

Precaution and Participatory Integrated Assessment of GM crops in Spain[†]

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Abstract Qualitative Participatory Integrated Assessment (PIA) has been carried out to unveil the different accounts and uses of the precautionary principle and of the precautionary approach in the management of Bt commercial crops in Spain. In particular, two main interpretations have been identified: a *case by case precaution* (or caution) and a *systemic precaution*. Three scenarios on the plausible causes and consequences of commercial GM crops policy futures and the role of the precautionary principle and of precaution in them were also developed. Further research found that these scenarios could be linked to two broader worldviews about different plausible societies, models of agriculture, and of the role of ethics in the management of science and technology. It is argued that such worldviews, which go beyond the bounded rationality of scientific expertise on commercial GM crops, are used by policy makers in Spain, rather than or in conjunction with expert assessments, to make complex decisions in situations of large uncertainties and high stakes.

Keywords GM crops; Integrated assessment; precaution; Spain; worldviews

Introduction

The debates and uncertainties over the risks of commercial GM crops in the EU are the source of a growing number of social, economic and environmental controversies which often call for the application of precaution and of the precautionary principle. The analysis of the Spanish case study is particularly relevant given that until the year 2004 Spain was the only country which allowed large scale commercial GM crops in the EU, and against European trends, 14 more commercial GM crop varieties of Bt (*Bacillus thuringiensis*) maize were approved in Spain between 2003 and 2004.

A large amount of literature is already available on the different meanings of precaution and of the precautionary principle (Graham, 2001; O’Riordan *et al.*, 2001; Stirling, 2001) and in particular with regard to their implications in the assessment and regulation of GM crops (Dommelen, 1999; Carr and Levidow, 2000; Dommelen, 2002; Löfstedt *et al.*, 2002). Many works have also been devoted to the understandings of precaution and GM crops within the European context (CEC, 2000; EEA, 2001a; Levidow and Marris, 2001; Sandin, 1999). However, it is not the aim here to review the vast literature which links the issues of precaution and the precautionary principle with regard to the management of GM crops and in a wider perspective, to environmental and sustainability issues. Rather, the purpose of the present article is to empirically identify the main accounts on precaution and of the precautionary principle used by Spanish policy-makers and relevant stakeholders involved in the assessment and regulation of commercial GM crops. It also aims to look at the underlying visions and driving forces which may condition the possible future developments of this technology in Spain together with its links with EU and global trends. This task was carried out through the development of

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participatory policy scenarios obtained via IA-focus groups, interviews, questionnaires, content analysis of secondary written sources, as well as participant observation in key forums of Agbiotech discussions. The theoretical and methodological background of *Participatory Integrated Assessment* (PIA) in its dialogical guise informed the procedure chosen during the fieldwork. Results have been obtained from the analysis of empirical qualitative research carried out within the framework of the EC funded project *Precautionary Expertise for GM crops* (PEG).

Commercial GM crops, precaution and the precautionary principle in Spain

Spain is the EU country with the highest number of hectares cultivated with commercial GM crops. The first two GM varieties (from genetic modification 176) for commercial use were approved in 1998: Bt maize 950243 Jordi CB and Compa CB both by Novartis (now Syngenta) although only Compa CB has been cultivated and commercialised. Also, GM soy resistant to Gluphosinate can be commercialised but not cropped. On the 11th March 2003 five more varieties of Bt maize were approved in Spain, and nine more on the 16 of February 2004. In all cases, all these new authorisations were based on the Decisions 97/98/CE and 98/294/CE and derived from the 1998 approved modifications CG 00256-176 and MON 810. During the period 1998–2003, the evolution of Bt maize in Spain has been the following: 1998: 22,360 hectares; 1999: 24,952 hectares; 2000: 25,516 hectares; 2001: 11,540 hectares; 2002: 23,280 hectares; 2003: 32,000 hectares; and it is expected that the total hectares for 2004 will be around 40,000.

