

Cultivating the future: Novel crops and new applications

Docent lecture in Biology, specialization in plant breeding by Cecilia Hammenbag

In a future world shaped by climate instability and a growing global population, our journey within agriculture, plant genetics, and plant breeding will be nothing short of epic. The call to action echoes loudly as we steer away from reliance on fossil fuels and embark on a quest to shape a sustainable society powered by renewable resources. Future of food security and supply of industrial raw materials depends on our capacity to challenge conventional understandings and develop new sustainable agricultural practices. Thus, our path forward requires an agricultural landscape that defies convention – producing more with less, while preserving the health of both humanity and our environment as well as maintaining biodiversity. This demands for crops that are adapted to more stringent growth conditions, resilient towards a palette of stresses, resistant or tolerant against disease and pests, but still can provide large yields of high and stable quality.

In this lecture, I will guide you through two ongoing narratives that revolve around crop adaptation for future sustainability. The initial discourse centers on imaging the vast spectrum of prospects that can be found in the development of novel crops, designed to align with future demands. These prospective crops can span the domains of food, feed, bioenergy and industrial raw materials, addressing the multifaceted needs a sustainable society anticipates in the future. Within the context of the amazing diversity of our planet's flora with nearly 400 000 plant species, our agricultural efforts are concentrated on a mere fraction as only approximately 250 species are considered as fully domesticated. Even more remarkable, a mere 15 crops bear the burden of providing 70% of our global calorie intake, highlighting the vulnerability of our food system. With this context in mind, I will delve into the potential trajectory of novel crop domestication, shedding light on an ongoing project of rare significance underway at SLU. The majority of crops grown today originate from warmer climates, posing challenges for their adaptation to the Nordic climate. Introducing field cress, a promising prototype oil crop native to the Nordic countries, specially adapted to thrive in the challenging northern winters holds the potential to provide regionally sourced fats and proteins that are highly demanded. Domesticating native species could address the adaptation issue, potentially resulting in high-yield crops that enhance food security and reduce reliance on fossil oil as an industrial raw material.

The second narrative revolves around optimizing the potential of our existing resources. We delve into unleashing the potential of pea, an agriculturally valuable and nutritionally potent crop. Despite its attributes for human consumption, over 80% of European pea production is currently used for animal feed, making this crop an untapped potential reservoir for the growing demand for plant-based protein sources. This paradigm presents a promising avenue for increasing our plant-based protein supply, aligning with the rising demand for sustainable nutrition sources. Focusing on identifying quality predictors and uncovering the molecular mechanisms underlying crucial traits for improving pea cultivars for human consumption will play a pivotal role in transitioning peas from being primarily used as animal feed to becoming a significant human protein source in Europe.

As we navigate the complex landscapes of crop adaptation and innovation, my efforts aim to enhance our knowledge of plant utilization, harnessing the potential of both new and existing resources to shape a more resilient agricultural future.