AGNÈS PAPONE
fermelavancia@gmail.com

Small organic family farm producing 30 varieties of vegetables and raising laying hens for organic eggs and manure

Digital technologies/tools/applications

We're using two technologies to try to improve our efficiency/productivity. The first is a web-based platform for selling our products directly to consumers in short supply chains, called www.cagette.net – its chief advantage over other such platforms is that by design it encourages and incentivises producers to form groups together and to become more technologically autonomous. The second application is a farm management tool to collaborate on all the farming tasks, which maps down to the field level allowing projections of harvest timing for each crop, yields, quantities to plant, maintain and sell. We are a beta site working with the development team to co-create the solution, www.elzeard.co which we expect to help optimise all our work on the farm.

Benefits

I often hear the saying that happy farmers are well-organised. We have sought to innovate every year and regularly challenge ourselves with new crops or new processes. This last year we've decided our most important innovation will be to save time and to use it more wisely to improve our quality of life. So farming more efficiently is benefitting our business because improving time management saves money and improves profitability.

Knowledge and skills

We informed and taught ourselves and we also underwent training provided by the partners we work with providing the technological solutions.

Challenges

The biggest challenge is taking the time to thoughtfully implement changes and innovations so that they are working for us and not the other way around!

BORIS BRESTNICHKI
b.brestnichki@geosemselect.com

Geosemselect LTD is a vegetable breeding and seed production company. We specialise in breeding and producing hybrid tomato varieties.

Digital technologies/tools/applications

Hydroponic growing:
- HydroBuddy – free and open-source program for calculating nutrient solutions for hydroponics
- Plant breeding:
- Custom Solution – Cataloging software that keeps track of important characteristics in regards of breeding purposes
- Field Book App – Android app created to replace paper field books, enabling increased collection speed with greater data integrity

Benefits

HydroBuddy has allowed us to transition to hydroponics growing, doing the heavy lifting in nutrient solution calculations. We are growing a lot of different varieties and species of plants and need to be flexible in iterating them. Hydroponics for us is a must, as we are growing only in greenhouses and soil pathogen risk is high.

The Plant Breeding Software has given us a better overview of our breeding process. Looking into the data from multiple years and different crosses gives us the opportunity for a clearer picture of the genetically determined characteristics of the breeding material. The system is part of our effort to eliminate the guesswork in the plant breeding software, making the results faster and more reliable.

Field Book has been very helpful in reducing labour costs in data collection and handling. We've encountered some important technical inconveniences but it gets the job done.

Knowledge and skills

The skills and knowledge have been internally developed at the company.

Challenges

The main challenge in both cases has been the adaptation of the software to our reality.
This is also the main reason to look for a custom solution in the case of the breeding system. We have found that a deep understanding of the non-technology aspects of the problem is key in order to use software successfully. The modeling systems are often deviating from the reality and it's important to know what kind of traits or data can be modeled and what is hard to pull value from.

We have mixed success in introducing the systems to breeders and agronomists that have worked with the old "offline" methods.

JOLANDA RAAIJMAKERS
info@adraaijmakers.nl

Arable farm, contractor: including innovative crops and crop treatment:
Developing software with my farmers' organisation ZLTO
Vocational education on the farm

I use ICT for	Benefits of ICT	Challenges
Management: planning, registration & labelling, precision technology		
Accountability, complying with quality labels and certificates; Optimum treatment based on soil and crop	**Surviving**: impossible to plan without ICT tools Income: better market for better products **Promise**: see more than the human eye in the future	• Tangible, better insight: projects per parcel • Integration of tools & data (lease, costs, yield, etc): save time / fewer mistakes • Generate output for supply chain partners, authorities, stats, certificates • User-friendly: on the parcel, the phone asks: "What will you do?" • Entrepreneur decides what to do with the data
Education & qualification in practice		
Student & qualifications administration	Future: Well-trained workers in agriculture	• Agriculture has a lack of students, • therefore a lack of budget to develop trainings, • therefore lack of proper training, • therefore a lack of students.

How I acquired ICT skills:

Basics in education
• myself: educated in care; my husband in farming

Permanent education
• learning by doing, study groups, advisers: training in the Fairshare project

Teach others
• starting at primary education: Class Farmers
• students, together with schools like Helicon
• demonstrations, FarmDemo makes them professional

FAIRshare
DIGITAL TOOLS FOR FARM ADVISORS

klasseBOEREN
Leren door beleven!

