Co-operative Research on Environmental Problems in Europe (CREPE)

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Summary

Environmental harm from industrial agriculture is widely recognised, so nowadays most agricultural research projects claim to develop knowledge which contributes to sustainable agriculture. This study aimed to formulate research agendas for sustainable agriculture from the standpoint of civil society. Our study linked two different activities: analysing documents relevant to European research agendas, and discussing this analysis at stakeholder workshops, as a means to clarify proposals for alternative research agendas.

Research agendas can be compared to the visions of NGOs for sustainable agriculture. For decades, numerous NGOs have been concerned about the state of the planet and people. They act traditionally as whistleblowers or 'watchdogs'. At the same time, they propose policy changes to fight against climate change and environmental degradation, as well as to protect indigenous peoples, access to care, or the resilience of ecosystems, etc. Around the world, NGOs have produced documents explaining their visions and objectives on sustainable agriculture.

Some common principles are shared among NGOs throughout these statements. Sustainable agriculture is ecologically sound, economically viable, socially just and inclusive, culturally appropriate and based on a holistic scientific and participatory approach (integration of traditional knowledge), It preserves biodiversity, maintains soil fertility and water quality, recycles and conserves natural resources, diversifies crops, reduces energy and water consumption, It adapts farming practices to local contexts and respects regional agroecosystems, allows more efficient management of the farm and better conditions for farm workers, It promotes food sovereignty of people,

Divergent meanings and agendas

Dominant research agendas have incorporated key concepts from alternative agendas, while using such language for their own account of sustainable agriculture. To clarify these meanings, we did a semantic analysis of key terms appearing regularly in discourses on sustainable agriculture and research agendas. Such terms include: innovation, participation, holistic approaches, and soil health. These terms were analysed for their frequency, their meaning and their context of use.

The semantic analysis compares documents from various actors who manage research agendas or attempt to influence them. We surveyed several documents reflecting actors with distinct interests and approaches. These include: the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD), from IFOAM for Technology Platform Organics, the Standing Committee on Agricultural Research (SCAR) foresight study, the European Technology Platform Plants for the Future, DG Research on the Knowledge Based Bio-Economy (KBBE), and annual work programmes of its FP7 research programme (2010, 2011, 2012).

Similar terms are used according to different accounts of sustainable agriculture. ETP Plants for the Future reports link sustainable agriculture with global economic competitiveness and support for European biotechnology research; the terms biotechnology and sustainable are often directly linked with each other. By contrast, other documents put sustainable agriculture in a complex, multi-factorial context linking environment, society, health, economy and culture; these approaches link farms, eco-systems and landscapes through systemic interactions (SCAR, 2007). By emphasising biotech, research agendas have lost other important expertise, argues the IAASTD report. It calls for a reorientation of Agricultural Knowledge, Science and Technology (AKST), which 'would also recognize farming communities, farm households, and farmers as producers *and* managers of ecosystems'.

Scientific disciplines such as biotechnology, life sciences, agronomy, ecology or agro-ecology are cited in regard to sustainable agriculture in different ways by various actors. In the IFOAM document, ecology and agronomy are central. The term biotechnology is absent in the consideration of possible solutions, while it is predominant in KBBE documents and the ETP strategy, which refer repeatedly to genomics, plant genetic improvement, genetic engineering techniques, molecular breeding, transgenesis and DNA sequence inventories. In the latter documents the term 'sustainable' is pervasive, as a generic term to describe nearly everything.

Differences also arise with concepts such as innovation and participation. In the ETP agenda, the innovation process depends centrally on laboratory research, especially biotech. Wider participation is foreseen as a means to gain public understanding and support. Other reports consider wider participation in research – e.g. farmer-based participatory breeding, participatory or action research, integration of peasants' knowledge – as an essential means to achieve sustainable agriculture. The latter reports also emphasise farmers' knowledge as central to sustainable agriculture, especially agro-ecological methods, which are 'highly knowledge-based'. Agricultural benefits are public goods, whose enhancement depends on methods and research using a systemic approach.

As a means towards sustainable development, agroecological methods are widely used in agriculture and have wider potential applications, far beyond organic-certified farms. Yet agroecological methods generally remain marginal in R&D budgets, finding a place mainly in some 'organic' research projects. Such projects have been given much less funds than biotech in Framework Programme budgets since the 1990s. Agroecological research is being promoted as a research priority by the IFOAM's Technology Platform Organics.

