

A Farmer's Toolbox for Integrated Pest Management

AGRI/2020/OP/0003

Case study "A collective initiative initiated by vegetable farmers to reduce dependency on pesticide use: the Brittany case in France"

Abstract

Vegetable growers from North-Brittany have set-up a collective approach to reduce dependency on pesticide use through their association of producer organisations (APO) - CERAFEL.

This multi-year initiative aims to produce and market the main vegetables produced in the area (cauliflowers, artichokes, shallots, onions in open fields and tomatoes in greenhouses) under a label created by the APO named "Zero pesticides Prince de Bretagne". Vegetable growers substitute pesticides with a range of integrated pest management practices and alternative products to chemical pesticides.

The program builds on regional R&D efforts funded by the APO and additional regional technical centres such as the Chambers of Agriculture of the region Bretagne. First, the overall structure of the fresh vegetable sector in Brittany is presented. Then, the history and development of the initiative is described. Following, the current situation and the results achieved since the launch of the initiative are presented.

Eventually, the forthcoming activities foreseen by CERAFEL to further develop their initiative with the objective of a complete phasing-out of chemical pesticides in the coming decade are described.

1. Introduction

With 25% of national output, Brittany is the leading region for vegetable crop production in France and one of the most important vegetable crop producing regions in Europe. Major regional crops include cauliflower, artichoke, shallots and broccoli (for these four crops, the regional production represents 80% of the national production). Field cropping of vegetables occupies some 70 000 hectares, largely in the north coastal area where good soils and a favourable maritime climate allow year-round production. The improvement of land and sea links to and from the region has greatly contributed economic development and facilitated exports, particularly towards northern Europe. More than 50% of the area's Brassica crops (some 40 000 hectares for autumn and winter cauliflower and broccoli combined) are exported.

Growers are organised in marketing co-operatives recognised as producer organisations (POs). These producer organisations are in turn co-ordinated through a regional recognised association of producer organisations (APO), called CERAFEL (Comité Economique Agricole Régionale Fruits et Légumes de Bretagne). This organisation of the market, coupled with the development of rapid transport has stimulated exportations to those countries in Europe where production of vegetable crops in the winter months is not possible due to climatic reasons. The commercial trademark of these products is "*Prince De Bretagne*" (over 120 products in total in 2020).

Through the CERAFEL, vegetable producers play a major role in the supply chain as they have invested in several instruments to improve the quality of their production, including research and testing facilities which are used to adapt agronomic practices to fresh vegetable production conditions in the north of Brittany. For more than fifty years, producers have been able to regulate and coordinate the market of the main Breton fresh fruits and vegetables.

The producers have always been aware of potential issues linked to the growing practices being used in Brittany and have developed multiple initiatives and activities to reduce the impact of agriculture on the environment. In 2015, a collective initiative was initiated to reduce the use of pesticides by growers. Since then, the initiative has further developed and led to significant results in some crops. For example, about 60% of tomato growers are not using pesticides after flowering any longer. This percentage continues to increase, and further research and testing work has been extended to open field crops such as cauliflower and artichokes in the research centres funded by the CERAFEL and/or the POs being present in the APO.

This case study allows to investigate the importance of farmers' experiences with integrated production practices and the development of new practices and technologies for pesticide-use reduction. It also provides good practices on how to use agricultural economic organisations such as POs and APOs to set-up collective efforts with the objective to reduce dependency on pesticide use.

2. Research theme

This case study will explore the establishment and the development of a unique initiative aiming at reducing dependency on pesticides use in vegetable productions. More specifically, the case study will first introduce the history and structure of the initiative, as well as the involved stakeholders and their role in establishing the program. In addition, it will discuss

potential effects of the program on reducing vegetable producers' dependency on pesticides and explore effects of the program on the development and establishment of practices and technologies supporting vegetable producers in pesticide-free and -reduced production.

Finally, it will present the current and future actions under development and implementation.

