

 **O.58 - A categorisation of the social sciences approaches on crop protection issues**

Lamine, C.¹, Mack, G.², Noe, E.³

¹ INRA, Eco-Innov, Avenue Lucien Brétignières, 78850 Thiverval-Grignon, France

² Station de recherche Agroscope Reckenholz-Tänikon ART, Reckenholzstrasse 191, CH-8046 Zürich, Suisse

³ Aarhus University, Faculty of Agricultural Sciences, Department of Agroecology and Environment, Research Centre Foulum, Blichers Allé, Postbox 50, DK-8830 Tjele, Denmark

Contact: clamine@grignon.inra.fr

Abstract

This paper offers a categorisation of the different approaches of crop protection in sociology and economy and is structured according to the main themes that we could find in the literature: 1. The changes in farmers' conceptions and practices regarding crop protection; 2. The economic aspects of innovation; 3. The interactions with consumers and civil society. This review allows us to enhance important themes for further research, such as the analysis of the changes towards more sustainable agricultures in terms of learning processes and trajectories, the study of the interactions between farmers, extension services, and researchers, as well as approaches that consider the agro-food system as a whole.

This paper is a proposal to categorise the different approaches of crop protection in sociology and in economy rather than a proper literature review. The paper is structured according to the main themes that we could find in the literature:

1. The changes in farmers' conceptions and practices regarding crop protection;
2. The economic aspects of innovation;
3. Taking into account the interactions with consumers and civil society.

These themes have been much more documented regarding organic farming than regarding other strategies, be it IPM or other forms of conventional agriculture. Some of the reasons for this might be that organic farming has a rich historical background as well as relatively clear definitions, established rules and specific networks. We will not refer to organic farming here though; see (Lamine and Bellon, 2008) for a recent literature review on conversion to organic farming.

1. The changes in farmers' conceptions and practices

Here we refer to papers which study innovations that succeed or fail in integrated protection (IP), integrated pest management (IPM) and biological control (BC) systems.

The first issue dealt with is farmers' rationality regarding crop protection. The promotion of low input practices might hurt the basis of farmers' professional identities i.e., the image of professional excellence (high yields, neat and clean fields), but also the perceived autonomy of choice. However, those who adopt such practices often say they re-discover the heart of their profession and like the experimental and technical sides of such changes. Sociologists and anthropologists showed that it was accurate to talk of processes of transition and to study farmers' trajectories as well as farmers' collective dynamics and interactions with different networks, not only professional, but also local and social networks (Paratte, 2005).

Some authors question the links between increased knowledge from education and training and actual better pest management behaviour (McNamara et al., 1991; Price, 2001). The nature and the organisation of advisory services (public/private, linked to input suppliers or not) also seem very determinant (Zilberman and Millock, 1997; Villarejo and Moore, 1998; Ehler and Bottrel, 2000; Compagnone, 2004). The case of Denmark proves that loyal and efficient relationships between advisors and farmers are a factor of success for the adoption of low input practices (Langvad and Noe, 2006).

Several authors showed that the adoption of new crop protection strategies was more efficient when farmers are organised in groups, as they can comfort each other not only on technical aspects but also in psychological terms as well as in participatory projects (Norton et al., 1999; Collet and Mormont, 2003; Compagnone, 2004; Warner, 2007).

This is true beyond the issue of crop protection (Rolling and Wagemakers, 1998; Paine et al., 2004).

Finally, the adoption of more sustainable crop protection strategies often goes hand in hand with changes in the organisation of work at farm level: more observation in the fields, more mechanical work, more frequent spraying at much lower doses, different tasks and competences for farm workers, issues that seem to be tackled more by farm management scientists than by sociologists.

2. From the study of motivations to the analysis of innovation trajectories

Broadly speaking, economists would analyse farmers' rationality in terms of objective factors, whereas sociologists are more interested in the co-evolution of conceptions and practices.

Following the principle of economic rationality, the economists identify the factors favouring the adoption of more sustainable crop protection strategies and the components of farmers' decisions (Barbier and Bellon, 2007): price premiums, working force availability, farm size, level of education, relation to independent advisors, level of diversification, degree of aversion to risks, age and information. Some factors can be ambivalent, such as farm size: some would expect large farms to be more willing to innovate, but on the other hand, it might be more difficult to adopt low input strategies because treatments are more often planned systematically rather than adjusted to observation (Jørgensen et al., 2007). Furthermore, information does not always play in the intended way. More observation and control of pest attacks in the fields could lead not to reducing pesticide use but even to increasing it, as farmers see things they did not see before and become more aware of the risks (Horowitz and Lichtenberg, 1994; Carpentier et al., 2005).

