Initial progress in use of detection dogs for EAB monitoring

Ute Hoyer-Tomiczek, Gernot Hoch

Department of Forest Protection

Conference “Preparing Europe for invasion by the beetles emerald ash borer and bronze birch borer, two major tree-killing pests” 2018-10-01/04

Vienna, Austria

2018-10-02

A look back into the past

Dog detection method for ALB/CLB

- Method development started at BFW in Feb. 2009, carried out by Gabriele Sauseng and Ute Hoyer-Tomiczek
- Dogs are trained to detect ALB/CLB
  - in all development stages (egg, larva, pupa, adult) alive and dead
  - larval galleries, pupa chambers, exit holes, not developed oviposition sites
  - frass and wood shavings
  - overgrown symptoms of infestation
- dogs are trained to indicate as close as possible to the maximum of scent
- Indication: active (scratching, barking) or passive (sitting, laying down, focusing scent source)
- work is based on positive reward by food (goodies) or playing
- Method improvement and refining for
  - **ALB** in AT, DE, CH, IT, UK
  - **CLB** in IT, HR, NL

Dog detection method for ALB/CLB

Detection dogs can be used for

- inspections of **WPM** at import or at storage places
- inspections of **imported plant material** at entry points or registered places of destination, at nurseries, garden centers, DIY markets, …
- in **outbreak areas** for investigation of any plant material (growing, felled, cut), especially of dense growing stands, (preventively) felled trees and fire wood
- for **surveillance of high risk spots**

Dog detection method for ALB/CLB is

- included as complementary method in the German guidelines for ALB control
- included as complementary method in the EPPO standards PM9/15 and PM9/16 of procedures for official control *of A. glabripennis* respectively *A. chinensis*
- accepted by the IPPC: CPM 11 in Rome 04/2016 (presentation and video) and IPPC calendar 2017

Anoplophora Detection Dog Training courses at BFW since Feb. 2011

Trainers: Ute Hoyer-Tomiczek, Gabriele Sauseng (until 2017)

- basic training in 2 obligatory consecutive basic modules
- each one week
- each with theoretical and practical examination and certificate
- exam after 2 years
- **108 dogs and 88 dog handlers** (as of June 2018)
  - AT: 29 dogs, 21 dog handlers
  - DE: 53 dogs, 48 dog handlers
  - CH: 26 dogs, 19 dog handlers

➢ most of them working in outbreak areas and at import inspections

➢ in their own countries as well as in IT, FR (incl. Corsica), FI

➢ in total many good experiences in practical use

BFW. Austrian Research Centre for Forests

Euphresco AnoploRisk II

Evaluation of the Anoplophora Detection Dog Method

MINISTERIUM FÜR EIN LEBENSWERTES ÖSTERREICH

Standardized conditions

- ALB frass/wood shavings
- living ALB larvae
- living ALB larva with infested wood piece
- 14 dog teams
- 3 repeats / test
- 8 samples: 2 pos. / 6 neg., randomized
- random order of the dog teams per test and repeat
- blind search

Evaluation of the Anoplophora Detection Dog Method

More realistic environments

Tests with ALB frass/wood shavings hidden

- in the grass at base of poplar trees
- in a tube at 1.8 m height on poplar trees
- in holes and crevices of old orchard trees at ca. 1.8 m height
- 10 dog teams
- 3 repeats per test
- 8 samples: 2 pos. / 6 neg., randomized
- random order of the dog teams per test and repeat
- blind search

BFW. Austrian Research Centre for Forests

Euphresco AnoploRisk II

MINISTERIUM FÜR EIN LEBENSWERTES ÖSTERREICH

Evaluation of the Anoplophora Detection Dog Method

	Test	Sensitivity	Specificity	total samples
Standardized conditions	saw dust	0,917	0,856	240
	larva	0,850	0,794	240
	larva + wood piece	0,926	0,944	240
	➢ Over-all result:	**Sensitivity**	**85 – 93 %**	
		Specificity	**79 – 94 %**	
More realistic conditions	poplar ground	0,881	0,956	336
	poplar / tube 1.8 m height	0,750	0,865	336
	orchard 1.8 m height	0,833	0,853	336
	➢ Over-all result:	**Sensitivity**	**75 – 88 %**	
		Specificity	**85 – 96 %**	

Hoyer-Tomiczek et al. 2016, EPPO Bulletin 46, 148-155

Median sensitivity and specificity 80 – 100 %

Training of dogs for detection of EAB

Euphresco Phytosanitary ERA-NET Project PREPSYS

- symptoms hardly visible ► visual monitoring unsuitable for early detection
- to be prepared for inspections at entry points and in case of EAB findings:
  - ➢start of training of the first 6 EAB detection dogs end of November 2017
- training with alive larvae, dead beetles and bark/wood pieces with larval galleries and saw dust (origin USA/Connecticut)