Reflections on soil appear in all the documents. According to the SCAR report, there has been a significant increase in soil degradation processes over the last few decades, and these processes are likely to accelerate if nothing is done to protect soil. The authors notel that soil erosion, compaction, salination, contamination and losses contribute to the current problems of sustainability. It proposes breeding practices that include farmers as a response and highlights their active role in soil preservation. Although Plants for the Future TP refers to commonly shared observations about soil, it envisages solutions which refer to greater productivity of plants by genomics, plant genetic improvement, genetic engineering techniques, molecular breeding, transgenesis and DNA sequence inventories – by contrast to the diverse approaches proposed by IFOAM. For example, Plants for the Future promotes novel crops as a means to improve or conserve soil fertility, i.e. to fix nature, whereas IFOAM is promoting agronomic practices as the main means.

The semantic analysis provides a basis to analyse research priorities of EC funding in the agricultural sector, especially the relative roles of biotechnological and agro-ecological approaches. The FP7 KBBE programme emphasises biotechnological techniques for eco-efficient solutions to sustainable agriculture. At the same time, some proposals for organics research have been incorporated into the programme. It has undergone a shift to the broader concept of agroecological approaches, though the concept is rarely explicit in documents. To enhance soil health, for example, the FP7 2011 work programme promotes approaches which overlap with visions from the SCAR report and NGOs; these include inter-disciplinarity between scientific domains (e.g. agronomy, ecology, pedology etc.), integrated low-tech solutions, sustainable management practices, adaptation of research protocols for organic and low input agriculture needs, etc. The programme has also included a call on agricultural knowledge systems, along lines proposed by the SCAR expert report.

In those ways, the FP7 KBBE programme combines two tendencies: the environmental re-adaptation of agronomic research via agroecology, and the promotion of biotechnological tools as solutions for greater eco-efficiency of agriculture. Those two approaches are partly complementary: with post-genomics, it could be possible to link molecular-level modelling with the eco-physiological and ecological modelling at a higher level. But they are mainly contradictory: biotechnological discourses promise to solve complex ecological problems by proposing techno-fixes which ignores or even exclude systemic approaches at the level of farms, agro-ecosystems and landscapes.

Participatory research for agro-ecology

The above semantic analysis helps to identify different research priorities and how they promote different societal futures in the name of sustainable agriculture. This analysis served as a briefing document for French workshops entitled, "What research for sustainable agriculture?". These brought together representatives of agro-ecology research, peasants and NGOs. As a workshop aim, we sought to evaluate how various research agendas relate to the visions of civil society actors. On this basis, the workshops sought to identify prospects for joint proposals for research projects, as well as obstacles that need to be overcome. Some discussion points follow here.

Although there are common interests between agricultural researchers and peasants, cooperation in research has faced many obstacles. Peasants have difficulty to find researchers who can respond to their questions. Either no researchers work on such questions, or else researchers are unwilling to exchange knowledge with peasants. Peasants feel abandoned by research agendas that seems distant from their practices, knowledge and concerns.

Over the past couple decades, greater importance has been given to highly technological, expensive innovation. Little scope remains for other approaches, even if they are knowledge intensive, e.g. agroecology. International participatory research projects often impede cooperation of researchers with non-researchers, partly because English is the dominant language and thus a barrier. Some peasants reported that, after some years of difficult cooperation with researchers, they stopped working with them and favoured knowledge exchange only amongst peasants.

Researchers may want to involve farmers but face many barriers or even create them. In some cases, the research design has been unnecessarily complex, perhaps in order to seem sufficiently scientific to commercialise or to publish in specialist journals. But why make it complex when one can make it easy? Research projects could incorporate a notion of simplicity, which allows for alternative solutions. Many researchers feel a need to work in interdisciplinary teams (e.g. with social scientists) but lack relevant experience. Moreover, they have difficulties in publishing results of such cooperation; in the current publication system, systemic approaches are often less valued.

Often calls for project proposals are effectively calls for results, whereby participants must nearly know in advance the results of the research, and where there is an imperative to publish in specific journals. Participatory research projects have difficulties to accommodate this pressure, since the process is as important as the tangible results and since the results are very open. Agroecological research implies recognising the importance of diverse knowledges, as well as questioning the current dominant mode of knowledge production. To engage in participatory research with peasants, therefore, researchers have profoundly modified their working practices.

