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Societal assessment of current and novel low input crop protection strategies. Phase 2

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Glossary

AS: Alternative Systems
CH: Switzerland
CS: Current Systems
CSA: Community Supported Agriculture
DK: Denmark
FR: France
HU: Hungary
IPM: Integrated Pest Management
IS: Innovative Systems
IT: Italy
MDGRF: Mouvement pour le Droit des Générations Futures
MRLs : Maximum Residue Levels¹
NAP: National Action Plan
NAS: National Action Systems
NL: The Netherlands
PAN: Pesticides Action Network
PL: Poland
RSPB: The Royal Society for the Protection of Birds
GB: The United Kingdom of Great Britain and Northern Ireland

¹ Based on: Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC

Summary

The aim of Endure sub-activity RA3.5 is to lead a sociological analysis of relevant crop protection related issues, to identify at various levels of the food chain, social and cultural factors affecting decisions, behaviour and practices that are relevant to the adoption of low-input strategies, and to characterise social and cultural sustainability indicators for crop protection, in interaction with other RA3 sub activities (i.e. multicriteria assessment) and with RA2 (design of innovative crop protection strategies).

Referring to Endure general orientations for the JPA3, we analyse the transition processes from Current to Alternative or Innovative Systems as the co-evolution of major subsystems of collective action: farmers' trajectories and professional organized action at the production level (including extension); marketing strategies and supply chain governance through the study of certification schemes; policy-making, political agenda and norms about pesticide reduction and control; civic mobilization and NGOs involvements towards public authority and towards the general public. The content of RA3.5 tasks were defined following these themes and subsystems.

While the tasks achieved in the JPA1 had focused on farmers evolutions in practices and on the conditions of transitions towards IPM, on the growing importance of supermarkets schemes and on the positions of NGOs towards pesticide issues, the tasks held in the JPA2 were focused on structural elements such as governance of research and extension systems and the evolution of public debate on pesticides, through four tasks corresponding to chapters 3 to 6 of this report, chapter 1 being a general introduction and chapter 2 offering a transversal analysis:

- Analysis of extension services and their relationships with farmers (TR3.5 a, chapter 3 in this report)
- Analysis of governance and the structuration of research (TR3.5 b, chapter 4 in this report)
- Analysis of the public debates around pesticide issues (TR3.5 c, chapter 5 in this report)
- Interaction with other ENDURE scientists in order to keep them aware of our work and results and to show the complexity of the issues involved in the adoption of IPM (TR3.5 d, chapter 6 in this report).

This report will show that the very conception of IPM as a progress path from Current to Alternative and Innovative Systems is challenged at field level. Firstly because changes in modes of governance have led to changes in the farming systems' capacity of supporting a transition to Alternative Systems (see 2.1 in the transversal analysis); secondly because many stakeholders are not receptive to the idea of progressiveness on the long run that underlines this conception of farming systems evolution (2.2); thirdly, because the degree of lock-in of National Action Systems draws the limits of evolution to Alternative Systems (2.3). More generally, such an idea of transition is confronted by a prevailing social and historical path which generates many bottlenecks, most of them being linked to the interdependencies of key stakeholders strategies on the long run (most often understood and expressed in terms of dominance of the power of the market as the main driver for action, whereas it involves indeed many other aspects including institutional ones). Working on a definition of IPM that could integrate the idea of transition and evolution in practices and give minimum definitions of the different steps at EU level, could therefore be useful.

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Definitions

Community Supported Agriculture (CSA) is a way for the food buying public to create a relationship with a farm and to receive a weekly basket of produce. By making a 6-month or 1-year financial commitment to a farm, people become "members" (or "shareholders," or "subscribers") of the CSA.

Covenant. In The Netherlands, a covenant is an agreement whereby either party stipulates for the truth of certain facts, or promises to perform or give something to the other, or to abstain from the performance of certain things

EU pesticide Package: the set of directives and regulations dealing with pesticides and their use which review EU regulation on pesticides. It includes:

- a) The regulation revising Directive 91/414/EEC COM(2006) 388 final
- b) The framework Directive on the sustainable use of Pesticides COM(2006) 373 final
- c) The regulation on the collection on statistics on Plant Protection Products COM(2006) 778 final
- d) The Directive on the placing on the market of pesticide application equipment (COM 2008 0535). In this work we have focused on a) and b)

Grenelle de l'Environnement. A debating process on environmental topics that was initiated in 2007 by the French government and which included NGOs, Unions, Government, local authorities and "persons with moral authority"

National Action System: a structured set of social actors that act and interact with one another with reference to a common objective; being here the limitation and control of pesticides.

Product boards (NL). Also called levy boards in GB, product boards are organizations that gather representatives of all types of activities working in the different economic sectors (farmers unions, pesticide industry, administration etc). They are financed by a levy paid by the members of those organizations.

1. Introduction

This report is based on the work achieved from January 2008 until June 2009 in Endure sub-activity RA3.5, which leads a sociological analysis of relevant crop protection related issues. The aim of this sub-activity is to identify at various levels of the food chain, social and cultural factors affecting decisions, behaviour and practices that are relevant to the adoption of low-input strategies, and to characterise social and cultural sustainability indicators for crop protection, in interaction with other RA3 sub activities (i.e. multicriteria assessment) and with RA2 (design of innovative crop protection strategies).

Following the Endure annual meeting of La Grande Motte (October 2008), decision has been taken at the scale of Endure network to focus on the analysis of the conditions of transition from Current Systems (CS) of crop protection towards Alternative Systems (AS) and Innovative ones (IS) and to contribute to specific System Case Studies (SCS, mainly orchards and winter crops SCS for RA3.5).

We then adjusted our program in order to contribute to such reorientation of Endure general objectives while keeping on our more specifically sociological investigations.

The first intermediary report DR 3.5 of June 2008 (Lamine & al. 2008) had shown that identifying drivers and bottlenecks for the adoption of low input strategies at farm scale was not enough. Much larger and more complex scales and systems are at stake in what we call transition processes. In RA3.5, we analyse **these transition processes as the co-evolution of major subsystems of collective action**: farmers' trajectories and professional organized action at the production level (including extension); marketing strategies and supply chain governance through the study of certification schemes; policy-making, political agenda and norms about pesticide reduction and control; civic mobilization and NGOs involvements towards public authority and towards the public. The content of RA3.5 tasks were defined following these themes and subsystems.

Against this background, our objective for the JPA2 was to focus on four tasks:

- Analysis of extension services and their relationships with farmers (TR3.5 a, chapter 3 in this report)
- Analysis of governance and the structuration of research (TR3.5 b, chapter 4 in this report)
- Analysis of the public debates (TR3.5 c, chapter 5 in this report), all the more so as the EU pesticide package was in its final stage.
- Interaction with other scientists in order to keep them informed of our work and to show the complexity of the issues involved in the adoption of IPM (TR3.5 d, chapter 6 in this report).

Method: As in the first phase of our work, **all tasks were to be achieved by several partners (2 to 5)** of the main countries involved: F, CH, NL, GB, DK, IT. They refer to three SCS i.e. orchards, maize and winter crops. It should be noticed that, with the agreement of SZIE, IHAR (Poland) has replaced the Hungarian team on the sub activity TR 3.5.b.

For achieving these tasks, we have used various information sources and methods:

- Document analysis, interviews with stakeholders on the grounds of common interview guides both for tasks a and b.
- Quantitative survey addressed to advisors for task b.
- The task c on corpus analysis is based on a selection of articles made from online newspapers data bases in France and in The Netherlands and on the use of specific corpus analysis software (Prospero) to analyse the French corpus.

The work achieved during these 12 months has led to the production of the present report, of three information leaflets targeting scientists and members of the agricultural world (see chapter 6) and of various **communications and articles**:

Lamine C. « Les dynamiques sociales de la conception et de l'adoption de systèmes innovants ». SIA conference. Paris. 26 Feb. 2008

Lamine C. « Conversion à l'AB et adoption de la Protection intégrée des cultures : Analyse des formes de transition vers des agricultures plus durables ». Dinabio conference. Montpellier, France. May 18-20 2008

Haynes I. and Lamine C. « L'impact des pesticides sur la santé humaine, nouvel outil de recadrage du débat public », AISLF conference. Istanbul. July 2008

Lamine C. « Réduire les pesticides : Entre modernisation écologique et écologisation de l'agriculture ». AISLF conference. Istanbul. July 2008

Haynes I. "Exploring the role of private standards for the implementation of IPM : the supermarket's schemes". EU conference Sustainable agriculture and pesticides. Paris. November 2008

6 papers built on RA3.5 results have been presented at ENDURE conference in La Grande Motte, October 2008

Lamine C, Noe E and Mack G. "A categorization of the social sciences approaches on crop protection issues"

Haynes I, Buurma J, Paratte R. "Rising concerns of the impact of pesticides: an analysis of the public controversies about pesticides"

Lamine C, Paratte R, Buurma. J, Burnett. ML. "Crop Protection in changing agro-food systems – a sociological approach"

Buurma. J and Lamine C. "Policy planning and implementation in crop protection; lessons learned in Denmark and in the Netherlands"

Lamine C, Ricci P, Meynard JM, Barzman M, Bui S and Messean A. "Intensification of winter wheat production: a path dependency analysis"

Buurma J. Dynamics of the public debate on pesticides and crop protection in The Netherlands.

Publications in peer-reviewed journals:

Lamine C, Meynard J-M, Perrot N and Bellon S, 2009. « Analyse des formes de transition vers des agricultures plus écologiques : les cas de l'Agriculture Biologique et de la Protection intégrée », Innovations Agronomiques, 29

Lamine C, 2009. « Anticiper ou temporiser. Injonctions environnementales et recompositions des identités professionnelles en céréaliculture ». Submitted to Sociologie du travail, in revision.

Besides, I Haynes, C Lamine and J Buurma will present a paper at the 2009 ESRS conference in Vaasa (Finland), and C.Lamine and E.Noë have submitted a workshop at the next IFSA Europe congress in Vienna in July 2010, focussed on transitions towards sustainable agriculture with a focus on comparative European perspectives, which will offer a possibility of discussion for several papers from Endure. This workshop has been accepted by the conference organizers.

RA3.5 partners, subtasks and internal working papers.

	Partners involved	Documents available and internal working papers
a) Extension services and farmers: a comparative studies of information, attitudes and decision-making	AU, INRA, SSSUP, SZIE, RRES	- Working paper :Basic description of the advisory systems in NL, Italy (Tuscany), Denmark and Hungary through a questionnaire addressed to researchers (C. Lamine and I.Haynes, Inra) - Extensive report (J.Blanc and E.Noë)
b) Governance and structuration of Research and Extension Systems	INRA, IHAR, WUR, RRES	- National reports for the NL, GB and Poland (M. Barbier, I. Haynes) - Governance and the structuration of research and extension systems - Detailed outlines and main conclusions (M Barbier, I Haynes)
c) Analysis of public controversies	INRA, WUR	- Working paper on the dynamics of the public debate on pesticides and crop protection in The Netherlands (J. Buurma, LEI/WUR) - Working Paper on the French press corpus analysis (C Lamine, Inra)
d) Interaction with Endure's other scientists and activities on the basis of the results of phase I	INRA, WUR, RReS, SZIE, AU SSSUP	Information leaflets: 1)The conditions of transition towards integrated production (IP) practices 2) Supermarket schemes a tool for implementing Integrated Production Management 3) Rising concerns on the impact of pesticides: an analysis of the public controversies DR3.6 Synthesis of RA3.5 contribution towards the rest of Endure Participation to RA2.5 and RA2.6 SCS. Discussion with advisors about the bottlenecks and the drivers for implementing IFP in orchards. Working paper as a contribution to the DR 2.10 (SCS orchard) report (Haynes I., Lamine C.) Participation to RA2.4-RA3 meetings and to the elaboration of social criteria for DEXiPM

Each of these tasks will be the subject of a chapter numbered from 3 to 6. From their results we can identify common elements that contribute in a transversal analysis of the conditions of transition from Current (CS) to Alternative Systems (AS). Such analysis is the subject of the following chapter.

2. Transversal analysis. From current to alternative systems.

Our ENDURE colleagues and agricultural scientists in general understand the notion of system as a notion centered on the farm activity whereas we as social scientists understand this notion in a broader way: the farming system is not separated from the rest of the society. Therefore we enlarge it to include stakeholders whose action can impact pesticide use (ex: institutions which deal with agricultural issues, food chain actors such as supermarkets, civil society stakeholders such as environmental NGOs etc).

The tasks achieved by RA3.5 in the JPA1 (Lamine & al., 2008) had focused on analyzing three issues:

- 1) The evolutions in practices and transitions towards IPM;
- 2) The growing importance of supermarkets schemes;
- 3) The positions of NGOs towards pesticide issues.

It was then decided to focus the tasks planned in the JPA2 on structural elements such as governance of research and extension systems and the evolution of public debate on pesticides. In other words our work had to do with knowledge and conceptions about strategies and modes of pesticide use reduction (IPM) and their circulation in various arenas.

We will see that the very conception of IPM as a progress path from Current to Alternative and Innovative Systems which is supported at EU level by the 2009 pesticide package is challenged at field level. First of all because changes in modes of governance has led to changes in the farming systems' capacity of supporting a transition to Alternative Systems (2.1); secondly because many stakeholders are not receptive to the idea of progressiveness on the long run that underlines this conception of farming systems evolution (2.2); thirdly, because the degree of lock-in of National Action Systems draws the limits of evolution to Alternative Systems (2.3).

2.1. The changes in modes of governance and their impact on the possible transitions from Current to Alternative Systems

We refer to the notion of National Action System (NAS) to define a structured set of stakeholders (institutions, industry, farmers etc.) who act and interact with one another with reference to a common objective; being here the limitation and control of pesticide use. However, the existence of those relationships should not be taken for granted.

A first observation was that in some Northern EU countries **drastic changes have occurred in the public sector which have impacted the governance of research and extension** (Ch 3 and 4).

The general trend in those countries is that research and extension are less (or not) public driven and/or funded anymore (with nuances according to each country). For instance, in the NL and in GB, public extension services have been dismantled. In the NL the pesticide policy was in the past defined by public institutions in what the interviewees call an "iron triangle" that was linking the ministry of Agriculture, the Landbouwschap² and the agriculture specialists from the parliament. Since the 1990s, the Members of Parliament have lost their importance in policy making (maybe because most decisions are taken at EU level). The Landbouwschap doesn't exist anymore and the Farmers Union has strongly advocated for the recognition of the pesticide industry as a full stakeholder (for example for its entrance in

² A semi public organisation controlled by both the government and the farmers union (LTO) that was participating in the design of the crop protection policy.

the administrative organization that coordinates the Dutch National Action Plan for the reduction of pesticides).

Such a kind of movement has had a triple impact:

- First of all in countries with the less public research funding (such as GB and the NL), it seems that **the orientation of research activities is more and more towards short term, practical problem solving issues**; this type of research being the most easily funded by organizations such as levy boards³ and chemical companies. It seems that in other countries like Germany, public funding organizations are often demanding publication of results in journals with high impact factors. However, applied research in agriculture doesn't easily meet these requirements. This research depends highly on public funding but these budgets are diminishing from year to year.

In France, agronomic research is still mainly public driven but the crop protection national system has recently been submitted to big structural changes. Research efforts dedicated to sustainable strategy of crop protection are confronted with a **potential paradox: supporting the quantitative objectives of food security or supporting environmental concerns and human health protection**. The translation of this paradox is for instance, to assume whether the efficiency of sustainable use of pesticide is based on pesticide use limitation or on human health and environmental status improvement.

Those efforts in agronomic science towards the issue of sustainable (or non-use) of pesticides has to face, in all EU Countries, the fact that life sciences are evolving towards challenging fronts of research that are not directly related to environmental matters or agricultural concerns. They are living under epistemic tensions related to the dissolution of the idea of gene (epigenetic phenomena's), but also under evolution of research techniques of biomolecular biology and bioinformatics, and under many consequences coming from change in scale in tackling with life provided by ecology and evolutive biology. One could wonder whether agronomic research dealing with long term stakes for human life and environmental concerns of pesticides uses is receiving enough attention and funding in such a context (see Vanloqueren and Baret, 2009).

- Secondly, **knowledge tends to become scattered** between various and often independent or even non related research centers and the financial relationships between research and extension are reorganized in order to benefit from synergies of resources. Extension companies and applied research centers invest in experimental farms (many of which used to be state owned) or develop organizational and/or financial links with universities, thus giving strong orientations to research priorities. Meanwhile at the advisory level, it seems that the development of the individual networking is important to keep awareness of research results because (in NL and GB) there is no more access to a central information source. This **distribution of knowledge capabilities is certainly in favor of regional and local capacities but, at the same time, such a system requests coordination at the national and European levels to face the purpose of informing the implementation of sustainable strategy** (IPM basically). This should be enhanced within reflection about national action plans implementation but certainly deserves a long term strategy of monitoring in relation to epidemiological watch on both sides of human health and crop diseases. Moreover, the situation of New Public Management that prevails in many European countries is not in favor of this. Therefore the coordination of knowledge production and the use of locally produced actionable knowledge in different situations remains a key issue for research dealing with the challenge of sustainable use of pesticide and of generalizing IPM as a technique.

³ Levy boards in GB or product boards in the NL (or federations et unions professionnelles de secteurs in France, as FGD for retailers) are organizations that gather representatives of all types of activities working in the sectors concerned (farmers unions, pesticide industry, administration etc) . They are financed by a levy paid by the members of those organizations. Part of their work is to finance research according to the sector's needs.

- Thirdly, as advisory systems become market led, **farmers are clients that the various extension services don't want to lose**. Actually this situation has important consequences on the type of advice given to farmers. Against a background where farmers tend to assess the advisors' work according to the yield (and income) they contribute to generate, **advisors become risk adverse and reluctant to promote alternative strategies**. They will be heavily criticized by competitors when it happens that their "alternative" advice (towards a reduction in pesticides) leads to failures in a given year (Lamine, 2009). Therefore, testimonies claiming that IPM advice will only be offered if the client is asking for it, i.e. in situations where there is a specific market demand or reward; or if the farmer is facing legal "dead-ends" (ban of products) or a "serious problem that affects his production" (such as resistance), are numerous. To the contrary, as studied in JPA1 (Lamine & al, 2008), cases of collective action and participatory learning have proved to be efficient in inducing changes of practices but they are not the majority.

