Directive 2000/29/EC, the beetle is unlikely to enter the EU via this pathway. However, it cannot fully be excluded that introductions have happened before these requirements came into force, without being detected until now. In addition, the beetle could already be present in new third countries without being noticed yet and thus not regulated. Furthermore, firewood from countries adjacent to Russia (Belarus, Ukraine) is not restricted. The beetle could also hitch-hike to the EU by various means of transport, in particular via highways and railroads. Given the above, surveys should focus on these areas.

## Introduction

The European Commission mandated the European Food Safety Authority (EFSA) to support the EU member states plan and implement their annual survey activities for pests of EU relevance within the European Commission co-financing programme (EU, 2014). For this purpose, EFSA develops pest survey cards for around 50 plant pests that include key biological, epidemiological and diagnostic information relevant for the detection and identification of the pests by inspectors and laboratory technicians in the EU member states. In addition, specific guidelines for three pilot pests are being prepared for the survey planners and designers in the member states to provide more detailed information on how the statistical design of the survey should be done for these pests (for more details, see EFSA, 2018).

One of these pilot pests is *Agrilus planipennis* (emerald ash borer, EAB). The survey card that is prepared for this plant pest is part of a toolkit that is being developed to assist and support member states plan a statistically sound and risk-based pest survey approach in line with the IPPC guidelines for surveillance (FAO, 2016). The toolkit consists of pest-specific documents and general documents relevant for all pests to be surveyed:

1. The pest survey card on *A.planipennis*, providing the relevant biological information that is needed to prepare surveys for this beetle in EU member states.
2. Specific guidelines on *A.planipennis* surveys, aiming to guide the member states through the entire process of survey design including guidance on sample size calculation and practical information on how to implement the surveys (to be finalized in 2020).
3. The general survey guidelines (to be finalized in 2020).
4. The statistical tool RIBESS+ in open access (available online at https://shiny-efsa.openanalytics.eu/app/ribess), used to inform the survey design, including sample size calculation. The tool requires a simple registration. Support on the application of the underpinning statistical methods including a manual will be provided. The software was developed by EFSA, allowing the calculation of statistically significant sampling for pests during surveillance activities. The RiBESS+ tool was developed in the context of animal health to inform member states how they can demonstrate the national absence of the tapeworm *Echinococcus multilocularis* (EFSA, 2012).

To ensure that the toolkit is fit for purpose and increases harmonization of surveys between member states, interaction with experts from the member states on these organisms is essential before and after the implementation of surveys, that will be designed based on the survey card and guidelines.

This article deals with the development of the survey card for EAB. A first draft was presented and discussed at the PREPSYS Workshop in Vienna, Austria (Preparing Europe for invasion by the beetles emerald ash borer and bronze birch borer, two major tree-killing pests; 1st to 4th October 2018). The survey card and the specific guidelines will be finalized after two workshops with member state representatives in Tallinn, Estonia and be published subsequently. These workshops are organized in the context of a cooperation agreement with the Estonian Agricultural Board on crisis preparedness for Emerald Ash Borer in the European Union: (1) toolkit for EAB Surveillance, 23rd to 25th January 2019 and (2) contingency planning, spring 2020.

EFSA (2018) describes the work plan and the methodology that is being explored, used and fine-tuned for assisting the member states in developing and tailoring the risk-based and statistically sound survey design to their specific situations.

# Methods

## Collection of data and information to prepare the survey card

A survey only makes sense when the potential threat posed by the pest has been analysed and confirmed to be relevant for the area to be surveyed. This means that there must be a certain probability of the pest entering and establishing in that area, that the pest is able to spread, and that it is expected to have inacceptable impacts on plants. This was confirmed for EAB by a pest risk analysis (PRA) by EPPO (2013) for the EU (and the other EPPO member countries). The likelihood of entry was considered moderate in that PRA and the likelihood of establishment as high. Long-distance spread will be by human-assisted pathways, whilst natural spread is expected to occur over shorter distances and more slowly. After introduction, the pest has the potential to cause major losses and environmental impacts, and some social impacts. Eradication or containment will be difficult and costly, and most likely unsuccessful according to this PRA (EPPO, 2013). Therefore, the need for surveys, in particular in areas of high risk, is clear.