These difficulties led to a discussion about the question of how to solve problems. There are two modes of approaching a problem – either trying to solve it, or else trying to suppress it without solving the problem. It is essential to make a diagnosis of a situation or problem, while keeping in mind that this diagnosis is framed by underlying values. Accordingly, different results can emerge from diagnosing the same situation. Any agronomic solution has social and environmental consequences, so these should be reintegrated into economic calculations.

The Fondation Sciences Citoyennes (FSC) brings together civil society groups with peasants and scientists in order to develop alternative research agendas. Mutual learning between those groups is needed, especially for them to overcome cultural barriers and for CSOs to gain trust in research institutions by positive experiences and responses. On this basis they can jointly answer calls for research proposals. Closer links could strengthen efforts to expand research funding for agroecological methods.

Civil society organisations should be involved in formulating calls for proposals and research questions. CSO representatives want clear recommendations for two main aims: how to deal with funding institutions (especially the European Commission), and how to build co-operative research projects. Towards those aims, the FSC plays the role of a knowledge-mediator and boundary-spanner among relevant stakeholders.

1 New Plan for the WP

WP6 objectives

1. To analyse how the European Research Area (ERA) selectively favours some priorities in agricultural research, amidst competing accounts of the agri-environmental problems that warrant research.

2. To analyse how these priorities relate to sustainable development as envisaged by civil society.

3. To inform CSOs' discussions and efforts towards influencing research priorities for agri-environmental problems.

Rationale

The European Research Area aims to fulfil the Lisbon strategy, so that by 2010 Europe will be the 'globally most competitive knowledge-based economy'. In this 'knowledge economy', research and scientific innovation will be the driving force behind wealth creation. Agricultural technology has a central role in this strategy, extending research priorities from the past two decades.

Although the European Commission funded little research on agri-environmental issues until the early 1980s, since then biotechnology has been an important research priority. Significant funding came from the Biotechnology Action Programme (BAP, 1986-1989), Biotechnology for Innovation, Development and Growth in Europe (BRIDGE, 1990-1993) and BIOTECH (1992-1998), and the 'Quality of Life and Management of Living Resources' programme in the 5th Framework Programme (1994-2000). In 2001 the EU Council of Ministers confirmed that 'economic growth, social cohesion and environmental protection must go hand in hand'(EU Council, 2001). Afterwards the European Commission elaborated an action plan for biotechnology – in the sectors of health, agriculture, food production and environmental production – in order to contribute to Europe's competitiveness (CEC, 2002).

In the specific area of agricultural biotechnology, funding support has been given through the framework programmes, as well as the Competitiveness and Innovation Program (CIP) of the Commission. Given the complexity of scientific issues and categories, it proves difficult to define an exact amount that was spent for agricultural biotechnology. Judging from the European Commission's data, this amount can be estimated at over €400 million between 1982 and 2007 (FoEE, 2007).

Furthermore, an important Community contribution to rural development has been spent on agri-environmental measures. These measures support specifically designed farming practices; they include environmentally favourable extensification of farming, management of low-intensity pasture systems, conservation of high-value habitats and their associated biodiversity, integrated farm management, and organic agriculture (CEC, 2007).

They have led to reductions in agri-chemical inputs and to positive impacts on biodiversity, water and soil resources. These changes have also helped emerging research communities to study the interface between environmental sciences and agricultural research such as organic farming research, agricultural biodiversity conservation research, plant breeding for low-input cultivation, etc. (DG Agriculture, n.d.).

In such a context, it appeared relevant to analyse and compare the semantics used in documents produced by European institutions to the one used by other international expert groups such as IAASTD or UNEP on 'sustainable agriculture', 'organic agriculture' and 'agro-ecology'. This language-analyse will allow us to identify the differences and common points between the actors involved in this area, the institutional barriers, the use or misuse of concepts to justify political strategies. Thanks to it, we will be able to clarify if the European orientations are close or not to the wishes of civil society and more particularly to civil society organisations such as farmers organisations. The work will lead to recommendations for the European Commission and on criteria, which could help CSOs to identify if an European project is 'sustainable' or not.

Research questions and sub-questions

Q1: How do different actors (NGOs, community of researchers, industry) perceive sustainable agriculture?