FarmDemo

Helicon
Opleidingen

Drones in het onderwijs

smart farming drones innovatie
Europese samenwerking technologie
kennis delen precisielandbouw
data-analyse

helicon.nl

JUAN OLIVARES
jolivaresfer@gmail.com

400 ha farm (155 ha olive trees + 35 ha almond trees + 190 ha scrubland)
Organic certification. High quality olive oil mill (inside the olive farm)
3 systems: Traditional olive trees of local varieties.
Intensive Picual. Arbequina super-intensive hedges

Digital technologies/tools/applications

- Precision farming: monitorisation of environmental conditions (relative humidity, temperature, soil temperature, soil humidity) using a different station (data logger) with sensors
- Remote irrigation management: fertigation and irrigation telemanagement

Next step: Smart trailed air blast

Benefits

- Precision farming:

Accurate monitorisation of the environment of the crop. This monitorisation helps to take better and more precise management decisions. The 2 biggest benefits are:
1) better and more efficient control of the irrigation (we get real information of the soil humidity): more efficient
2) better and more efficient integrated pest and disease management (more information, better decisions)

- Remote irrigation management:

Control what the irrigation system is doing. In case of a mistake, the system gives you an alert and checks where the mistake is coming from.

Knowledge and skills

Taking a general course on the use of this kind of technology, and researching by myself. These technologies are new and there are very often updates and new devices and technology options. Therefore, self-learning capacity is needed to improve and renew your knowledge and skills.

Challenges

When I started to use this technology, the work team didn't trust the sensor systems at all. Therefore, I have to teach them and show them how to use and understand this kind of information.
The other problem is, when you manage a big farm, the situation of the weather station is essential (there are huge environmental differences in a few metres). So, sometimes you can receive confusing information that leads you to take wrong decisions.

LAURA GIRDŽIŪTĖ
laura.girdziute@vdu.lt

GEDIMINAS URBONAVIČIUS
gediminas.urbonavicius@lsmuni.lt

The Public Institution Practical Training and Trial Center is a scientific institution that provides practical training for veterinary students and generates its revenue from agricultural business

Digital technologies/tools/applications

The Public Institution Practical training and trial center of the Lithuanian University of Health Sciences is testing a few new technologies:
1. "Pitstop+" – this technology consists of special feeders, electronic ear tags for cows and suitable mineral feed supplements. This system delivers an individual dosage of minerals to each cow.
2. "Feeding robot" – a special robot for moving and mixing feed. It is adapted for movement on uneven floors.
3. "Nitrogen sensor system" – scans the amount of nitrogen in the plant and spreads fertiliser as needed. This system can be used with an automatic steering system which operates within a tolerance zone of 2 centimetres.

Benefits

1. "Pitstop+" – ensures an efficient use of minerals. This system improves cow health, reduces somatic cell count and ensures a complete mineral supply.
2. When the "feeding robot" moves in a barn, it causes the cows to become more interested in the feed. The more cows are fed, the higher the milk yield becomes. Farm labour productivity is also increasing as more time is left to do for other jobs on the farm.
3. "Nitrogen sensor system" – helps in a rational and efficient use of fertilisers.

Knowledge and skills

1. The "Pitstop+" technology can be monitored through a mobile phone app. It is very convenient, but this requires some level of computer literacy and having a computer or smartphone.
2. The "feeding robot" does not require any special skill set.
3. The "nitrogen sensor system" can be used by every skilled tractor driver.
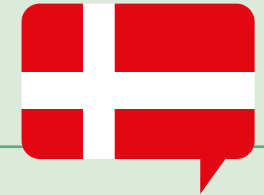
Challenges

"Pitstop+" – during the introduction of the technology, the cows blew the wires. They had to be replaced. The adaptation of the "Feeding robot" and "Nitrogen sensor system" on the farm were without challenges.

KNUD BAY-SMIDT
kbs@skylinemail.dk

300 ha arable-and grassland. Cereal, Grass seed, Oilseed, Legumes and permanent grass for hay.

Digital technologies/tools/applications

CROPsat (provided by the authorities) – A tool to create prescription files to control the application rates.
Satellite image/NDVI, precision soil mapping, plant samplings and yield data.
Farm Tracking – An app for task registration. A digital notebook. The notes are merged with the field records. Variable lime, seed and fertiliser rates according to soil tests and historical data. The application of seed is done by an Agleader terminal and the fertiliser through a GPS/Tablet solution. A contractor is applying a variable rate of lime.
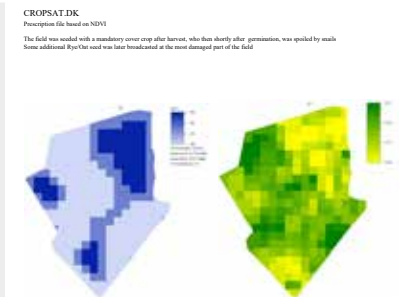
Benefits

A more detailed knowledge about the soil, its nutrition content and yield potential. The most beneficial changes have come from the variable lime and seed rates. It gives a more even stand of plants with variable seed rates.
The fertiliser spreader's automatic on/off at the headlands, and its adjusting to avoid overlap, have resulted in much fewer problems with lodging.