To assemble the survey card, a template is used that has been developed by EFSA, agreed with the European Commission, and fine-tuned with some member states. The survey card for EAB provides the key information necessary for designing the survey guidelines of the beetle, including

1. essential biological information on the pest, its regulatory status in the EU and its current, worldwide distribution, to better target the surveillance;
2. key parameters needed for applying the EFSA statistical tools to calculate the sample size. These key parameters include, in particular, the host range and the host distribution to define the target population, the spread capacity of the pest and the information needed to define the epidemiological unit (e.g. field, farm, glasshouse and region) and the inspection unit (e.g. individual tree or trap);
3. information on how to conduct detection and identification, e.g. for visual examinations, traps and trapping. It is necessary to estimate the sensitivity of the method, because the risk of misidentification of the organism and the possibility of the pest not being detected needs to be known and considered. This refers to the probability that a truly infested epidemiological unit (i.e. a group of individuals with a defined epidemiological relationship sharing approximately the same likelihood of exposure to the pest; e.g. fields or greenhouses, or forest stands with host crops) that is examined will indeed be detected and confirmed as infested or, if it is not infested, it is confirmed by survey to be not infested.

## Spread capacity of the pest

The availability of host plants is considered to be an important and, potentially, a limiting factor for the establishment and spread of the beetle. A pest prioritization project has been conducted in EFSA (EFSA, 2019b), which applies an Expert Knowledge Elicitation (EKE) procedure by a panel of experts for a series of pests, including EAB. The panel uses information from literature and expert knowledge to estimate the spread rates relevant for the EU. The expert knowledge elicitation was done as described in EFSA (2014 and EFSA 2019a and 2019b). It has five steps: 1) review of the general scenario for each parameter, 2) discussion by the experts of the evidence with respect to the relevance for the parameter of interest, assumptions, reliability or limiting conditions, interpretation and/or recalculation of the results reported in the evidence, concluding with a list of elements of evidence and their uncertainties/limitations, 3) discussion and summary of the overall uncertainties, concluding with a qualitative listing of the overall uncertainties, 4) elicitation of the parameter(s) by a structured expert judgement, using the informal EKE method as described in the EFSA Guidance on Uncertainty (EFSA Scientific Committee, 2018), concluding with a table on the elicited values, a list of percentiles of the fitted distribution, a graphical description of the distribution fit, the distribution of uncertainties as a formula and graphically as a probability density function and descending cumulative distribution function, 5) conclusion on the quantitative results in summary and answering the question of interest including the central estimate and the 95 percent uncertainty range in nontechnical wording (EFSA, 2019a and 2019b).

## Identification of units

Based on the analyses of the pest population dynamics interacting with the host plant system across different biological and spatial scales relevant for accurate pest detection, a hierarchical approach is used where the different units needed for survey design have to be defined and tailored to the situation of each member state. Three levels are distinguished, the target population, the epidemiological unit and the inspection unit (EFSA, 2018).

1. The target population: the set of – in this case – individual plants in which EAB can be detected directly (the pest itself) or

indirectly (symptoms of the pest) in a certain area. The target population has to be clearly identified, including its size and geographic boundaries.

2. The epidemiological unit: a homogeneous area in which interactions between pest, host plants, abiotic and biotic factors and conditions would result into similar epidemiology where the pest is present. The epidemiological units are parts of the target population reflecting its overall structure in a geographical area (e.g. a tree, an orchard, a field, a greenhouse or a nursery) (EFSA, 2018). This means that the situation from an epidemiological point of view e.g. on a host tree (here: an ash tree) would be similar to the situation on another host tree, when the pest is present on these different trees.
3. The inspection unit: plants (trees in this case) or traps to be examined for the pest.

### Risk factors

An important feature of the survey cards in general is the identification of risk factors, to focus the surveys in areas where the likelihood of finding the pest is highest (in case it is present). A risk factor is defined as a biotic or abiotic factor that is able to enhance the probability of infestation in the epidemiological unit by the pest. Risk factors can only be of use if they have more than one level of risk for the target population (i.e. the host plants). By this, the epidemiological units can be separated into subunits, each characterized by a different risk of being infested. It is essential to estimate the proportion of epidemiological units belonging to each subunit, as this information is imperative for sample size calculation. After defining one subunit as the baseline (typically that of lowest risk), the relative risk of each of the other subunits is calculated or estimated relative to the baseline risk, which typically has the value of 1.

