Early detection of invasive wood boring insects by detection dogs

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How can such amounts of WPM or plants be investigated?

... with detection dogs!

Detection dogs can smell an infestation even there, where a visual inspection is chanceless!

Dog detection method for ALB/CLB

❧ Method development started at BFW in Feb. 2009, carried out by Gabriele Sauseng and Ute Hoyer-Tomiczek

❧ Method improvement and refining over 2 years for
- **ALB** in AT, DE, CH, IT, UK
- **CLB** in IT, HR, NL

❧ 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
- ➢ in WPM, wood or living plants/trees
- ➢ at import, storage places, in the vicinity of high risk spots or in outbreak areas

❧ dogs are trained to indicate as close as possible to the maximum of scent

❧ indication can be active (scratching, barking) or passive (sitting, laying down, focusing scent source)

❧ work is based on positive reward by food (goodies) or playing

Detection dogs in import inspections

Detection dogs can be used for WPM inspections
- 🐾 at the import of goods with WPM directly at the arrived container at any registered place of destination
- 🐾 at storage places of goods with WPM
- 🐾 for the surveillance of the vicinity of WPM storage places

Detection dogs can be used for inspections of imported plant material
- 🐾 at nurseries, garden centers, DIY markets, …
- 🐾 at other entrance points or registered places of destination
- 🐾 for the surveillance of the vicinity of places mentioned above

Detection dogs in outbreak areas and surveillance of high risk spots

Detection dogs can be used in outbreak areas for investigation of
- 🐾 trees, stumps, roots, hedges, shrubs in public and private green
- 🐾 public collection sites for green waste
- 🐾 urban, agricultural and natural environment
- 🐾 forests, dense growing stands
- 🐾 areas of (preventive) cuttings and (preventively) felled trees
- 🐾 nurseries
- 🐾 fire wood

Detection dogs can be used for surveillance of high risk spots
- 🐾 ports, airports, customs points
- 🐾 railway stations, container terminals, packing-centers
- 🐾 importers of goods with WPM, nurseries, …

Evaluation of the Anoplophora Detection Dog Method

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

Two meetings with 10 and 14 dog/dog handler teams, respectively, 10/2014 and 02/2015
- all trained by BFW
- different levels of experiences

Experimental setup:
- 3 repeats per test
- 8 samples: 2 positive and 6 negative, randomized
- random order of the dog teams per test and repeat
- blind search for dog and dog handler

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

Evaluation of the Anoplophora Detection Dog Method

Standardized conditions

- ALB frass/wood shavings
- living ALB larvae
- living ALB larva with infested wood piece

AnoploRisk II

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Euphresco *AnoploRisk II*

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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

@ Gernot Hoch, BFW

🐾 in holes and crevices of old orchard trees
   at ca. 1.8 m height

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 %**

	Test	Sensitivity	Specificity	total samples
More realistic conditions	poplar ground	0,881	0,956	336
	poplar /tube1.8 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 %**

Median sensitivity and specificity 80 – 100 %

WPM control with detection dogs

at import of containers with stones from China

already inside of the imported container
(only if no remains of fumigants, esp. Methyl bromide!)

WPM control with detection dogs

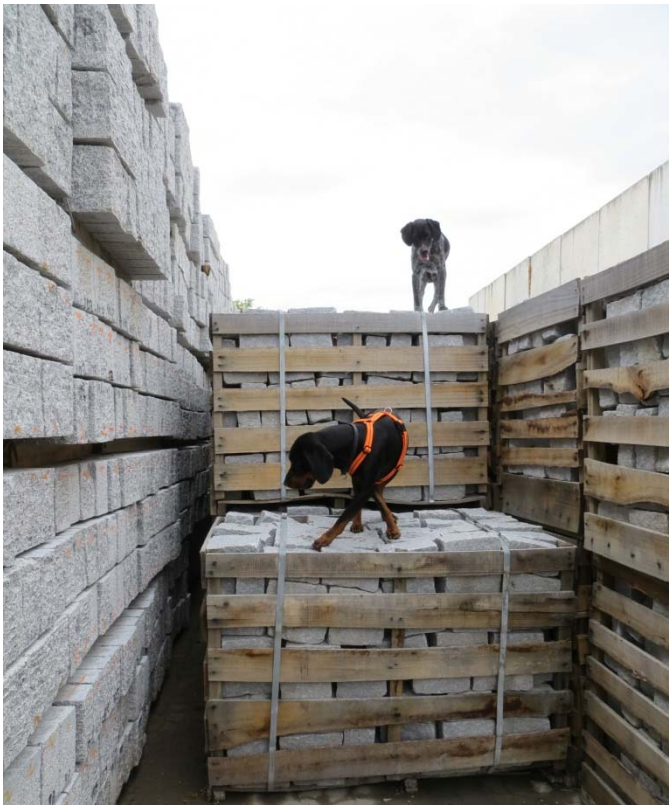## at storage places of goods with WPM

Nails, metal bands, stand-away wire ends, instable storage, half filled crates are risks for the dog

Tractability on distance of the dog is essential in cases if self-dependant work is necessary

WPM control with detection dogs

at storage places of goods with WPM

Lifting the dogs to higher levels of crates to investigate also those on the top

WPM control with detection dogs
at storage places of goods with WPM

CH/Basel port

WPM control with detection dogs

at storage places of goods with WPM

exuvie and alive pupa

Wood shavings and frass among the grave on the ground ►crate was delivered in the morning ► return next day ► alive larva in the middle pole

Surveillance of the vicinity of high risk spots

... at/around stone importers

in Austria also partially done with detection dogs

CLB monitoring with detection dogs of imported plants

at general importer in NL

NL import two China interceptions 2010

40,000 A. palmatum:
- Inspector: two larvae (visual damage roots)
- Sniffer dogs from Austria:
    One dead larva, one part of a larvae
    Five trees with galleries
    (no visual symptoms)

CLB monitoring with detection dogs of imported plants

Imported plants for planting in nurseries, supermarkets, DIY markets

Imported bonsai plants in bonsai nurseries

ALB monitoring at high risk spots

Inspection of **green waste** and **fire wood** as potential source of **ALB**

ALB monitoring with detection dogs of plants in nurseries in outbreak areas

Risk of distribution of the quarantine pest with plant material from nurseries!

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Where visual inspection is impossible, sniffing is obligatory!

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ALB monitoring with detection dogs in outbreak areas

Inspection of (preventively) felled trees

AT/St. Georgen/Oberaichet 07/2012

DE/Bavaria/
Feldkirchen
in the forest
06/2015

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ALB monitoring with detection dogs in outbreak areas

Dense growing stands, shrubs and hedges
are predestinated for detection dog monitoring

Sniffing instead of visual control

detection dog

CLB monitoring with detection dogs in outbreak areas in IT/Lombardy, Milan + surrounding 2010 - 2012

Investigation of trees along watering ditches and lakes, in urban parks and agricultural environment

A new pest at the borders of the EU:
Emerald Ash Borer *Agrilus planipennis*

Euphresco Phytosanitary ERA-NET Project **PREPSYS** Training of dogs for detection of EAB

- wide distribution in Canada and USA as well as west and south of Moscow/Russia
- most probably pathways to enter the EU: import of fire wood and round wood of ash
- 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 pieces with larval galleries and saw dust (origin USA/Connecticut)

➢ Results of first training units are promising

PREPSYS Pest Risk Evaluation and Pest management SYStems for EAB and BBB

Thank you for your attention!

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