To this extent, the framing of the pesticide debate that can be described according to the press content analysis (ch 5) has influenced changes in the regulation of the risks associated with pesticides and has created legal dead ends. Particularly, **concerns about the long term impacts of pesticide use on the health of the living beings have now taken the lead in the public debate** and have been translated at regulatory level. For example, while the idea of controlling the pesticide risk was prevailing in the past EU regulation (1991); the 2009 EU pesticide package emphasizes the precautionary principle. The inclusion of this element in the EU debate has translated in the debates developed in the press and the parliamentary questions (ch 5). The 2009 EU ban of several substances is an important element pushing farmers towards considering alternative strategies (see JPA1 and also ch 3). For example, farmers would start to consider seriously alternative methods once conventional methods are no longer effective or available. This is already the case for example in minor crops (some fruits and vegetables). For many farmers this implies a change in the way and scale in which they consider risk and the start of a learning process that can't be done without the support of a professional and marketing network (Lamine, 2009).

2.2. Many stakeholders are not receptive to the idea of progressiveness on the long run

IPM has been discussed at Endure annual meeting and conference of La Grande Motte (2008) as a path that goes from Current Crop Protection Systems to Alternative and Innovative ones. Such an analysis was grounded on scientific inputs such as **the ESR "Efficiency, Substitution, Redesign" model of transitions** which defines 3 steps (EAP, 2009; Hill & Mac Rae 1995):

1. Efficiency i.e. focus on the fine-tuning of existing practices to reduce consumption and waste. At field level this is translated by farmers and extension workers as the use of Good Agricultural Practices (maintenance of equipment, avoiding leaks), the use of improved sprayers, low-drift nozzles and DSS (Decision Support Systems). It can also translate in the use of precision agriculture.
2. Substitution i.e. Resource-dependent and environmentally disruptive products and procedures are replaced by those that are more environmentally benign. Scouting, biological control and low-toxicity pesticides - may replace the routine use of conventional pesticides without challenging the cropping system.
3. Redesign i.e. a more holistic approach that fosters long-term sustainability is achieved. Instead of responding by trying to minimize the symptoms of a problem, the whole cropping system is re considered taking into account ecological balances.

This grid has been used to analyse transitions at farmer's level in the DR 3.5 JPA1 report (see also Lamine & al, 2009).

At research, advisory or farm level, IPM is used as a kind of generic term which hardly refers to the same notion: IPM according to an IOBC partner will not be the same as IPM for a supermarket controller or a civil servant working for the ministry of agriculture. The practical positive outcome of such a situation is that most stakeholders will not disagree on the idea of implementing IPM.

However, **in many cases, the so called “IPM” research or practices are orientated towards the “minimization” of the risks of pesticide use thanks to techniques defined in the “efficiency” category, and not towards a larger redesign of farming systems (Ch 3 and 4).**

This situation reflects the farmers’ reluctance to consider non chemical alternatives. Indeed, market conditions, the legal framework in plant protection, as well as long lasting practices and habits are framing current stakeholders’ perceptions. Knowledge and practices that might threaten the economic performance are not considered, with the consequence that the very conception of integrated pest management and redesign approaches are hardly considered (Ch 3 and 4). In other words the opportunities for system evolution as defined above by some researchers of agricultural sciences and ecology are not taken into account by the majority of the stakeholders.

At field level many farmers and advisors stick to “Good Agricultural Practices” – which means mainly respecting legal conditions, in contrast with IPM which involves other demanding aspects - while most advisors and researchers endorse the economic constraints that seem dictated by the current production system and focus on the improvement of techniques (precision agriculture for instance) which is presented as the best way to tackle the pesticide issue (Ch 3).

On their side, most administrative bodies and private sector stakeholders pay more attention to impacts on product quality (MRLs, eg. for sanitary organisations such as food safety agencies and actors of the agrifood business) or to impacts on the environment than to the conditions of production (Ch 3 and DR 3.5 report). This reveals another expression of the effects of the interdependencies of key stakeholders’ strategies that can be assessed through a path-dependency analysis (Lamine et al., 2008b).

For most environmental NGOs but also for some advisors and farmers, **such a situation which avoids questioning the whole system makes, by contrast, organic farming appear to be the only type of system redesign strategy.** This element might explain why, in many countries, NGOs focus on organic agriculture (Ch 4 and 5). However, high forms of IPM which take into account the cropping system in a systemic way can be considered as redesign as was shown in the case of wheat growers in JPA1 (DR 3.5 report, see also Lamine, 2009).

In many countries, the **tradition of strong opposition between organic and conventional farming** (for instance in GB where research organizations, advisors and NGOs that deal with both of these sectors are presented as completely separated and where organic farmers seem to be perceived as the members of a religious sect by conventional ones) or between NGOs supporting organic agriculture and conventional farmers (FR, NL) (DR 3.5 report) **doesn’t contribute to the opening of collective thinking to system redesign or to knowledge and practices transfers** between different stages of the ESR continuum.

This situation is reinforced by the loose definition of IPM given by the strategy on the sustainable use of pesticides (frame 1):

Frame 1: Definition of IPM in the EU documents

"Integrated pest management" means careful consideration of all available plant protection methods and subsequent integration of appropriate measures that discourage the development of the populations of harmful organisms and keep the use of plant protection products and other forms of intervention to levels that are economically and ecologically justified and reduce or minimise risks to human health and the environment. Integrated Pest Management emphasises the growth of a healthy crop with the least possible disruption to agro ecosystems and encourages natural pest control mechanisms

Source: DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing a framework for community action to achieve the sustainable use of pesticides 2008

It has consequences on the definition of National Action Plans (Frame 2) as the administrative bodies that we met in the countries studied (in Western Europe) consider that their National agriculture is already under the IPM regime and that no further improvement is necessary. They consider that the framework directive is targeted to harmonize plant protection in all 27 Member States (MS) and that MS with already high standards like GB, NL or Germany need less changes than others. However, their understanding of IPM is often related to the “efficiency” paradigm, and seldom to “Substitution” or “Redesign” paradigms.

Frame 2 :Directive on the sustainable use of pesticides. Article 4

1. Member States shall adopt National Action Plans to set up their quantitative targets, measures and timetables to reduce risks and impacts of pesticide use on human health and the environment and to encourage the development and introduction of integrated pest management and of alternative approaches or techniques in order to reduce dependency on the use of pesticides. These targets may cover different areas of concern, for example workers' protection, protection of the environment, residues, use of specific techniques or use in specific crops.]

To this extent, the Water Framework directive⁴ with its precise monitoring program of water catchments quality might have more impact on the risk reduction than the Directive on pesticide use. It has also consequences on marketing opportunities: **because there is no formal standard such as for organic agriculture, promotion of IPM is difficult.** On the one hand, Good Agricultural Practices which tend to represent minimum standards for export do not go much further than the general regulations (such as in Global GAP for instance). On the other hand, when supermarket certification schemes include requirements for advanced forms of IPM, it is not turned into a marketing element as supermarkets communicate on other product qualities (safety, freshness, origin etc) (DR3.5 report; Haynes, 2008).

However, if many advisors and farmers don't consider the positive inputs that they could get from their organic colleagues, some acknowledge that they do have relationships with them or that they should have some in order to progress in their IPM practices even though there are many unsolved problems in organic farming regarding system sustainability (for example, repeated mechanical weed control may increase loss in soil fertility resulting from higher erosion). It suggests the hypothesis according to which **the degree of knowledge transfer between organic and conventional agriculture both at farm and advisory levels could be a sign of the potential of evolution of farming systems towards more sustainability.** Science policy makers and managers of knowledge organisation should watch the possible **isolation of organic farming both in terms of technical knowledge and scientific**

⁴ The water framework directive requires that all inland and coastal waters within defined river basin districts must reach at least good status by 2015 and defines how this should be achieved through the establishment of environmental objectives and ecological targets for surface water

knowledge. We have noticed that, in some countries, **scientific and institutional work around a sustainable use of pesticides does not structurally benefit from research and extension in organic farming yet.** This relation seems to be much needed since the development of organic farming seems to be very much socially situated (in terms of experiential knowledge, support, technical specification and knowledge).

However, it seems that in the very recent period we find in the professional discourse and press (ch 5) more positive reporting about organic farming and the lessons than can be learned from it for “conventional” farmers. This should be considered as a positive sign despite a high degree of “lock-in” of the National Action Systems that prevents transitions towards Alternative Systems.

2.3. The degree of lock-in of National Action Systems draws the limits of potential evolution to Alternative Systems.

National Action Systems can be considered as more or less structured in terms of decision making by the locked-in of technological regime of agriculture within agrochemical techniques of fertilizing and crop protection. The case of France is emblematic of it and agronomic research institutions have recognized this fact in 2005.

The notion of lock-in has been developed within the path dependency theory (Davis, 1985; Cowan and Gunby, 1996; Vanloqueren and Baret, 2004) which suggests that an innovation trajectory may become dominant and strengthened by the feedback of its implementation, despite the existence of alternative innovations which could have offered a better sustainability on the long run. We have demonstrated how this has been the case in France with **current farming systems based on a convergence of innovations and strategies from the 1960s to the present regarding breeding** (with the development of varieties with high yields but that are susceptible to diseases), **pesticides** (homologation of new pesticides), **farming practices** (intensive crop management based on early sowing, high density and a non-limiting supply of nitrogen), **research** and **advice** etc. (Lamine et al., 2008b). When considering the potential of evolution, we have also showed the difficulties at different levels of the system. For example, the introduction of new crops in crop rotations for winter crops is confronted with lack of storage capacities and retailing possibilities and often with strong resistance from cooperatives. It is also to be noticed that this technological regime has received a huge support from European subsidies, becoming thus a kind of technological paradigm (Dosi, 1982).

The degree of lock in of the administration and the economy of crop protection in the Netherlands and in GB is quite remarkable too: the objective of farm profitability, the need to support an export orientated agriculture, the rationalization by market quality limit the possibility of exploring new systems all the more so as it is backed up by a technical lock-in due to the convergence of the pesticide industry and suppliers strategies and the evolution of crop management practices as it has been demonstrated for France.

Other elements participating in this lock-in phenomenon are:

- the structure of land ownership. In a country like the GB where big private companies which are not farmer-owned, possess and/or manage farms, everything is mobilized for achieving the highest profitability with the lowest risk taking;
- the constraints linked to the market : large farms are often working for wholesalers or supermarkets that are looking for a secure supply in terms of quantity, hence emphasizing the need to achieve the highest yield.

One of the consequences of the system lock-in is its strong reaction whenever EU regulation disturbs its usual way of functioning, hence the protest about the phasing out of certain substances by the EU pesticide package, both at European scale (in the cases of GB and NL) or towards the government (in France). In GB, the government has commissioned a survey showing that one of the consequences of the planned phasing out of pesticides will

be a very important yield decrease for wheat (PSD, 2008). In the NL the same kind of study was commissioned by the farmer's union (Spruijt, Spoorenberg & al, 2008). Its results were used to build a media campaign according to which the national production of tulips would disappear. This study did not even consider the possibility to implement alternative strategies (Ch 4).

Conversely, more heterogeneous situations, such as in France or Poland with a higher diversity of small farms and economic relationships, seem to allow a larger diversity of experiences that can lead to situated innovation processes in farming systems.

For instance, the situation of Poland is very contrasted, with clusters of intensive agriculture on one side, and a distribution of small farms with very low level of inputs on the other. This country offers a large variety of potential of evolution with a direct access to organic farming "by default" without restructuration. However, this does not mean that access to knowledge and techniques could be neglected in these cases, in the sense that organic systems are complex and mainly knowledge driven. Moreover, the profitability of small farms remains a key point, which is conditioned by access market to specific agrochains (Ch 4).

Another element is **the system's capacity for integrating new stakeholders**. In many countries, the Ministry of Environment has begun to interfere in the setting up of agricultural policies, particularly when the protection of water catchments is at stake. However, the integration of other stakeholders such as the Environmental NGOs that are animating the public debate on pesticides is often more difficult.

The common way of achieving this integration is by creating **specific forums** (the pesticide forum in GB, the Grenelle de l'Environnement⁵ in France, The Covenant Crop Protection⁶ in the Netherlands) that gather representatives of the agri-food chain, NGOs and also water boards and local authorities. It seems that this is a first step which does not always bring positive results. NGOs often resent that they are not considered seriously enough. For instance, in the Netherland's Stichting Natuur and Milieu left the Covenant on Crop Protection. The involvement of new stakeholders and especially environmental ones can sometimes be more easily achieved at local scale, as is observed in the case of water protection issues or natural parks (Candau & Ruault, 2005).

It should also be noticed that **nature conservation concerns do not always lead to support alternative systems**. For instance, in GB where environmental NGOs are full stakeholders of the NAS, the NGOs' objective is to increase the global sustainability of the farms' activity i.e. lowering its environmental impact through a sustainable management of wastes, energy, native fauna and flora, more than the lowering of pesticide use. Such a situation can be interpreted as a result of the history of nature conservation in GB, which seems to have been centred on the protection of fauna for years at the expense of other issues such as transitions in agricultural practices. The importance of fauna is shown, for example, by the importance of NGOs such as the Royal Society for the Protection of Birds (RSPB) which has over a million members, 200 nature reserves covering almost 130,000 hectares and a budget (2007) of £78.6 million.

Finally, another element that can contribute to the lock-in of the system is **the convergence of some stakeholders justification regimes for action**, in the sense that, as in the NL or GB, many stakeholders share the same views about the purpose of their action (i.e., contributing to the Dutch reputation of quality exports; contributing to the world's food security).

⁵ See definition page 5

⁶ A covenant is an agreement whereby either party stipulates for the truth of certain facts, or promises to perform or give something to the other, or to abstain from the performance of certain things

As far as scientific knowledge is concerned, for researchers who are used to working within the Current System, integrating the environmental and social aspects of sustainability leads to another way of doing natural sciences. It puts them in uncomfortable situations, hence the trend to stick to well known situations and routines. In other words, they often talk in terms of transitions in techniques, sometimes forgetting the importance of transitions in the way of thinking (Ch 6). As pointed out by Geels (2005) and Elzen et al. (2004), transition in technological regime requests that novelties have the possibility to emerge in niches. But those niches are not completely linked to existing regimes and « landscapes ». The question of managing transitions thus requests a specific framework mixing the formation of a vision for the long term that can be enhanced by foresight exercise and experiments that seek to develop niches (Kemp et al., 1998) and to promote specific sociotechnical and strategic arrangement like is the case for water quality protection of catchment areas (Barbier, 2008) or Natura 2000 zones (Rémy et al., 1997).

Conclusion

At field level, the practical translation of the science-based notion of “transition from Current to Alternative Systems” should lead to the idea of a progress path from IPM practices targeting the Efficiency of crop protection to IPM practices that mobilize Substitution by alternative solutions and then Redesign of their cropping system (following the ESR grid suggested by Hill and MacRae, 1995).

However, such an **idea of transition is confronted with a prevailing social and historical path which generates many bottlenecks, most of them being linked to the interdependencies of key stakeholders strategies on the long run** (most often understood and expressed in terms of dominance of the power of the market as the main driver for action, whereas it involves indeed many other aspects including institutional ones). Against this background, most IPM practices lie within the “Efficiency” category while organic agriculture is considered by many stakeholders as the only alternative, whether they consider it as a limited but necessary alternative for upper class consumers or as the only ecologically acceptable form of agriculture which should therefore be generalized, hence forgetting in both cases other types of farming practices which are localized on intermediary points of the ESR continuum such as advanced forms of IPM.

Working on a **definition of IPM that could integrate the idea of transition and evolution in practices** and give minimum but clear definitions of the different steps, could therefore be useful. Such work has already started at the EU level where the DG environment has commissioned a study to define those steps (BIPRO, 2009, a report which is currently – Fall 2009 - under reviewing by MSs and ENDURE). It could be interesting to further develop work on this basis.

3. Changes in attitudes concerning pest management practices in the agricultural advisory sector: examples from five European countries (Denmark, Netherlands, United Kingdom, France, Italy)

Julien Blanc & Egon Noe (AU)

Field work with the help of Jan Buurma (LEI WUR); Mary-Louise Burnett (RRes); Elisa Marraccini (SSSUP); Claude Compagnone and Béatrice Simon (INRA) and a Working paper on EU advisory systems from Claire Lamine and Isabelle Haynes (INRA) based on the analysis of a first questionnaire among Endure partners.

Also with inputs from Hungary (I.Madarasz).

SCS: Winter crops

Introduction

Reducing the use of pesticides – including fungicides and herbicides - in agriculture has become a major challenge these last years, which can be considered as the outcome of:

- The EU directive which aim is to reduce the risks and impacts of pesticide use on human health and the environment (EU Parliament, 2009)
- Some EU countries' will to go further and reduce pesticide use (and not only impacts).

First in line to face this challenge are the farmers. However, agricultural extension services, known to be a cornerstone of the decision making at the farm level, are in the firing line too. As shown in the new EU Directive (EU, 2009) addressing sustainable use of pesticides, they are expected to play a crucial role in this broad turn toward more sustainable pest management strategies. However, little is known regarding the agricultural advisors' current attitude toward this problematic. Are they active diffusion agents of new pest management strategies at the farm level, neutral advisors led by demand-driven process or, conversely, holding-back the transition to low pesticide use strategies for some reason?

European extension services have experienced major changes these last decades leading, among other things, to an increasing diversity of advisory logics and advisors professional status (Ingram, 2008). Public advisors are now very scarce if not inexistent in most of the countries. Most of the agricultural advisory is provided by organizations whether specialized in this business (Private independent consultants) whether providing support to farmers next to other related – economical or non-economical - activities (Farmers' Union, Input suppliers, Farmers' Cooperatives, etc.). As their activities are grounded in different interests and as they may not be involved equally and similarly in the farmers' decision making process, these actors may show different attitudes regarding pest management advisory; But in what extent? Meanwhile, these advisory organizations are acting in different national contexts. Differences in agricultural development histories, differences in the way to cope with pesticide issues in the political arenas, differences in the national advisory systems organizations may lead to different advisory attitudes toward pest management issues; But, once more, in what extent?