## Results

In the results below, the concept and some key aspects of the survey card are summarized. The full contents of the EAB survey card will be published in the series of other survey cards in the framework of the above-described mandate by the EU Commission.

### Collection of data and information to prepare the survey card

Whilst collecting data about the biology and the host plants of the pest is relatively straight forward – with some uncertainty on the degree of susceptibility of European ash species – a more difficult issue that needs to be addressed to prepare statistically sound surveys is the sensitivity/effectiveness of the detection methods available. Exploration of different trapping methods revealed that experiences with traps differ within and between countries, where the beetle is already present. Trapping systems and other detection methods were discussed with experts in this field from the US, Canada and Russia, having different opinions about the effectiveness of the methods. Discussions are still ongoing. Several values for trapping effectiveness have been published and are presented here. In the survey card, no single method will be recommended, since member states have different conditions, resources etc. Therefore, for the surveys, each member state is to decide upon the method to be applied. However, the survey card outlines different suggestions and provides useful information on the methods, so, with this information the member states can choose what would be the best method for their circumstances.

### Comparison of different traps and other detection methods

At low EAB prevalence, the highest detection rates (up to 100 percent effectiveness, i.e. the percentage of traps capturing at least one adult according to Poland and McCullough, 2014) have been reported for double decker traps. These traps worked best when placed near ash trees but in open space and when they were exposed to the sun. In such sites, the traps resemble small trees, and are not hidden by foliage from trees and other vegetation. Furthermore, the lures represent a hot spot of ash-resembling volatiles to the beetles, which are easily located. In addition, adults of *A. planipennis* prefer sunny sites. It was also found that these traps are less prone to storm events than traps that are hung in the tree canopies.

Double decker traps are made of two differently coloured corrugated plastic prisms, the upper one being green, baited with cis-3-hexenol – a substance produced by ash leaves. The lower one is purple and baited with Manuka oil. If both prism traps are baited with cis-3-hexenol, the effectiveness was 90 percent instead of 100 percent. Whilst the upper green trap was found to be most attractive to male beetles, the lower purple trap was found to catch more females (Crook and Mastro, 2010). This is due to their behaviour – males feeding and mating on leaves and females also feeding on leaves but also staying for extended periods on the bark of trees for oviposition (Cappaert et al., 2005). The two prism traps are fixed to a 3 m PVC pipe, which is supported by a T-post. Both prism traps are coated with glue to capture adults of *A. planipennis*. In comparison, if both prism traps were dark purple and baited with cis-3-hexenol on both prisms or with cis-3-hexenol on the upper trap and Manuka oil on the lower trap, effectiveness was 60 percent and 70 percent, respectively. Using light purple coloured traps, however, baited with cis-3-hexenol on both prisms had an effectiveness of 80 percent (Poland and McCullough, 2014; Poland et al., 2016; McCullough and Poland, 2017).

Males seem to be more attracted to traps when the female-produced pheromone (3Z)-lactone is added to the leaf volatile cis-3-hexenol (Silk et al., 2011; Ryall et al., 2012). The effectiveness of green prism traps with these two substances was reported as 75–88 percent (Ryall et al., 2013; McCullough and Poland, 2017), whilst green multi-funnel traps with (3Z)-hexenol were assessed as having a sensitivity of 60–75 percent (Crook et al., 2014). Other methods had a less clear effectiveness, e.g. effectiveness of green or purple prism traps with (3Z)-hexenol ranged from 37 to 82 percent (Ryall et al., 2013; Poland & McCullough, 2014) and were therefore considered less suitable.

In addition, green and purple multi-funnel traps either untreated or treated with different lubricants (nonsticky coatings) such as RainX, or Fluon in the same colour as the trap, or untinted, were tested. Green multi-funnel traps treated with untinted Fluon captured significantly more EAB than green multi-funnel traps with the other treatments or purple multi-funnel traps with any treatment. Trap catches were significantly reduced when Fluon was diluted to 25 percent (Poland et al., 2016).

