AGRICULTURE 4.0 AND RURAL DEVELOPMENT

Precision Farming

KEYNOTE SPEAKER

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He is the author of over 50 scientific, technical and dissemination publications. He is the director of "Agrobótica" - a Portuguese dissemination publication focused on Precision Agriculture.

CHALLENGES

The agricultural sector is faced with many challenges worldwide namely the need for higher productivity, lower production costs, lower environmental impact and lower risk. Meeting these challenges is only possible through the adoption of sustainable intensification strategies.

Precision agriculture is the optimization of resource and production factors use in space and time using information and computer technologies and electronics to maximize economic returns and reduce risk in a sustainable way. By matching the demand and supply of crop inputs, Precision Agriculture is a realistic path to sustainable intensification. Its adoption needs to be fostered.

PRESENTATION

The focus of precision agriculture should be on the development of farm decision support systems that will help the decision maker to make efficient, optimized, multicriteria decisions at various time-frames: operational, tactical, and strategic.

To be effective these decision support systems need have some key attributes, namely:

- Incorporate data from multiple sources (technology is key to provide data);
- be developed with the farmer as a participant and key user;
- be integrative and multidisciplinary;
- incorporate process-based modeling (crop systems models) and data-based modeling (big-data, analytics, …);
- Be complex at the core (the problems being solve are not simple), but simple for the end-users;
- Be open, modular and customizable (to be able to adapt, to account for improvements and innovations, to be link to other decision support systems in the food chain);
- Produce decisions in a digital format that can be incorporated in all equipments;
- Provide benchmarking at various levels;
- Protect data ownership.

Decision support systems provide an efficient way for knowledge dissemination throughout the agro-innovation system (researchers, farmers, service providers, equipment and input sellers, farmer organization, administration, others).

Decision support systems also represent an effective way for process re-engineering i.e. the full realization of digitalization which is the digital transformation, not only a digital mimic of the tradition analogic processes.

Knowledge intensity is the key performance indicator for the successful application of precision agriculture.

At current state and to reach its full practical application, precision agriculture must overcome several bottlenecks, namely:

- Need for training, knowledge, technical qualification (Farmers, Advisor, Graduates, …);
- "Process Re-engineering" requires more research (new sensors, new methods, …);
- Farmers need better support from dealers and advisors (specific knowledge is still scarce);
- Need for rigorous determination of breakeven for the new decision-making processes;
- Need for networking and dissemination (learning communities);
- Need for focus on data management and compatibility (workflows in the digital world);
- Need to improve compatibility between High-tech vs Low-tech Precision Agriculture (Precision Agriculture should be for all farmers);

Development and user incentives of decision support tools will play an important role in the adoption process in that they not only facilitate some technological upgrade but

also soften the early phase of the adoption process that is more focused on recording, compiling and processing data.

In the adoption of precision agriculture, although there are in some cases near-immediate returns to investment, there is an initial period of intensive data collection without which it is impossible to work and reach the field application phase (and return on investment). This more or less long period will benefit from an instrument of support.

MAIN OUTCOMES FROM THE DISCUSSIONS

From poster presentations, the main topics that stood out were:

- High resolution high throughput remote detection for data management of farms;
- Tailored agriculture technologies and democratization of information;
- Integration of data;
- Precision agriculture enable us to reduce the inputs and costs and increase quality and efficiency; it should also be used for the supply chain;
- Gathering the most data to take the most cost-efficient decision;
- Precision farming is possible due to applicable tools and techniques for decision making by farmers;
- transfer of existing technologies to solve real farming problems.

In terms of opportunities for digitization identified by those present in the session, we can summarize:

- Governance of information flow attaining farmers (integration, focus on quality and value, avoid contamination / distortion);
- Revealing unintended uses for gathered data;
- Tailor agriculture platform;
- Integration of data in order to achieve a decision-making support tool;
- Provide data in order to use in the whole supply chain to improve decision-making and reduce costs (however and incentive is needed);
- Global multi-sourced database easy to feed and use;
- farm management by cost-efficient and convenient applications;
- using data to make real time management decision of ground;

- Better decision making that leads to better efficiency in resource use and higher revenue based on global multi-sourced database that's easy to feed and use.

The key-words from the session can be the following: Data, Decision Support tools, Efficiency, Customization, real and practical solutions.

INNOVATION PROJECTS

At this thematic session, each participant assisted to the presentation of 3 of the following posters:

- **4D4F** - Data Driven Dairy Decisions for Farmers
- **BigDataEurope** - Integrating Big Data, Software and Communities for Addressing Europe's Societal Challenges
- **Control of additional water use in crop production** - situational, site-specific and automated (Precision Irrigation)
- **Data assimilation** from soil-crop-climate sensor network in IRRINET DSS
- **Evaluation of innovative agronomic strategy** to improve precision in managing biotic and abiotic stress in fruit orchard
- **Increasing the viability of sown biodiverse pastures** through optimization of phosphate fertilization
- **High precision detection and spraying of aphids** for optimization of lettuce production
- **PARRA** - Integrated platform for monitoring and evaluating vine health (automatic detection of flavescence dorée: work on cost optimisation of data collection etc.)
- **SMARTCROP** - Sustainable competitiveness
- **SMARTFARMING** - Precision integrated system for irrigated farming efficiency and sustainability
- **WATER4EVER** - Optimization of irrigation to conserve soil and aquatic resources