Our purpose here is thus to shed light on the current attitudes of advisors toward pest management issues, to identify the major factors underlying these attitudes and to explain their diversity across EU and the different advisory organizations. This objective involves getting broader insights about these actors - their involvement on the farms, their business

logics and their strategies –, which only can be done in getting deeper knowledge of the national advisory systems within which they are acting.

Six countries were involved in this study, namely Denmark, Netherlands, Great Britain, France, Italy and Hungary, despite data procurement constraints led to unequal treatment of the problematic in each country.

This report is made of three sections, out of the concluding one. The first section introduces the methods used to gather data in the different countries and highlights some of the major methodological constraints we faced. The second section focus on the national advisory systems and their recent evolution, while giving a clearer picture of the advisory organizations involved in agricultural extension, of their involvement at the farm level and of their business strategies. The third section focus more particularly on the involvement and attitudes of the advisors towards pest-management advisory, while the last section consists in a general discussion.

3.1. Methods, methodological constraints and consequences for the comparative analysis

As a first step, a questionnaire was addressed to the different partners involved in the study, asking them to draw an overview of the structural characteristics of the advisory system in their country (Working paper by Claire Lamine and Isabelle Haynes). The results of this study were taken as a basis to conduct literature surveys and interviews with researchers, representatives of extension organizations and of public authorities, depending on the countries.

Meanwhile, all the partners involved in the study sent a closed questionnaire to field advisors who were providing advisory support to arable farmers in their country or region. Preference was given for a structured questionnaire (with closed questions) instead of semi-structured interviews to reach better homogeneity in the data provided by the different countries. A few specifications / complements were asked for some questions to enrich the quantitative analysis, however. This questionnaire aimed to compare the work performed by (on-farm) advisors, and more specifically the way they get involved with pest management issues. It was mainly composed of three sets of questions (cf. extensive report).

A first set of questions addressed the main characteristics of the organization there were working for and different general aspects of their work (specialization, level of involvement in the farms).

A second set of questions focused more specifically on their attitude toward pest management, with special concern in the knowledge advisors had about IPM and in assessing in what extent they were involving IPM issues and tools in their advisory.

Finally, some questions were addressing the learning processes regarding IPM within the advisory worlds, focusing on their sources of information and on the extent they were connected to specific knowledge provision networks.

The involved partners were responsible in selecting the suitable (and available) advisors to apply the questionnaire, with the objective, not necessarily to encompass the total diversity of existing advisors status/profile, but to reach most of them and at least the most representative ones. The questionnaire was to apply with 5 advisors of each type of organisations (Frame 3) to get a set of data suitable for quantitative analysis.

Frame 3: Five types of advisory organisations.

Coop: Farmer's Cooperative
FU: Farmer's Union
IC: independent private consultant
IS: input supplier
PU: public advisors
TP: Trade partners

Reaching this objective showed-up problematic, however, owing to lack of availability of some advisors and, sometimes, reluctance to participate in the study. It was thus differentially fulfilled with the consequence that the dataset used to perform quantitative analysis difficultly reached the required threshold to give fully reliable results and make unequivocal interpretations. Still, these results and interpretations have been confronted with qualitative data achieved through interviews with researchers and actors of the advisory systems enabling us to get more reliable pictures of the depicted phenomenon and offering interesting exploratory results.

Let's finally emphasize that, whereas in the United Kingdom, the Netherlands and Denmark, the questionnaires were addressed with no specific regard to the geographies of the advisors activities and are, consequently, supposed to provide us with national tendencies, in Italy and France questionnaires and interviews were applied and performed in specific Regions, respectively Tuscany and Bourgogne, and thus depict some specific situations, limiting our capacity to extrapolate to other situations.

3.2. Advisory activities and organizations, a transversal approach

European Agricultural Extension Systems (AESs) are experiencing important transformations. One of the main features of these - recent and undergoing- reconfigurations has been highlighted as being the **privatization of extension institutions**, resulting of more and more-market orientated knowledge policies (Chapman and Tripp, 2003; Pool and Lynch, 2003; Rivera and Alex, 2004). After the Second World War, all Western European countries established structured technical support systems. Knowledge generation and circulation were embodied in these systems, financed to a large extent by public funds and/or by a system of additional taxes on the sale of farm produce or on land tax (Laurent et al., 2006). Thus, until recently, farmers of all Western Europe countries benefited from the services of these bodies delivered partly free-of-charge. Since the mid-1980s, however, extension services as many other components of the agricultural R&D system as a whole have experienced consistent shrinkage of the public involvement. Public extension services have almost disappeared and financial supports to extension services have strongly decreased in many countries, if not totally disappeared. Meanwhile, Central and Eastern European countries show very specific features, as the end of the communist Regime along with the recent entry in the EU have raised particular challenges for agricultural extension activities: if private advisors are the king pin of the extension system, this last is strongly supported and coordinated by the public sector.

3.2.1. GB and NL, highly competitive advisory provision markets

In GB and NL former public extension services have been privatized in the 1990s leading to the growing emergence of Independent consulting firms. However, while in the Netherlands, most of the farmers are connected with a broad array of advisors, employed in Trade companies, Input supplier firms, Farmers' cooperatives, Farmer's Unions and Private consulting groups, in GB they are – mainly – getting on-farm support whether from input suppliers whether from private consulting companies, but rarely from both.

Indeed, one of the major features in the Netherlands is the high diversity of advisory organizations working in the arable sector, and more particularly in the dominant potato production based systems. Five types of organizations are currently providing support to Dutch arable crops farmers:

- Input suppliers, who are by far dominant in the advisory sector employing 60% of the total number of advisors,
- Private consulting companies (like DLV Plant), representing 15% of the total amount of the Dutch advisors,
- Farmers' Union, representing 15% of the total amount of the Dutch advisors,
- Farmers' cooperatives and

- Trade partners, representing each 5% of the total amount of advisors in the country.

The first ones are both upstream and downstream chain partners (providing inputs and buying the farmer's production) whereas the last ones are only involved in downstream operations, commercializing the farmers' merchandise. Dutch arable farmers are almost always related with Trade partners or farmers cooperatives.

These different actors are offering quite different sets of services to the farmers: Input suppliers companies are only providing advisory in agronomical aspects, Farmers' Unions on economical and strategic issues, whereas advisors from the trade companies, the Cooperative and the Private consultants' company (DLV) are involved in different dimensions of the farm management.

Meanwhile, most of the Dutch arable farmers are connected to a plurality of advisory actors. The basic feature is to be connected at the same time with at least input suppliers, Trade partners (or cooperatives) and Farmers' Union, knowing that all these actors are providing support almost free of charge⁷: 35% of the arable Dutch farmers are said to only get advisory from these actors, while the majority is connected to private advisory companies (as DLV) too, through study groups and for some of them at an individual level. The Private consultants then play different roles, as generalist counsellors in the study groups, and more specialized ones in the individual relations.

Conversely, input suppliers and private consulting companies are almost the only agricultural advisory providers in GB, employing respectively around 600 and 300 advisors. Next to these, some Conversation advisors and Environmental schemes advisors, working on the behalf of NGOs (with public funding) and for the government are involved in land-management too. However, they are not involved in farm management or agronomical issues per se, but only provide support for being granted in environmental schemes. Conversely to other countries, like Denmark or Netherlands, the advisory services offered by input suppliers are not free of charge in GB: sales of input and agricultural support are separate activities. Some farmers are thus buying inputs to suppliers while getting advisory from private consultants, whereas others are buying both these services to input suppliers. As a consequence, only very occasionally, British farmers are receiving advices from different providers (excluded those coming from the conservation and environmental advisors) and, consistently, both input suppliers and private consultant companies are offering support on all aspects of the farm management. However, if Input suppliers are almost always providing global advice on the farms, it is not the case for Independent consultants who may only be employed for very specialized consulting activities (from crop protection advisory to business advisory).

In both countries, **the competitive environment of advisory is quite high**, even if grounded in different configurations and the notion of "**knowledge market**", in relation to advisory provision, fits quite well in both of the contexts. In both cases, farmers are expected to behave as "entrepreneurs", knowing where they are heading to and what are their needs regarding knowledge and advices. Advisory providers are for their parts acting accordingly to different logics, with on the one hand providers selling nothing but advices and, on the other side advisory providers whose advisory may be, to different extents connected to other trade interests. Independent advisors are claiming their differences in this respect, trying to make their "independent views" a competitive advantage. This is actually one of the main marketing argument of the GB Independent consultants to distinguish their activities from the input suppliers' ones. This explicit position is notably to relate to the existence in GB of both a pesticide industry's self-regulatory scheme, BASIS⁸ and a Voluntary Initiative launched in 2001 by the farming and crop protection industry. BASIS was set up in 1978 at the suggestion of the GB Government to provide training and certification for sellers of

⁷ Included in their general services fees would be more accurate.

⁸ British Agrochemical Standards Inspection Scheme

agrochemicals and those giving advice on their use. From then on, this inspection scheme strengthened its requirements and include, for many years now, mandatory trainings in various domains, as Integrated Pest management and integrated crop production, that all advisors have to follow (included the independent consultants). In order to retain their name on this BASIS register advisors have to attend each year a certain amount of courses, conferences and training sessions to keep themselves up to date. Meanwhile, in 2001, the GB government again, accepted the proposals put forward by the farming and crop protection industry to launch a program known as the “Voluntary Initiative” aiming to minimize the environmental impacts from the pesticides and developed as an alternative to a pesticide tax which had been under consideration (in the late 1990s) by the Government, and strongly opposed by the farmers and Chemical industry lobbies.

3.2.2. Denmark, from a traditional corporatist-based advisory system to a competitive commercialized one.

Denmark, for its part, never had public advisory services, but a monopolistic Farmers' Union extension organization (the DAAS⁹), in a large extent fuelled by public funds. Recent definitive withdrawal of public support led this organization to commercialize its services. Nowadays, farmers are paying a basic (small) fee for which they get in return their membership of the DAAS, along with a subscription to the organization's weekly newspaper, but most of the support provided by the organization is charged on hour-basis.

The DAAS is still by far the dominant actor in agricultural extension activities, and particularly in the main sector-based productions of the country, dairy production and pig production, two systems where crop production is integrated with animal breeding. Its advisors are estimated to account for 80 to 90% of the total advisors of the country. Along with this organization four other – private - actors are involved in agricultural advisory activities in Denmark: advisors working for Input firms (IS), a few trade partner's advisors, and private advisors companies. Input suppliers and Trade partners are including their advisory services in their global services package, with no additional charges, whereas private consulting companies are charging the farmers on an hour basis of work provided. All these private actors are still playing a minor role in the Danish extension system, as they account for only 10 to 20% of the total amount of advisors in activity in Denmark. However private consultants, whose activity was until recently limited to very specific production sectors - ranging from horses or sheep production to organic vegetable production – are quickly expanding their activities to the main production sectors and are expected to continue gaining importance these coming years.

From a monolithic free of charge advisory system, Denmark thus recently turned a commercialized one, where competition between the providers is increasing. The DAAS politics, as a Farmers' Union company, is to provide a broad range of support to as many farmers as possible. With the withdrawal of public support and its increasing activities regarding Grant schemes advisory, the company is experiencing difficulties to keep its strong tights with more and more farmers as much as its availability and efficiency to cope with very technical aspects. The small private advisories companies are benefiting from this situation and increasingly entering the arena. These last are rarely taking over the farm management though and more often provide specialized advice on agronomical issues, complementing the support of the DAAS agents on other farm management aspects. Meanwhile, the input suppliers are usually only involved in agronomical advisory activities and don't deal with other aspects of the farm management. Further inquiry showed the involvement of their advisors at the farm level remains very superficial, as each company doesn't employ more than 5 of 6 advisors, who have to deal sometimes with more than a hundred of farmers.

⁹ Danish Agricultural Advisory Service

3.2.3. France (Burgundy), private actors increasingly taking over the advisory sector

France is the only Western European country – in our sample - still having “public” agricultural extension agencies (Agricultural Chambers). However, **Agricultural Chambers have experienced budget cuts these last years**. These budget cuts, along with increasing assignments in environmental and rural development issues as much as in Grant scheme support, led some local Agricultural Chambers to lower or sometimes even quit their activities related to agronomical and strategic advisory. Consequently, in many places, **agronomical and strategic advisory activities are growingly left in the hands of private advisory providers, mainly farmers cooperatives and input suppliers**, which advices’ are free of charge for farmers¹⁰.

In the locality where the current research was implemented the Agricultural Chamber didn’t fully give up with agronomical and strategic on-farm advisory issues. Still, the public advisors lost part of their capacity to engage with these issues. Indeed, only two public advisors, with one working part time only, are working in the sector nowadays, whereas private actors are locally represented by ten advisors, nine working for three different Cooperatives and one for an input supplier company. Consequently, the cooperatives’ advisors appear to be the most influent regarding farmers’ decision making. They support farmers on all issues of farm management and have an important knowledge of the farmers and the farms they are involved in, as well as having good skills regarding most of the aspects of technical advisory (agronomical issues). In front of these influent advisors, public advisors show difficulties to cope with the farmers’ specific technical and strategic concerns and attest having difficulties to compete with the cooperatives’ advisors. The greater diversity of assignments they are facing and their limited number don’t enable them to stick with the farmers’ needs. The input supplier’s advisors, for their part are said – by the other advisors of the sector - to show a relatively low level of on-farm advisory activities.

Both the Advisory Companies (AC) and the Cooperatives are growingly involved in Integrated Production issues. While public advisors are participating to Integrated Pest management development programs at a Regional level (through the Agricultural Chambers network), Cooperatives’ ones recently began to follow training programs in general agronomy topics (provided by public agronomy schools and a French Cooperatives network) aiming to improve their global knowledge in crop production and provide them with more integrated perspectives. Actually, In France, many Farmers’ Cooperatives – acting as input sellers, outlet trade partners and advisory organizations – federated in a national Group (InVivo) have created in 2006 a “sustainable farming and development” committee whose assignment is notably to strengthen knowledge and know-how in regard with alternatives farming systems and practices, with special concern in lowering environmental pollution of agricultural activities. This Cooperatives network now provides its advisors – who follow mandatory trainings - with a specific “accreditation”, validating both their general skills in advisory activities and their concern and involvement with sustainable issues.

Still, the advisory provisions of the AC and the Cooperatives seem to be still embedded in different logics. The public advisors consider that the cooperatives’ advices are still strongly grounded in economical interests related to the selling/buying activities of their organizations, and that their turn towards a low input agriculture is shy, whereas the cooperatives advisors consider the public ones to be quite disconnected from the economical constraints faced by farmers and turned toward a quite unrealistic advisory. Even if they may be seen as caricatures of the competitors, these respective views show that farmers may be often caught in the middle of contradictory injunctions, even if, as already said, cooperatives advisors are generally more influent in the farmer’s decision-making.

¹⁰ Out of few special features (soil analysis, Nitrogen diagnostics, etc.).

3.2.4. Hungary, strong public involvement to expand high standards and affordable advisory provision

The Hungarian case shows an organization of its advisory system grounded in a dramatically different logic, related with the specific context or the Hungarian political, economical and agricultural trajectory – common to many of the CEECs countries. The end of the communist Regime along with the recent entry in the EU have raised new challenges for agricultural extension services resulting, in Hungary to the erection of a system where private advisors are the king pin of an extension system strongly supported and coordinated by the public sector (Adams, 2001).

Indeed, **an important part of the advisory is provided by - registered - private consultants** (about 800), usually self-employed and with many of them being part-time workers. Several other advisory organizations are said to work in the country, with considerable territorial, professional and personal overlap, but no data is available on these last. Meanwhile, the only public extensionists, working on the behalf of the Ministry of Agriculture and Rural Development (MARD), have restricted assignments in supporting farmers on administrative tasks (Grant Scheme application, legal requirements). However, **the overall extension system is strongly supported and managed by the Ministry of Agriculture and Rural Development**. This management includes registering, training and accreditations schemes for all advisors, providing a multi-layer support infrastructure to extension activities in the country, organizing group advisory programs, demonstration farm events, and offering subsidies for the advisory support up to a level that can reach 80% of the total cost farmers have to bear¹¹, depending on the farmers' income. Only very large farms are not eligible for refund of their advisory expenditure (Maresova, 2005).

Authors like Madarasz and Réti (2008), use the term of knowledge market to emphasize that their activity is grounded in a competitive environment that values their professional skills. These consultants are, mainly, self-employed, charging on hour-basis or on a specific service-basis to farmers, who, for their parts may contract one or more advisors and be refund up to 80% of the cost they have to bear. The advisors are said to often have an important role in the decision making, as they begin to cultivate special relationships with the farmers. However, there are neither data available regarding the involvement and specific work of the advisors on the farms, neither regarding particular complementarities or antagonism between potential multiple support sources provided to the farmers. Finally let's emphasize that, until now, this system only reached 2000 farmers per year out of a total of 200.000...

3.2.5 Italy (Tuscany), regionally diverse systems in fast transition

In Italy, the system is currently semi-public, still presenting public agricultural extension agencies driven by the regions but where the weight of different kinds of private organizations (cooperatives, farmers' unions, producers' associations) is rapidly increasing.

In the Italian arable crop sector, the main actors of the agricultural extension system are public extension agencies (regional agricultural development agencies), farmers' unions, both purchasing agricultural outputs and selling input to the farmers, input suppliers, along with independent advisors who may be more specialized sometimes in the global farm advisory, sometimes on specialized crops (horticulture and floriculture, olive groves and viticulture). However, the weight and the organization of each actor present huge regional diversity. Vagnozzi (2007) reported a higher weight of public extension agencies in the Southern regions than in the Northern and Central ones (respectively 65% versus an average of 48%), Conversely a higher importance of independent advisors in the Northern regions (26% versus an average of 10%) along with a higher weight of Farmers' Unions in the Central regions (23% versus an average of 12%).