3. Methodology

The case study was conducted through an extensive literature review and interviews with regional stakeholders being part of the initiative. These include farmers' representatives, technicians, and researchers from the various research centres working on the initiative, as well as representatives from the POs and the CERAFEL. Since the initiative was introduced only a few years ago, long-term effects on commercialisation and acceptance of these pesticide-free products are not known yet.

4. Activities and results

This chapter presents the results of the case study. First, we describe the overall organisations and collective efforts that the Breton farmers have established over the last 50 years to defend their economic interests. The grouping of vegetable producers is one of the characteristics of Brittany, unlike other regions. Brittany has 12 producer organisations in fruit and vegetables, including three in vegetable processing. The affiliation to a PO is higher in this region than the average for other regions as it reaches >80% compared to a national average of about 50%. Only market gardening is less concerned by this approach, the producers being more oriented towards direct sales. In 2018, the value of production marketed by the 12 Breton POs would amount to 470 million euros, or nearly 90% of the total produced in the region. Following, we will describe the history, structure (including relevant stakeholders) and objectives of the zero-pesticide initiative set-up by the CERAFEL and will present the results obtained to date before describing the long-term objectives in the area of reducing dependency on pesticide use.

4.1 Description of the CERAFEL, its history and structure

Vegetable producers in Brittany have a long history of collective efforts. The first PO that was recognised in France in 1962 is the SICA St Pol de Leon. This PO is today member of the CERAFEL and has been the historical leader of CERAFEL. In the 1950s, vegetable producers in Nord-Finistère were plagued by difficulties mainly linked to private sales, which left producers limited power in negotiations: individually, the producer was always the loser. Farmers created the SICA in 1961 with the objective of imposing the clock-market on merchants and traders to ensure equitable, fair prices for their products and transparent relations with these traders.

Since then, growers have continued to organise themselves. Today, the most important economic organisations are organised in marketing co-operatives recognised as producer organisations by the national authorities. These POs are then co-ordinated through a regional recognised association of producer organisations, the CERAFEL (Comité Economique Agricole Régionale Fruits et Légumes de Bretagne) created in 1965.

The CERAFEL is composed of five producer organisations (SICA St Pol de Leon, UCPT, Terres de Saint Malo, Socoprim, and Eureden) and two processors (la Bretonne and Bretagne

Plants) distributed in three main production areas in North of Brittany. Fresh vegetables are commercialised through about 50 traders that are selling to retailers in France or exporting mainly in the EU. The key figures of the CERAFEL read as follows:

- 2 000 producers are members of the CERAFEL through their PO membership;
- 1 800 farms, mainly family farms;
- 33 000 hectares cultivated;
- 500 000 tonnes of commercialised fresh vegetables and 130 000 tonnes of potato seeds representing a turn-over of more than EUR 400 million;
- First operator in the sector of fresh vegetables in France for both conventional and organic products;
- 50% of the production is exported in more than 30 countries;
- About 120 products in the portfolio.

Two additional economic organisations exist in the fresh vegetable sector in Brittany, namely SAVEOL and SOLARENN, however, they are mainly producers of tomatoes in greenhouse and are not producing nor selling open field vegetables. Together with the CERAFEL, these three organisations represent 50% of the total production of tomatoes in France.