Over a larger time span, an important contribution to the understanding of current practices is the theory of path dependency (Cowan and Gunby, 1996; Vanloqueren and Baret, 2004): at one point, an innovation trajectory, such as the intensification paradigm of the 1980s in the case of wheat, is strengthened by positive feedback, such as the increase of pest attacks due to pesticide resistance and the destruction of natural predators, which in turn leads to an increasing use of pesticides. This leads to 'irreversibilities' also reinforced by the intertwined strategies of different actors, such as input suppliers.

3. Taking into account the interactions with consumers and civil society

Political scientists have highlighted the dominantly private institutional character of Agrochemicals' regulatory activity based on companies' product testing routines but also on their involvement in expert committees (Irwin and Rothstein, 2003), leaving wider public groups such as NGOs with very limited opportunities for participation – at least, national NGOs, as opposed to European-wide NGOs such as Greenpeace and PAN (Hood et al., 2001). Such approaches have been applied in comparative studies, confirming a common idea that Scandinavian regulatory standards are stricter (Rothstein et al., 1999).

Marketing science and sociology of consumption have studied crop protection issues as they are supposed to be taken into account by consumers, that is in terms of risk perception (Halkier, 2001; Saba and Messina, 2003) or labels and quality (Barham, 1997; Lockeretz, 2003). Other works have shown how the agricultural industry strategically repositions itself over recent decades by changing its messages in response to changes in the socio-cultural setting and in public concerns (Kroma and Flora, 2003).

Rural sociologists have put the accent on links between producers and consumers and claim broader visions of the implications of crop protection strategies at the level of the food chain. The interaction between farmers and consumers and possible negotiation around farming practices - where crop protection practices are however hardly tackled - have been studied in the case of short circuits like local markets or box-schemes (Griffin and Frongillo, 2003; Kirwan, 2004; Lamine, 2005). Taking into account the interactions between the different levels and actors of the food chain often demands interdisciplinary work, as has been demonstrated for example in the case of fruit production (Toubon et al., 2000; McKenna and Campbell, 2002).

Interdisciplinarity is also necessary for the evaluation of farm sustainability (Noe et al., 2005) and the assessment of the impact of crop protection practices as it involves not only environmental and economic impacts but social ones too (Leviton, 2000).

To conclude, several promising approaches seem to be emerging in recent literature:

- The analysis of the changes towards more sustainable agricultures in terms of learning processes and trajectories (if possible through interdisciplinary work linking sociological, economical and agronomical analyses);
- The study of the interactions between farmers, extension services, and researchers;
- The approaches that consider the agro-food system as a whole.

References

- Barbier J.-M. & Bellon S. (2007) Relations entre changements techniques et configurations agro-écologiques: cas des transitions vers la Protection Intégrée et l'Agriculture Biologique en cultures pérennes., PIDAL.
- Barham E. (1997) What's in a name? Eco-labelling in the global food system, in: Joint meeting of the Agriculture, Food, and Human Values Society and the Association for the study of Food and Society, Madison, Wisconsin, June 5-7 1997.
- Carpentier A., Barbier J.-M., Bontems P., Lacroix A., Laplana R., S L. & Turpin N. (2005) Pesticides, agriculture et environnement. Expertise scientifique collective. Aspects économiques de la régulation des pollutions par les pesticides. Paris, Inra-Cemagref.
- Collet E. & Mormont M. (2003) Managing pests, consumers, and commitments: the case of apple growers and pear growers in Belgium's Lower Meuse region., *Environment and Planning, A* 35, 413-427.
- Compagnone C. (2004) Agriculture raisonnée et dynamique de changement en viticulture bourguignonne, *Recherches Sociologiques* 3, 103-121.
- Cowan R. & Gunby P. (1996) Sprayed to death: Path dependence, lock-in and pest control., *Economic Journal* 106(436), 521-43.
- Ehler L. E. & Bottrel D. G. (2000) L'illusion de la protection intégrée des cultures, *Le courrier de l'environnement de l'INRA*(40), 4.
- Griffin M. R. & Frongillo E. A. (2003) Experiences and perspectives of farmers from Upstate New York farmers' markets, *Agriculture and Human values* 20, 189-203.
- Halkier B. (2001) Consuming ambivalences: Consumer handling of environmentally related risks in food., *Journal of Consumer Culture* 1(2), 205-224.
- Hood C., Rothstein H. & Baldwin R. (2001) *The Government of Risk: Understanding Risk Regulation Regimes*, Oxford: Oxford University Press.