Girdled trap trees with sticky bands attract adult EAB because they emit plant stress volatiles (McCullough et al., 2009a and 2009b), but were found to be approximately 45–50 percent effective and sometimes even ineffective. However, when density of larvae was lower than five per tree, three girdled trees increased the probability of detection to 90 percent, or even close to 100 percent with five girdled trees (Marshall et al., 2010; McCullough et al., 2011; Mercader et al., 2013). However, this method damages the trees, making them prone to other pests or diseases.

Branch sampling as a method for asymptomatic trees (Ryall et al., 2011) was also discussed, but when the pest's density is extremely low (less than one gallery per branch), probability of detection is expected to be 55 percent. In addition, patterns of infestation at landscape scale show clumped or aggregated distributions of EAB; thus, branch sampling can easily miss the infestation, and this may also be true for traps (Ryall, 2015). However, branch sampling could be a useful tool when delimiting surveys are necessary when the beetle has been detected.

Inspection of the tree canopy is not recommended, because it is labour-intensive and has a low sensitivity (Ryall et al., 2011). Generally, the observation of symptoms on trees (e.g. exit holes) is not a means for early detection as the pest might already be circulating in the area for several years when the holes are found. Therefore, in relation to early detection, trapping methods are preferred in the annual detection surveys to be performed by the member states.

Furthermore, the use of sentinel trees in high-risk areas was discussed at the PREPSYS workshop in Vienna and found to be a useful tool for early detection. The trees used for this approach could be stressed, potted *Fraxinus* trees of one of the most susceptible species (e.g. *F. pennsylvanica*). Investigations regarding this method are ongoing (BFW, 2018).

Since the effectiveness of the different methods has been determined in a noncomparable way, due to different experimental designs and methodologies, the values of effectiveness have to be considered with caution. Currently, for the purpose of survey design, a trapping effectiveness of at least 70 percent (when choosing one of the methods above) is suggested as an informed value to be used for sample size calculations (this will be elaborated in detail in the Specific Guidelines for EAB Surveillance).

The method or methods used are to be chosen by each member state according to the distribution of host plants, the presence and location of high-risk areas, the availability of resources and other factors in their countries.

## Spread capacity of the pest

The generic scenario assumptions that are applied in the EKE are the following (cited directly from EFSA, 2019b):

- 'The pest is present in an isolated focus in the area of potential establishment (e.g. a small number of individuals or a single infected plant).
- In the isolated focus, a small population has established on suitable host(s). The time to detection is evaluated from this moment in time.
- After establishment, the size of the pest population increases. It is assumed that due to the favourable demographic (e.g. initial population abundance, population structure, no Allee effect) and environmental conditions, there is no lag phase in the population growth.
- When the population has reached a relatively high abundance in the isolated focus, it starts spreading from the original area of presence. The spread rate is assessed starting from this moment in time, when the area where the pest is present starts to consistently increase in most/all the directions due to the dispersal of the pest individuals.
- Spread rate is measured as the linear increase of the area (i.e. the radius of a hypothetical circle) where the pest is present. Spread occurs only when it results in the successful infection/infestation of the host on arrival. Extreme phenomena of long-distance spread (e.g. human-assisted 'jumps', including hitchhiking) are not included in the scenario.
- Assumptions for the assessment of spread:
  - Host availability is not a limiting factor for pest establishment after a dispersal event.
  - Spread rate was assessed without considering the contribution of the different susceptibilities of host plants (e.g. species, varieties and rootstocks), virulence of different subspecies/strains/pathovars of the pest or the biological characteristics of vector species or subspecies (e.g. dispersal rate and feeding activity).
  - The current climatic conditions were assumed for population growth/epidemics and spread of the pest.
- Means of spread
  - The spread rate is the outcome of the contribution of natural dispersal together with local human-assisted spread.
  - Spread due to post-harvest movement, such as the trade in commodities, was not included in the estimation.
  - Human-assisted spread includes operations related to production (e.g. common agricultural practices such as the use of pruning equipment and usage of farm saved seed potatoes) and operations related to commerce of the harvested product (which includes trade in commodities). The second category was not part of the estimation.
  - For forest management, the common practice of gathering the cut logs inside the forest and transporting them along a forest road was included in short-distance dispersal and in the spread rate. In the case of urban infections or infestations, the material resulting from pruning is either shredded on the spot or gathered in a collection place, which could be far from the infestation spot, and therefore, this component was not considered in the assessment of the spread rate.
- Monitoring activity
  - It was assumed that the monitoring activity for the pest was conducted according to current practices in the EU.'