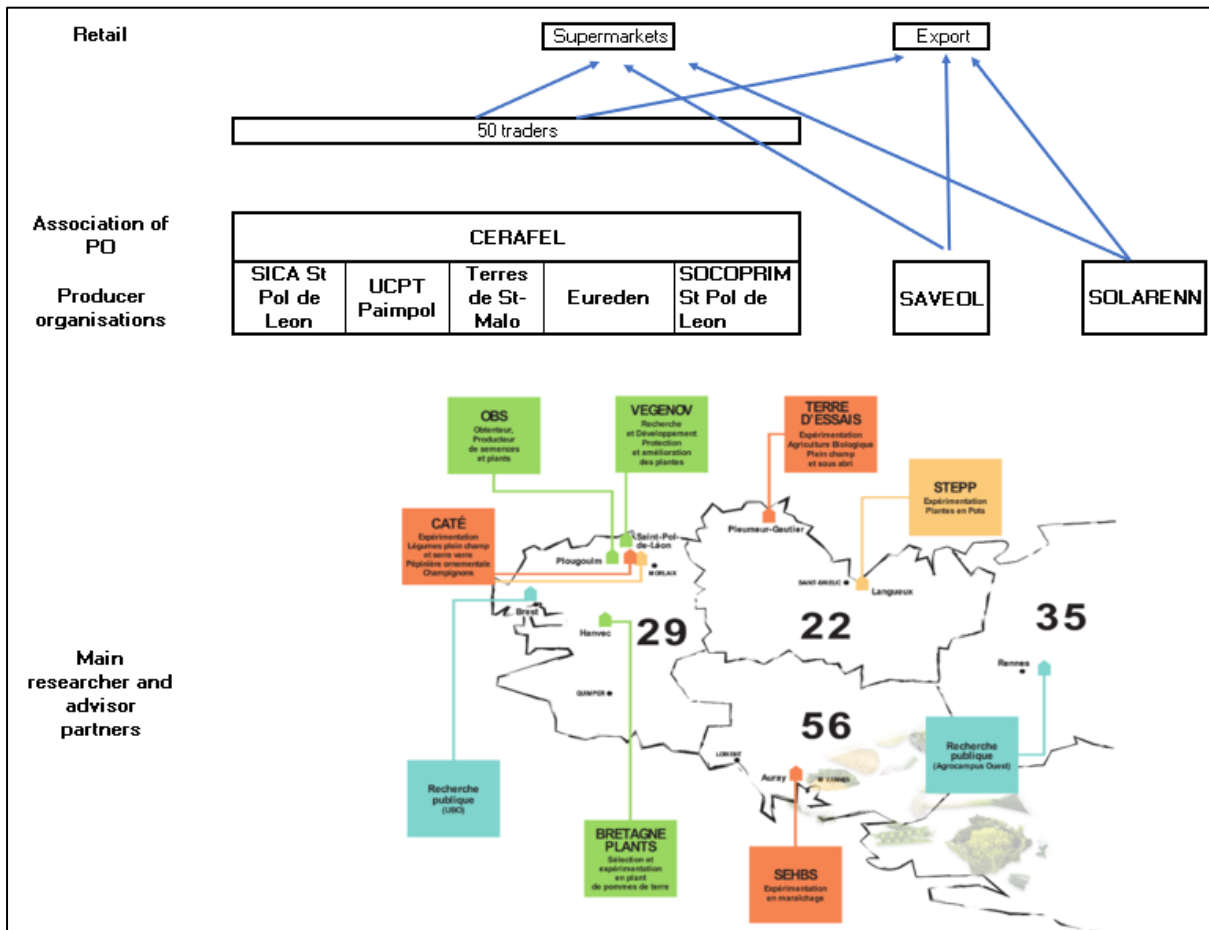
Since the creation of the CERAFEL, the producers have created several research and marketing instruments aiming at the development of the production both in terms of quality and quantity. Such research initiatives were also established to respond to the regional specificities of vegetable production, both in terms of vegetable species and the regional agronomic conditions. In 1970, the producers decided to create a plant breeding and seed company (the OBS - Organisation Bretonne de Sélection), the mission of which is to respond to local needs for vegetables mainly grown in Brittany, such as the artichoke Camus de Bretagne, through the development of new varieties adapted regionally. After creating the OBS, Breton vegetable producers continued to set up a technical and scientific environment specific to their productions and climate. The CERAFEL therefore created CATE and then SECL, today named *Terres d'Essais*, two experimental and research facilities which are funded by the POs. Additional structures have been developed later and are today associated to the research and testing network that has been built in the areas of production. These include Bretagne Plants (field testing of potatoes), the STEPP and the SEHBS, dedicated to research in horticulture.

