



A personal agricultural adviser that fits in your pocket

How a Tunisian start-up is making artificial intelligence in agriculture accessible to everyone, without any complex technology.

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This article appears as part of our series on sustainable development goals and tech-based solutions from Africa, which we are discussing with an African-German community.

"The biggest disadvantage is that I no longer see my advisors at all, and almost everything is over the phone." Amine Cherif laughs. The 37-year-old accountant started investing in agriculture six years ago. Apples, grapes, a few peach trees and olives grow on the eight hectares of fields on his small farm in Zaghouan, about an hour south of the capital Tunis.

But behind the laughter hides tension. It rained a lot in May and June. This May was the rainiest month since 1950. Usually these months are very dry in Tunisia. While the rain has helped fill in the country's empty reservoirs, it could be fatal to the grapes, leaving them vulnerable to fungal disease. That could ruin the harvest.



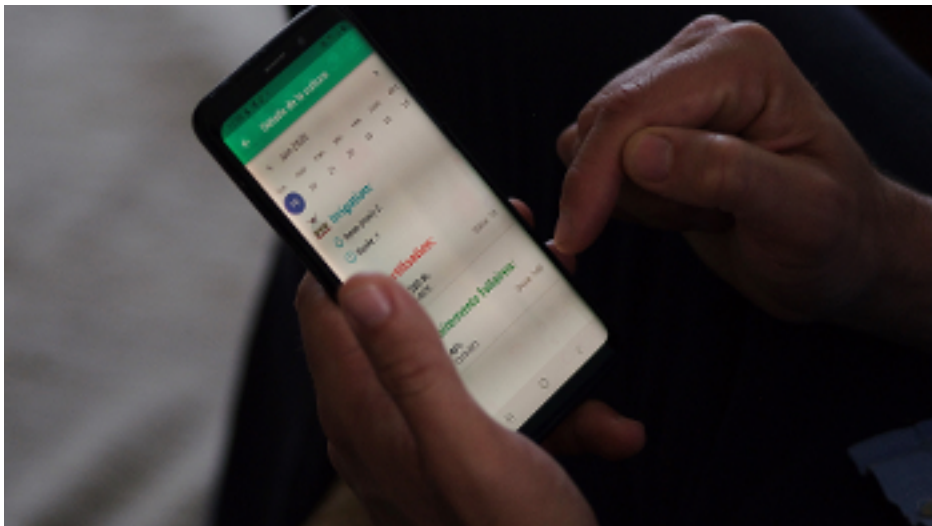
Amine Cherif examines the fruit. The threat of a fungal disease on the grapes seems to have been averted.

Recommendations straight to your smartphone

Cherif started treating the plants quite early in the season. He used an antifungal agent suggested by the Crop's Talk smartphone app. The app is his personal agricultural advisor in his pocket, he jokes. Rabeb Fersi and Samir Chebil, the inventors of Crop's Talk, used to come to his farm to advise him. Today, their recommendations come directly and automatically to Cherif's smartphone. Events such as the unexpected rainfall in early summer are a test for the application's algorithms.

Cherif is part of a generation of young Tunisians who are new to investing in agriculture and see opportunities there despite the challenges of climate change. In contrast to the older generations, the young farmers are very open to digital solutions. However, they often lack the traditional knowledge of their elders and agricultural training. "I had a lot of problems with irrigation," Cherif says. "Farm workers in Tunisia are often poorly qualified, so there was either too much or too little watering." As a result, he risked repeated crop losses.

In search of modern, smart irrigation solutions, he first became aware of a sensor-based technology that had also been developed by the founders of Crop's Talk. But for a small operation like his, the high initial investment costs were not worth it. When the software-based solution came onto the market, he was immediately enthusiastic. "It's better than spending many thousands of dinars and not knowing if it will pay off. And it's also cheaper than personalized advice." Success came quickly. "I'm seeing really good progress on harvest and disease control. You can treat better if you start on time. At the same time, it reduces costs and increases earnings." He's been much more relaxed since having the app.



How does the app work? Users receive a weekly plan on their mobile phone, updated daily: for each field and crop, the application recommends if and how much they should water, fertilise and spray for the day. If the weather changes, the plan is automatically updated.

Countless algorithms run in the background so that farmers like Amine Cherif receive their personalized work schedule on their cell phones each day. Founder Rabeab Fersi decided she wanted to develop smart solutions for agriculture while she was working on her master's thesis. The agronomist was dismayed by the huge gap between the latest scientific research and what farmers are actually doing. In 2017 she founded the company iFarming together with Samir Chebil, who was supervising her academic work. "As a rule, farmers follow the experience that they have acquired over the years. They are not up to date on new research findings, new varieties or adaptations to changing climatic conditions." She wants to close this gap with Crop's Talk. With her partner, she has "25 years of know-how that we translate into algorithms that combine mathematical and agronomic calculations."

Recommendations in real time

The key advantage of her app is that it considers a whole series of parameters in real time and doesn't just rigidly follow a given plan. "Based on the geospatial data, we take into account the microclimate of each growing area, as well as the variety, the age of the plants and so on. And then we run our algorithms, which use all of this data in real time every day to carry out simulations and calculate what the crops need." For example, daily precipitation forecasts are included in the irrigation schedule. And if it didn't rain after all, compensation for the next day is planned. This makes precision irrigation possible without expensive soil sensors or a farmer's own weather station.