In Spain, we have observed that a large majority of the disagreements around practical application of precaution over commercial GM crops arise from different conceptions which are to a different degree more or less reductionist or, on the contrary, more or less systemic while assessing risks, benefits, or costs of their use. From content analysis of secondary sources, interviews and documents, it has been possible in Spain to identify two main sets of interpretations and implicit practices related to precaution and of the precautionary principle in the management of GMOs, risks in agriculture (Tabara *et al.*, 2003, 2004). On the one hand, one which promotes and defends a *case by case precaution* (or caution) which promotes and defends a somewhat limited one-per-one, step-by-step, procedure in the assessment and regulation of the attendant risks, costs or benefits of GM crops, but excludes the consideration of larger ethical and political issues. On the other, a *systemic precaution* interpretation, mainly defended by civic and environmental groups, which appears to be closer to the conceptual and political framework of sustainability and which usually demands broader changes in social structure and institutional practices. Gathered from the qualitative analysis of primary and secondary sources, these two main approaches constitute an ideal-type multi-dimensional categorisation of the two understandings on precaution and their related practices. Table 1 summarises the main characteristics of the two precautionary conceptions, principles, and practices of the current discourses of agricultural GM crops and their commercialisation in Spain.

Participatory scenario making on commercial GM crops in Spain

Integrated Assessment (IA) can be understood as the scientific and methodological effort aimed to collect, structure, synthesise, and efficiently communicate interdisciplinary knowledge relevant for policy making (Rotmans, 1998; Jäger, 1998; Gough *et al.*, 1998; Toth and Hizsnyik, 1998). Within IA, participatory approaches have been characterised by the incorporation of relevant stakeholders, both expert and non-expert, through dialogue and several qualitative methodologies. Among the multiple aims of participatory methods are: to help frame the problems at stake in a more relevant manner according to the affected people, to enhance processes of mutual learning between policy, science and

Table 1 Case by case (pre)caution versus systemic precaution in Spain

Dimension	Case by case <i>precaution</i> (or ' <i>caution</i> ')	'Systemic precaution'
Expert approach and strategies to risk assessment, costs and benefits.	Single-issue focused, mainly to only a particular crop or product. Towards reduction. Focusing mainly on benefits, usually only of economic kind, and tending to ignore costs	Systemic, in an holistic and relational manner. Toward integration. Giving equal weight to costs and benefits and of different kind.
Trends and criteria to decide thresholds on commercialisation and its consequences.	Increase thresholds, for feasibility, and economic profit reasons	Reduce thresholds, for health, environment or safety reasons.
Main risk and benefit discourse orientation.	Towards natural objects or human subjects and towards specific issues.	Towards socioenvironmental relationships and systems.
Risk management style and type of participation orientation promoted.	Towards separated administrative bodies. Fragmentation.	Towards several agencies at the same time in an integrative way. Transversal management.
Way of public consultation. Encouragement and support to stakeholder participation.	To specific stakeholders, one per one. Without special support to participation.	To a plurality of stakeholders at the same time, encouraging diversity.
Main references to frame risks, potentialities and problems.	Individual: e.g.: defence of consumer choice, personal health, or food taste.	General: socio-political, structural, and environmental aspects.
Possibility of coexistence.	Possible and desirable, with conditions, but to a large extent unavoidable.	Not possible or desirable, mainly for social and environmental reasons.
Main time and space scales taken into account.	Short and medium term. Local and national.	Long term. Global, international.
Aim of evaluations, usually implicit in the different GM crops discourses.	To reduce the number of elements, relations and issues to be considered.	To increase the number of elements, relations and issues to be considered.
Food discourses on global supply. Public interest GMO justification.	Food safety as dependent of increasing quantity and pushing technology. Agbiotech is needed for 'survival.'	Enough food is already available, food safety not dependent of quantity or corporate technology but of social and economic relations.
Type of losses to be precautionary about.	Mainly economic.	Mainly social and environmental, but also some economic.
Type of knowledge and expertise demands and sources to tackle uncertainty.	Mainly natural sciences, although economics and law are also used in disciplinary manner. Limiting science expertise to 'experts.'	Mainly social and environmental sciences. Interdisciplinarity. Promoting the democratisation of expertise.
Importance given to the burden of proof, to assess risks and inform decisions.	Crucial, to argue that no evidence of negative effects has been provided on particular issues.	Less important, although also present, as higher difficulties exist to prove systemic damage and negative outcomes.

the public, to improve equity and representativeness of assessments, and provide opportunities to introduce and structure qualitative sources of relevant information, underlying cultural visions or values into the policy process (Asselt van *et al.*, 2001; Hisschemöller *et al.*, 2001; Kasemir *et al.*, 2003).