In 1989, the plant R&D laboratory VEGENOV-BBV was created by the CERAFEL and other economic actors to work on the development of varieties resistant to pests and diseases. The OBS became funded by several POs and by the CERAFEL. In addition to these structures and local partners including the OBS and VEGENOV-BBV, the CERAFEL and other POs have established close relationships with regional and national partners to complete their set of expertise in research and dissemination of good agricultural practices to farmers. These partners include, but are not limited to, the French research organisation (INRAe), the university Agrocampus Ouest (and the National Institute of Horticulture) and Bretagne Occidentale. All these structures are working together for the interest of the producers. Cooperation across POs exist in terms of R&D activities; and, for example, the CATE supports

also SOLARENN and SAVEOL, even if these two POs are not members of the CERAFEL but rather competitors on the marketplace for tomatoes.

To this overall network of research and excellence, the CERAFEL developed marketing instruments such as, but not limited to, 30 conditioning plans, three clock-markets similar to the veilings in the Netherlands, the trademark “*Prince de Bretagne*” and the ferry company Brittany Ferries in order to export vegetables to the UK. All in all, vegetable producers are equipped with modern and proprietary tools to support the economic development of their supply chain(s).

Vegetable supply chain organisation in Brittany



4.2 Awareness of environmental issues by farmers

The CERAFEL initiated its environment and quality policy back in 1996. The main objective was, and still remains valid, to guarantee the food safety of products placed on the market and to develop environmentally friendly practices, both in production and for packaging and processing activities. Therefore, the approach is not limited to the production in the field and greenhouses but consider all steps of the supply chain which are managed by the APO. Farmers have obligations in particular to respect cropping guidelines which have been developed for many crops.

Under this policy, producers are required to:

- Respect product specifications defined by the APO;
- Apply measures to optimise fertilisation and crop protection;
- Use alternative crop protection techniques as much as possible;
- Record all interventions carried out on soils and crops; and complete the declarations of areas, forecasts and quantities put on the market.

To fulfil these requirements, technical guidelines have been drafted by the crop working groups of the CERAFEL and each producer has to respect each of them depending on the crops they produce. These documents explain what farmers can do and what they cannot do regarding all growing elements of the crops, including, but not limited to, IPM. These documents are reviewed annually, and each producer receives the new versions at the beginning of the seasons. These documents are kept private and are not available to producers who are not members of the PO in order to keep competitive commercial advantages that the guidelines could include. In addition, an "*Environment-Quality*" agenda is also distributed to producers every year. It constitutes a real working and reference tool. It consists of a production schedule / diary, practical sheets on the main regulatory texts concerning production, and various lists of approved suppliers and products.

In addition, the CERAFEL intervenes in support of quality procedures such as Agri-Confiance, GlobalGap, Nature's Choice, etc. set up in POs, by producing documents setting the mandatory basis applicable to any producer, coordinating the residue analysis campaign, and occasionally carrying out *ad-hoc* studies for POs.

Approach to the 'Zero pesticide' label

The origin of the labelling initiative is rather recent and dates back about 10-15 years. During the first years, the research stations were testing new approaches and technologies to reduce the use of pesticides together with the Chamber of Agriculture. It should be highlighted that the farmers in the region have never been using high levels of pesticides. Historically, the cropping systems have been based e.g. on mechanical weeding as the soil crusts easily in North-Brittany and therefore "decrusting" was achieved by using hoeing tools which also allowed the control of weeds in parcels. In addition, the region is rather windy and the parcels small, leading to difficulties in spraying individual fields due to potential drifts in neighbouring fields. Therefore, the use of herbicides has been limited.

