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RESDINET NEWS

Detecting stress before decline: Innovation, modelling and resilience science for forests



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A Swedish study has shown, for the first time, that spruce bark beetle infestations can be detected from the air at a very early stage using carotenoid-based hyperspectral methods. Subtle changes in needle light reflection reveal stress long before trees turn visibly brown, enabling faster and more targeted responses. This breakthrough supports RESDINET's mission to deliver evidence-based, remote-sensing tools for early forest protection. It strengthens international collaboration to build resilient forests.

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A recent Slovak RESDINET study in *Forest Ecology and Management* shows how heat and drought affect spruce physiology long before visible decline. Using thermal, hyperspectral, LiDAR and sap-flow data, researchers detected early warning signals that precede bark beetle attack. These findings support rapid, non-invasive forest monitoring and climate-smart management. The work reflects RESDINET's mission to deliver evidence-based tools for resilient European forests.

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At the RESDINET final meeting, researchers took part in hands-on training with the iLand forest simulation model. The workshop showed how disturbances, management choices and climate variables can be tested virtually to explore long-term resilience. By linking field data, remote sensing and ecological modelling, RESDINET is building capacity for evidence-based forest planning. Open-source tools like iLand help scientists make informed decisions for forests in a changing climate.

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At the EVOLTREE–FORGENIUS conference in Madrid, the Slovak RESDINET team presented new findings on spruce resistance, early stress detection and climate-smart forest management. Highlights included physiological traits in “last trees standing,” genomic markers linked to drought recovery, and remote-sensing tools for early bark beetle detection. The contributions show how interdisciplinary science supports evidence-based resilience. This work strengthens Slovakia’s role in European forest research networks and reflects RESDINET’s mission of global expertise with local impact.

ADVANCING FOREST RESILIENCE IN MADRID