Scenario making, specially in the form of participatory exercises, is now emerging as a widely accepted methodological approach in Integrated Assessment (Asselt van *et al.*,

1998; Anastasi, 2003). Scenarios can be applied both to large-scale contexts, as it is recurrently the case of the climate change, world, and Europe scenarios, and to regional or local ones (Bertrand *et al.*, 1999; EEA, 2001b; Löfstedt, 2003; RIVM-UNEP, 2003). Scenarios can take many forms, quantitative, qualitative or hybrid between the two. There is also a growing body of works linking scenarios with the issues of commercial GM crops. This is the case, for instance, of the analysis of possible implications for co-existence of genetically modified, conventional, and organic crops in Europe (for within the PEG project, both EU-level and several national case scenarios were carried out linking the issues of precaution and the possible regulatory futures of GM crops (Bock *et al.*, 2002; Levidow, 2003).

Three policy scenarios were developed for the case of plausible futures of GM crop development in Spain and its relation to the European and international context: “full liberalisation”, “restricted liberalisation,” and “indefinite moratorium.” In all cases, the aim was to get insights on what the possible causes and consequences would be of achieving such plausible policy outcomes, to identify with the maximum detail the relevant variables of each scenario, and the logical links between them. IA-focus groups and other different qualitative social research techniques were used in the task of composing and analysing the final scenarios. Face to face interviews as well as telephone interviews and mailed questionnaires were employed to gather complementary information on the researched topics. Content analysis of written secondary sources was also employed to find out additional statements and value positions of relevant stakeholders. In particular, three members of the National Commission of Biosafety were personally interviewed, as well as one expert assessing the Spanish Association of Biotech companies and one farmer who had cultivated GM maize. Questionnaires which included explicit questions on the plausible futures of GM policy with regard to precaution were completed by nine experts and stakeholders. Participant observation (tape registered) at the largest congress of Biotech companies in Spain (Biospain) was also used. In total, the views of around 30 relevant stakeholders and opinion leaders were directly gathered or indirectly incorporated via the analysis of secondary written sources and/or public speeches.

Discussion and conclusion

On 26 April 2004, the new elected Socialist Minister of Agriculture, Ms Elena Espinosa, cast the vote of abstention during the Agriculture Council meeting vote aimed to decide on the EU commercialisation of the Bt 11 maize, after several years of Spain showing a favourable position on GM crops development in Europe. This vote seems to have halted the former attitude toward this technology defended by the previous Spanish conservative party. That position entailed that the decision was then taken again by the Commission which decided in favour of its commercialisation in May 2004. It is hard to believe that such change in policy direction is simply the result of increased expert knowledge and assessments on GM risks or further evidence on possible harm which have made their way into the decision making process (in fact, such evidence provided by Spanish experts and GM crop corporations has claimed to prove the opposite). Rather it seems more likely to have been the result of the penetration of other broader considerations about the role of social institutions, of (bio) technology in organising society and its place in national and international agricultures. Because of the uncertainties of complex issues such as GM crops, the relative limited rationalities of expert knowledge, and the large number of values and interests in conflict, broader visions of society, which by nature are purely cultural constructs, are commonly used to make difficult decisions. Very often, such views cannot be reduced to purely (instrumental) rational terms. Neither should they be considered irrational, as they provide efficient ways to deal with uncertainty.

The uses of the embedded rationality which broad cultural worldviews provide become more evident when high stakes are at play and urgent decisions need to be taken.