Initially, the uptake of new practices developed by the above-mentioned organisations was slow as the economic value for farmers was not fully proven. At that time, the CERAFEL did not take part in the approach as the risk was considered high for farms. In fact, the non-chemical alternatives to pesticides were lacking and the economic profitability of the farms involved was not assured. However, the Breton research stations applied for funding under the DEPHY¹ EXPE programme of Ecophyto in 2011. The aim of this project called Breizleg

¹ DEPHY Network is a flagship action of the French "Ecophyto" plan which aims at a reduction of 50% of the PPP use in France by 2025. DEPHY network intends to test, valorise, and deploy appropriate techniques and agricultural systems to reduce the use of phytosanitary products while being efficient at economic, social, and environmental levels. It covers all the French production sectors and involves a partnership between research, development and transfer players. DEPHY Network is the combination of two measures. First DEPHY FERME

was to evaluate vegetable cropping systems with low inputs, in conventional and organic agriculture. This was a six-year experiment (2011-2017), including the main vegetable crops grown in the North of Brittany: cauliflower, artichoke, and shallot. To improve the sustainability of the tested cropping systems, proven levers already tested in previous analytical experiments, were combined. The assessment carried out consists of an *ex post* evaluation, using performance indicators. The results indicate that the TFI² can be reduced without any loss of yield in the conventional low input system (-54%/control). An 18% decrease in yield is noted in the organic systems. The combination of levers has maintained economic performance in the conventional low input system, and even improved it in the organic systems, while improving environmental performance. Working time was not significantly increased. However, in conventional systems, the indicator “TFI active substances (AS)” highlights the use of AS presenting a risk of transfer to the surface waters. The aim of the study is to communicate the results to multiple growers and to transfer easy-to-use tools (e.g. decision rules).

The year 2016 was a pivot year as during a board meeting, the members stressed that not enough efforts were made to communicate to consumers the efforts being made concerning the reduction of use of pesticides. For some directors, promoting low use of chemical pesticides should be used as a marketing competitive advantage. In 2018, this approach led to the drafting of a document called ‘rapport development rural RSE’ (corporate social responsibility report) which describes the CERAFEL approach and objectives as regards sustainable development, of which one of the main objectives is the reduction of pesticide use. In parallel to those marketing activities, the working group on tomatoes decided to create, in 2016, two DEPHY Groups: one for open-field production composed of 12 producers, and a second one, made up 16 producers coming from two POs including SICA Saint Pol de Léon and Maraîcher d’Armor, dedicated to tomato production in glasshouses and greenhouses. As mentioned above, CERAFEL was not engaged in the approach because of the economic risks for farms in a context where reliable alternatives were lacking. However, the first promising results in terms of reduced pesticide use and alternatives of some other DEPHY groups in other vegetables and other French regions led producers of CERAFEL to take up the challenge. As of 2016, this was the only ECOPHYTO national network group where producers were specialised in fresh vegetables in greenhouse, while all other DEPHY groups were for open-field production. A coordinator and the technical services of the POs supported the initiative.

Producers, members of the DEPHY group, set-up their own objective towards zero chemical insecticides used and to replace these by biocontrol solutions. Additional goals were to improve their technical and production skills by sharing practices across producers and with

(farm) which is a network of demonstration farms and production of references network gathering 3,000 farmers voluntarily committed in a process of reducing the use of pesticides? Second, DEPHY EXPE (experiment and testing) which is a testing network that conceive, test and assess different cropping systems where the use of PPPs is extremely limited. DEPHY FERME is made of 250 groups of farmers, each being composed by a dozen of farmers. They are accompanied by a network engineer in an individual or collective project aiming at reducing the pesticides use. DEPHY EXPE associates forty or so projects and more than a hundred partners and testing sites. DEPHY is also It is designed to wildly disseminate and share the results of the experimentations and changes in practices implemented by the members of the network.