¹¹ Actually, the rate of this subsidy is 100% of the costs for group advice events

Since the 1980s with the increasing influence on agricultural development of the regional governments, an autonomous development of the advisory systems has appeared. In the region where the current research was implemented (Tuscany), five different regional laws have been implemented and coexisted for some fields (1979, 1984, 1990, 2001, 2008). Currently, in the last regional law which concerned the farms asking for public subsidies within the rural development plan, there are 45 recognized organizations providing advices to farmers and more or less 115 technicians working directly with farmers. Concerning this direct advisory system, the technicians seem not to have changed in total number from 2001, but because of the new reform, they are obliged to find new solutions to associate if they wish to participate to the supported regional advisory system. In the 45 recognized organizations, **the main stakeholders seem to be farmers unions which historically are monitoring a large number of farms and which often support farmers also on legal and administrative sides.** Then, there are some associated consultants and producers associations that have a more local impact. The kind of advisors working in farms depends on the farming systems which are present in the area. However, according to all the interviewed people, there is not a particular specialization, except for some areas like the coastal ones for horticulture and tomato crops and the inland hilly areas for wine. Independent consultants seem to provide more services than the other organizations, whereas producers' associations seemed to be more concerned by agronomical issues.

3.2.6. High fragmentation versus unbalanced views: delicate balances

Many authors are emphasizing that transformation of the agricultural extension services is leading to atomization and, potentially to an increased fragmentation of advice available to farmers (Garforth et al., 2003; Ingram and Morris, 2007). Indeed, increasing divergent - and sometimes contradictory - injunctions may emerge from differential interests and business logics of the advisors, as much as divergent knowledge and conception of farming activity, or accumulation of narrow perspectives related to specialized advisory provision. This multiplicity of advisory views may make farmers' decision difficult while jeopardizing "the synergy of a holistic, joined-up knowledge and information system" (Garforth et al., op.cit.: 330).

This is likely to be the case in The Netherlands where farmers are facing a multiplicity of on-farm advisory support, provided by advisors with partial or total specialization of their advisory activities. Consequently, an increasing number of farmers are contracting independent consultants to put things into perspective, as much as to balance views of advisors whose support is said to be distorted by connected trade interests.

If the Netherlands can be seen as a case where diversity of advisory provision led to a problematic fragmentation of advice (Klerkx et al., 2005), the recent transformation of the Danish agricultural extension system should definitely be seen, on the contrary, as a positive feature. For sure the situations in the two countries are highly contrasted as Denmark just entered its advisory commercialization area and as few support providers are in the arena. Still, withdrawal of public support to the DAAS led to break the monolithic pattern of advisory provision and may provide farmers with "alternative" views of farming orientations.

Alternative view is, conversely, what may lack to the French farmers of the locality where this study has been conducted. Indeed, in this case, the decreasing public funding of the Agricultural chambers may lead to an increasing unbalanced advisory provision. Decreasing of public funding and increasing assignments in other activities led the local public advisors (Agricultural Chamber) to lose part of their capacities to engage with fine-tuned on-farm support and, consequently, to influence farmers' decision-making. Cooperatives' advisors are thus gaining in importance. Even if farmers are aware that their advice may be – to some extent – grounded in trade interests, cooperatives advisors are seen as more reliable as they have better knowledge of the farms and the farmer's constraints. In this case, the risk is not the fragmentation of advice but, on the contrary, a monolithic discourse provided to the farmers.

Such a situation could prevail in GB, too, where part of the farmers is only getting advice – apart from conservation and environmental advisors – whether from input suppliers whether from independent consultants.

Thus, **if fragmentation may lead to confusion among farmers, diversity of services and means of delivery holds the interest to offer farmers “balanced” perspectives.** Such absences of balanced perspectives could be as “harmful” as fragmentation of advice, particularly when advisory providers are not fully independent of trading interests.

3.3. Integrated Pest Management: a shared principle for new crop protection strategies?

While the EU new regulatory framework shows an increasing activity within the European community on pesticide use regulation, some European countries such as Denmark and Netherlands had already undertaken National Action Plans to reduce pesticide use in their respective agriculture for a long time (respectively since 1986 and 1991). And if other countries like France and United Kingdom only launched their National Strategies recently, in 2008 and 2006 respectively, reduction of pesticide use had been already heavily debated for years, if not being at the root of different measures taken by Groups of the private sector to show their willingness to cope with pesticide use reduction in their farming sectors as shown in GB and France.

3.3.1. Different conceptions and knowledge of Integrated Pest Management

Thus, it would come with no surprise that, from the agricultural advisors point of view, in all the European countries involved in the study, there is nothing new under the sun when it comes to talking about reduction of pesticide use (or impacts, see chapter 2), or implementation of more sustainable practices towards pest management. All advisors (except one, France) had a definition of Integrated pest management, showing that all of them heard about it and know what it refers to, in its –general meaning, at least. Furthermore, many surveyed advisors, working on the behalf of Farmer’s Union, Independent consulting groups or Input suppliers consider that it is part of their job to bring into discussion alternative pest management strategies with the farmers, and even to promote them.

Concluding that we entered a new era of a generalized advisory activity turned toward reducing pesticide use and implementation of alternative crop protection strategies based on IPM principle would be irrelevant though. Indeed, **meanings given to “alternative pest management strategies” as much as Integrated Pest Management” (IPM) differ widely between the advisory actors**, and reductive conceptions of what such concepts refer to are not isolated cases. From a broader perspective, knowledge regarding the elements to be put into practice when implementations of alternative practices or IPM are at stake is very unequal. Lack of mandatory training – or specific involvement in IPM programs - can explain such unequal levels of knowledge and capacity to conceptualize alternatives to a chemical-based approach to crop protection.

The knowledge held by British advisors and the way they phrase IPM, with no regard to their companies’ affiliations (input suppliers, independent advisors) is a good example of the positive effect of such mandatory trainings in this domains.

Conversely, French cooperatives’ advisors that have been surveyed show knowledge in IPM that is in its infancy, as advisors only begin following courses in “agronomical issues”, pretending to improve their capacity in implementing alternatives to chemical crop protection strategies. Participating in specific programs dedicated to promotion and knowledge generation in IPM can probably be as effective as mandatory training courses, however. The involvement of many of the Dutch’s independent advisors from DLV in the Farming with

Future program has largely benefited from their knowledge in IPM¹². Equally, the French public advisors involved in the survey showed better knowledge than their colleagues from the Cooperatives, mainly because of their involvement in such programs.

But what can be said about the Danish advisors then? Without mandatory and regular trainings, and no specific involvement in specific strong IPM programs, Danish advisors – both from the DAAS (Farmer’s Union) or from independent companies - have no reason to be jealous of their British or Dutch homologues. This may be due to the successive National Pesticide Action Plans which brought into concern alternative pest management strategies and promoted knowledge useful to put them into practice. Let’s emphasize however, that if different ways to improve knowledge in IPM can be successful, the British model with its mandatory trainings in IPM and ICP is the only one that favoured equal acquisition of knowledge for all the agricultural advisory providers, input suppliers included.

3.3.2. Shared demand-driven constraints to implement low-pesticide crop protection strategies

If knowledge can be considered as a pre-requisite to implement suitable alternative pest management strategies, it is not enough however. Indeed, most of the advisors, even if they have broad knowledge in IPM and/or consider supporting lowering pesticide use as part of their (new) professional identity, are far away from systematically putting into practice what could be considered, from their point of view, as optimal strategies of integrated crop protection. The given explanation is that many obstacles come from downwards and that they cannot override the demand. The most illustrative example of such attitude is coming from the Dutch’s independent advisors who stress that their job is firstly to answer a demand and that putting alternative crop protection on their agenda is optional and not particularly a constituent of their professional identity.

From the advisors’ point of view, there are two main types of obstacles, which can be referred as **“structural” obstacles** and **“attitudinal” ones**. The first ones include profits limitation due to intercropping with non economically profitable plants, or constraints due to the important size of some farms and/or difficulties for the farmers in terms of work organisation, both making them reluctant to move from standardized procedures of crop management (spraying plans) toward some more fine-tuned practices (involving scouting and evaluating pest infection). The “attitudinal” obstacles refer to the difficulties farmers may experience moving away from a mindset inherited from the “conventional” production models. Indeed, from the advisors’ point of view, most of the farmers are still considering that it is worth using a little more inputs to be sure to get an optimal yield - even if taking the risk of lowering economic returns by excess of inputs spending – than risking low yields in trying to reach the optimal yield/input economical balance (as shown when studying farmers transitions, Lamine 2009). Implementation of alternative and fine-tuning practices involve taking more risks toward not getting the optimal yields, and even if a good yield/input economical balance can be achieved, it is worth using more reliable “conventional” techniques. Meanwhile, having infested fields (weeds, fungus) is more likely to be related with unsuccessful practices than having used too much chemicals (asymmetrical perception also reflected in RA3.5 contribution to orchard SCS RA2.5). Of course these views don’t concern farmers already convinced, and sometimes for a long time, by low input farming. Nor do they take into account the potential lying in specific IPM programs that could be implemented, involving heterogeneous collectives made up of farmers, advisors and sometimes applied researchers that proved to be quite efficient in different countries like France (Lamine et al, 2008) and Netherlands (De Buck and Beerling, 2006; PAN Europe, 2007).

As a matter of fact they depict the “ordinary” case, i.e. the most common one, in which, from the advisors’ point of view, with no specific market rewards for implementing low pesticides strategies, and no specific regulation constraints or (and related) problem of resistance, the

¹² However we will see in the next chapter that the most advanced forms of IPM do not seem to be included in this program.

major part of the farmers won't consider non chemical alternatives. For example, crops where PPP are not available enough (minor uses) are often taken out from the rotation instead of using non-chemical alternatives.

The ordinary case is also the one where many actors of the agrichain consider first of all, that the severity of the pesticide authorization process combined with a proper use of pesticides allows avoiding risks both for human health and for the environment; secondly that further reduction in the authorization of Plant Protection Products (PPP) would put the farms' economic viability at stake.

3.3.3. Advisory providers, crop protection strategies and business logics: contrasted pathways

The obstacles identified by the advisors are expressed as independent from their willingness, as if they were neutral agents in the changing process, which is consistent with a demand-driven perspective. However, in doing so, they are casting a cloud onto their own interest, and omitting what is at stake in the relations they built and try to preserve with the farmers. Indeed, why risk adversity and concerns with profitability should only be symptoms of the farming activity and not of advisory activities too? Every advisor has a stake in "being reliable" and keeping the trust of the farmers, as to maintain a proper business relation with them, whatever the interests nested in these business relation are.

Changing attitudes of "trade partners"

The common sense credits Input suppliers and Cooperatives' advisors with advisories orientations strongly distorted by their interests in selling more inputs and favouring higher production output (which can also be true for suppliers of non-chemical alternatives). Consequently advisors from these companies are often regarded as being very shy in supporting the transition toward lower input agriculture and, even more, as holding back this transition. Comments from independent advisors, from advisors from the DAAS in Denmark and from public advisors in France illustrate such views. In the domain of crop protection, advisors from these companies are, indeed, often criticized for not favouring the turn towards low pesticide-use pest management practices.

Obviously, **the interdependence between advisory orientations and profits related to sales and purchase is at the heart of these companies' activities**. Furthermore, our study shows that many input suppliers - in Denmark and Netherlands particularly - as much as trade partners of the Dutch potato sector are still strongly – almost explicitly if not fully - reluctant in entering the "sustainable" game, as their commercial interests continue to be seen as contradictory with low input crop protection strategies.

However, this is not the case anymore for each company of this kind. Both the case of input suppliers in GB and - to a certain extent as it is in its infancy – of the cooperatives in France illustrate **changing attitudes of such companies, and as a consequence, of their advisors' attitudes**. Indeed, these cases illustrate changing strategies in these companies whose profits are mostly related to sales of inputs and, for the cooperatives purchase of agricultural outputs. If they are doubtlessly interested in continuing in selling (and purchasing) as much as possible, these actors show interests in complying with the new rules of the game. While growing public debates and polemics stress needs to move away from high input agricultural models and from practices that are damaging for the environment (included pesticides pollutions), **they need to be seen as reliable partners for farmers** and avoid being the black sheep of sustainability. Credibility in being active agents of this global turn – as much towards the farmers' who are facing these exigencies than towards society as a whole - is of importance to avoid banning or, at least "restrictive" measures that could be taken against their interests.

National contexts are framing the changes

For many concerns, National contexts show to be of importance in defining the strategies of advisory actors. Indeed, each National advisory system defines a particular competitive

environment for advisory provision, and these competitive environments are as different as the advisory systems are.

On the one hand, two main and shared features are used by the advisory providers' to distinguish themselves from their national competitors. Differentiation in the portfolio is one of them: While some advisory providers are offering input procurement facilities along with their advices (Input suppliers, Cooperatives), others may offer economically reliable general planning schemes with corresponding outlets (Trade partners, Cooperatives) or provide – more likely - high-skilled expertise on specialized aspects (independent consultants). Claiming that they *produce impartial agronomic information*, free of other trade interests (GB), or that they are purely demand driven (NL) – which actually means the same – is, for the private consulting companies another main distinguishing strategy. The characteristic of their offers are thus partly grounded in specific inherent business logics and lead to different advisory attitudes.

On the other hand, however, these activities, strategies and attitudes will depend on the other actors playing in the arena. As shown in our study, input suppliers, for example, are not involved equally in advisory activities and consequently in the farmers' decision making from one country to another. And they may not have the same attitude toward pest management advisory too: indeed GB input suppliers seem to have more concerns in providing non-chemical based crop management strategies than their Danish or Dutch homologues. Furthermore, it is not by a curious coincidence that the initiatives above mentioned, i.e. the BASIS and Voluntary Initiative in United Kingdom, and the training and accreditation systems for the Cooperatives' advisors in France, didn't come out in the Dutch and Danish contexts. And on the contrary, in these last countries, inputs providers and output purchasers are still strongly stuck in "reluctant" attitudes towards alternatives pest management advisory.

Two main contextual differences can explain these divergent attitudes.

Firstly, these actors don't have the same potential impact in farmer's decision making in both sets of countries. In Denmark, they are no major actors and in Netherlands they are advisory providers among many others. Conversely, in GB and France, they are not only major actors of advisory provision, but provide – to some extent – risk adverse PPP use orientated on-farm advisory. Secondly, whereas some National Pesticides Action Plans have been undertaken in Denmark and Netherlands, United Kingdom and France are the two countries where, until recently, there had been no important direct restrictive regulation about pesticide use coming from the Government. Summarizing, in GB and France both the non-regulated context and the important weight of input providers and output purchasers in the advisory system – and in the farmers' decision making – drove actors traditionally said to provide advisory indentured to their "sale and purchase" business interests to change tracks. Conversely, the implementation of a regulatory context, and their weak or shared involvement in advisory provision didn't encourage these "same" actors to move from their "conventional" attitudes in NL and DK. Along with inherent business logics, the **National contexts are thus important factors in differentiating the attitudes of advisory organization toward pest-management advisory.**

Commercialization of advice and adversity to risk: weakening positive attitudes towards change?

At this level, the consequences of the withdrawal of public involvement/support in advisory activities must be called into question. The commercialization of advisory activities goes hand in hand with the emergence of specific business logics and with a growing competitive environment for the advisory providers. If this process can be seen as favouring the quality of services provided by the different organizations in comparison with public services (Pool and Lynch, 2003; Garforth et al., 2003), it may trigger risk aversion attitudes in the advisors' on-farm work. In what extent advices that may lead to failure for the farmers, should be provided in a context where the prime concern of advisors selling their advices is to keep the trust of the farmers, so that they can keep their portfolio of clients? **Giving wrong advice or risky agronomical advices may thus be avoided**, as there is no reward for failure either for farmers or for advisors. Commercial forms of advisory – in competitive provision

environment - may thus not be so strong leading forces for changes, and status quo could be the preferential attitude. If farmers and advisors are aware that low pesticides use is growingly framing the evolution of agricultural systems, adversity to risk can be seen as a shared symptom of activities embedded in summing business constraints that could globally weaken positive attitudes toward change. As the Dutch's advisors from DLV say, “*we won't go further than the demand*”. Unless farmers show strong necessity or willingness for changes that will irremediably imply more risk and complexity, independent advisors won't particularly trigger the process.

Still, in Netherlands, for example, “independent” advisors are often contracted to balance the Input suppliers and trade partners' views as they are said to give distorted advices in relation to their sales & purchase interests. It is to say that these business logics may not impede advisors to provide farmers with more alternatives and innovative propositions than input sellers or cooperatives would do, and that they might be specifically chosen for that. In that sense, they can be considered as fully driven by the farmers' demand, or in a more complex understanding of the farmer-advisor relation, as co-constructing with the farmer the problem to solve (Andersen, 2004 ; Botha et al., 2009) without any parallel economical interests involved. However, as some of them testimony, when it comes to make the operational decision in front of a farmer asking for it, they usually avoid advising on risky options that could be harmful to their relations with the farmers.

This study didn't enable us to get more insights on these aspects and to assess in what extent this advisors' risk adversity could distort the theoretical purity of a demand-driven activity. However, in such a context, one could wonder in what extent real innovative crop protection strategies could strongly be supported, even by these independent advisors. Introduction of IPM and of alternative approaches or techniques in order to reduce dependency on the use of pesticides are calling for highly complex and integrated knowledge and know-how (Coughenour, 2003; Leeuwis 2000). Shifting toward these practices involves many changes in the farming systems in order to support the farmers' progressive transition from current systems to alternative systems as shown in the DR3.5 report. And the more complex is the change, the greater the perceived risk is, while greater the time and support that is likely to be needed. In front of this complexity, “Structural” constraints, risk adversity for both farmers and advisors, absence of clear economical reward, and advisory provided on hour-basis, will probably continue to favour “minimal” incremental changes and fine-tuning practices, at the expense of more radical changes.

Conclusion

There is a major tendency of decrease in public involvement regarding extension systems in Western Europe. Public extension services have almost disappeared and financial supports to extension services have strongly decreased in many countries (Chapman and Tripp, 2003; Garforth et al., 2003). If many commentators argue that the broad transformations occurring in the extension services organization within Europe may lead to important failures regarding the implementation of a more “sustainable” agriculture (Leeuwis, 2000; Rivera and Alex, 2004), few data are available regarding their potential in supporting the implement of more sustainable pest management strategies.

This study, albeit exploratory, provides many insights about the current attitudes - and their determinants - of agricultural extension organizations toward pest management advisory. The main findings can be resumed as follows.