In Spain, our research found out that the introduction of the notions of precaution and of the precautionary principle for the assessment and regulation of risks related to commercial GM crops is still relatively recent and to a large extent absent in many discourses and practices carried out by relevant stakeholders in this field. In general, the most widespread notion and supposedly related practices of precaution used both by experts and policy makers alike in Spain do not substantially differ from the more traditional approaches of risk analysis and the more limited notion of prevention (in line with the views expressed by the EEA). In particular, most regulatory bodies use the Spanish terms 'caution' and 'cautionary principle,' for instance, in the translation of the Deliberate Release Directive despite both environmental and consumer groups arguing for the original terms, which also exist in Spanish, of precaution and precautionary principle. This is why, among other reasons, we could identify, for the case of Spain, two main sets of accounts of the uses of precaution: one based on a 'case by case' precaution (or caution), closer to the perceptions and interests of pro-GM commercial crops corporations, researchers and policy makers trying to find an intermediate future between the 'full liberalisation' and the 'indefinite moratorium' situations, and the other, based on a 'systemic' interpretation, mainly defended by environmental and consumer organisations.

Out of the three scenarios identified, it appears that most of the main elements, causes, consequences, and logical relationships between them could be linked to broader cultural worldviews about both society and nature and its relationships held by our stakeholders. In turn, these broad visions reproduced two types of 'models' of science, of technology and in particular of agriculture. On the one hand, the '*enhanced agrofood business as usual model*' corresponds to a worldview which takes both GM and a case-by-case precaution to reinforce current trends in global and national agricultural production systems, without introducing fundamental changes in social structures or in the regulatory and assessment agencies. And on the other, the '*new social and ecological diverse agrofood model*' envisions an agrofood system not only focused in the development of new technological fixes, quantitative solutions, or single individual national-state strategies but departs from a systemic view of precaution to enforce new practices and deeper socio-economic reforms both at local and at global levels; in particular, those that would counter-balance the power of economic corporations with relation to political institution and that would lead to a more participative and socially and biologically diverse 'world.'

A crucial aspect which appeared to discriminate between the two worldviews and practices related to the developments in the agrofood sector and the role of GM crops in Spain was the different views on the meaning of *quality*: of food, of the environment, and of life. For some stakeholders, quality both in the process and in the outcomes of the agrofood sector was associated with high-tech efficient, 'clean,' and universal technologies which entail the intensive utilisation of capital, instead of labour. For others, quality would entail slowing down of the path and the scale of production, and generating contextualised and identifiable (usually local and regional) products which meet some more or less ideal conceptions of social and environmental soundness.

Other identified issues which differentiated between the two worldviews were: (a) notions of what constitutes 'pollution' (e.g. whether to label GM transgene flow to wild plants as such); the importance given to diversity (both cultural and biological, and in agriculture and society in general); (c) the role given to ethics in shaping science and technology (e.g., as to label the precautionary principle an ethical principle or simply a strategic or 'political' one); (d) the extent to which the current 'business as usual' model of agriculture is acceptable, feasible or needs a structural (and radical) change to meet

near-future global changes; and thus, to the degree the current system should integrate the issues of diversity and of decentralised technologies in the shaping of new modes of production and consumption for global agricultural markets.

Finally, one could say that the tension between the ‘full liberalisation’ scenario and the ‘indefinite moratorium,’ and in practice, the role of the EU and Spanish regulatory bodies to find an ‘intermediate solution,’ can also be interpreted as the struggle of policy makers to find a operational reconciliation between two worldviews. Current developments in GM policy at the EU level may be indicating that both the EU and Spain might be moving towards the intermediate ‘restricted liberalisation scenario’. As pointed out earlier, such worldviews include complex issues such as the role of science and technology in society, but also beliefs about the possible ecological limits and human capacity to learn, adapt or change today’s (unsustainable) societal pathways. In a similar vein that Olsen *et al.* (1992) argued (following a dialectical Hegelian perspective) that the new sustainability paradigm could be understood as the synthesis between ‘technological’ (thesis) and ‘ecological’ paradigms (antithesis), it appears that to a large extent the intermediate scenario represents the struggle and/or hopes of relevant stakeholders to find a compatible win-win situation able to combine the two worldviews. A struggle though, which remains unresolved and latent in many other fields of current technological and social innovation.

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