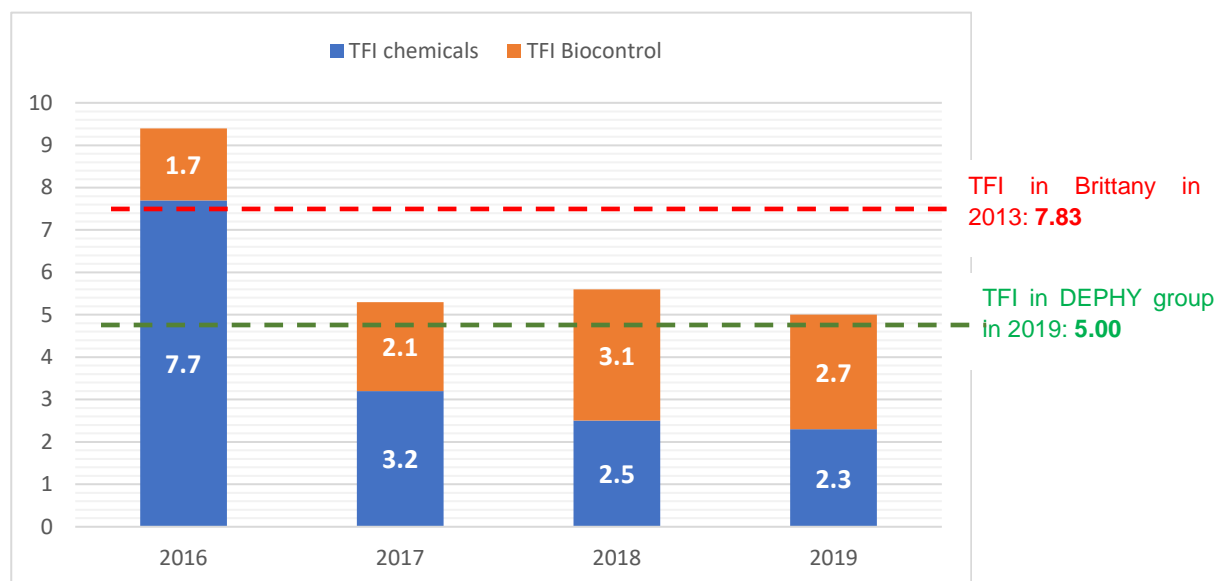
² The TFI is the most popular pesticide use indicator. It was developed in Denmark 2008 and replaced the simple measurements of the applied pesticide volume as indicator. It has been used for pesticide use since then in several countries worldwide as national or regional indicator or as part of projects. The TFI is calculated by the theoretical number of pesticide treatments per hectare, based on standard dose rates of active ingredients, and the amount of pesticides sold yearly. An advantage of the TFI is that the indicator can be aggregated into a single value, e.g. a TFI of 1 is equivalent to one full dose applied on a certain agricultural area.

other DEPHY groups located in other regions. A third objective was to improve working conditions of employees and part-time workers in the greenhouses. Eventually the DEPHY group had the objective to disseminate their knowledge to other tomato producers of the APO (about 200 in total). Then, they defined the means needed to achieve their objectives. They decided to recruit a part-time technician for this mission to support the group. The mission of this technician is to work directly with the producers through group activities, discussions, technical advice, and individual monitoring to farmers. The technician discusses individually with producers on the best growing practices to implement. He also constantly exchanges with the internal technicians of the two producer organisations and therefore plays an essential role in the transfer of information. Eventually, the technician is also responsible for creating the links with other DEPHY groups at national level, both in term of disseminating knowledge and practices to other groups and in seeking information through his discussions with other technicians.

Results have been positive rather rapidly as technical solutions and alternatives were available and had been already successfully tested in other tomato production areas in France, Belgium and the Netherlands. At the time of setting-up the DEPHY group, the TFI was estimated at 7.42,³ on average, for the 16 farmers. After one year, the average TFI decreased to 4.90 but that season the disease and pest pressure was rather low as compared to a normal year. On the one hand, farmers saw rapid results, and this encouraged the members of the group as well as other producers to continue and further develop the initiative. On the other hand, reducing the TFI meaning using fewer chemical pesticides does not necessarily mean that the number of applications (treatments) will decrease in the greenhouse as biological treatments are more frequently sprayed to replace chemicals. In addition, such alternatives are more expensive than chemical products. Five years after the launching of the DEPHY group, the TFI has significantly decrease and it is estimated that the volume of use of chemical pesticides has decreased by about 70% as shown in the figure on next page.

