Translation of the article:
https://www.wedemain.fr/ralentir/fruit-rescue-au-secours-des-arbres-fruitiers-face-au-rechauffement-climatique/

Helping fruit trees adapt to global warming

Led by researcher Amandine Cornille, Fruit Rescue is a vital project to protect future food security. By decoding the genome of fruit trees – apples, apricots, peaches, olives as well as grape vines – and their wild ancestors, the team is identifying the varieties that will be able to withstand a changing climate and where they should be planted to ensure fruit production.

Comme les forêts, les vergers sont en danger face au réchauffement climatique. Fruit Rescue cherche des solutions. Crédit : encierro / shutterstock.

If you pick up a Pink Lady apple, you might admire its smooth roundness, its light red blush shading to green or imagine its tart sweetness and crunch. You might also assume that this apple is a normal, everyday product of modern agriculture. But its history may surprise you: the Pink Lady originated in the woods of Kazakhstan in Central Asia, where its wild ancestors still grow, but which are smaller and much less tasty. Yet they share part of the genome of the apple you hold in your hand. And they also have a common enemy: climate change.

Amandine Cornille, a researcher in the evolutionary genomics of plants and insects at the French National Centre of Scientific Research (CNRS), explains the impact the climate has on fruit trees: “Last year in France we had a late frost after a warm spell, damaging the fruit buds. The rise in global temperatures will result in flowering taking place much earlier, putting fruit crops at risk of late cold snaps and leading to production problems. This is the case both for cultivated fruit trees and their wild relatives, whose pollination and reproduction will be affected." In addition to habitat loss, pests, and hybridisation between cultivated and wild fruit trees, fruit is threatened by changes in the temperature, weather, and seasons.

The good news is that scientists can help fruit trees become more resistant. With this in mind, Amandine Cornille launched the Fruit Rescue project, with the initial aim of finding out how apple trees and other fruit trees are adapting to climate change in Europe's temperate zones.

A key objective is to map "which fruit trees will be able to be grown where over the next 30, 50, 100 years", explains Amandine. This will be an essential tool for planning our future food security and will also be useful for farmers and the wider food industry. The urgency explains the project's support by the BNP Paribas Foundation until 2025 within its "Climate & Biodiversity Initiative": support that will allow the study to be extended from apple trees to apricot, peach and olive trees and grape vines.

Part of the team's work takes place in the laboratory, where they decode the genomes of cultivated fruit trees – for example, apples – and their wild relatives. Their genetic differences stem from 1500 years of human domestication of the apple, involving innumerable hybridisations, as well as the recent development of advances that allow genetic improvement. The large, sweet apples found in supermarkets are an impressive illustration of this. The Pink Lady and the Golden Delicious are both derived from the same variety whose wild ancestor in Central Asia produces a small, sour fruit. As for the Granny Smith, its distant ancestor is found in Europe, in the forest of Fontainebleau, and the fruit of its wild relative is also small and bitter.

How have these trees adapted to climate change over the centuries? The scientists are trying to find out, to identify the trees best able to withstand the risks of tomorrow. The team has found that some are remarkably adaptable. "Around 20,000 years ago, the climate cooled and the wild European apple migrated southwards. Then around 10,000 years ago, during a period of warming, they recolonised northern Europe. We know that wild species have the potential to do this," says Amandine.

The Fruit Rescue project also takes its work outside the laboratory into the field. It is carrying out research in orchards all over France, as well as in Romania, Spain, and Germany. The project will soon be extended to Greece (for apricot trees) and North Africa (for olive trees). Data obtained in the lab is cross-checked with data from the field obtained by monitoring the development of the trees: time of budding, flowering, growth, etc.

Translation of the article:
https://www.wedemain.fr/ralentir/fruit-rescue-au-secours-des-arbres-fruitiers-face-au-rechauffement-climatique/

Beyond the data they provide, these orchards are invaluable genetic banks. The aim of the project is very specific in this respect: to conserve the varieties most likely to be cultivated in the future, as well as those most able to recolonise wild areas threatened by global warming and hybridisation. To achieve this, "we will need to extend natural areas, but biodiversity is a constant dynamic and life always finds a way," affirms the researcher.

Broadening the scope of the study to the general public, Amandine is appealing to citizen science, calling on all those who have apple trees in their gardens to get involved: "You can measure the fruit trees, their flowering and budding times, their production of fruit, etc. We'll be announcing more information about this soon."

And while climate change will require us to question which varieties we plant, the scientist points out that we must also question the way we grow crops. "Monocultures have encouraged the colonisation of parasites and pathogens. If we combine different varieties within orchards and retain hedges, we create a dynamic that will help to eliminate pests. This method may turn out to be less productive than monoculture, but we don't know that for sure."

We will also have to question our consumption patterns. "There's no such thing as a perfect apple, at least not without artificial treatment. We must get used to apples that don't look flawless," Amandine warns. But she realises that the challenges of climate change and biodiversity loss will require more than small steps. "Decisions need to be taken at a much higher level," she stresses.

Arthur Hily