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A TRANSATLANTIC GAP IN BIOSAFETY RESEARCH: A COMPARISON OF EUROPE/U.S. RESEARCH DYNAMICS ON THE IMPACTS OF GMOs

While, in the 1970's, the United States was distinguishable for stricter risk regulation and for more open and adversarial procedures, in comparison France's risk/regulatory culture appeared deeply "technocratic". At the end of the 1990's the European and American positions as to risk regulation seemed to have reversed. This swing in positions, very clear throughout the history of the GMO controversy, obliges us to drop too "culturalist" explanations for some finer comparative analysis of the trajectory of public problems (Joly and Marris, 2003). It is at this crossroad between science studies and social problem sociology that we shall contextualise the question of the role played by science in this transatlantic swing.

Some refer to "sound science" and others to the "precautionary principle" but to maintain the comparison at that level would mean to drop the various ways in which GM crops' risks can be framed by scientists into a black box. Let us therefore reformulate the question: we shall not ask if Americans and Europeans have drawn upon "the science" in different ways, but instead if they have developed the same science, the same research on the effects and risks of GMOs. This approach allows us to put the question of 'research governance' at the very heart of the thinking on the precautionary principle (Stirling, 1999).

Material and method

Other than interviews and records study, the analysis is mainly based on a bibliometrical analysis of the research field in biosafety of transgenic plants (details in Bonneuil and *al*. 2004). For this purpose and from the base "CAB abstracts", we have created a data base of 1667 articles published between 1984 and 2003 in indexed reviews (those concerning economics and social sciences having been put aside for this paper). Later, this basis has been analysed with the ReseauLu relational data software of analysis and visualization (Cambrosio and *al*. 2004).

Results (see Bonneuil and *al*.2004 for the maps)

The fifteen countries of the European Union come ahead of the United States with 688 papers against 645, revealing a stronger priority for research in biosafety on the old continent, whether research in biology or planted areas of genetically modified plants (GMP). Moreover, what stands out is that American and European research quite obviously diverged in the mid 1990s. This division has become more acute from 1997 on, each side focusing on different research issues: genes flows, food safety, biodiversity and detection for the Europeans; agricultural entomology (management of insect resistance to plants Bt or non-target effects of theses crops) for the Americans.

Discussion

In the United States, 1993-1999 was a period of little public debate on GMOs. Competition for control of the issue in the regulation arena ended up, in the late 1980s Reaganian context of deregulation, with a lesser regulatory control from the Environmental Protection Agency (EPA) in the face of the Food and Drug Administration and the USDA. Around 1994, most regulators and researchers had the feeling that all the possible problems of biosafety had been addressed. Research programs were downsized (especially at EPA) and the USDA "Biotechnology Risk Assessment Research Grant Program" did not attract many good research projects from university research teams. Population biologists interested in gene flows worked, then, on species (cucurbitaceous, sunflowers, rapeseed) relatively non-relevant for regulators in the USA and found it hard to arouse the risk regulators' interest. The research on the safety GMOs in food largely depends on the biotechnological firms themselves and their reassuring results seem to confirm the choice for the substantial equivalency principle.

However, in Europe, during the period 1993-97, the question of gene flows was subject to active and fructuous research (commission grants decided according to the 90-220 directive). This research interacts strongly with the regulation arena (Is there, or not, a need to authorize modified colza or beetroots in order to tolerate a weed-killer?). Some scientists, then, set out on the agenda the problem of possible escaping transgenes, either inside their research institutes (for example in France, inter-institutes platforms; AIP OGM at INRA) or outside in public space (for ex: the scientists' petition of 1996). The controversy, once public, manifests the distinction between a reassuring "molecular biology" framework and that

of a more interrogative "agro-ecological" one, which has since been taken up by NGOs. Mobilised in the regulatory battles and publicised through the media, the European research work on gene flows has been published in prestigious scientific reviews (see Nature, in particular), legitimising this research field in the eyes of scientists. In brief, an interface took shape between the scientific arena (cognitive logic, publishing requirements), the regulation arena and other public arenas. Between 1997 and the European moratorium of June 1999, numerous new programs and calls for research on the effects of GMOs were decided, as much at the European level as at the member states level, the framing of which escapes only molecular biologists and the biotechnology promoters.

If the matter of gene flows boosted research grants in Europe, at a crucial moment when biosafety research was stagnating in the world, a great diversification of the subjects subsequently took place. The question of food risks enjoyed a new boom: the Pusztai affair (1998-1999) favoured the development of criticisms on the substantial equivalency principle, and the commission put up money for important research projects on finer GMP analysis approaches as well as for projects on PCR detection approaches (almost non-existent in the USA), in the context of the genesis of the n°1830-2003 regulation on labelling and traceability constituting a transformation of the event into a regulation unit.

Since 1999, the monarch butterfly affair and the kickback effects from the European Moratorium have boosted research on biosafety in the United States, especially entomology (durability of target effects, evaluation of non-targeted effects).

As there is no *Bt* crop to be "bio-watched" in Europe (except Spain) there is very little research on entomology. But for some years, other subjects, almost non-existent in the USA, have been developed: the evaluation of impacts of GMOs on biodiversity (boosted by the incitement to study the indirect and long-term effects according to the 2001-18 Directive; see Farm Scale English evaluations) and the assessment of intra-specific gene flows in agricultural landscapes in connection with the debates on co-existing crops which arouse very rich developments of agro-ecological modelling (see project SIGMEA).

Conclusion

The quite different dynamics used in Europe and the United States to construct scientific knowledge on PGM's impacts are related to quite distinct trajectories in the constitution of GM crops as a public problem across the Atlantic. Among the main factors intervening on the patterns and dynamics of GM crops risk research, the following are particularly noteworthy:

- The cognitive interests for one or another group of scientists (differing in the disciplinary/epistemic culture they belong to) and the relative weight of these various epistemic cultures in the scientific and expertise arenas,
- The volume and framing of the calls for scientific projects (research politics and assessment arenas),
- The framings of regulatory policies (regulatory arena),
- The configurations of the public debate (legal, media and activist arenas).

In the interaction between these different arenas, GM crops have been viewed in public arenas through the various problems they may pose, each generating new sub-framings, new discussions and new research objects that were co-constructed within the controversy. Examples of such co-constructed research problems include the modelling of resistance to *Bt* GMOs, especially in the USA and the modelling of co-existing crops in Europe; the study of effects on non-targeted organisms, focused on insects in the USA and more largely framed (biodiversity) in Europe; the evaluation of the GMO nutritional value with the help of new non-targeted approach rather than the substantial equivalency principle; the molecular detection techniques of GMOs.

Rather than undifferentiated obstacles to "Science", precaution and controversy can therefore be viewed as forces generating some new scientific fields and questions. Any thinking on precaution, then, implies an approach to research governance in order to increase its capacity for exploring multiple patterns and in several possible worlds.

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For more information

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