- Firstly, the advisors show contrasting potential capacities to favour the low-pesticide use turn, as knowledge of alternative to pesticide use is not equally held when such alternatives are available.
- Secondly, it shows that part of the actors usually said to provide advisory indentured to their “sale and purchase” business interests (input suppliers, farmers' cooperatives and trade partners) have started to change tracks and – to some extent – changed their attitudes toward pest management practices, whereas others are still stuck in conservative strategies. The national contexts have shown to be determinant for these contrasted changes: different competitive environments for advisory provision, differential weight of the providers in the

national advisory systems and presence/absence of National Pesticide action plans have, together, triggered different attitudes from these actors.

- Thirdly, if private consulting firms and agents, said to provide *impartial agronomic advisory*, are often contracted by farmers for this reason, they cannot be fully considered as neutral advisors purely led by demand-driven processes. Indeed, the commercialization of advisory activities and the growing competitive environment for advisory provision is likely to trigger risk aversion attitudes regarding these advisors' on-farm work, potentially weakening positive attitudes towards innovative pest management strategies.

- Fourthly, if fragmentation of advice may be seen as a problem leading to confusion among farmers and not supporting the need for highly complex and integrated knowledge to implement IPM strategies, diversity of services and means of delivery holds the interest to offer farmers "balanced" perspectives. Lack of balanced perspectives could be as "harmful" as fragmentation of advice, particularly when advisory providers are not fully independent of trading interests.

- Finally, "structural" and attitudinal obstacles coming from the farmers' side, combined with constraints inherent to the - different - advisors business logics and with over-fragmentation/unbalanced views of advisory, will difficultly favor implementation of innovative and radical changes in pest management strategies and, rather, encourage "minimal" incremental changes and fine-tuning practices.

Such results lead us to call into question the capacity of the current advisory practices, grounded in both one-to-one relations and commercial interests, to enable the growth of real innovative practices and strategies in crop protection. Doubtlessly this system will enable improvements, as restrictive regulations toward pesticide use and the societal pressure will increase. However, others approaches, based on collective action participatory learning¹³ and largely fund with public money have proved to be successful and probably show stronger potential to expand IPM in Europe: the program Farming with Future in Netherlands, existing farmers' groups working with public advisors on IPM implementation in France, Farmers Field Schools all over the world (Van den Berg and Jiggins, 2007), etc. European States would thus probably benefit a lot in increasing their support to these approaches and turn them to a major leverage for innovation in pest management strategies.

APPENDIX (see Endure RA3.5 website)

Questionnaire

Extensive report

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¹³ See for example (Röling and Wagemakers, 1998)

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4. National Action Plan in Context and the Governance of Research and Extension Systems

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Introduction

Contrasting policy or regulatory reactions to technical and scientific evidences about the matter of concerns and the matter of facts about pesticides, may indeed be explained in part by differences in policy cultures, in styles of using science to meet the demands of increasing regulation, in risk perceptions, in more or less precautionary attitudes and behaviour. The status and legitimacy of economic and social actors, and their capacity to mobilise resources, and influence decisions, as well as the role of public debate, may also account for differences in perceptions, and in action in face of risk (See JPA1 report).

A cross cutting analysis of national reports realised under the same common methodology allows to sketch out a European comparison on the sustainable use of pesticides and might have its own interest for the sub-activity RA3.5 in general. We expect this report to achieve a sufficient description based on previous work and some added information in order to set up the context of a more limited approach of research activities and extension services.

Pesticide use varies according to agricultural systems, in relation to pest pressures, climate, human approach of crop protection, but also results from the efficiency of plant protection products and the way industrial interests are vested in regulation or in apparatus of risk evaluation and even research regime in agricultural science: this is not conspiracy theory but a reflexive consciousness of good business strategy to capture state regulation and influence political debate. On the other side of the battlefield and after Rachel Carson's book "Silent spring" about the adverse impacts of pesticides on the environment (1962), it seems that Civic Society representatives (mainly environmental and "green" NGOs) have also understood how it goes with risk regulation and develop international coordinated public action, for which PAN Europe represents a good example. The European BSE crisis and GMO controversies have been good opportunities to raise the voice in public affairs: a *safety tum* appears in civil society and increased what had already been realized with the *environmental turn*.

Our work is not at all an evaluation of National Systems nor a socio-political assessment of actor positions in governance structures towards what should be done or not with pesticide use according to a positive definition of them. We do not think either that all national political cultures should converge into one best way that we would know better. The only normative position is that pesticides are dangerous products as it is written on packages, that some of them are very well know substances to commit suicide as reported by epidemiological studies and finally that they are a complex matter of risk regulation and research regime in a risk society.

For those reasons paying attention at what is a public action towards a sustainable use – including a non-use - of pesticides is a relevant issue for social researchers as it is a legitimate public problem of public and political debate about science and technological choice in a democratic order (Jasanoff, 2005). We hope that our work is bringing some elements to tackle these very complex issues.

4.1. Objective, methodology and fieldwork

4.1.1. Objective of the Sub-task

The objective of the task was to realize case studies in four European countries (GB, the Netherlands, Poland and France), in order to contrast and compare the agenda-setting of the European framework to achieve a sustainable use of pesticides. From now until 2011 Member states must implement the Directive on sustainable use of pesticides, and National Action Plans are the means of such an implementation (EU, 2009).

More precisely we decide to put a focus on National Action Plans in their context and to study the contribution and responses of research and extension institutions - within their national administrative and political context- with the view to achieve a sustainable use of pesticides.

The description of the EU decision making process is fully available on Euractiv, which is a source that enables to follow the complexity of co-decision system and to better understand the intensity of the EU Parliament debate before the EU Pesticide legislation (known as the EU package) was finally set up in 2009. But the public awareness of risk means also more focus of inspection bodies and more precise control of human activities. Very recently a EU report has revealed the presence of pesticides in organic food, and on the other side of the debate, the use of pesticides is still a hot topic for best farming-practices definition after the EU proposal to substitute the most dangerous substances with safer alternatives.

National Action Plans (NAP) represent for each Member State a specific and targeted public action in response to the European Thematic strategy on pesticides as enforced by regulation: the regulation to replace the pesticide authorization directive 91/914 and the directive on the sustainable use of pesticides (6124/2008 – C6-0323/2008 – 2006/0132(COD)).

With this sub-task we aimed at **shedding light on how administrative, scientific and technological knowledge are involved and put into action at that stage of the implementation of this European framework** that had been issued under the co decision principles.

4.1.2. Methodology

Main goals of the surveys

We have designed a specific methodological tool to describe the way in which interactions or structural relationships between the various actors of the National Action Systems have been challenged and mobilized to set-up National Action Plans (NAP). The idea was to pick in each situation the matters of concerns that were at stake.

We have realized four series of interviews in the four national situations selected, thanks to the identification and the contact of relevant institutional actors by the Endure partners. We were interested in questions such as:

How does this normative pressure redefine crop protection strategy or not and if a gap had to be faced?

What are the participation knowledge systems to the definition of more sustainable techniques of protection in the NAP?

What are the changes in public action and collective action of professional and farmers?

To achieve this task, it seemed thus particularly important:

a) To achieve a sufficient description of the characteristics of the normative pressure and the call of public authorities for more knowledge and more transfers that prevail in each particular national situation;

b) To gather the views and opinions about this situation for those (decision-makers, public officers, researchers and extension professionals) who produce, circulate and follow-up knowledge about crop protection and environmental health.

4.1.3. Definitions

In the Endure context, a comprehensive analysis of «national action systems» aims at picturing the evolution of the matters of concerns and matters of facts that characterise a “government by risk” (Barbier & al, 2009) about the use of pesticide and the limitation or residues.

The notion of national action «system» used here suggests that there is some kind of mutual communication or interaction among the various actors/sub-systems; however, this should not be taken for granted; rather, the degree and the nature of such communication and interactions, and possible dependency and weak linkages among the various sub-systems, are some of the crucial items to be analysed and compared.

In various EU countries, the basic features of the main actors involved in a NAS, and of their interactions, will enable us to compare how these actors picked up these concerns and facts about pesticides and how they implemented a response toward the use and residues of pesticides. **Contrary to BSE where the Europeanisation of the BSE problem came after the crisis; in the case of pesticide, the Europeanisation is so to say first.** But intriguingly, this does not mean that the EU standard is improving all national situations according to the objective of limiting pesticide uses and residues in food.

To analyse national action systems in a qualitative methodological way means to analyse the actors/stake-holders and their dynamics, for which we adopted both social constructivist approaches (from the sociology of sciences, and sociology of socio-technical controversies), and institutionalist approaches (from the sociology of organisations, and public policy studies). In other words, **our inquiry will seek to explain the influence of beliefs, actions, and power on institutions, and, reciprocally, the influence of institutions on actions.**

In this connection, attention will be given to the extent to which, throughout the controversies that prevail, conventional boundaries between science and policy are eroded. How have different cultures (the scientific, the political, possibly also the business ones) inter-constructed themselves; has actors' mobilisation led to shifting pre-existing boundaries at these interfaces? To what extent research progress has impacted upon regulatory action, and to what extent has the evolution of the regulation impacted upon science policies in the various countries?

In approaching the EU context, **a comparative analysis was carried out on the impact of EU regulation on national regulatory cultures**, both at the level of the formation, and of implementation of decisions, emphasising **hypothetical discrepancies between the homogeneity and harmonising goals sought by the EU, and the heterogeneity of cultures at all the different levels studied.**

4.1.4. A common analytical grid for National case studies

1. To achieve a description of NAS (to be completed according to what is already gathered in previous work)

- a) Existence of a state of scientific and technological knowledge about pesticide (use and residues)
- b) Expert committees' recommendations;
- c) Regulatory decisions (laws, decrees, administrative measures);
- d) Parliamentary inquiries or working group;
- e) Media coverage;
- g) Public reactions to the problem;
- i) A preliminary analysis of the attitudes and behaviour toward the risk and their evolution.

2 - A description and analysis of each «National Action System» involved in the implementation of the EU regulation and prescription to act towards pesticide limitation and residue reduction

- a) Who are they?
- b) How are they organised (general characteristics of their structures)?
- c) How do they work (general features of policy and administrative practices)?
- d) Do they communicate/interact among themselves, and, if so, how; what institutional mechanisms are available to that end ?

3 - The Actors/stake-holders included or excluded from the implementation:

- i) The political-parliamentary and governmental structures;
- ii) The Public Administration - agencies or institutes with competence in pesticide, general characterisation of plant epidemiology, crop protection agency
- ii) Specific expert committees: origin and mandates, membership, functions, relationships with the scientific milieu, as well as with the political/administrative systems; effectiveness;
- iii) Scientific establishment: main university centres, and state laboratories involved-general characterisation of their structures, main rules of operation; research projects in the relevant areas, national and international;
- iv) The agricultural/industrial sector position according to specific economic and social characteristics of agrochain.
- v) Other social organisations: e.g. consumers and environmental associations: their dimension, scope, and degree of activism.

4.1.5. Cross-cutting framework

We elaborated a check list of items and analytic dimensions in order to contrast and compare national case studies. Those questions were a first attempt to build a comparatist perspective based on cross cutting questions.

- What area of scientific knowledge production and professional knowledge mobilised in intermediaries and extension activities are concerned?
- What are the specific knowledge production facilities, labs and thematic on crop protection strategies?
- Can we identify subsystems of crop protection (e.g. linked to specific organisation or sectorial scientific programmes, to regional policies)?
- What is the Closed/Open nature of (sub)systems (especially in relation to the existence of controversies and splits in agronomic and extension research)?
- Changes in repertoires: how are controversies dealt with involved research institutes and extension services, what kind of actions, by whom, standard procedures are taken?
- How does agenda setting occur about sustainable crop protection strategies: what is on the agenda and what not for policymaking/action taking and how it involves R&E activities?
- Are there any transition regime to be acknowledged, meaning a regime based on procedural rationality of innovation?
- Are there any significant shifts toward reflexive governance of the transition?

4.1.6. Field work

Each National survey is presented in a report that provides (i) a description of the NAS in order to contextualize how crop protection is a matter of public action (describing actors, position in the formal system, main strategy at the moment); (ii) a description of the NAP as a public action instrument and on the way the NAP provides an answer to the main issues of the new EU package; and finally (iii) an analysis of scientific knowledge and extension knowledge contribution to the setup of the NAP.

4.2. National Reports

The four National Reports are edited separately at that stage three are available on Endure RA3.5 website (GB, NL, Poland). The French report has been delayed, it is indeed very challenging for methodological reasons dealing with the recent turn of the Grenelle de l'Environnement and its legislative and institutional followings. However, the French situation has been studied by M.Barbier for long and the French case could be taken into account in the comparative analysis.

4.3. Cross cutting analysis: Communalities and differences

At that stage the crosscutting of field NAS under the common methodological frame have led to identify a set of key issues:

1. We have noticed **a common structure of Crop Protection based on the same types of actors**: a specific administrative board for crop protection, research centres or university capabilities, extension organizations, farmers' cooperatives or professional unions, organisations of pesticides producers and retailers, civic stakeholders and NGOs. Of course the nature and intensity of the relations in between those actors vary a lot, and the crosscutting of National situations reveals specificities and indicates the contents, type of concerns and matters at the European level. In all national situations, the objectives of NAP, and aspects of its definition and implementation, are said to trigger few difficulties because member states have already been implementing the political means to face the requirements of the Directive on the sustainable use of pesticides¹⁴. In Poland many of the requirements have already been achieved except for buffer zone distance and air spray for forest. The same in GB and in the Netherlands since these countries are well known for their ability to anticipate environmental European policies if not framing them with active lobbying capacities. Nevertheless, it seems that **the European directive on pesticide use is much more considered as a list of requirements to check, to follow or to address than as a *feuille de route* for exploration, development and working for the future**. Even though article 14 § 4 of the new Directive refers to taking into account scientific and technical progress, the position of representatives of scientific institutions and extension service in Western EU is then curiously not that much proactive when the technical content of sustainable use have to be defined and assessed and when the issue of efficiency of sustainable crop protection is at stake.

2. One important thing to be noticed is **the effect of the recent dynamic of change in the public sector**: for example there is no more Ministry of Agriculture in GB but a department (DEFRA); in Poland the traditional extension services (ODR) have been largely affected by budget cuts and by the focus put on integration in relation to SAPARD¹⁵ programme of the early 1990s; in the Netherlands the privatisation of extension services has led to induce markets of knowledge and crop protection and responsibility is largely considered as a matter of the private sphere; in France, New Public Management Policy and transformation of the subsidies system for agricultural research and extension are also very effective towards the decrease of public support.

¹⁴ Sometimes, as in the French case, this is done without saying that this effort comes from European objectives; this raises questions about the image that the French government wants to convey about its relationships with the EU institutions in front of the French public. This attitude is nevertheless not specific, but particularly salient in the case of this Directive.

¹⁵ EU Special accession programme for agriculture and rural development

What has to be noticed also is that this trend of **deconstructing national knowledge systems, which had been established within a welfare state perspective**, is at work. On one side, it seems to reinforce strong ties between farmers, cooperatives and pesticides retailers and firms. On the other side, it translates the question of the sustainable use of pesticides either in a technical definition of integrated production systems or in a contractual marketable definition of the use or non-use of pesticides. A specific comparative survey should be realized to analyse the effect of this trend on the capacities in terms of inspection and epidemiological watch for pest and diseases.

The focus which is put by NGOs on organic farming appears to be a very important master-frame for the civic actors in order to approach the issue of pesticide uses (better no pesticide as underlined by the DR3.5 report), thus, as the case of France shows it, **the public debate is much more driven by pesticide non-use than by sustainable use**.

The crosscutting suggests that the position of stakeholders from the public sector (inspection, administration, researchers) towards the definition and implementation of sustainable use of pesticide is not much put at the centre of a process of change, not because this would be considered as irrelevant but because the sustainable use of pesticides is considered to be already at work in political objectives or in some practices thanks to so called “integrated production” schemes. The greenwashing of conventional agriculture – and the reason why discourse sometimes replaces action- is certainly reinforcing the fact that NAPs are not yet proactively considered as a potential tool for change¹⁶. This is why in all the countries the actors of conventional agriculture are very reluctant towards the limitation of active substances to be authorized. A Network of scientists working on onion production¹⁷ has recently gone public at the European level to claim that the suppression of some fungicide creates a situation of potential lack of onions on European market and development of imports from China with no guarantees on MRLs. Such a position has also to be understood within the background of research program agendas: according to some scientists, the research on alternative strategies for minor crops is underdeveloped in European agricultural research centres.

3. The trend to localise the use of practical knowledge about crop protection solely within the relation between firms and farmers is to be questioned since it tends to transform a public problem (as the European Directive and the debates that had prevailed both indicate the public nature of sustainable choice about pesticides) into a private one. In all countries we have noticed that **research about pesticide use is driven by a regime of knowledge production driven by agrochain short term needs**. This has to be added to the fact that the number of public officers in charge of inspection and epidemiological watch on pest seems to be too low to face the agenda of sustainable use and the fact that regional climate change and globalisation increase pest invasion pressure¹⁸. Of course networks of R&D demonstration (public or private), networks of chemicals retailers, stewardships of crop protection play a big role in the set up of a passive kind of epidemiological watch but it does always rely on expert knowledge and scientific facilities at the end. This is also a matter of sustainable use of pesticide for which public officers have to deal with to establish sustainable use also as a matter of public concern.

¹⁶ As far as public action and public problem are concerned, this is not necessarily the sign that nothing is already at work; it is only saying that the political agenda is not structured around the idea of “change”. The public engagement of scientists – life sciences as much as biomedical scientists- is certainly a key point.

¹⁷ See for example EURONION Annual Meeting held in Skierniewice (Paaske K., 2008). Impact of new EU regulation of pesticides on registration of pesticides for onion production, EURONION Annual Meeting, Skierniewice – Poland, 22-23 October 2008)

¹⁸ This idea comes from recent work realised in a European Project dealing with cropterrorism (CROPBIOTERROR) and to scientific concern about the situation of biotic invasion pressure (see for instance Mack R.H., Simberloff D., et al. (2000). “Biotic invasions: causes, epidemiology, global consequences, and control”, *Ecological Applications*, 10(3): 689-710).

4. Another point of worrying for public officers is the use of pesticides in large public areas (like forests) or close to protected areas, this tends to transform public use of pesticides, or private use with public effect, in **a matter of boundary-work about what is public and what is not. Though the situations are very contrasted when member states are to be compared, questions of impacts outside the private sphere of use remain latent in water catchment areas, public gardens, and public forest.** The question of distance and buffer zones is the direct manifestation of this issue. This will - if not already is- call many experts on the scene of expertise, definition of indicators, and generally speaking public debates.