³ At that time the regional TFI was 7.85 according to AGRESTE, the national statistical organisation in charge of compiling nation pesticide use's statistics.

Evolution of the TFI in the DEPHY group for tomato production in greenhouse



Source: CATE

In 2018 and 2019, several labels related to the use of pesticides have been developed in France. For example, the collective action named "*Nouveaux champs*", composed of seven producer organisations and companies from the centre and the south of France representing a production of about 30 000 tonnes of 35 vegetable species. Three years later, this label, named ZRP⁴, was adopted by 60 producer organisations and vegetable traders grouping about 6 000 producers representing about 25% of the total French vegetable production. The label guarantees consumers the absence of pesticide residues in fruits and vegetables within the limit of quantification. The farmers involved in this approach thus submit their productions to the analysis of 496 active substances used in pesticides and approved in France and those likely to generate residues due to the existence of other crops. This commitment to results is the consequence of the adoption of dedicated agricultural practices based on a combination of means (a sophisticated technical itinerary, dedicated plots, the use of a traceability system, the use of auxiliary insects, the preservation of biodiversity, etc.). The TFI of plots cultivated under that label decreased by 51% in 2018, 53% in 2019, and 58% in 2020 compared to plots carried out in conventional agriculture. This initiative has been perceived by retailers and distributors. Out of 155 ZRP-labelled references available depending on the season, Intermarché sells 87, Leclerc 73, and Auchan around 60. However, it is at Carrefour that the highest ZRP turnover (26% market share) is achieved. Among the best-selling varieties: tomatoes (44% market share by volume), onions (20%) and carrots (9%). The results of the Kantar 2020 barometer of confidence in F&V, the ZRP label gained of 13 notoriety points in 2020.

The three main Breton economic operators, SAVEOL (AOP), SOLARENNE and SAVEOL (OPs), decided not to join that global effort but rather to create their own label in January 2019. This label named "*cultivées sans pesticides*" guarantees that no chemical pesticide will be used in tomato production after flowering meaning that no chemical will be in contact with the tomatoes. The label applies to tomato production in greenhouse only. The three partners, with

⁴ Zero Residues Pesticide.

a production of 196 000 tonnes of tomatoes by 208 farms (in 2018), founded the Nature et Saveurs Alliance in 2018 to market their first tomatoes without pesticides. The second step has been the drafting of a dedicated cropping guideline (no synthetic pesticide treatment from flower to plate and no trace of pesticide on tomatoes) resulting in the creation of a recognition label. The approach is to create a “third way” of production side-by-side with conventional and organic production. The cropping guideline has been controlled for its validity by a certification body (CERTIS for tomatoes and CERTIPAQ for other products). It involves several controls at greenhouse level. The producers who adhere to the label are controlled by staff from the PO they are members of (internal control) as well as by external controller from certification bodies. The cropping guideline and the control mechanisms are harmonised across the three economic actors which are members of the label. In 2021, about 65% of the production is labelled. The objective is not to attain 100% as some market segments (for example, early in the season) are not demanding such type of products with no pesticides. In addition, the exact economic valorisation of the label to date, if any, is not known but the initiative has allowed to remain competitive with economic actors present in the initiative “*nouveaux champs*”.

For its part, CERAFEL, through its trademark “Prince de Bretagne” has integrated other vegetables under the label. There are already cucumber, broccoli and pumpkin since 2018; and cauliflower, the most important crop in the area, since 2021. Additional testing and experiments are taking place in the field to extend the range to other species. An additional objective of the APO CERAFEL is to convert the production to 25% organic by 2030 in line with the objective of the European Green Deal and the Farm to Fork strategy. Today, organic production represents 100-150 producers out of 1 700 for a production of 30 000 tonnes of vegetables.