In addition, the application calculates fertilizers and pesticides "depending on the development stage of the plants, the so-called physiological stage. This means that we carry out fewer but more effective treatments and only treat when it is really necessary."



Rabeab Fersi and Samir Chebil (right) work on Crop's Talk with a small team of developers.

Depending on the crop, they have so far managed to cut water use by 40%, increase yields by around a third and reduce production costs by a quarter. "We have translated our accumulated knowledge and experience into mathematical equations. And these variables are now adapting thanks to the algorithms. In other words, they learn thanks to the use of [artificial intelligence](#)." According to Fersi, well over 90% of start-up founders in the agritech sector come from IT. "We come from the outside and know exactly what the farmers need," she says. This is their strength.

Crop's Talk fills a unique niche among farming apps

While most other smart farm management solutions are either sensor-based solutions or use satellite data, Crop's Talk approach, based only on software and a plant's stage of development, has created a niche where there is little competition.



Houcine Salhi is the technical director of the 29-hectare Dar El Khir farm in Khelidiya. Since he started working there in 1990, the rainfall has decreased massively and the climate has changed.



"The seasons are not what they used to be: Winter and autumn are too dry and warm, and summer is far too hot. The cycle of the plants has become completely confused. They no longer understand what season it is."



Since he started using the Crop's Talk app two years ago, water consumption has dropped by a third. "We have also used around 15% less fertiliser in the last two years. Only pesticide consumption has remained more or less the same," says Houcine Salhi.

The founders of Crop's Talk started with fruit trees. In a pilot project in Senegal, the application is also used in potato, pepper and tomato cultivation. The foundation of the

controversial seed and pesticide giant Syngenta covers the cost of the app for around 3,000 smallholders in the greater Dakar area. Another project in Côte d'Ivoire is in preparation, as is a version for grain cultivation. In addition to the North and West African countries, they also want to conquer the southern European market, which has similar climatic conditions and, like the Maghreb, is suffering massively from the consequences of the climate crisis. "The advantage of our algorithms is that they quickly adapt to any culture in any country," Fersi says.

Digitization in agriculture in Germany

In Germany, digitization in agriculture is relatively advanced, says Michael Clasen, professor of business informatics at the Hannover University of Applied Sciences and Arts and a specialist in agricultural informatics. "I actually think that in agriculture we may have gone a bit too far in recent years. Digitalization hasn't lagged behind. On the contrary, we have sometimes developed solutions for problems that didn't exist." In a survey he recently conducted among younger farmers, the use of digital technologies was taken for granted. The number of start-ups in the agritech sector is also relatively high. Apps like Crop's Talk would only be interesting for the smallest farms in Germany, he says, since most farmers have university degrees and the average farm area is much larger than in Africa. However, paperwork is becoming increasingly important in Europe due to strict guidelines. "And that's where it gets interesting," he says. "If you develop voice-based solutions that allow the farmer sitting on the tractor to say: 'I'm taking the following protective measure.' The system records it, the documentation is done and the EU is satisfied." The scalability of the purely digital approach can also be a weakness, he cautions. As soon as one of the giants like Google offers a similar product, the market is dead, he says.

However, when Amine Cherif opens the app on the sofa at home in Tunis, he still has to call his workers to tell them what to do every day. "I'm still waiting for the Arabic version. The workers don't understand French, so I have to tell them what to do every time."

While around three quarters of Tunisian farmers own a smartphone, many do not speak French. Offering the app in other languages in addition to French, English and Wolof, the lingua franca in Senegal, is one of the most urgent items on the young start-up's to-do list. They are also thinking about a way to make the app usable offline or with voice messages. That could further reduce the costs for users and at the same time reach the illiterate among the approximately 300 million small farmers on the African continent. These are a cornerstone of the food supply in many African countries, but

at the same time they are particularly vulnerable to the climate crisis and crop failures.



In the picturesque setting of the Jbel Zaghouan mountain range, Amine Cherif also grows apples.



In Tunisia, olives were traditionally grown in dry conditions, but they now have to be increasingly irrigated because of the climate crisis.



To ensure he always has enough fertiliser, Amine Cherif recently bought a few cows.

A small contribution to securing the production chains

That's why the app's smart watering plan will remain free of charge. "This is our small contribution in light of the water scarcity that is affecting most countries. If you equip the weakest and most vulnerable link in the agricultural chain with the right tools, you can strengthen the entire production chain," Fersi says. Users do have to pay to receive recommendations for the use of fertilizers or pesticides. (The app only suggests those that are approved for use in the user's country.) But fees can be paid online and weekly, without complicated subscription structures. While personalized advice in Tunisia costs the equivalent of around 5,000 euros a year and hardware solutions cost up to 20,000 euros, the app only costs 10 to 15 euros a month.

Amine Cherif is confident about his late summer grape harvest. His fruit seems to have survived both the late rains and the subsequent extreme heat wave thanks to the early fungal treatment. Without the app, he says, this year easily could have been a disaster.

The project was funded by the European Journalism Center, through the Solutions Journalism Accelerator program. This fund is supported by the Bill and Melinda Gates Foundation.

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