InnOBreed

Alternative ways of European participatory organic fruit breeding projects

The APPLE OASIS project

UNIVERSITY OF COPENHAGEN

Funded by the European Union

Project funded by

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs, Education and Research EAER
State Secretariat for Education, Research and Innovation SERI

Funded by the Horizon Europe Framework Programme of the European Union under grant agreement No 101061028

University of Copenhagen & the Apple Oasis

The Apple Oasis project takes place at the University of Copenhagen, Department of Plant and Environmental Sciences, section of Crop Sciences. This is where education and research in the fields of biotechnology, plant sciences and the environmental sciences meet – from the molecular scale to entire ecosystems. The goal is to create essential and excellent research and courses within the focus areas, and to strengthen the interdisciplinary collaboration between them.

The section of Crop Sciences is situated in Tåstrup just west of Copenhagen in connection to experimental fields, greenhouses and the fruit- and berry genebank: the *Pometum*. The section of Crop Sciences studies and teaches basic and applied sciences related to crop production. The core of interest is the interaction between genotype, management and environment as the basis of crop growth and production of sustainable food, ornamentals, fibre and bioenergy.

Within the section of Crop Sciences, senior lecturer Torben Bo Toldam-Andersen and academic worker Maren Korsgaard are collaborating on fruit science. In addition to other tasks, they are both working together with the Danish national genebank of fruit and berries: the *Pometum*.

Torben Bo Toldam-Andersen
University of Copenhagen

Maren Korsgaard,
University of Copenhagen

Apple Oasis - a collaborative project

While the initial objective of the Apple Oasis project was to promote more local apple trees in the Danish landscape and develop new robust cultivars for organic growing, the current focus is on creating a collection of robust and tasty apple cultivars with great diversity, in cooperation with local volunteers.

The Danish national genebank, the *Pometum*, has a collection of approximately 800 apple cultivars, of which approximately 280 are original Danish cultivars. In 2006-2009, the robustness of the old Danish cultivars was screened under unsprayed conditions. Based on this information and on the taste of the apples, 52 robust and tasty old Danish cultivars were selected as mother-cultivars for the Apple Oasis project.

The Apple Oasis project provides an example of social innovations in terms of engaging volunteers in a long-term participatory activity. Furthermore, technological innovations involved include the use of DNA-analysis to identify the two parents of the new robust cultivars.

In 2013, open-pollinated seeds of the selected cultivars were taken out from the *Pometum,* dried and packed in bags of 10 seeds. Volunteers were invited to learn about growing apple trees from seed, starting out from these seed bags to sow in their own gardens/farms. Approximately 130 people from all over Denmark participated and received in total 10.000 apple seeds.

As the University of Copenhagen followed up on the seeded trees in 2019, about 50 volunteers had been successful in growing apple trees. In total, 2000 apple trees were alive, and some had started to fruit. Since 2019, regular visits have enabled an evaluation of the trees and fruits for robustness and taste. The fruiting was later than expected, with only one third of the trees having fruited in 2023. Until 2022, 91 interesting seedlings have been selected, which are now grafted and planted for further investigations at the *Pometum*.

The volunteer Solvejg Pedersen has planted her seedlings as a hedgerow at an organic farm.

InnOBreed collaboration

Since 2022, the Apple Oasis project is part of the InnOBreed project as a case study, joining a network of European colleagues working in the same field.

The activities of the Apple Oasis project contribute to InnOBreed by giving a new perspective on how different ways of participatory breeding can be done. The case study demonstrates what is possible to achieve, when releasing new combinations of apple genetic diversity from the genebank with the help of volunteers. The seedlings are grown in private gardens under unsprayed conditions, which means, that the natural pressure from diseases, pests and our new climate has wiped out the less robust seedlings. This more natural cross-breeding and selection might result in cultivars with a long lasting robustness. Which is what is needed in organic fruit growing.

"Through the collaboration with InnOBreed, we have learnt from the experience of other European actors, for instance in defining, evaluating and scoring different apple diseases in new cultivars."

In terms of concrete opportunities, the Apple Oasis project will get one of its seedlings tested in a trial by the InnOBreed partner SERIDA (Spain). SERIDA is carrying out a trial to test new rootstocks for their resistance to rodents, and the Apple Oasis project has an interesting seedling for this purpose. The Apple Oasis will also start testing a non-destructive tool to define fruit-maturity. Furthermore, InnOBreed has made the Apple Oasis project focus more on the social impact, which is carried out as part of the work.

You can find more information about the "Apple Oasis" project here: https://pometet.ku.dk/projekter/ (in Danish)

You can find more information on the fruit genebank "The Pometum" here: https://pometet.ku.dk/ (in Danish)

For further details, contact Maren Korsgaard: mkor@plen.ku.dk

Leftovers from tasting of new apples, showing a huge diversity of shape, colour and taste