Knowledge and skills

Learning by doing! The capability to get the full benefits of the precision technology is an ongoing process and we have just entered it. The suppliers of the technique offered some hours of training through a free training course. The authorities offer some training regarding the use of CROPsat. They encourage farmers to use it, with the purpose of minimising the impact on the environment.

Challenges

A major challenge is to pick the right technology that suits one's needs, at an affordable price. The development of new, smarter and cheaper solutions makes the horizon for the investment very short.

CROPSAT.DK
Prescription file based on NDVI

The field was seeded with a mandatory cover crop after harvest, who then shortly after germination, was spoiled by snails
Some additional Rye/Oat seed was later broadcasted at the most damaged part of the field

MAJA KÓSA
kosamaja@edu.u-szeged.hu

- Feeder pig farm
- Located in Vojvodina (Serbia)
- Established in 2019
- 31 sows and almost 200 piglets in the first year

Digital technologies/tools/applications

Because we are a feeder pig farm, we are planning to use an electronic feeding system.

Benefits

We expect to:
- increase the production,
- reduce the costs,
- reduce food waste,
- monitor growth rate,
- improve livestock health,
- ensure us to act in real-time

Knowledge and skills

To successfully realise this goal, I prefer the following channels:
- online courses of the Prosperitati developmental programme,
- online courses at Coursera platform,
- participating at seminars and trainings

The Prosperitati developmental programme has been organised by the Hungarian government from 2015 up to now. In the form of online farming training, they intend to integrate famers, and so to develop their digital (and) agricultural knowledge and skills.

Challenges

As a beginning pig farmer, I identify the following difficulties:
- financial background
- few users in the immediate environment
- appropriate knowledge to use these technologies

MIGUEL CACHÃO
Miguel.cachao@avipe.pt

Wine producer with 10 ha of own vineyards, who also buys from other local farmers. Most of the wine is sold in bulk, some are sold as a bag-in-box, some in bottles.

Digital technologies/tools/applications

On my farm, I am using sentinel 2 images, and with the NDVI index it is possible to define areas which will have different treatments. That difference is not just about different vigour but also about different soil types.
Besides being a farmer, I also work in a farmer's association and we use these images to define which vineyards will produce better wines. We also use remote pest traps, and weather stations to predict diseases and study climate change in vineyards. We have used fluorescence to anticipate nutrition needs.

Benefits

There are economic and environmental benefits to using this information. The major benefit is that it is possible to spend money in a better way. I don't consider my farm to be a single one but rather made up of several ones. I treat differently what is different, and that also means environmental considerations. I will use different amounts of production factors on different areas.
From the farmer's association's point of view, it is possible to add more value to different vineyards and have a better value for wineries. Besides this, with the weather station, it is possible to predict diseases and give farmers an earlier warning.

Knowledge and skills

Knowledge and skills can be acquired on the internet and by reading some documents about it. It is quite time-consuming and you need some patience to have your first results. Images help us to identify spots but we need to validate that information on the field.

Challenges

Challenges to use these technologies are how we can translate that amount of information to a simple system to decide. What would the difference in results be between the use of technologies and simple observations? How much would this data be payed for? Presenting this information to farmers is always a challenge because there is social reluctance. Future challenges will be about information accuracy, sensor development and how we can make things simple.

SAVERIO DELSANTE
s.delsante@libero.it

Società Agricola Delsante: Parmigiano Reggiano dairy farm
Caseificio San Pier Damiani: Parmigiano Reggiano dairy plant

Digital technologies/tools/applications

Our project "Aggregation of producers of Parmigiano-Reggiano cheese in order to create a short supply chain for direct sales via social media" as mentioned in the title is based on the creation of a platform for direct selling of Parmigiano-Reggiano cheese. This platform was created by means of an adaptation and combination of the main online and web-marketing tools. Thus it is a mix of e-commerce, market places (Amazon, Airbnb, Tripadvisor) and main social media (Facebook, Instagram, Twitter). These tools are used to communicate intrinsic values of our dairy production, adding elements such as: the social responsibility of the dairy farm, innovative products (Halal certification) and focusing on biodiversity.

