# :EXTEMIT-K
GEN level

🔑 KEY OUTPUTS

- Sequencing and publication of the genome of the European spruce bark beetle (*Ips typographus*, L.).
- Successful use of two distinct systems for heterologous expression. Identification of pheromone receptors and host odour receptors.
- Uncovering mechanisms of host defence breakthrough in selected bark beetles of the *Ips* genus.
- Creation of complex facilities for the deorphanization of insect olfactory receptors.
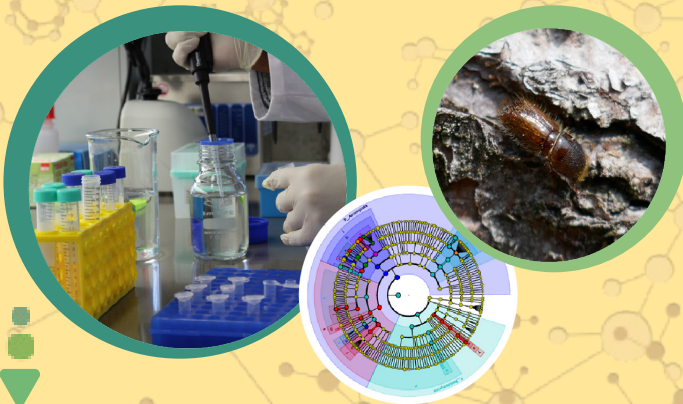
Chakraborty A, Purohit A, Khara A, Modlinger R, Roy A. Life-stage and geographic location determine the microbial assemblage in Eurasian spruce bark beetle, *Ips typographus* L.(Coleoptera: Curculionidae). Frontiers in Forests and Global Change. 2023;6:1176160.

Naseer A, Mogilicherla K, Sellamuthu G, Roy A. Age matters: Life-stage, tissue, and sex-specific gene expression dynamics in *Ips typographus* (Coleoptera: Curculionidae: Scolytinae). Frontiers in Forests and Global Change. 2023;6.

Powell D, Große-Wilde E, Krokene P, Roy A, Chakraborty A, Löfstedt C, et al. A highly-contiguous genome assembly of the Eurasian spruce bark beetle, *Ips typographus*, provides insight into a major forest pest. Communications biology. 2021;4(1):1059.

Roberts RE, Biswas T, Yuvaraj JK, Grosse-Wilde E, Powell D, Hansson BS, et al. Odorant receptor orthologues in conifer-feeding beetles display conserved responses to ecologically relevant odours. Molecular ecology. 2022;31(13):3693-707.

Yuvaraj JK, Roberts RE, Sonntag Y, Hou X-Q, Grosse-Wilde E, Machara A, et al. Putative ligand binding sites of two functionally characterized bark beetle odorant receptors. BMC biology. 2021;19:1-21.

:EXTEMIT-K
TREE level

🔑 KEY OUTPUTS

- Selection of new substances from the bark beetle olfactory environment, its symbiotic fungi, and the host spruce with biological activity.
- Presentation of a new method for the early detection of trees attacked by bark beetles based on the principle of searching for attacked trees by dogs trained to recognize the aggregation pheromone of bark beetle.
- Presentation of new methods of genomic evaluation for spruces differently resistant to the bark beetle.
- Exposure of spruce to stress by drought in a controlled large-scale experiment in a real environment in the context of susceptibility of such stressed trees to bark beetle attack – a world-unique large-scale experiment.
- Creation of complex facilities for laboratories of chemical ecology of forest pests with global significance.

Jirošová A, Modlinger R, Hradecký J, Ramakrishnan R, Beránková K, Kandasamy D. Ophiostomatoid fungi synergize attraction of the Eurasian spruce bark beetle, *Ips typographus* to its aggregation pheromone in field traps. Frontiers in Microbiology. 2022;13:11.

Stejskal J, Klápště J, Čepl J, El-Kassaby YA, Lstibůrek M. Effect of clonal testing on the efficiency of genomic evaluation in forest tree breeding. Scientific Reports. 2022;12(1):5.

Stříbrská B, Hradecký J, Čepl J, Modlinger R, Tomášková I, Jirošová A. Physiological and biochemical indicators in Norway spruces freshly infested by *Ips typographus*: potential for early detection methods. Frontiers in Forests and Global Change. 2023;6:13.

Vošvrdová N, Johansson A, Turčáni M, Jakuš R, Tyser D, Schlyter F, et al. Dogs trained to recognise a bark beetle pheromone locate recently attacked spruces better than human experts. Forest Ecology and Management. 2023;528:10.

Česká zemědělská univerzita v Praze. Přípravek pro repelenci lýkožrouta smrkového. Původci: Anna Jirošová, Rastislav Jakuš, Roman Modlinger, Marek Turčáni, Frederik Schlyter. Přihl.: 13.12.2021. Uděl.: 18.11.2022. Patentový spis CZ 309426 B6.