5. In GB and in the Netherlands (this is confirmed with the Danish case, see C.Lamine's work in JPA1), **the intensity and level of lock-in effects of the economy and administration of crop protection:** the rationalization by market quality and the objective of farm profitability have created very efficient technico-economical systems but the margins of action of the agrochain are very low unless risks of production costs are supported by farmers. This **situation of lock-in of a technical trajectory (very important in the case of green house production) is not in favour of the exploration of sustainable systems with different approaches of weeds and pest.** It only allows incremental innovation.

Our work suggests that **the possible exploration of « sustainable use » of pesticides has to be considered according to National or Regional diversity.** For instance, the situation of Poland is much contrasted with clusters of intensive agriculture in relation to soil quality, market access and farm communities on one side and a dispatch of small farms with very low level of inputs on the other. This country offers a large variety of potential of evolution with a direct access to organic farming without restructuration (which doesn't mean without the need for improved technical knowledge) but also with an attention to the use of pesticides due to the conditions of exports to the Federation of Russia (export of fruits and vegetable to Russia requests the logbook of treatments to be certified and produced at the border). Our impression after this comparative work is that Central European countries could be in a better position to explore a sustainable use of pesticides. One thing to add is that countries like Poland or Hungary are not ignored by chemicals and pesticides corporate firms, since they are purposefully planning R&D and innovative products demonstration in those post-emergent countries. It seems then that what is a strategy of sustainable use remains an open question, and a national foresight could be very useful to enhance debates within the NAS.

6. Another situation of isolation of knowledge could be due to the **hyper isolation of organic farming both in terms of technical knowledge and scientific knowledge.** We have noticed that, in some countries, the experimentation of a sustainable use of pesticide could not really benefit from research and extension in organic farming yet. Building this relation, as it is the case for example in pome fruit production in Southern France, seems to be much needed since the development of organic farming seems to be very much socially situated (in terms of experiential knowledge, support, technical specification, knowledge).

7. The process of **sectorisation of knowledge** about pesticides is at work with **separation of Agricultural issues and Health problems.** Our interviews show that the epidemiological watch of illnesses due to pesticide is not that high on the agenda of research policy, or tends to be very recent. In each country they are researchers working on health issues doing field epidemiological studies or large cohort follow-ups. In Poland, the question of the effect of pesticide in occupational health or in rural spaces is tackled. It is also the case in France with the AGRICAN¹⁹ program but in circumstances of a kind of isolation of health concerns from agricultural workers and farmers. What is to be noticed is the existence of a public debate about causal relations between pesticide use and illnesses such as cancer or the Parkinson disease; this is quite high in the agenda in France at the moment with the 'Grenelle de l'Environment' and the Chlordecon crisis (used by banana plantations in the French West

¹⁹ http://www.msa.fr/files/msafr/msafr_1132306887138_DOSSIER_DE_PRESSE_AGRICAN.pdf

Indies). Such issues exist in many national debates with an extension to pets in relation to chemical use in gardens.

DR3.5 results also show that, if PAN-Europe supported by its National members (MDGRF in France, Stitching Natuur and Milieu in the NL) and the European Environmental Bureau has been very effective for supporting IPM, National generalist NGOs seems to be much less aligned under the issue of pesticide and sustainable use; the focus is much more in favour of support of organic farming and the respect of MRLs. Then in a country like Poland the organisation of pesticides retailers and firms is even facing a lack of stakeholders to develop debate and disputes about the kind of sustainable use they would like to define.

Interviews in France also suggest that such a type of focus is not directly addressed by many NGOs, even if they have been involved in the REACH discussions. Most of them rather challenge GMOs and call for organic farming. However, it is addressed by NGOs with sufficient knowledge about pesticides (see JPA1 report). Actually, it seems that National NGOs are rather not “constituted actors” to address the framework issued by the European directive. This lack of frame alignment on a public cause has also certainly to do with the lack of permanent constituted think-tank of knowledge or scientific expertise that would structure the debate about causality between cancer and pesticides.

Conclusion

It appears that the sustainable use of pesticide²⁰ is not that much governed directly by research and extension systems, matters and issues, but is indirectly strongly affected by the late trend of “privatisation” of extension knowledge. This might be explained by the fact that the level of lock-in of the crop protection systems is rather governed by technological trajectories of farming practices and by business plan of farming model (cost structure prevails against exploration). The lock-in effects are stronger in certain countries than others, though.

It seems that these lock-in effects in production also affects public actors, knowledge economy and research. In relation to this, Central European countries could be more in the position of exploring the potentiality of farming with less pesticides use since the “cost” of transition is differently shaped, but conversely they have to face a reconstitution of their public services.

Public debate about pesticide types of uses does not seem to be very consistent at the moment though the question of pesticide and cancer is an emergent public problem, a kind of hygienic master frame poorly related to the political economy of food system. Much more central are the claims made towards organic products. Paradoxically, under the objective of the European framework even agrochemicals firms could face a lack of organized public debate at the national level about the issue of sustainable use of pesticides.

The governance and the structuration of research and extension systems seem to be poorly aligned towards the objective of the European directive, not because there would not be available knowledge, sounds sciences and extension activities but much more because the production of knowledge in relation to sustainable pesticide use requests the existence of innovation *milieus*, situation of exploration of alternative paths, and thus socio-historical prevailing trajectory to be un-locked. Scientific experiments and experiential knowledge about sustainable use request farmers to take risks with sustainability: it is firstly an

²⁰ Let’s remember that the EU directive defines by default as” reducing the risks and impacts of pesticide use on human health and the environment and promoting the use of *integrated pest management* and of alternative approaches or techniques such as non-chemical alternatives to pesticides.” (EU parliament, 2009)

economic question. The relation between actors of science and extension in conventional agriculture and in organic agriculture is certainly a key point to un-lock.

Finally, the evaluation of the National Action Plans and the possible European willingness to coordinate inspection and to follow up the effects of the thematic strategy on human health would shape a different agenda. This is much in relation to the type of *set ups* including local plans and instruments that have to be used or even invented to follow up the sustainable use of pesticides. The question of measuring sustainability and exploring the possibilities of IPM being still a very open question, one might wonder whether the common European framework will come to concrete life or not.

ANNEXES (soon available on Endure RA3.5 website)

Basic grid for analysis of EU package vs. NAP

Major Types of Insecticides and Herbicides

Interview grid NAP/NAS and list of interviews

Pesticide as a scientific issues in Social Science Literature – ISI SSCI DataBase

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5. The analysis of public controversies

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Introduction

This chapter describes the dynamics in the public debates on pesticides and crop protection in both The Netherlands and France. The description is based on a corpus analysis of various written sources and shows how the subjects debated change in time and differ between countries and/or governance levels. The chapter also shows which stakeholder groups are feeding or leading the debate and which stakeholder groups focus on which subjects.

The objective of the corpus analysis is to get a better understanding of the dynamics in the debates on pesticides and crop protection issues and their social dimensions. The analysis is also meant to keep researchers, policymakers and stakeholders informed about the dynamics and their own roles in the public debate on pesticides and crop protection. As a result the parties involved can learn which subjects are considered important and which subjects will probably become more important in the near future.

The background of the corpus analysis is the complex network of actors and stakeholders involved in the public debate on pesticides and crop protection. The various actors and stakeholders all have their specific positions in the debate. Moreover the dynamics is further increased by changes in time. As a result the actors and stakeholders have difficulties to get a complete picture, to put the changes in historical perspective, to separate the essentials from the side-issues and to anticipate future developments. The corpus analysis is meant to get a better understanding of the technical and social dimensions of pesticides and crop protection issues.

5.1. Method and Composition of the 3 corpus

An important condition for a corpus analysis is to have one or more normalised databases, i.e. databases which represent specific cross sections of all written sources on pesticides and crop protection. Having press releases and policy documents in one and the same cross section will result in unbalanced time series. Such time series indicate the amounts of papers related to pesticide and crop protection issues. The proper analysis of the focus points of the public debate has to be based on a content analysis of the documents composing the corpus.

For that reason two homogeneous information sources are used:

- parliamentary questions on pesticides and crop protection (1995-2008)
- national newspaper articles on pesticides and crop protection (1995-2008)

In the next sections the methodology of selecting documents in The Netherlands and France is specified in terms of keywords and newspapers.

5.1.1. Composition of the corpus in The Netherlands

The parliamentary questions in The Netherlands were retrieved from the website www.overheid.nl by using the search words 'bestrijdingsmiddelen' (Dutch for pesticides) and 'gewasbescherming' (Dutch for crop protection). The national newspaper articles are retrieved from the website www.academic.lexisnexis.nl by again using the search words

'bestrijdingsmiddelen' and 'gewasbescherming', but now in combination with the names of NGOs (Milieudefensie or Natuur en Milieu), sector organisations (LTO or Nefyto) or universities or science. The database of LexisNexis is accessible through the library of Wageningen UR.

The restrictions on the selection of newspaper articles (combinations with names of NGOs, sector organisations or knowledge organisations) were made for two reasons. The first reason was to create the possibility for discovering and specifying differences in attention fields or perspectives between the three actor groups concerned. The second reason was to keep the number of documents manageable for manual analysis. At the start of the project activities the software and expertise for computerised analysis was lacking at LEI.

The before-mentioned restrictions strongly reduced the total number articles on pesticides and crop protection published in national newspapers. In roughly 20% of the articles also the names of NGOs, sector organisations or knowledge organisations are mentioned (the total number of articles on pesticides and crop protection in national newspapers is five times bigger than the number reported in this study).

Resulting corpus NL

Numbers of documents in the corpus, classified to years and references

<i>year</i>	<i>questions parliament</i>	<i>newspaper sector org</i>	<i>newspaper NGOs</i>	<i>newspaper universities</i>	<i>Total</i>
1995	8	0	1	1	10
1996	11	2	5	2	20
1997	4	1	0	1	6
1998	6	2	6	3	17
1999	9	12	7	1	29
2000	6	7	10	4	27
2001	4	8	8	1	21
2002	0	6	8	0	14
2003	5	19	7	3	34
2004	4	10	16	4	34
2005	2	3	12	4	21
2006	3	6	3	2	14
2007	8	1	5	1	15
2008	7	7	1	2	17
2009					
2010					
Total	77	84	89	29	279

This table shows a total of 279 documents with sector organisations, NGOs and parliament having shares of about 30% and universities having a share of about 10%. The years are subdivided in four government periods (1995-1998, 1999-2002, 2003-2006, 2007-2010).

The numbers of documents mentioned in table 5.2 are related to plant production and natural environment. Documents related to pest control in industry, ships, animal husbandry and conservation of wood were left out of consideration. Especially the category of parliamentary questions contained a high percentage (40%) of "industrial" items. In the period 1995-1998 LexisNexis did not include the Agricultural Daily. This (partly) explains the relatively low numbers of newspaper reports in the period concerned. The total number of newspaper articles amounts to 202 of which 101 in the Agricultural Daily.

5.1.2. Composition of the corpus in France

The parliamentary questions in France were retrieved from the website of the French National Assembly www.assemblee-nationale.fr/controle/questions.asp. The website provides the texts of questions of Members of Parliament to the government.

The newspaper articles were retrieved from the FACTIVA database from January 1, 1997 to November 17, 2008. This period corresponds with the XI (1997-2002), XII (2002-2007) and XIII (2007-date) “legislatures”, i.e. period of parliamentary activity between two elections of the French National Assembly. The articles of La France Agricole were retrieved from their own website: www.agrionline.com/archives

In France a wider set of keywords was used to get a complete picture of the public debate on crop protection. Also some names for different types of agriculture (farming systems) and names of important actors in the public debate were used as keywords.

Keywords used for the selection of newspaper reports in France

<p><u>Generic terms:</u> <i>pesticides,</i> <i>protection des cultures (crop protection)</i> <i>but also:</i> <i>protection intégrée (Integrated Protection)</i> <i>phytoprotection</i> <i>ravageurs (pest)</i> <i>Limite Maximale de Résidus (MRL)</i></p>	<p><u>Actors of the debate.</u> <i>MDGRF</i> <i>FNE (France Nature Environnement)</i> <i>François Veillerette (head of MDGRF)</i> <i>FARRE (association of reasoned agriculture)</i> <i>Dr. Sultan (head of medical research unit)</i> <i>Pr. Belpomme (head of medical research unit)</i> <i>UIPP (Pesticide Makers Union)</i></p>
<p><u>Forms of agriculture:</u> <i>Agriculture Intégrée (Integrated Agriculture)</i> <i>Agriculture raisonnée (Reasoned agriculture)</i> <i>Bonnes pratiques agricoles (GAP)</i></p>	

In a second step some articles were excluded from the corpus when they did not deal with pesticide issues: i.e., those where “protection des cultures” meant “protection of cultural heritage”, or those dealing with bioterrorism, suicides with pesticides, persistent organic pollutants, Bhopal, biofuels and financial results of pesticide producers. Owing to this second step about 50% of the articles collected in the first step were eliminated.

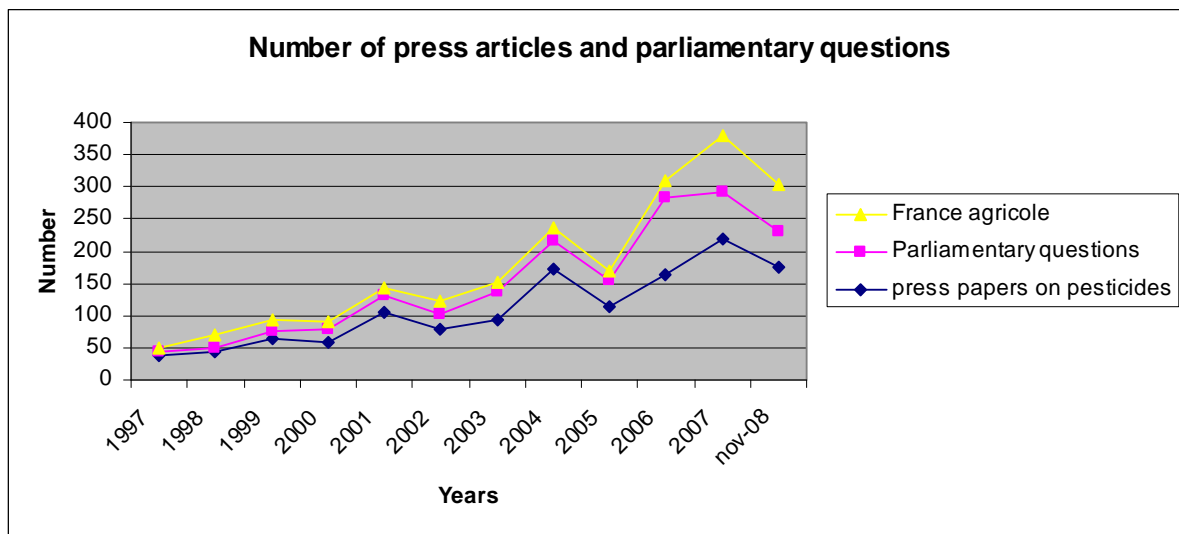
Resulting corpus in France

The corpus is composed of 815 articles extracted from 4 generalist daily newspapers (Le Monde, Libération, Le Figaro, La Croix), an economic one (La Tribune), 2 generalist weeklies (Le Point and l'Express) and one of the main agricultural newspaper (la France Agricole which is a weekly):

National daily press	567	Le Monde	193
		Libération	166
		Le Figaro	151
		La Croix	57
National daily economic press	52	La Tribune	52
News and Magazines	53	Le Point	29
		L'Express	24
Agricultural press	141	France Agricole	141
Total	815		815

The numbers of questions in Parliament and articles in newspapers collected are depicted in the graph below. The pesticide issue starts to be more discussed in 2001 with a peak in 2004 (discussions on REACH and on the impacts of chemicals) and a bigger peak in 2006/2007 which corresponds to the debates of the Grenelle de l'Environnement.

Intensity of the public debate on pesticides and crop protection in France



From the graph we can conclude, that both parliamentary questions, general newspapers and the Agricultural Magazine follow the same pattern.

5.2. Analysis of the Dutch debates

In this section the Dutch corpus of documents is analyzed in two ways: (1) a general review of the public debate on pesticides and crop protection, and (2) a content analysis of the debates on food safety and on pesticide registration.

5.2.1. General review of the public debate in The Netherlands

A series of hypotheses on the dynamics of the public debate were formulated on basis of impressions gained when preparing the dataset. These hypotheses were:

- the public debate is moving from the public domain to the agricultural domain;
- the centre of the public debate moved from parliament to civil society;
- each actor group applies its own terminology with regard to crop protection;
- different topics in the debate are put forward by different actors;
- the debate shows a succession of topics in the course of the years 1995-2008.

Starting from these hypotheses tables were composed to check the successive hypotheses and to find evidence for conclusions. In the next sections the hypotheses pass in review.

(see the detailed analysis of these hypothesis in the extensive report, soon available on Endure RA3.5 Website)

For example, to describe the succession of topics, the documents were classified to years and themes in the table below. In order to show the relative importance of the themes the line heights were adjusted to the total numbers of documents within each theme. Consequently the table shows bigger line heights for registration policy, food safety, positional play and labour safety & health. Within each line the years with relatively high numbers of documents were marked with different colours. The colours make clear which actor groups were leading the debate on the respective themes.