Training of dogs for detection of EAB

- Imprinting with living EAB larva
- search at the base of a large tree
- search at fire wood
- search along a hedge at the end of first day

Training of dogs for detection of EAB

Differentiation between non-infested ash wood and EAB-infested ash wood

- 7 negative ash wood pieces and 1 positive EAB/ash sample per setup
- searches at hollow building blocks and fire wood

Training of dogs for detection of EAB

Training with negative ash wood pieces and positive EAB/ash samples at

- cut wood, fire wood and WPM
- wood logs
- shrubs

- Results of first training units were promising
- the EAB/ash samples were clearly identified
- sometimes negative ash wood pieces were also indicated
- differentiation has to be trained more strictly

Tentative Evaluation of the EAB Detection Dogs

Quantification of

- **Sensitivity** = correct positives / all positive samples
- **Specificity** = correct negatives / all negative samples

3 different experimental setups with 5 dogs in June 2018

- 3 repeats per test
- random order of the dog teams per test and repeat
- blind search for dog and dog handler
- **Setup 1 young ash trees**:
  30 samples: 2 positive and 28 negative, randomized
- **Setup 2 firewood piles**:
  8 samples: 2 positive and 6 negative + firewood, randomized
- **Setup 3 wood logs**:
  8 samples: 2 positive and 6 negative + wood logs, randomized

Tentative Evaluation of the EAB Detection Dogs

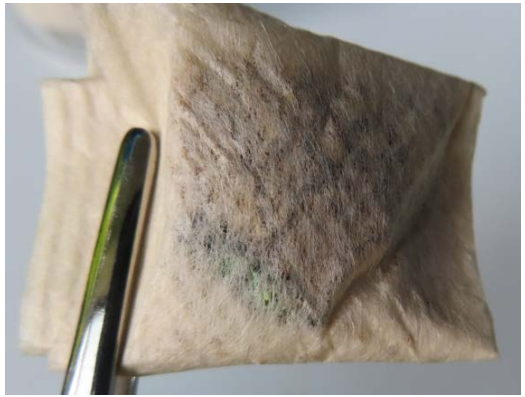
Young ash trees in a forestry nursery

- 30 ash trees in line
- 2 positive samples: EAB/ash wood pieces
- negative samples: 28 ash trees

Tentative Evaluation of the EAB Detection Dogs

Firewood piles in a forestry nursery

- 3 different firewood piles of poplar and ash wood
- 2 positive samples: dead EAB beetle and saw dust of EAB larvae
- negative samples: 6 negative ash wood pieces + firewood



Tentative Evaluation of the EAB Detection Dogs

Wood logs at a wood storage place

- 3 different piles of wood logs
- 2 positive samples: EAB/ash wood pieces
- negative samples: 6 negative ash wood pieces + wood logs

Tentative Evaluation of the EAB Detection Dogs

Test	Sensitivity	Specificity	total samples
Ash trees: EAB wood pieces	0,967	0,998	450
Firewood: † EAB beetle/saw dust	0,833	0,889	120
Wood logs: EAB wood pieces	1,000	0,989	120

➢Over-all result:

Sensitivity 83,3 – 100 %

Specificity 88,9 – 99,8 %

Tentative Evaluation of the EAB Detection Dogs

Conclusions

- Number of dogs limited
- Results are very promising
- Further experiments have to be carried out

➢ EAB inspections with detection dogs, especially at import points, could provide a promising method for helping to prevent EAB introduction into the EU

Acknowledgement

Thanks

- to the dog teams
  - Diana Mittermayr with Joy & Kada
  - Christof Schweiger with Dana
  - Bernhard Kohl with Finlay
  - Ute Hoyer-Tomiczek with Andor & Cina
- to Claire Rutledge (USA/Connecticut) for providing the EAB scent material
- to Euphresco Phytosanitary ERA-NET Project PREPSYS for the scientific frame and support
- for financial funding by the Austrian Ministry BMNT

BFW
Federal Research Centre for Forests

Thank you for your attention!

Federal Research and Training Centre for Forests, Natural Hazards and Landscape

Austria, 1131 Wien
Seckendorff-Gudent-Weg 8
Tel.: +43 1 878 38-0
direktion@bfw.gv.at ute.hoyer@bfw.gv.at
http://www.bfw.ac.at