:EXTEMIT-K
LANDSCAPE level

🔑 KEY OUTPUTS

- Clarification of the main factors influencing the emergence and development of the current bark beetle increase in Central Europe.
- Finding procedures for the identification of spruces predisposed to bark beetle attack, using satellite images with a short temporal resolution.
- Testing the protection of forest stands against bark beetle attack using a mixture of anti-attractants covered by a Czech patent and an international application.
- Determination of factors influencing the survival of spruce during large-scale forest dieback during bark beetle increase.
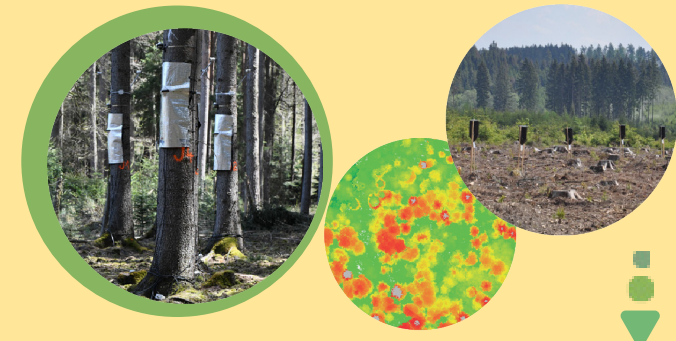
Bače R, Schurman JS, Brabec M, Čada V, Després T, Janda P, et al. Long-term responses of canopy-understorey interactions to disturbance severity in primary *Picea abies* forests. Journal of Vegetation Science. 2017;28(6):1128-39.
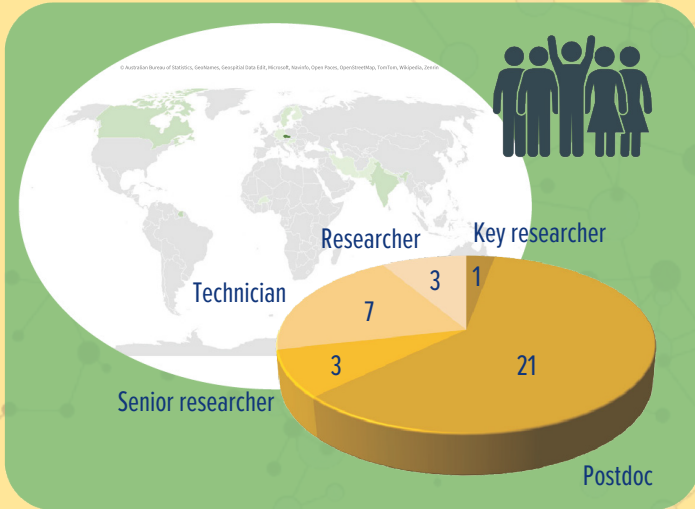
Hlásny T, Zimová S, Merganičová K, Štěpánek P, Modlinger R, Turčáni M. Devastating outbreak of bark beetles in the Czech Republic: Drivers, impacts, and management implications. Forest Ecology and Management. 2021;490:13.

Jirošová A, Kalinová B, Modlinger R, Jakuš R, Unelius CR, Blaženec M, et al. Anti-attractant activity of (+)-trans-4-thujanol for Eurasian spruce bark beetle *Ips typographus*: Novel potency for females. Pest Management Science. 2022;78(5):1992-9.

Korolyova N, Buechling A, Duraciová R, Zabihi K, Turčáni M, Svoboda M, et al. The Last Trees Standing: Climate modulates tree survival factors during a prolonged bark beetle outbreak in Europe. Agricultural and Forest Meteorology. 2022;322:14.

Trubin A, Mezei P, Zabihi K, Surový P, Jakuš R. Northernmost European spruce bark beetle *Ips typographus* outbreak: Modelling tree mortality using remote sensing and climate data. Forest Ecology and Management. 2022;505:9.

The excellent team members

- Key researcher — 1
- Researcher — 3
- Technician — 7
- Senior researcher — 3
- Postdoc — 21

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Selected indicators

Professional publications
created by supported entities

115

International patent application
created by supported entities

1

Professional publications
with foreign co-authorship

88

Centre of Excellence
newly built

1

Modern infrastructure

As part of building modern infrastructure, laboratories were renovated between 2016 and 2023 to a value of 11.2 million CZK and state-of-the-art equipment and machines were purchased to a value of 57.2 million CZK.

Among the most important equipment can be mentioned e.g. a two-dimensional gas chromatograph with a special mass spectrometer with a time-of-flight analyser valued 10.6 million CZK.

EUROPEAN UNION
European Structural and Investment Funds
Operational Programme Research,
Development and Education

MINISTRY OF EDUCATION, YOUTH AND SPORTS

:EXTEMIT-K

CZU Faculty of Forestry and Wood Sciences

Building up an excellent scientific team and its spatio-technical background focused on mitigation of the impact of climatic changes to forests from the level of a gene to the level of a landscape at the FLD CZU Prague

GEN level

TREE level

LANDSCAPE level