Numerous international and national conferences and reports, and reports from stakeholder groups have dealt with the why and how of sustainable agriculture. Nowadays, the notion of sustainable agriculture is almost omnipresent in discourses about the future development of agriculture, and there is a consensus that sustainable agriculture is today indispensable if our societies want to overcome agri-environmental problems and guaranty certain living conditions for future generations. However, consensus does not seem to exist of how to interpret what makes indeed sustainable agriculture. Furthermore, numerous similar terms and concepts are used. We examine some of these terms and analyse how they are used by different stakeholders.

This part of the work includes the analyses of different reports and documents concurrently in terms of context definition in which the development of sustainable agriculture has to be considered and of semantic analysis of the use of different terms (sustainable agriculture, low input, organic, etc.) (first part of semantic analysis). This part of the work was a prerequisite for the next steps.

Q2: How do CSOs regard current and desirable research for sustainable agriculture, towards potential solutions for agri-environmental problems?

The impact of industrial agriculture on the environment (energy use and climate change, water use, loss of biodiversity, health impact through the use of pesticides, etc.) is now widely recognised. Nowadays most research projects in the field of agriculture claim to be doing research to contribute to sustainable development. We investigate the ambiguous classification of research – variously called organic, agri-ecological, low-input, sustainable but also terms such as multifunctionality, holistic approach, multi- inter- and transdisciplinarity, biotechnology, collaborative or participatory research , etc. (second part of semantic analysis).

How to define better approaches to research on agri-environmental problems from the viewpoint of civil society? From the specific questions below, we will define recommendations or criteria that can be applied to the analysis of current research agendas.

Possible questions:

How are agri-environmental issues framed?

How do (or should) research agendas link societal needs, agricultural problems, knowledges, techniques, etc?

What are (or should be) the disciplines involved? E.g. biology, agronomy, etc.

How are (or should be) those disciplines linked, e.g. through interdisciplinary knowledge and research teams?

How do (or should) research take into account farmers' knowledge? e.g. as a source of innovation and/or as objects of education?

How are (or should be) agri-ecological methods relevant for agri research in general?

For Q1 and Q2 we will work on reports such as the IAASTD report from April 2008, the SCAR report from 2009, EC documents on the knowledge-base bio-economy (KBBE) concept, documents from the ETP Plants for the future, and from the ONG IFOAM.

Q3: How do the above recommendations or criteria compare with priorities in FP7?

How to interpret calls for proposals vis-à-vis sustainable agriculture?

To what extent do existing calls comply to civil society's vision for agriculture research?

We will apply the results of the first task (developing a list of recommendations or criteria) to the analysis of documents

Tasks and working methods

To answer the research questions, we decided to analyse identified reports produced by European institutions (SCAR, Technology platforms reports, Gearing European research towards Sustainability, FP7 work programmes) and international expert groups (IAASTD 2008,) to clarify semantically how the concepts linked with agri-environmental issues are used in comparison to CSOs (e.g. IFOAM vision 2007, IIED report 2009)).

This step gave us the basics to investigate further on the potential needed adjustments between the European orientations and the expectations of CSOs. The workshops with representatives from CSOs and researchers aimed at clarifying the main points of criticism but also to make recommendations to European institutions for a better understanding between those 'communities' (CSOs and scientists), which are, culturally speaking, strongly different.

We will test the conclusions of the workshop with CSOs representatives and close sympathetic scientists (e.g. involved in participatory research projects) to European stakeholders through individual interviews.

The list below corresponds somewhat to the three questions above. They will be addressed in an iterative way, by moving back-and-forth between current and desirable priorities.

1. Stakeholder and expert engagement

Formulate exploratory questions and then seek answers through engagement with various experts and stakeholders, rather than apply a prior expertise of our own. We will engage various stakeholders at an early stage, e.g. Reseau Semences Paysanne, Confederation Paysanne, IFOAM environmental groups, consumer groups, etc. and a few INRA experts (e.g. S.Bellon, JM Meynard, D Desclaud, I Goldringer).

Engagement with stakeholders has already led us to question the methods initially planned to conduct this WP, and to re-frame the research questions.

2. Analysis of research programmes and diverse proposals

We will compare CSOs priorities and their language, as well as the IAASTD report and the IFOAM Vision Paper with diverse proposals for research priorities – FP7 research Theme 2, relevant ERA-Nets, SCAR 2nd foresight exercise, Plants for the Future ETP's Strategic Research Agenda.