The specific scenario assumptions were as follows (directly cited from EFSA, 2019a):

- 'Local displacement of logs is not considered to be important for short distance dispersal, so the spread rate only takes into account the active and passive (wind supported) natural spread.
- Different ash species do not influence the spread rate.
- Hitch-hiking is excluded as it is not confirmed to be a major component of spread.'

For the EKE, the experts were requested to reply to the question 'What is the spread rate in 1 year for an isolated focus within this scenario based on average European conditions? (units: m/year)'.

From the available literature (see Table B.2 in Appendix B of EFSA, 2019a), the experts reviewed the evidence for the spread rate of *A. planipennis*, in particular McCullough et al. (2011), Mercader et al. (2012, 2016), Siegert et al. (2010) and Taylor et al.(2010).

Studies reporting the spread of the beetle to exceed a distance of 1 km per year have been conducted in areas where the pest is highly abundant. Regarding initial entry points, however, where infestation rates are low, natural spread distances of less than 700 m per year have been reported, even though, occasionally, these distances could be higher (Mercader et al., 2016). The panel of experts of the EFSA pest prioritization project (EFSA, 2019a) revealed an estimated 50 percent chance for the beetle to be found within a radius of 1.5 km from the point of initial spread within or after one year. The chance of the pest having spread beyond 6 km from the point of initial spread was elicited as less than 5 percent. Using the 75$^{th}$ percentile (3 km spread distance per year) as the basis for the survey activity allows for conservative calculations. The probability of detecting these early infestations though is very low.

### Identification of units

Based on experiences and current knowledge about EAB, examples of the target population, the epidemiological units and the inspection units have been drafted and are now under discussion. The appropriate description of the target population and the epidemiological unit requires accurate data with regard to the abundance and location of host plants. Each member state has to define the specific units based on the national data available. The inspection units as the smallest units are either individual ash trees, individual branches or traps that are examined for pest presence. An epidemiological unit of a single hectare is suggested where one or more ash trees (inspection units) are present or a hectare bordering an ash forest. The target population is the sum of all epidemiological units. It includes all ash trees in each member state (including trees found in forests, parks and gardens) and is quantified as the total area of available host trees representing epidemiological units.

It is not possible to provide more details regarding which units should be sampled and how many samples should be taken in each member state within the survey card. These details will differ depending on the situation in each member state and are, thus, to be determined by the corresponding authorities. Some of the difficulties member states will have to cope with are the localization and sampling of single ash trees, e.g. in mixed forests or the often poor health of ash trees caused by other factors, in particular by the infestation with *Hymenoscyphus fraxineus* (ash dieback). Guidelines on how to calculate sample size will be presented as part of the specific guidelines.

### Risk factors

Although it is unlikely that EAB will enter the EU via trade of host plant commodities from infested third countries due to the special requirements laid down in 2000/29/EC (EC, 2000), there is some risk it could enter with firewood from Belarus and Ukraine, which are close to the known western edge of EAB infestation in Russia and where the pest may already be or could soon be present. Indeed, Drogvalenko et al. (2019) have recently reported the finding of EAB in Ukraine. Furthermore, wood packaging material and wood chips (from infested countries) are regulated, but an introduction with this material cannot be excluded fully, as interceptions of other pests in the EU have shown. Human assisted (inner EU) spread by movement of infested material or by cultural practices is also unlikely since the beetle is – as far as is known – currently absent from the EU. However, the beetle could hitch-hike to the EU by means of transport, i.e. cars, lorries or trains from Russia. Therefore, areas with a higher risk of finding the beetle in the EU can be identified. In addition to parking lots along highways where these cars or lorries stop, the high risk locations include sites such as hardwood sawmills, wood storage and trade facilities including firewood storage facilities, nurseries, garden centres and forests or other areas where ash trees grow along the terrestrial transport network (Lyons et al., 2007). Despite the regulation of wood chips, areas where the wood chips have been stored could still indicate a risk area (outlined for bronze birch borer by Økland et al., 2012), since their import from infested countries was allowed until 2014 (EC, 2000 with amendments, version from 1 April 2018). An infestation at that time may have gone undetected and an outbreak may only be detected much later. There is also an increased risk to find the pest around harbours and airports associated with international transport.