Table 5.8 Numbers of documents (parliamentary questions and national newspaper reports) classified to themes, years and actor groups

Theme	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
invasive species	1	2	0	1	0	1	1	0	0	1	0	2	4	4			17
genetic modification	2	3	1	2	1	3	0	0	2	1	1	0	0	2			18
integrated production	0	0	1	1	0	1	1	2	2	3	3	2	0	1			17
labour safety & health	2	4	1	6	2	0	0	0	3	1	1	0	1	2			23
food safety	0	0	0	0	2	9	4	3	4	14	6	2	3	3			50
registration policy	0	6	1	3	17	8	14	6	12	7	4	5	5	1			89
positional play	0	2	0	0	3	1	0	3	7	3	5	0	0	0			24
inspection&certification	1	0	2	2	1	3	0	0	4	2	0	1	0	0			16
water pollution	3	2	0	2	2	1	0	0	0	0	1	2	0	3			16
competitive position	1	1	0	0	1	0	1	0	0	2	0	0	2	1			9
Total of documents	10	20	6	17	29	27	21	14	34	34	21	14	15	17			279
Colour of Government	social-liberal				social-liberal				centre-social				centre-social				
Minister of Agriculture	Van Aartsen				Brinkhorst				Veerman				Verburg				

parliament	
parliament + universities	

parliament + sector orgs	
parliament + NGOs	

sector orgs + universities	
sector orgs + NGOs	

This table makes clear that the spectrum of themes shows major changes in the course of the years. In the period 1995-1998 the most important themes were genetic modification, labour safety & public health, water pollution and inspection. In the period 1999-2006 the main focus in the debate was on registration policy, food safety, positional play (shaming and blaming), integrated production and certification. In the period 2007-2008 the dominant themes in the public debate are invasive species, competitive position, genetic modification and water pollution (again).

In summary two drastic changes have taken place in the public debate. The first change took place in the end of the 1990s. In those years discussions on water pollution, labour safety & health effects and genetic modification made place for fierce campaigns around registration policy, food safety, integrated production and certification. The second change took place in the years 2006/2007. Since then invasive species, competitive position, water pollution and genetic modification are dominating the debate. The debate on water pollution in the end of the 1990s provided the basis for the second and the third National Action Plan (2001-2002 respectively 2003-2010). Reduction of the environmental impact on water organisms became the key target of the second National Action Plan. It is still unclear how the change in the years 2006/2007 will affect the content of the current National Action Plan.

The dynamics of the public debate on pesticides and crop protection in The Netherlands has several dimensions. In the course of time the centre of the debate has moved from questions in parliament (1995-1997) via articles in general newspapers (1998-2001) and articles in the agricultural newspaper (2002-2006) back to questions in parliament (2007-2008).

The public debate covers a broad spectrum of themes including invasive species, genetic modification, integrated production, labour safety & public health, food safety, registration policy, positional play, certification & inspection, water pollution and competitive position. The different themes are supported by different actor groups. Left wing parties, centre parties and universities are strongly focusing at genetic modification, invasive species, labour safety & public health, food safety and integrated production. NGOs and their opponents (right wing parties) are strongly focusing at food safety and registration policy. Sector organisations are mainly active in registration policy, positional play (with NGOs) and certification & inspection.

In addition to their support for different themes the actor groups are also different in their terminology with regard to crop protection. General newspapers, NGOs, universities, left wing parties and environment/health Ministries preferably refer to pesticides. Right wing parties, Ministry of Agriculture, Agricultural Daily and sector organisations are more inclined to talk about crop protection. We will see that it is quite the same in France.

The analysis of the debates in the recent period suggests that crop protection policy (genetic modification, landscape ecology, soil vitality) will become the main issue in the National Action Plan for the period 2011-2020. Pesticides might fade into the background.

5.2.2. Content analysis: food safety in The Netherlands

(see the extensive report for details and for a presentation of the main stages of this debate).

The debate tells a story of NGOs targeting health risks of pesticides (cancers, brain tumours, miscarriages). They were not successful in getting these risks on the political agenda. The scientific evidence for the causal relationship between contacts with pesticides and health problems was not very clear. For that reason NGOs started a series of campaigns (1998-2007) on exceedings of pesticide MRLs.

In the first instance they requested the government (Ministry of Agriculture and Ministry of Public Health) to take action. This effort also turned out to be rather ineffective. The Ministries made clear distinction to Maximum Residue Levels (MRL), Acceptable Daily Intakes (ADI) and Acute Reference Doses (ARfD). MRLs refer to Good Agricultural Practices. ADI- and ARfD-norms refer to health effects. In most cases MRLs are far below the ADI/ARfD-norms. Consequently exceedings of MRLs rarely result in health risks. For that reason the Ministries systematically rejected the health risk claims of the NGOs

In the second instance they requested the supermarket companies to take action. This time they were very successful. The supermarket companies fear concerns among consumers about the reliability of their products in general and food safety in particular. Such consumer concerns may cost them considerable decreases in turnover and profit. This fear explains why supermarket companies were very keen in making agreements with the NGOs on compliance with MRLs. In their turn the supermarket companies forced their suppliers (trade companies and growers) to comply with the official MRLs.

At the end of the ten year period (1998-2007) of campaigns the compliance with MRLs of vegetables and fruits in Dutch supermarkets was nearly 100%. The NGOs are continuously following the MRL performance of the individual supermarkets through the MRL monitoring data of the Food Inspection Authority. The consumer can follow the MRL performance of the various supermarket chains at the website www.weetwatjeet.nl. The government for a long time refused to release the MRL performance data and the names of the supermarkets, but in the end the NGOs forced through lawsuits to disclose the data and the names.

The historical review makes clear that neither the government nor the scientific community in The Netherlands were at the side of the NGOs. This explains why Dutch NGOs perceive the government and the universities as opponents rather than partners.

5.2.3. Content analysis: pesticide registration in The Netherlands

(see the extensive report for details and for a presentation of the main stages of this debate).

In the press, the debate is all about conflicts of interest between agriculture and the environment (i.e. reduction of the environmental impact of pesticides). The conflict was already present in the Administrative Agreement (1993) of the Multi-Year Crop Protection Plan. The Administrative Agreement included both a “black list” of 42 environmentally critical pesticides from the Ministry of Environment and a “white paper” of the Ministry of Agriculture towards the National Farmers Organisation for an effective package of pesticides. The promise of an effective package of pesticides was a *condition sine qua non* of the Farmers Organisation for their participation in the Administrative Agreement.

At the occasion of the mid-term evaluation of the Multi-Year Crop Protection Plan in 1996 the environmental NGOs started to ask questions on the withdrawal of the 42 pesticides on the “black list”. Furthermore they checked whether the Board for the Authorisation of Pesticides had taken into account the environmental criteria (1995) for the authorisation of pesticides. This was the beginning of the fight on pesticide registration with the Ministry of Agriculture. The Ministry of Agriculture had promised the farmers to be flexible in the authorisation of pesticides for the period 1995-2000. Consequently the interests of farmers and the chemical industry had been safeguarded for the time being.

In 1999 however, the withdrawal of the 42 pesticides came nearby and numerous applications in minor crops threatened to lose their authorisations. Important agricultural interests were at stake and the solution of “agro-technical essentiality” was politically accepted in 1999. In the perception of the NGOs the acceptance of “agro-technical essentiality” was a defeat for the environment. For that reason they again started lawsuits against the government, resulting in a ban on essential pesticides. Surprisingly the pesticides considered turned out to be not very “essential” for the chemical industry. They failed to provide (complete) dossiers in order to get authorisations for the essential applications. So finally the 42 pesticides disappeared from the market owing to strategic considerations of the chemical industry.

In fact the impasse in the Dutch registration policy in 2002 can be traced back to the strategic decision of the chemical industry to focus at authorisations at European level. As a result the authorisations of a big number of the pesticide applications potentially fell between two stools. The new Minister of Agriculture (2002-2006) had to build a bridge between the two stools. He managed to unlock the registration policy through the establishment of a National Agreement on Sustainable Crop Protection and through the replacement of the old Pesticides Law 1962 by the new Law on Crop Protection and Biocides 2007.

In conclusion the long debate on pesticide registration resulted in:

- (a) the withdrawal of 42 environmentally critical pesticides from the market (1996-2001)
- (b) the harmonisation with the European regulation on pesticide registration (2002-2007)

The chemical industry played a decisive role in the background, without being very present in the public debate. The public debate was heavily stimulated by several lawsuits of Stichting Natuur en Milieu against the Ministry of Agriculture. Minister Veerman (2002-2006) played a crucial role in bringing stakeholders together.

5.3. Content analysis of French press corpus

From a first analysis “hand made” by Isabelle Haynes on the basis of a codification of articles (with one main theme per article) and collective discussions within this task, we decided to conduct our content analysis following 4 main aspects:

- Pesticides or phytosanitary products? The semantic specificities of the debate.
- The evolution of the main themes over time and in the generalist press as opposed to the agricultural press
- The evolution of the main actors of the debate over time
- The presence of the agricultural practices and transitions in the debates

We used the **Prospero software** which allows looking largely at the themes that are present (and often co-present) in the articles, at their evolution over time as well as at their links with specific stakeholders and arenas.

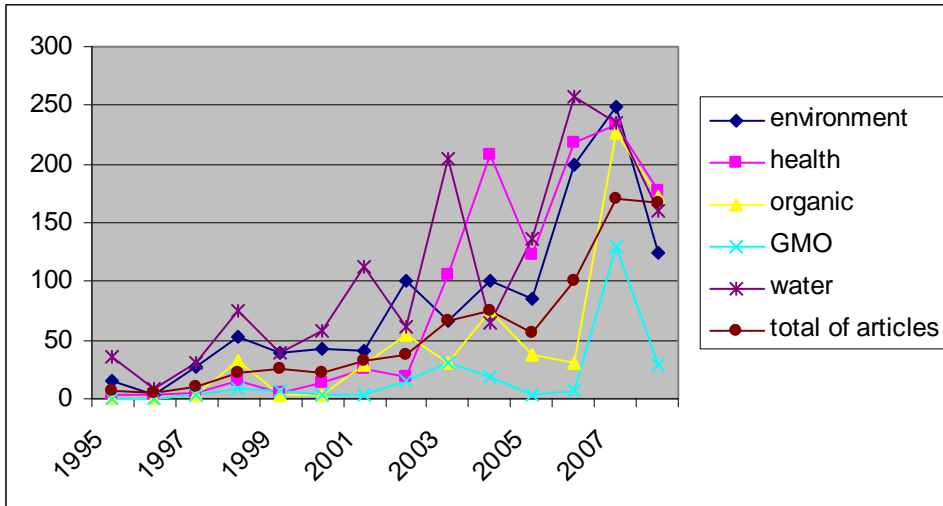
5.3.1. Pesticides or phytosanitary products? The semantic specificities of the debate

In France, the professional world uses proportionally 2,5 times more the word “phytosanitary products” than the word “pesticides”, as compared to the generalist newspapers. This has also been acknowledged by other colleagues (Bertrand et al., 2007).

5.3.2. The evolution of the main themes over time (and in the generalist press as opposed to the agricultural press)

In the whole corpus, the issues linked to water appear as the most present among the 4 themes that had been identified initially (with a peak in 2003 and in 2006-2007). The three other main issues identified from our interviews with NGOs in phase 1 – health, the environment and GMOs – appear quite parallel to the overall number of articles, with a peak in 2007 (Grenelle de l'Environnement).

Noticeable is the fact that **organic agriculture** had been much less present than these main themes until recently and was very much put on the foreground in 2007 and 2008 (see below).



(number of quotations, except for the red line which is the total number of articles, as a reference)

If we compare the presence of these themes in the agricultural press and in the generalist press, the evolutions are similar even though GMOs and organic farming appear to be proportionally less present in the agricultural press than in the generalist press until 2006, and more present suddenly in 2007. This suggests a recent shift in the professional press which seems to tackle these questions and debates more directly now, partly under the influence of the Grenelle debates but also under the more general influence of civil society around regulatory issues (with the MON810 controversy which happened in 2007).

(see details and tables in the extensive report of this task).

If unsurprisingly pesticides and agriculture are the most frequent themes of the articles, the following leading themes differ slightly in the generalist press and in the agricultural press corpus, as shows the table below:

- in the **generalist press**, **water, planet, risks, cancer, researchers, health, bees, children**, are themes that are ranked higher than in the agricultural press;
- in the **agricultural press**, the notions of **products (agricultural products) and phytosanitary products** rank higher but also **organic agriculture**.

Health, environmental and civil society issues are more present in the general press even though the agricultural press of course also has to tackle them.

Number of quotations of the main themes (whole French press corpus)

(an @ indicates that the theme has been codified, i.e., different expressions meaning the same thing have been recodified under the relevant theme).

generalist press	agric. Press	total	
PESTICIDES@	2095	245	PESTICIDES@ 2320
AGRICULTURE@	889	231	AGRICULTURE@ 1120
EAU (water)@	569	125	produit@ 637
LA-FRANCE@	525	83	EAU@ 596
products@	512	48	LA-FRANCE@ 531
ETAT-CENTRAL@	422	40	ETAT-CENTRAL@ 506
LA-PLANETE@	228	26	LA-PLANETE@ 203
étude@	185	26	étude@ 186
Environnement@	164	19	Environnement@ 181
risque@	137	18	risque@ 149
EUR-UNION@	136	18	EUR-UNION@ 147

LE-CANCER@	130	plan	16	CHERCHEURS@	119
CHERCHEURS@	128	risque@	14	Santé@	118
Santé@	108	FILIERE-BIO@	13	LE-CANCER@	115
ABEILLES@	98	EUR-UNION@	13	ENTREPRISES@	97
ENTREPRISES@	92	marché	13	ABEILLES@	91
ALIMENTATION@	83	Grenelle	12	EUR-INSTITUTIONS@	89
ENFANTS@	82	EUR-INSTITUTIONS@	12	ALIMENTATION@	89
EUR-INSTITUTIONS@	78	production	12	PRODUITS-PHYTO@	81
SOLS@	68	CONSOMMATEURS@	11	CONSOMMATEURS@	75
pollution	67	Santé@	11	SOLS@	74
CONSOMMATEURS@	63	ASSOCIATIONS@	10	cultures	72
pays	57	OGM@	9	ENFANTS@	71
FILIERE-BIO@	56	étude@	9	FILIERE-BIO@	69

If we consider more thoroughly the health issues, it appears that health issues in general are slightly less present in the Agricultural press, but the contrast is much higher for specific health issues such as “Cancer” which is proportionally 10 times less present in the Agricultural press.

The main types of arguments

The Prospero software allows qualifying **the type of rhetoric and arguments** which are linked to a specific theme. These types of arguments are codified under general logics such as logics of consequences, ecological logics, market logics, risk logics etc.

It appears that the themes of health and cancer are strongly linked to logics of consequences, risk and contamination. The types of cancer or illnesses as well as their potential victims (especially children) are also very present.

The software also allows identifying the themes and elements which are bounded together in specific recurrent argumentations (this is called a **“grappe” or package** of entities). In our case, **the most present argumentation deals with the impact of pesticides and the studies of these impacts:**

1 *pesticides, study, water, report, existence, France, phytosanitary products, pollution, usage, use, molecules, risk, insecticides, soils.*

Following major argumentation packages concern the health (2a and 2 b), the impact of pesticides on bees (3), the public policies about the reduction of pesticides (4), the economic aspects of pesticides (5), and the organic farming (6).

2a: *illnesses, cancers, development, insects, bees, cancer, use, life, vegetables, children, origin, plants, environment, insecticides, crops, chemicals.*

2b: *researchers, cancers, study, risk, environment, pollution, chemicals, studies, impacts, question, children, bees.*

This argumentation package interestingly links health problems (cancers, illnesses) with their potential victims (children, bees, life in general), their process (risks, development) and the knowledge about these issues (researchers, studies).

3. *bee keepers, bee, Gaucho, President, insecticide, bee hives, France, work, produce, usage, market, insect, maize, existence, farmer*

This argumentation package is mainly focussed on the impact of a specific insecticide on bees populations.

4. *Grenelle l'environnement gouvernement reduction agriculture GMO law biodiversity maesures environment plan president farmers research*

This argumentation package is very contextual and linked to the debates which have followed the Grenelle de l'environnement period (end of 2007) and their consequences in terms of public policies and laws (the national plan for the reduction of pesticides). GMOs appear to be linked to these debates.

5. *euros water market country France products farmers system prices consumption use production people*

This is a typically economical argumentation which links prices (euros, price), market issues, other countries (probably about importations and differences in legislations), but also water issues, and enhance the economic consequences of pesticide use or policies.

6. organic products prices organic farming farmers production Europe persons weather crops vegetables consumers market

This argumentation package shows that organic farming is often tackled through the question of products (probably authorized products), prices, market and consumers.

If we look specifically at the agricultural press, it appears that the argumentations that we can identify in this sub-corpus are somewhat different: the first one above, dealing with the impact of pesticides and the studies of these impacts is also present, but the following ones concerning health issues and bees are less present as well as, surprisingly, market and economical argumentations. On the other hand, two kinds of argumentation packages are more present: those linked to public policies and those linked to technical issues (reduction of pesticide use, agriculture raisonnée, certification etc.).

5.3.3. The evolution of the main actors of the debate over time

The main actors of the debate appear to be the State and the European Union, far ahead of unions, civil society organisations and researchers.

The increasing rate of presence of these categories of actors between the first period (1995-2005) and the recent period (2006-2008) shows a sharp augmentation for civil society organisations and a slight diminution for the syndicates as opposed to a relatively stable presence for the others actors.

The calculation of an indicator of presence for each of these main actors shows that researchers are far less present in the agricultural press than in the general corpus whereas the unions are far more present, the institutional actors (the State and the EU) as well as the civil society organisations being in closer proportions:

	Agric. Press	indicator of presence	Generalist Press	indicator of presence	Total
Researchers	26	0,4	439	1,1	465
NGOs	46	1,2	244	1,0	290
Unions	93	2,5	197	0,8	290
Central State	184	1,3	910	1,0	1094
European Union	122	1,1	752	1,0	874

indicator of presence= nb of quotations in the Agricultural corpus/nb quotations in the total corpus) / (size of the Agricultural corpus/size of the total corpus)

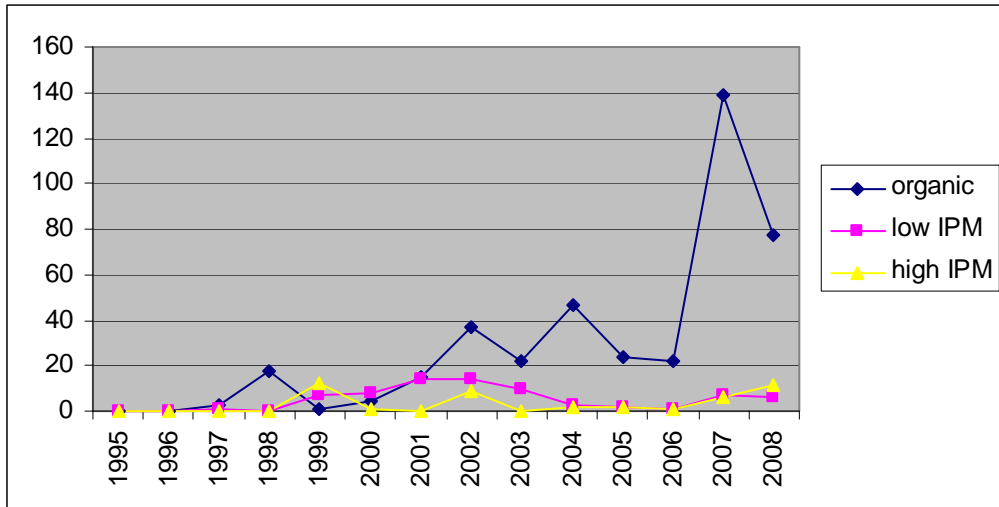
The most frequently quoted **personalities** are ministers and presidents, far ahead of medical doctors (who work about pesticides risks), environmentalists, and farmers' union leaders. It is noticeable that some actors such as consumers are not very present in the overall corpus.