Benefits

A significant increase of cheese quantity sold directly to the final consumer and an increasing number of visits of consumers who want to know our production process. And finally we created an added value at farm level.

Knowledge and skills

We created an Operational Group involving the dairy farm Società Agricola Delsante Elevezio e Saverio; the dairy plant cooperative Latteria Sociale San Pier Damiani, the Research Institute CRPA, a certification company and a webmarketing company. All these actors have contributed with their skills to the success of this project.

Challenges

The challenges for the future is to maintain our company reputations, increase our direct sales and export and improve some technical features of the cheese production. But also finding skilled workers able to combine manual work with internet services.

VINCENZA FERRARA
donidinatura@gmail.com

In a rural area of inner Sicily, inspired by agroecology, we steward ancient olive trees and produce our own organic extra virgin olive oil.

Digital technologies/tools/applications

As my farm is an extensive farm made of several different plots of land spread in the landscape (Figure 1), I use Geographic Information Systems within an overall approach of integrated landscape analysis. This is first to understand the ecological features and ongoing dynamics both around and inside my orchards, secondly to support practical aspects in their daily management.

In terms of **integrated landscape analysis**, I have applied GIS to understand which are the agro-ecological and geomorphological features which characterise the specific **terroir** in my farm (Figure 2), as well as to create proper 3D models of the whole area (Figure 1).

An example of GIS applications for the resolution of a practical spatial problem has been the **calculation of the best location** where to plant new trees in two orchards, in relationship to the location of already-present scattered old trees (Figure 3).

Finally, I have been carrying out a research project in collaboration with Stockholm University to understand which could be the new analytical workflows that agricultural professionals can use to improve their **capacity building** in relationship to Climate Smart Agriculture.

Benefits

Better understanding of all the different environmental components that play a crucial role for the determination of the soil, ecological and habitat features on my farm, thus consequently a better management of the farm itself. Increased promotion: the work done about the terroir has been showcased in the book "Food and wine tourism. Integrating Food, Wine and Terroir", edited by CABI as a case study adopting good practices.

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Knowledge and skills

I also have an academic background in GIS and Remote Sensing, flanked by ongoing self-learning training under the NASA ARSET Programme and now Copernicus.

Challenges

- Scarse availability of open and updated regional geodata.
- Low capacity building on the use of free available satellite images at the large scale (small-scale farms).
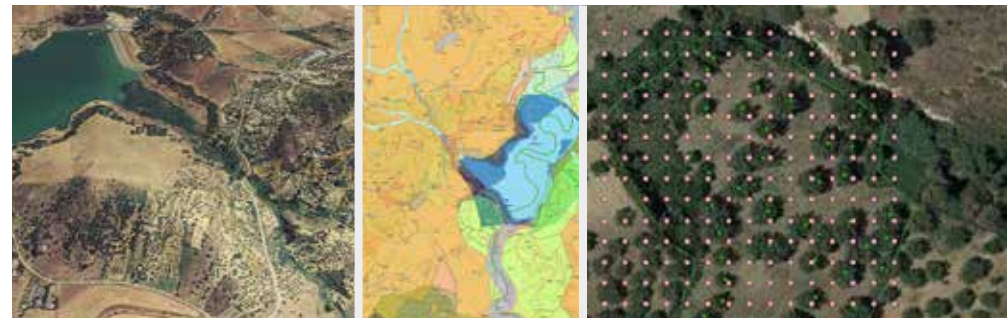
YOLÈNE PAGÈS
yolene.pages@gmail.com

Involved in farming with dairy sheep, suckle cows and mixed cultures on the family farm since I was young. My area, Aveyron, is the area of production of the Roquefort PDO, a blue sheep cheese, the oldest PDO in France.

Digital technologies/tools/applications

I am working on 3 differents projects linked to adding value to the farm system at different levels:

- "Les éleveurs du Rougier" – Collective joint venture with 6 other farms to collect and deliver the sheep milk to small artisan cheesemakers, with a strong focus on the quality of the milk to make "raw milk"; we use the cloud to work together.
- "Les Locomotivés" – This is an NGO, gathering consumers and producers to deliver once a week a huge range of different local products; we use an app "mon panier local" to manage the logistics and the orders.
- "Le jardin d'Arvieu": the numeric village; a place to mix numeric, rural and agricultural people.

Benefits

By using the new technologies, we save time and we can work in a more collective and efficient way.

Knowledge and skills

I learnt how to use a computer from a young age; I have graduated with a master degree "agricultural engineer", so I learn it both by myself as someone of the Y generation and at school. I love to train the other farmers that I'm working with and to make it more intergenerational.