High-risk areas are defined as areas with the highest probability of the pest being present and can be restricted – for EAB – to 3 km distance from high-risk locations in which increased surveillance should be carried out. This is based on the assessment of spread capacity outlined above. Each member state should map or define its high-risk locations and delimit the 3 km area around each of them.

## Discussion and Conclusion

The new Regulation (EU) 2016/2031 on protective measures against pests of plants, adopted on 26 October 2016 and applying from December 2019 focusses much more on prevention and risk targeting than the former Directive 2000/29/EC. In line with this legislation, and in order to improve preparedness and early prevention in plant health, EFSA provides, as requested by the EU Commission, technical assistance in surveillance by providing a survey card for EAB (as well as around 50 more survey cards for other pests of EU relevance) to the EU member states.

The results of the EFSA Project 'PERSEUS' (Bell et al., 2014) are considered when developing the survey cards and guidelines. In the 'PERSEUS' project, the methodological aspects of surveys for plant pests have been examined to identify their strengths and weaknesses. The project revealed that:

1. Survey methods for most of the plant pests regulated in Council Directive 2000/29/EC (EC, 2000) are poorly documented. Sampling methods used were not sufficiently described and statistical methods to determine sampling size or higher risk areas were rarely provided.
2. Though diagnostic tests were well described in many cases, the relative sensitivity of the methods could rarely be determined.
3. Since member states have their own methods for conducting surveys, which are often generic, a lack of harmonization between the member states was found.
4. Models to predict areas with a higher risk of the pest to be present have not been developed for key pests, making targeted sampling difficult.
5. Many factors, in particular the sampling methods used, can influence the outcome of a survey.

When developing the toolkit for EAB and the other plant pests, the above issues were considered. EFSA aims to provide scientifically and statistically sound information, in cooperation with EU member states, to improve the situation on plant pest surveys in the EU. The survey card and the guidelines for *Agrilus planipennis* under development will provide a basis to document clearly the surveys that have to be conducted. This clear documentation allows the surveys to be reproducible when repeated in the following years. Applying the guidelines, the sampling size can be calculated using the RIBESS+ tool (EFSA, 2012). The sensitivity of the detection methods is still under discussion but will be clearly documented for the different methods, upon availability of validated data. Recently, progress has been made in developing reliable molecular methods, which are expected to increase the sensitivity of the available diagnostic procedures (Bray et al., 2011; Kelnarova et al., 2019). As far as is known, comprising more than 3000 species, the genus of *Agrilus* is the largest known genus of the animal kingdom in the world (Kelnarova et al., 2019) and has a high number of externally (i.e. morphologically) similar species (Jendek and Grebennikov, 2011). The morphological identification down to species level, therefore, needs expert skill and a reference collection – which is often not available. Since early detection and taxonomic identification of EAB would be the only way – in case of an introduction – to increase the probability of eradication, reliable techniques to identify any life stage, in particular immature stages of the beetle, would accelerate a first positive identification (Jendek and Grebennikov, 2011). DNA-based methods are fast, do not need taxonomic expertise and allow the identification of immature stages (Kelnarova et al., 2019).

The survey card for EAB and the corresponding guidelines are discussed with member states, as outlined above, to increase the level of harmonization between member states considerably. The survey cards and guidelines provide necessary information to predict high risk areas based on risk factor identification as well as information on a selection of detection and identification methods including, as far as available, their sensitivity. Thus, the weaknesses outlined in the project PERSEUS (Bell et al., 2014) are taken into account. Consequently, it is expected that survey efficiency will increase, and that resource allocation will be improved, since surveys will be targeted based on pest risk by looking for the pest in the locations it is most likely to be present.

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## Conflict of interest statement

The information given in this article is with reservation since it may be different from contents of the to-be-published EAB survey card and guidelines.

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