GIS Fruits proposition:

Agriculture Innovation 2025:
The fruit sector: from agroecology to competitiveness

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The consumption of both fresh and processed fruits and vegetables is at the heart of European public policies on food. There are a number of challenges currently facing the fruit sector: social (employment and consumer perceptions of the sector), economic (productivity gains and increasing consumption) and environmental (the impact of practices and climate change). GIS Fruits is helping to meet these challenges. It brings together sector specialists, from research and development through to those working in the profession, examining the technical and organisational developments and innovations which could be introduced, supporting the strategic thinking of its members and implementing group projects.

GIS Fruits, which is unique in grouping together 22 upstream and downstream partners, has identified three priority themes:

1 - Agroecology for fruit quality: Defining innovative and sustainable production systems

Fruit quality comprises a large number of criteria: visual, organoleptic, nutritional and health value. Fruit quality is the result of good orchard management and, for this, the agroecological dimension is increasingly being taken into account. On the one hand, this leads to a redesign of production systems, considering the agricultural system in its environment, without forgetting territorial reflections on growing areas. On the other hand, it seeks a change in the choice of varieties and cultural practices. And these changes are sought while taking into account the viability of fruit farms in terms of orchard protection, and this is despite the appearance of emerging pests, climate change, the reduction in the number of solutions available for plant protection and the expectations of citizens. It is necessary to seek protection methods which are technically, socially and economically acceptable by everyone and which improve competitiveness.

GIS Fruits' commitment to this theme is already clearly established through various working groups, particularly those concerning the study of major or re-emerging pests and the implementation and monitoring of integrated approaches, particularly within the framework of systems approaches to production. GIS Fruits has also been particularly active in the establishment of the Ecophyto programme, drafting the Ecophyto Fruit Guide, and participates in several DEPHY experimental networks. Fruit farming has long been a pioneer in the development of biological controls and GIS Fruits supports these innovative efforts through concrete actions on the stimulation of plant natural defences, biological control using parasitoids and the development of digital tools for pest diagnostics.

When biocontrol methods prove inadequate, the implementation of integrated chemical protection, coupled with a precision agriculture approach, must be further developed to limit as far as possible the use of inputs. GIS Fruits' work contributes to achieving the

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objectives set out in the Ecophyto ll plan in terms of the NODU (Number Of Dose Units) without harming fruit quality.

GIS Fruits' 22 partners have the ideal expertise to address this type of problem. They are able to mobilise themselves in a co-construction approach, brining together researchers, engineers and technicians and those working in the fruit business.

2 - Developing digital tools for developing and maintaining quality

In addition to the visual aspects, one of the keys to increasing fruit consumption is to guarantee consistently high quality taste. This is why it is important to have innovative tools at all the different stages of the chain to ensure the quality matches consumers' expectations. These decision support tools (DST) are based on digital technologies: software, databases, web platforms etc., and involve the ability to manage large volumes of data ('big data').

Some examples:

- Triggering harvesting: having a DST for optimising harvest dates makes it possible to target optimum fruit quality.

- Conservation techniques: it is necessary to limit quality losses due to storage diseases or changes in fruit maturity. Conservation is an important issue in terms of market management and control. In recent years, developments in European regulations have limited the ability to manage conservation. It is therefore important to find new, innovative ways to optimise these processes.

- Improving the quality of processed fruit: the adaptation between fresh fruit and processing methods, establishing contracts between producers and processors.

- Fruit distribution methods must also evolve to ensure the right conditions for maintaining fruit quality right up to its arrival on the shelf and beyond.

R&D partners in GIS Fruits are actively developing research and experimentation on fruit quality and its maintenance in the post-harvest phase, as well as controlled maturation. This experience and these skills can be exploited in European projects. This research work has seen the implementation of innovative tools and methodologies which, thanks to the collaboration of those working in the sector, can be introduced and exploited in the field. To optimise the large amount of data collected at different levels of the sector, the fruit sector would also like be part of the Digital Agriculture approach.

3 – Agricultural machinery: increasing mechanisation in the fruit sector, in the orchard, for harvesting and post-harvest:

Given the level of social standards in other countries, the sector's reliance on manual labour weakens the competitiveness of the French fruit business. Thanks to technological advances, various initiatives are being set up in order to mechanise the operations performed by hand (thinning, pruning, harvesting etc.) and to make wider use of precision approaches to arboriculture. If these are successful, and especially if they are compatible with the sustainability and quality objectives identified earlier, these projects would standardise the

work conducted and increase the speed at which it can be achieved, leading to a reduction in production costs for developed countries. Similarly, optimisation needs to be achieved in terms of labour and energy consumption in the packaging phase, which is still largely manual.

The GIS Fruits' mechanisation working group brings together various stakeholders, from research to those working in the field, in order to identify innovation needs and to implement operational projects regarding agricultural machinery.

Conclusion:

The expertise of the various partners brought together within GIS Fruits makes it possible to meet the challenge of promoting quality produce which is environmentally friendly and internationally competitive.

GIS Fruits recommends mobilisation on the following priority areas:

- **Agroecology**: through references acquired by partners and based on a deeper knowledge of the different ecosystem services in orchards, integrating all the agroecological levers which can be mobilised, including actions involving the redesign of agricultural systems, and a reflection on their zonation, to optimise arboriculture production systems and to make them more frugal in terms of inputs, while offering good performance and sustainability. Particular attention should be paid to improving knowledge on pests, the detection and control of emerging diseases and the functioning of the soil; to develop arboriculture which uses fewer chemical inputs and, where they are used, doing so in an increasingly precise manner.

- **Biocontrol**: identifying and testing biocontrol agents and products, improving and deploying biological control, integrating biocontrol in fruit production systems, and developing tools for pest diagnostics.

- **Plant biotechnologies**: making available and using biotechnology tools to characterise and develop fruit varieties which are resistant (and/or tolerant) to pests and diseases and the main abiotic stresses which could jeopardise fruit production (water stress, coverage of needs during cold etc.), and ensuring the durability of this resistance.

- **Agricultural equipment**: optimising quality management from the orchard through every post-harvest stage in order to minimise losses. Particular attention should be paid to the contribution of agricultural equipment in reducing pesticide use, minimising difficult work and providing a competitive advantage for the French fruit sector.

- **Digital agriculture**: pooling observational data collected throughout the country for pests (including emerging pests and diseases) and climate change (climate data and plant physiology) to develop a territorial approach to these phenomena.

The importance of the fruit sector

France is a major fruit producer, occupying third place in the European Community, behind Italy and Spain. Although the fruit sector occupies less than 1% of France's agricultural land, it accounts for 5% of total agricultural value, indicating a high level of value-creation per hectare. It generates 21% of total agricultural employment and 30% of seasonal employment, some 220,000 jobs. In 2012, fruit production accounted for 2.6 million tonnes and €3 billion in sales, or 4% of the total value of agricultural production. It is a sector which is geared to exports too, with annual export volumes amounting to 1.5 million tonnes.

* GIS Fruits brings together 22 partners in the French fruit sector, from upstream to downstream and involved in research, development, training and professional organisations, to implement over the long term a common strategy, ranging from research through to innovation transfer to economic stakeholders.

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