- Horowitz J. & Lichtemberg E. (1994) Risk-Reducing and Risk Increasing Pesticides. *Journal Agr. Econ.* 45(1994):83-89.
- Irwin A. & Rothstein H. (2003) Regulatory Science in an International Regime, in: F. den Hond, Groeneweg P. & van Straalen N. M. (Eds), *Pesticides: Problems, Improvements, Alternatives*, Oxford: Blackwell Science Inc., 77–86.
- Jørgensen L. N., Noe E., Langvad A. M., Jensen J. E., Ørum J. E. & Rydahl P. (2007) Decision support systems: barriers and farmers' need for support, *EPPO Bulletin* 37(2), 374-377.
- Kirwan J. (2004) Alternative Strategies in the UK Agro-Food System: Interrogating the Alterity of Farmers' Markets, *Sociologia Ruralis* 44(4).
- Kroma M. M. & Flora C. B. (2003) Greening pesticides: A historical analysis of the social construction of farm chemical advertisements, *Agriculture and Humans Values* 20, 21-35.
- Lamine C. (2005) Settling the shared uncertainties: local partnerships between producers and consumers, *Sociologia ruralis* 45(4), 324-345.
- Lamine C. & Bellon S. (2008) Conversion to organics, a multidimensional subject at the crossroads of agricultural and social sciences, *Agriculture for sustainable Development*, 28.
- Langvad A. S. & Noe E. (2006) (Re)-innovating tools for decision-support in the light of farmers' various strategies, in: 7th European IFSA Symposium, May 2006.
- Levitan L. (2000) "How to" and "why": assessing the enviro-social impacts of pesticides, *Crop protection*(19), 629-636.
- Lockeretz W., Ed. (2003) Ecolabels and the greening of the food market, Conference proceedings, Boston, Nov 7-9, 2002,
- McKenna M. & Campbell H. (2002) It's not easy being green: The development of "food safety" practices in New's Zealand Apple Industry, *International Journal of Sociology of Agriculture and Food* 10(2), 45-55.
- McNamara K. T., Wetzstein M. E. & Douce G. K. (1991) Factors affecting peanut producer adoption of integrated pest management., *Review of agricultural Economics*, Vol. 13, No. 1. pp. 129-139.
- Noe E., Halberg N. & Reddersen J. (2005) Indicators of Biodiversity and Conservational Wildlife Quality on Danish Organic Farms for Use in Farm Management: A Multidisciplinary Approach to Indicator Development and Testing., *Journal of Agricultural and Environmental Ethics* 18(4), 383.
- Norton G. W., Rajotte E. G. & Gapud V. (1999) Participatory research in integrated pest management: Lessons from the IPM, *Agriculture and Humans Values* 16, 431–439.
- Paine M. S., Nettle R. A. & Coats S. (2004) Learning and professional development in advisory services: supporting the reflective practitioner., 6th International Farming Systems Association European Symposium, Vila Real, Portugal. 653-662.
- Paratte R. (2005) Y a-t-il une version "chercheurs" et une version "professionnels" de la production fruitière intégrée en France? Paris, EHESS. DEA d'ethnologie.
- Price L. L. (2001) Demystifying farmers' entomological and pest management knowledge: A methodology for assessing the impacts on knowledge from IPM-FFS and NES interventions, *Agriculture and Humans Values* 18, 153–176.
- Rolling N. G. & Wagemakers M. A. E. (1998) *Facilitating Sustainable Agriculture: Participatory Learning and Adaptive Management in Times of Environmental Uncertainty*, Cambridge: Cambridge University Press.
- Rothstein H., Irwin A., Yearley S. & McCarthy E. (1999) Regulatory Science, Europeanization, and the Control of Agrochemicals, *Science, Technology, & Human Values* 24(2), 241–264.

Saba A. & Messina F. (2003) Attitudes towards organic food and risk/benefit perception associated with pesticides, *Food Quality and Preference*(14), 637-645.

Toubon J.-F., Sauphanor B., De Sainte Marie C., Plenet D. & Habib R. (2000) Status of Integrated Production in French Apple orchards. *Bulletin de l'IOILB.SROP*, 24: 27-31.

Vanloqueren G. & Baret P. (2004) Les pommiers transgéniques résistants à la tavelure: analyse systémique d'une plante transgénique de « seconde génération », *Courrier de l'environnement de l'INRA* 52.

Villarejo D. & Moore C. V. (1998) How Effective are Voluntary Agricultural Pesticide Use Programs? A Study of Pesticide Use in California Almond and Walnut Production. *California Institute for rural studies*. 35 p.

Warner K. (2007) *Agroecology in action. Extending alternative agriculture through social networks.*, MIT Press.

Zilberman D. & Millock K. (1997) Financial incentives and pesticide use, *Food Policy* 22(2), 133-144.