In addition to the presentation of this initiative on tomatoes produced in greenhouses, the research and testing centres present in Brittany have launched several additional initiatives dedicated to open-field production and with the objective of reducing pesticide use:

- The ongoing breeding work performed by the OBS has led to the creation of specific cultivars resistant to diseases that should in the short term allow to reduce the use of fungicides by 100% on cauliflowers by growing cultivars resistant to *Mycosphaerella* and will reduce the number of treatments down to 8 to 6 on shallots against mildew when it was more than 15 in the past.
- Several networks of DEPHY EXPE are located in Brittany of which e.g. Breizhecoleg managed by CERAFEL, System'Or managed by the CRAB cooperative in South-Brittany, Fragasyst managed by INVENIO/SAVEOL in North-Finistère. Some additional initiatives are also present in ornamental crops such as RosaBip, HortiPepi2 and HortiPot2 managed by the French technical institute ASTREDHOR specialised in ornamental crops; and
- In addition to the DEPHY FERME “tomatoes” presented in this document, a second DEPHY FERME on salads is in place which is specific in the sense that the overall cropping has been redesigned by the introduction of 9 new techniques (mainly cultivation, use of alternative non-chemical techniques, and rotation).

More information can be found in Annex I (in French).

In conclusion, we would like to mention that all these initiatives take place in the general context of the farm certification called HVE (Haute Valeur Environnementale - High Environmental Value) which is under rapid expansion in France and in the vegetable sector. The Ministry of Agriculture developed the HVE certification in 2001, a three-tiered system that encourages farms and producers to focus on increasing biodiversity, decreasing the negative environmental impact of their crop protection strategy (i.e., measures for the control of plant diseases, reducing the use of pesticides and fungicides), managing their fertiliser inputs, and improving water management. Once an operation has attained the third and most stringent level of the certification process, it is deemed worthy of the title "High Environmental Value". The authorities established an official label that producers with this status can display on their products and marketing materials. HVE is less strict than organic requirements in terms of the elimination of chemical inputs, but it emphasises other points, such as the promotion of biodiversity and water protection, which makes it much more aligned with sustainable agriculture systems. This voluntary approach involves three levels:

- Level 1 is a prerequisite for access to the process, obtained by carrying out a self-assessment by the farmer, validated by an accredited auditor. Action plans are created.
- Level 2 has 16 "best practices" around 4 themes: biodiversity, use of pesticides, fertilizers, water management. At this level a vineyard could receive the environmental certification label; it is validated by an external audit.
- Level 3 is the highest level and provides the certification HVE for the entire farm operation. It includes performance requirements measured either by composite indicators, or by global indicators corresponding to the four themes. This level is also validated by an external audit after three years of operating at Level 2.

The CERAFEL aims to have all farmers under the scheme by end of 2022 which is an objective already attained by the SOLARENN tomato producers.

5. Discussion and conclusions

This case study demonstrates that collective efforts aiming at reducing the dependency on pesticide use lead to concrete and robust results in greenhouse vegetable production and to a lesser extent in open fields. The initiative was taken up by farmers about 10 years ago and significant results have been rapidly observed over the past five years. The project has been supported by several technicians and organisations which have been set-up by the POs and APO present in the Brittany region.

The main factors that are making the initiatives successful can be summarised as follows:

- Collective approach initiated and funded by farmers through their economic organisations (POs and APO);
- Presence of dedicated and local technical knowledge to accompany individual farmers;
- Long-term views of the actors;
- Support (fund and technical expertise) received from the national plan for the reduction of pesticide use (Ecophyto) through the DEPHY networks (both EXPE and FARMS);
- Market demand in the vegetable sector in France is becoming a driver to the reduction of pesticide use.

- Results are faster in confined environment (e.g., greenhouse/glasshouse production) than in open fields as technical solutions and novel practices are existing for such type of production.

Description of the CERAFEL activities in the field of environment (in French)



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