Research tasks

- Analysis of EC, international expert groups and CSO documents;

- Improvement and enrichment of our analysis with the help of CSOs representatives and scientists during a workshop;

- Confrontation of the first conclusions with experts, stakeholders and policy makers;

- List of recommendations for the European Commission and advice for CSOs.

CSO networks: Réseau Semences Paysannes, Confédération paysanne, France Nature Environnement, Bede, Grain, Alliance pour la planète, WWF, Greenpeace, Via Campesina, CIVAM, FNAB, ITAB…

Workshops: During the workshops, we presented preliminary results of the study. The workshops participants also discussed possible means for CSOs to influence future research priorities, as well as to participate in research. Invited participants include other partners of this project, researchers from public research institutions working on agri-environmental issues, as well as non-researchers such as farmers' organisations and environmental CSOs. So there were two levels of co-operative research – with the project partners in this work package and with the participants of the workshops.

Partners' roles: This work-package is carried out by Fondation Sciences Citoyennes, with a contribution of the Open University. Other partners of CREPE project are involved through their participation to the workshops.

2 Research Activities

2.1 Research focus

Fondation Sciences Citoyennes worked during the last two years on an European project called STACS — Science, Technology And Civil Society. This project included a report on Participation of Civil Society Organisations in Research which attempts to analyse the benefits and limits of two innovative mechanisms that allow and fund research partnerships between researchers and CSOs : the Community-University Research Alliance (CURA) programme, set up in 1999 by the federal government of Canada, and its more modest French version in the Ile-de-France region since 2005, the Partnerships of Institutions and Citizens for Research and Innovation (PICRI) programme. Drawing on the experience of actors involved in the set up of these programmes and in research partnerships funded through these two mechanisms, we have attempted to outline the benefits of and the obstacles to Participatory Research, and to identify key principles that can ensure that such partnerships bear their most fruitful outcome. We also proposed some practical recommendations to a range of actors of the European research system including policy circles, the scientific community as well as the CSO world- on how to strengthen and improve support to Participatory Research in the European Union.

Les Levidow, project coordinator of CREPE, proposed us to continue this work on cooperation aspects of research through a concrete case: agri-environmental research priorities in Europe. We accepted this challenge to work on these issues by analysing the research priorities proposed by the European Commission on the one hand, and by expert groups on the other hand. Then, the WP6 includes a 'semantic' and 'linguistic' analysis of the vocabulary used by stakeholders on agri-environmental, agri-ecological and sustainable issues. This first step allowed us to go further by confronting it to the 'reality' as it is seen by CSOs and researchers close to civil society. This confrontation is an opportunity to confirm or to invalidate the idea that there are contradictions and paradoxes between discourses and what is really effective across the fields. The WP6 is also a good opportunity to deliver recommendations to European institutions to take into account the numerous challenges society will have to face in the immediate future and also in the long term. Among these recommendations, a particular place will be given to cooperation-oriented research, to the place CSOs should be allowed to occupy in the European decision processes and research orientations, and to modestly propose new ways for a better understanding between these different communities.

2.2 Changes from the original plan

We have realised that scientometrics are not the best tool to analyse research priorities, because we face a limited access to data (proprietary databases) and don't have the right software. In our FP6 project we attempted to analyse the role of organics research in various research fields. We used scientometrics to compare journal articles according to their country of origin, and thus to measure the relatively greater or smaller role of organics research in various EU member states. It has proven difficult to do such comparisons; yet such an analysis would be needed to put our results on organics research into context.

The comparative analysis of national budgets has also proven more difficult than anticipated. This is partly because most research projects in agriculture now claim to contribute to a better taking into account of the environment and to contribute to sustainable development (SD).

For both methods, a difficulty has been ambiguity in classifying types of agricultural research. Besides, the above tools would not enable us to answer some of our original questions about priority-setting in agricultural research. And it is not clear to what extent such results would benefit CSOs' capacity to intervene in research priorities.

Therefore we turned an earlier difficulty into a research plan for the CREPE project WP6. We try to develop criteria for analysing research priorities and projects, in order to allow for a clearer understanding and analysis by CSOs. This could also be a first step towards developing and clarifying CSOs visions of research useful for agriculture, as a basis to advocate specific priorities and feed these into future agenda-setting exercises.