(see details and tables in the extensive report of this task).

5.3.4. The presence of the agricultural practices and transitions in the debates

Organic agriculture is by far the most visible form of agriculture which is present in the press corpus, when we compare it to IPM (in French PI for "Protection/Production intégrée", which does not have any official definition but corresponds to high IPM standards) or "agriculture raisonnée" (which has an official definition and referential and can be considered as a low

IPM scheme). The rise of the presence of organic farming (and systems) is also very high over time, whereas IPM presence remains very low.



If we compare the agricultural and the generalist press, it appears that IPM is much more present in the agricultural press than in the generalist one, whereas the presence of organic farming is comparable. “Agriculture raisonnée” (low IPM) is also more present in the agricultural press even though the difference is lower than for “Protection intégrée” (high IPM). This confirms the lack of public recognition of IPM as opposed to more codified forms of agriculture such as organic farming.

5.4. Comparative analysis of public debates in France and the Netherlands

The public debates on pesticides and crop protection in France and The Netherlands are different in the topics debated and in the periods in which the various topics were debated. The table below gives a review of the topics and periods concerned:

Major topics within the debates on pesticides and crop protection in France and The Netherlands, with periods of debate and ranking to intensity

ENDURE – Deliverable DR3.11

France	Rank	The Netherlands	Rank
Water Pollution (1997-2008)	1	Water Pollution (1995-1999)	7
quality of drinking water protection of water caption convince farmers of changing practices association with nitrates		environmental criteria emission to surface water aeroplane applications	
Genetic Modification (1997-2008)	2	Genetic Modification (1995-2000)	5
dissemination of GMOs impact on other plants adversary impacts campaigns of Greenpeace		imports of maize and soybeans herbicide resistant varieties field trials with transgenic potatoes questions of left wing and christian MPs	
Health Issues (2003-2008)	3	Health Issues (1995-1999)	3
links between pesticides and cancer impact of pesticides on Parkinson disease, male fertility, brain tumors, development of childrens brains campaigns of ARTAC		links between pesticides and cancer impact of pesticides on brain tumors, male fertility, hormone disruption, behavioral problems of children left wing MPs and consortium of NGOs lack of scientific evidence	
Impact on Fauna (2000-2008)	4		
disappearance of bees impact on birds and little wild animals			
Food Safety (2000-2008)	5	Food Safety (2000-2007)	2
Maximum Residue Limits vegetables and fruits		Maximum Residue Limits vegetables and fruit campaigns against supermarkets samples > residue analysis > publicity campaigns environmental/consumer NGOs	
Registration Policy (2000-2008)	6	Registration Policy (1996-2005)	1
pesticide authorisations vegetables and fruits CMR products (Carcinogenic, Mutagenic, Reprotoxic)		pesticide authorisations bottlenecks in minor crops environmental criteria lawsuits against government filed by Stichting Natuur en Milieu	
Farming Systems (2004-2008)	7	Farming Systems (2002-2006)	6
agricultural policy organic agriculture alternative agriculture		integrated production biological control disease resistant cultivars	
		Stakeholder Relations (1999-2005)	4
		relations NGOs and Farmers Organisation dilemma between fighting and dialogue clean-up of pesticide package participation in National Agreement	

This table shows the topics debated in France ranked to the intensity of the debate: (1) water pollution, (2) genetic modification, (3) health issues, (4) impact on fauna, (5) food safety, (6) registration policy, and (7) farming systems.

The subjects debated in The Netherlands are largely the same, but the focus of the debate was on other topics than in France: (1) registration policy, (2) food safety, (3) health issues, and (4) stakeholder relations.

The cause of the difference in focus probably lies in the characteristics of agricultural production in the two countries. The Netherlands has a very important horticultural sector with a lot of minor crops, among which vegetables and fruits. An important issue in vegetables and fruits is compliance with Maximum Residue Levels (MRLs). The MRL issue is also present mainly for vegetables and fruits in France.

In the Netherlands the pesticide debate started and decreased earlier than in France. Health issues and water pollution were debated in The Netherlands in 1995-1999. In France the debate on water pollution had also started in 1995 (beginning of the corpus) but was still vivid in 2008. The debate on health issues started just recently (2003) and still continues in France. Likewise for genetic modification: in the Netherlands the debate was intense in 1995-2000; In France it also started in 1997 but was still going on in 2008.

The debate on food safety started at the same time (2000) in the two countries, due to a same context of food crises. In France the debate is still going on; in the Netherlands the debate stopped in 2007.

The debate on registration policy started rather early (1996) in The Netherlands and stopped in 2005. In France the registration debate started in 2000 and is going on. Debates over farming systems also started in the Netherlands somewhat earlier (2002-2006) than in France (2004-2008).

In summary: **the debates on pesticides and crop protection started earlier and tend to decrease earlier in The Netherlands compared to France.** The importance of horticulture in The Netherlands and the close relationships with health (MRLs) and pesticide authorisations for minor crops explains at least a part of the difference in earliness of the debate between the two countries.

Another part of the explanation can be found in the inventiveness and the legal position of the NGOs in The Netherlands. They experienced that the government was rather defensive in the debate on health issues. The government hid behind the lack of scientific evidence for pesticides causing health problems. They also hid behind differences in Maximum Residue Levels and Acceptable Daily Intakes.

As a result the NGO started campaigns against supermarket companies. They were very successful in the campaigns on MRL exceedings in vegetables and fruits.

The legal status of the NGOs in The Netherlands was also helpful. **In 1995 the NGOs in The Netherlands were officially recognised as the representatives of the collective interests in lawsuits against government decisions. This recognition gave then an important tool to put the government under pressure in the debate on pesticide registration** (compliance with environmental criteria for authorisation of pesticides).

A third factor for the success of the NGOs in The Netherlands probably is the co-operation with left wing opposition parties in parliament. Campaigns of NGOs are frequently accompanied by questions of left wing politicians in Dutch parliament. In France parliamentary questions have the function of stimulating the Ministers in the government to help the MPs of the coalition parties. Critical questions from MPs of opposition parties have to be given an answer within 2 months by the Ministers.

A very successful strategy of the Dutch NGOs in the food safety debate is buying samples of specific vegetables or fruits (e.g. strawberries or grapes) in supermarkets, contracting a well-known laboratory for pesticide residue analysis, and publishing the results in the silly season for economic and political news. This method guarantees a lot of attention from journalists, supermarket companies, farmers organisations, etc. The NGOs also applied this method during the debate in the European Parliament on the regulation for the putting on the market of plant protection products.

The content of the topics in the public debate is quite comparable between the two countries. In the debate on health issues **the same health problems are mentioned:** cancers, brain tumours, male fertility, vulnerable groups, etc. In the debate **on food safety and registration policy the same arguments** pass in review: vegetables and fruits, minor crops, environmental criteria, etc. In the debate on **water pollution the arguments are slightly different** between the countries: quality of surface water is the key issue in The Netherlands; quality of drinking water is the key issue in France.

A relatively new subject in the two countries is the design of farming systems. In The Netherlands the debate focused (2002-2006) on integrated production systems, biological control in greenhouses and disease resistant varieties in potato farming. Just recently the attention for soil and landscape ecology and learning from organic agriculture is growing in Dutch arable farming. In the French debate on pesticides and crop protection organic agriculture, alternative agriculture and agricultural policy are frequently mentioned as examples for innovating farming systems.

Conclusions

The public debate on pesticides seems to have been sharper earlier in The Netherlands than in France. In the Netherlands the debate was already very intense in the period 1995-2000 with attention for water pollution, health issues and genetic modification. These topics got settled in 1999/2000 and were then succeeded by fierce debates between NGOs, government, farmers organisations and supermarkets on registration policy and food safety. It took several years (2005/2007) to get these topics settled. Nowadays the main topics are soil quality, landscape ecology and genetic modification.

In France water pollution and genetic modification have continuously been debated since 1997. From 2000 onwards new topics were impact on fauna (death of bees), food safety, registration policy and health issues. Since 2004 the debate intensified due to events like the “Appel de Paris” (2004), the “Grenelle de l’ Environnement” (2007) and the publication of the book “Pesticides, un scandale français” (2007). Under this pressure the attention for agricultural policy, organic agriculture and alternative agriculture is growing in France.

Both in France and the Netherlands food safety and registration policy are typical topics for vegetables and fruits. This debate focuses at compliance with Maximum Residue Levels and pesticide authorisations for minor crops. **In both countries NGOs played an important role in activating the public debate**, although Dutch NGOs seem to play a more important role in the debates on food safety and registration policy than French ones. In food safety they bought samples of vegetables and fruits in supermarkets, had them analysed at pesticide residues, and blamed the supermarket companies in case of MRL exceedings. In pesticide registration they started many lawsuits against the government, because of pesticide authorisations which were incompatible with environmental criterions.

In France NGOs also played an important role in the public debate on pesticides, especially with regard to GMOs and health issues. However politicians appeared to have the lead in the public debate on pesticides and crop protection in France. Their names appear much more in newspaper articles than the names of medical doctors, environmentalists (NGO and their leaders) and farmers union leaders.

Since 1995 the public debates on pesticides and crop protection in France and the Netherlands largely focused on the adverse effects of pesticides for public health and for the environment. In the Netherlands the debates on food safety and registration policy have been settled. In France the debate probably also gets settled through Ecophyto 2008, the National Action Plan for pesticide reduction. Consequently the time and space for crop protection in the context of farming systems will increase.

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- About the Prospero software: <http://prospero.dyndns.org>

6. Interaction with Endure’s other scientists and activities on the basis of the results of phase I

The objective of the RA3.5 task d was to make the RA3.5 results of phase I useful for the rest of Endure and the colleagues from other disciplines. We also wanted to raise their attention on the importance of a systemic approach for understanding the interactions between stakeholders belonging to the National Action Systems and the actors’ practices (farmers and advisers particularly) for understanding the difficulties in implementing IPM that they could face.

6.1. The communication of RA3.5 results

Particularly, as developed in the DR 3.6 deliverable about our interactions with other Endure activities, the results of RA3.5 first working phase (DR3.5) have underlined the importance of 5 points (the paragraphs below are taken from the DR3.6 deliverable):

1) The gradual nature of the adoption of IPM by farmers. The study of farmers trajectories shows that farmers progress at different rates along a continuum between two contrasting approaches that can be analysed according to the Efficiency, Substitution, Redesign model (ESR: Hill, 1995) Tactical modifications involving an increase in the efficiency of input use (E) are followed or completed by the substitution (S) of chemical inputs by more environmentally-friendly inputs or methods and, finally, strategic changes resulting in a more radical redesign of their systems are implemented. Trajectories are not always linear though, and these phases would often overlap. This comes in contradiction with the fact that small-step tactical modifications towards systems that are less reliant on pesticides are often perceived by scientists²¹ as sub-optimal compared to a larger redesign of the systems.

Moreover, the socio-historical analysis has showed that farmers are in a “lock-in” situation in which pesticide reliance is optimal (Lamine et al., 2008b). Exiting such a locked-in situation would appear to therefore require a radical break. But our case-study results on farmers’ trajectories show that those farmers who have successfully reduced their reliance on pesticides have done so by gradual steps.

The question then is to create the conditions of such progressiveness and to see how the steps of optimising efficiency and substituting inputs can lead to new systems that both perform well and favour IPM.

2) The importance of economic expectations rather than environmental concerns in the farmers’ decision to implement IPM. Against this background:

- Advisors and Producers’ Organisations appear as key actors in the development of IPM implementation.

- It is likely that either strong public policies and/or strong environmental motivations are necessary to make changes possible.

Consequently, the civil society through the construction of the environmental impact of agriculture as a public issue has a determining role to play. This is also suggested by our analysis of the public debate, which shows the rising importance of concerns about the long term impact of pesticides for human health.

3) The influence of supermarket demands on farming practices.

In fruit and vegetable production, stringent physical quality and cosmetic standards appeared as a major bottleneck to the reduction of pesticide use. It is almost impossible to achieve such quality without using pesticides.

On the supermarket side, there are contradictory trends. On the one hand, supermarkets certifications schemes pay increasing attention to the environmental impact of farm practices relative to water, energy and wastes. On the other hand, those schemes promote good agricultural practice (GAP) techniques without specific demands on pesticide use. Attention

²¹ SA4.5 (Scientific Support Policy) discussions

to the reduction of pesticide use focus on good agricultural practices. Our analysis shows that generally speaking and referring to the ESR model, GAP are based on Efficiency strategies designed to ensure compliance with food safety requirements that contribute to product safety. In this context, the prospects for increased adoption of IPM driven by supermarket certification schemes are low.

4) The difficulties linked to communication and marketing.

Communicating on IPM is difficult for supermarkets: by raising attention to reduced pesticide use on a small portion of the food on display, it involuntarily makes it clear to the consumer that the non-certified food is produced according to lower standards. Therefore in many countries IPM is not market promoted.

As has been showed by market sociologists, we can state that consumer demand is by no way given, it is socially constructed. It is the result of a certain balance of the respective weights of the different actors involved in the agrofood system i.e., food chain economic intermediaries, institutions and NGOs. Indeed, when farmers talk about consumer demand, they are actually referring to the quality demands defined by retailers. Most producers never have contact with consumers and consumer demand is shaped by retailer policies.

5) The lack of robustness of farmer loyalty to IPM practices.

Adopting an IPM perspective would lead to a change of paradigm that is not obvious at any stage of the food chain: farmers are rather complaining for the lack of pesticides and fear a decrease in yields.

To adopt an IPM-compatible approach requires a change of mindset that does not seem likely among most farmers today. Rather than environmental or societal pressures, the concerns they voice relate to a scarcity of available pesticides and a fear of decreasing yields.

Conditions for the implementation of IPM as found in our cases studies (wheat and pome fruit) could be summarised as in the following Table (from DR3.5).

Factors affecting change towards IPM.

	<i>Apple CH</i>	<i>Apple F</i>	<i>Wheat F</i>	<i>Apple NL</i>	<i>GB Wheat</i>
<i>Role of public policies</i>	Strong: ecological requirements for direct payments	Might become stronger at national level and local level (e.g. watersheds)		Pesticides Action Plans 1991 and 2001	UK Pesticides Strategy 2006
<i>Involvement of research and extension</i>	Strong during the first phase	In pilot areas (research on IP fruit production)	In pilot areas (research on low input strategies)	Strong in pesticide action plan preparation; decreasing afterwards	Strong in the Pesticides Safety Directorate
<i>Collective dynamics among farmers</i>	Strong especially at the beginning	Market led (producers group for marketing)	Strong in some pioneer groups	Market led (cooperative) + study groups	
<i>Translation in marketing strategies</i>	Not successful	Supermarket schemes	Almost none(except for short circuits and a few cooperatives)	MRL requirements of retailers	Supermarket schemes
<i>Involvement of civil society</i>	Strong: public votation (referendum) on agriculture/environment	Low except in schemes	in CSA ²²	Increasing via MRL actions of NGOs towards supermarkets	Increasing (NGOs' concerns and action on pesticides impacts for human health)

²² Community Supported Agriculture. See definition page 5

These results have been communicated to other Endure Scientists through participation in the ENDURE conference in la Grande Motte (6 papers), participation in the orchard and winter crops System Cases Studies, participation in SA4.5 interaction with policymakers and participation in the definition of social criteria to be included in the Dexi IPM model created by RA3. The details of these elements were given in the DR3.6 report.

Since the publication of this deliverable, the leaflets summarizing the main results of phase 1 have been written for series called “Societal assessment of current and novel low input crop protection strategies”. One is available i.e. “The conditions of transition towards Integrated Pest Management (IPM) practices” and the other two i.e. “Supermarket schemes a tool for implementing Integrated Production Management?” and “Rising concerns on the impact of pesticides: an analysis of the public controversies” are being laid out by SA 3.1. (Milestone MR3.5)

However, we felt that social sciences are still not integrated by many other scientists. These are interested in the results and the issues that we can raise but it seems that they find it difficult to use it in their work; even if, as in RA2.5, they are convinced that socio economic factors are the only existing bottlenecks to the adoption of Integrated Fruit Protection (Haynes, Lamine 2008). Maybe this is because some scientists find it difficult to consider qualitative research (on which is based most of our research work) as an interesting option even for systemic approaches.

6.2. Interactions with and within the SCSs

Such an issue was discussed in the RA3.5 meeting in Paris at the beginning of June when discussing the focus of tasks according to the workshops held in SCS and the relationships with the SCS (Milestone 3.11).

We agreed on the fact that nothing replaces personal work with the scientists and that the best way to tackle this issue was by participating to discussions and meetings. Hence,

- The principle to be present as much as we can in winter crops and orchards SCSs meetings during JPA3 (as well as in maize SCS thanks to the participation of SSSUP to both RA3.5 and this SCS)
- The idea of asking Bart Heijne whether we could present both the DR2.10 results (Haynes, Lamine 2009) and Jan Buurma’s Working paper on “Crop protection economics; balancing yield risks and control strategies“ at the next SCS orchard meeting.
- The idea of looking for a “mediator” in each SCS. A mediator should be someone who would systematically read our reports and put important sociological issues on the SCS agenda when necessary.

General references

(specific references for chapters 3 to 5 are presented at the end of each chapter)

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