

Theme 3: Future Agri-Food Systems

1. 'One Crop Health for Next Generation Crop Protection', DKK 59,984,534 over 6 years

Main applicant: Paul Neve, Department of Plant and Environmental Sciences, University of Copenhagen

Co-applicants:

Per Kudsk, Department of Agroecology, Aarhus University

Jonathon Storkey, Department of Protecting Crops and the Environment, Rothamsted Research

Sune Darkner, Department of Computer Science, University of Copenhagen

Brief description:

Thirty percent of potential crop yield is lost to pests (herbivores, pathogens, weeds) and current efforts to limit pest impacts often rely on the routine application of pesticides. The One Crop Health programme combines the latest advances in agricultural science, ecology, sensor technology, machine learning and modelling to reduce reliance on pesticides and limit the negative environmental impacts of crop protection. In common with public health approaches that prioritise disease prevention, surveillance and early detection, in an effort to limit the need for intervention, we will explore (i) the importance of agroecosystem health and functioning for limiting pest population pressure, (ii) the use of sensors, diagnostics and digital twins for early pest detection and site-specific interventions and (iii) the development of control strategies that are more targeted and have less negative environmental impacts.

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2. 'N2CROP - Legume innovation for future agri-food systems', DKK 59,997,659 over 6 years

Main applicant: Stig Uggerhøj Andersen, Dept. of Molecular Biology and Genetics, Aarhus University

Co-applicants:

Esben Skipper Sørensen, Dept. of Molecular Biology and Genetics, Aarhus University

Martin Weih, Dept. of Crop Production Ecology, Swedish University of Agricultural Sciences

Jesper Holck, Dept. of Bioengineering, Technical University of Denmark

Brief description:

Sustainable production of plant food protein is challenged by heavy use of chemical nitrogen fertilisers. Legumes fix atmospheric nitrogen, N₂, through symbiosis and could greatly contribute to addressing this challenge. However, legumes remain minor crops in Danish and European agriculture. N2CROP will develop legumes that can serve as nitrogen engines for agriculture, providing biologically fixed nitrogen not only for the legume itself but also for companion crops that are not able to fix nitrogen themselves. This will be accomplished by enhancing nitrogen fixation and prioritising bioavailable seed protein and plant growth over total legume seed yield. The ambition of N2CROP is to develop legumes that perform so well in mixed cropping systems, e.g. in a wheat-faba bean mixture, that it will become unattractive to grow cereals as monocultures. This would expand legume cultivation far beyond what is currently considered possible, greatly advancing agricultural sustainability.

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