Those visions are compared with current Europe-level research priorities – especially in FP7 (annual work programmes in Agriculture; European Technology Platforms such as Plants for the future, as well as in ERA-Nets), as tools of the European agricultural policy and part of the European Research Area. This could help CSOs to get involved and to improve their capacity to influence future research policies in the ERA context.

2.3 Methods of document analysis

The chosen method to conduct our study properly is mainly based on a **language and semantic analysis** of official documents produced by European institutions or international expert groups on agriculture issues and more particularly on agri-environmental topics.

This stakeholder-language analysis was followed by a **test** with CSOs representatives of agri-environment. One of the desired outcome of this research was to manage to identify precisely if the themes (and language) borrowed from the agro-ecology paradigm by other paradigms or in policy-making documents really correspond to the visions and propositions put forward by civil society actors and international organisations.

However, we did not conduct an in-depth semantic/discourse analysis of the different paradigms. We are not sociologists, and we will not duplicate the work conducted by the Open University in WP7. Rather, we use the analysis of the meaning of the terms used – dependent on their context – as a point of departure, so as to try and clear up confusions created by a seemingly deceptive use of language in research projects. We will then look at the implications for research (policy) – in terms of content and methods – of a better taking into account of the agro-ecology paradigm.

According to sociology, several innovation paradigms can be distinguished, corresponding to contending accounts of what are the problems that should be addressed, how these problems are framed, what are the solutions advocated and the tools that should be used. These different paradigms can be linked to different social and economic conceptual frameworks .

According to a literature survey of paradigms (Levidow and Papaioannou, 2010):

> As the dominant one, complementing a neoliberal policy framework, the agri-industrial paradigm promotes globalised production of standardized food commodities for international markets. In the agrarian-based rural development paradigm, agri-production is relocalised, by embedding food chains in highly contested notions of place, nature and quality. . Thus 'rural space within Europe has become a "battlefield" of knowledge, authority and regulation' (Marsden and Sonnino, 2005; also Marsden et al., 2002).
>
> According to another taxonomy, the Productionist paradigm is being superseded by the Life Sciences Integrated paradigm and the Ecologically Integrated paradigm. Under the former, agri-business sought to maximise productivity of standard commodity crops for global markets, at the expense of nutritional quality and environmental resources; this paradigm is in decline. As the dominant successor, the Life Sciences Integrated paradigm elaborates engineering models, attempting to substitute capital-intensive biological inputs for agrichemicals in the production stage, and to diversify outputs such as functional foods for health needs, thus blurring distinctions between food and medicine. As an alternative, the Ecologically Integrated paradigm develops agri-ecological methods to enhance biodiversity, as means to improve productivity, nutritional

quality and resource conservation, while also empowering producers. There is 'a battle ahead for access to public monies and political credibility' (Lang and Heasman, 2004: 20-34)."

These paradigms, aimed at influencing and shaping policies, are conveyed to policy-makers through innovation narratives. Increasingly contested by civil society, the "productionist paradigm" might lost ground, and has been superseded by a Life Sciences innovation narrative that seems to incorporate some concerns of civil society and policy makers over industrial agriculture. Nowadays, all proponents of agriculture research claim to contribute to sustainable agriculture. But the use and appropriation of the language of one paradigm by the proponents of another one, through changes in narratives, does not mean that contending accounts are "merging" at a conceptual level. Though there are evolutions and shifts both in discourses and practices over time (e.g. in the scientific disciplines used), and though research agendas borrow language from each other, the use of language can be confusing and deceptive, and can serve to hide significant differences in the approaches to research.

2.4 Co-operative research aspects

The task ahead (develop a list of recommendations that would help measure to what extent research projects contribute to sustainable agriculture as viewed by civil society) is challenging. The STACS Project taught us that one has to be realistic and modest rather than to have too high expectations and to hope to produce a work that will make a huge difference.

Concerning relations with other networks or individuals on those issues, they are the "core" of the activities of Fondation Sciences Citoyennes (FSC). From the very beginning, the association is positioning itself at the conjunction of too often hermetic communities: researchers, activists, stakeholders, civil servants and politicians. In that sense, FSC is cooperative by nature. Our past experiences, reports, campaigns and productions are proving that, at least in France — but also more and more in Europe through EC projects, and internationally with the Science and Democracy World Forum we initiated two years ago —, this position is increasingly accepted and that many actors are considering the organisation as an efficient 'tool' and 'place' for mediation in spite of 'strong' positioning from time to time.

