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MWP – Young Researcher Abstract 2025

Project title: AI-driven robotics for elite forest plant production

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Abstract (approx. 200 words):
Through somatic embryogenesis (SE), a zygotic seed embryo can be cloned to produce genetically identical plants for forest regeneration and landscaping. The plant material is bulked up as embryogenic cultures, which can be stored long-term in cryopreservation. After field tests the best genotypes are thawed for propagation. When seeds from crossings of elite parent trees of the tree breeding program are used to initiate embryogenic cultures, the results of tree breeding can be implemented faster. Vegetatively produced material is also ideal for genomic selection. SE is a labor-intensive process, and scaling up and automatization are necessary for commercial viability. Robotics are being developed by Luke and Xamk to screen and transfer somatic embryos into germination, which is currently the most expensive step of the process. The robotics have been developed for Norway spruce somatic embryos, and the work is ongoing to apply the robotics to other tree species. AI models are being trained to improve the accuracy of the robots. Luke has registered two SE basic materials and is currently exploring the commercialization opportunities of SE and the related robotics. Using selected high-quality forest regeneration material, productivity could be improved and the effects of climate change on forestry mitigated.

Key words:
Vegetative propagation, somatic embryogenesis, Norway spruce, machine learning, forest biotechnology