Challenges

Our main challenge is to have a better knowledge about the ownership of the data we use and we create.
Have a more inclusive approach by training the older generation.

GEDIMINAS KONTRIMAVIČIUS
g.kontrimavicius@gmail.com

The family farm operates 600 hectares of land cultivated with wheat, rapeseeds, and barley. The precision agriculture and digital technologies have influenced the development of the farm for thirty years.

Digital technologies/tools/applications

Our first tool of Digital technologies was a GPS area measurement device that made the declaration of crops clearer, simpler and faster. Later, our investments were related with digital technologies of precision farming tools such as yield monitors and maps, GPS Auto guidance systems, automatic section controls, farm process management software, drone, and mobile applications. The last mobile app that we installed in our smart phones was NMA AGRO. It has significantly changed communication between farmers and public administration. The main purpose of investing and using digital technologies in our farm is related to precision farming which leads to yield increase, resource reduction and time saving.

Benefits

Various digital technology tools provide different benefits. The main advantages of innovative agricultural machines are time and cost savings: it reduces the cost of fertiliser, seed, fuel and chemicals application, which leads to a reduction of pollution. A drone saves time exploring the fields and helps to identify problem areas. Mobile applications provide better information for management decisions and for public administration. Using the mobile app NMA AGRO, we can report on performed activities, we can also use the map to measure areas, distances, analyse satellite maps, and report violations. This app is informative, saves time, and it allows you to communicate effectively with public administration.

Knowledge and skills

In principle, it is sufficient to know the basics of English and computer literacy. If the app is understandable then you don't need any special skills to use it. Equipment with digital technologies is practically customised and adapted to the needs of each farm by product agents or dealers.

Challenges

The biggest problem is that new technologies are expensive and are developing very quickly because it is difficult to adapt the latest technology to the existing ones. It is difficult for older farmers to understand the benefits and use of digital technology.
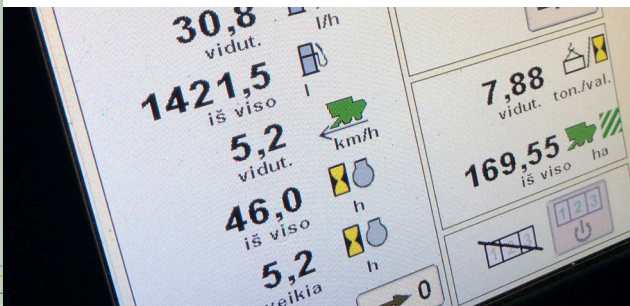
THOMAS LAGKAS
thomas.lagkas@outlook.com

Co-owner at the OLYMPUS CONSULTING company stated in Greece, which provides high quality services of sustainable forest management in public and private forest owners.

Digital technologies/tools/applications

For our field of expertise (forest/natural environment management) we have implemented digital technologies (software/hardware) to maximise the efficiency and preciseness of our deliverables. We use both commercial and open-source software and we are developing our own toolbox in-house, tailored based on our needs. The basic tools that we use are:

- QGIS (open source): tool for planning our field survey by compiling accurate maps. Through spatial analysis we can identify areas with for example high forest fire risk, to take appropriate measures.
- MAPinr android app: on–site data collection while evaluating spatial and thematic preciseness/accuracy of the map created at the office.
- UAV (Drone): to create aerial photo mosaics, Digital Elevation Models and Canopy cover height, needed to run specialized GIS scenarios to deal with fire risk, floods, expected tree growth and more. (3D Model of city forest in Agrinio Greece by Mr Fotis Giagkas).

Benefits

Using technologies in forest management has become a necessity, as they provide a higher level of accuracy in measurements (spatial detail, timber volume calculation, fire or flood spreading,…) and in management planning. The basic tool that would upgrade our efficiency is a DSS tailored to our way of working.

Knowledge and skills

The skills needed to use those technologies have been acquired mostly through personal research rather than seminars or other structured educational courses.

Our goal was always effectiveness and efficiency. In each project that was assigned to us, we researched more enhanced tools and technology.

Challenges

We had to choose the right technologies for our needs. The downside is that testing different platforms and applications is time-consuming and increases work cost. To identify needs and expectations, we need a team working on the project with standard methods and at the same time another team working on the same project with new innovative technologies under testing, to be able to compare results.

As for calculating canopy height, which is useful in calculating timber volume, the use of UAV armed with a standard spectrum camera can provide height measurements (after analysing the data with specialised software) but we also need a Digital Terrain Model. We are currently seeking ways to acquire a mobile LIDAR sensor that can provide us with these data.