These aspects of FSC activities, in addition to the skills of our team and board, allow us to be in touch with actors from divers horizons we try to gather for the CREPE project.

One of the most ambitious but also most exciting aims of CREPE project is to strengthen CSOs' capacity to participate in research. By its particular structure and positioning, FSC believes strongly that cooperative research is one of the most efficient manners to reach an ideal point, which could be called in stakeholders' words 'co-production of knowledge and culture' or 'knowledge and culture sharing'. As mentioned rightly by Philippe Galiay, from the EC DG Research, one essential step is needed to reach those points: trust between actors, and this confidence is only possible by learning who is 'the other', what is his/her culture, where he/she is coming from politically or socially speaking. Without this mutual wish of understanding, no significant results can be expected.

Without appearing uncalled-for, FSC has a strong experience in co-operative approaches (cf EC STACS — Science, Technology And Civil Society — project) and the CREPE project is a good opportunity to gather CSOs' actors we are in contact with for a few years, particularly farmers, organic farming, environmental organisations and researchers. The workshop we will organise and the individual interviews that we already lead and that we will initiate with researchers or European representatives should allow us to give recommendations and advises to different actors without being seen as an organisation 'lecturing' others.

2.5 Workshop preparation

As an important aspect of the CREPE project, we decided to concentrate strongly on the workshops we organised with CSOs and researchers. According to us, this part of the WP is definitively the major co-operative part. As we already mentioned, FSC organised or participated to many 'multi-actor' events.

Based on our good contacts with the French farmers seed network (RSP), we discussed with them whom we should invite at our workshops. The goal of the workshops was to help us determine how to continue the research and to get the input of civil society in particular (cooperative aspect). But since we also needed scientific expertise, we also invited scientists, so that the proposals we will make be relevant for researchers "inside the institution". Interestingly, RSP reminded us that they have problems with the scientists they work with in other participatory research projects, even with the ones who are like-minded. The main problem seems to come from the fact that scientists do not pay attention to the practical constraints NGOs are under (e.g. they impose un-realistic deadlines) and do not share the NGOs practical objectives (making a difference, having a political impact). In our opinion, these problems are typical and are aggravated by the fact that, in contrast to other

countries, there is no “knowledge broker” that can help resolve conflicts and disagreements between the two worlds.

As we finally managed to gather participants from the “two worlds”, we considered that working in sub-groups would be a good tool to “motivate” participants and to reach serious and interesting results to go further. We sent to the participants a preliminary document and a number of questions, which allowed them to be better prepared and to save time during our one-day workshops.

To accommodate the agendas of the participants, the workshops were held twice – on October 19 and October 27 2010 in Paris.

Section 3: Results

Our study links two different kinds of activities: analysing documents relevant to European research agendas for sustainable agriculture, and discussing this analysis at stakeholder workshops, as a means to clarify proposals for alternative research agendas. The semantic analysis compares documents from various actors who manage research agendas or attempt to influence them. We have focused on key terms appearing regularly in discourses on sustainable agriculture and research agendas. These terms were analysed for their frequency, their meaning and their context of use. The semantic analysis provides a basis to analyse research priorities of EC funding in the agricultural sector, especially the relative roles of biotechnological and agro-ecological approaches. Together these findings provided a basis for discussion during our workshops on “What research for sustainable agriculture?”. The workshops were attended by agricultural scientists, peasants and NGOs, together seeking ways to develop alternative research agendas.

Shared visions of NGOs on sustainable agriculture

Research agendas can be compared to the visions of NGOs for sustainable agriculture. For decades, numerous NGOs have been concerned about the state of the planet and people. They act traditionally as whistleblowers or ‘watchdogs’. At the same time, they propose policy changes to fight against climate change and environmental degradation, as well as to protect indigenous peoples, access to care, or the resilience of ecosystems, etc. Around the world, NGOs have produced documents explaining their visions and objectives for sustainable agriculture.

At the Earth Summit in Rio de Janeiro in 1992, the 27 principles of the *Rio Declaration on Environment and Development* have laid down the basic grounds of the concept of sustainable development. In parallel, NGOs and social movements have proposed to the UN the *NGO Sustainable Agriculture Treaty*[1]. It develops, in 40 points, a critique of current policies, principles of an alternative approach and a plan of action. Other NGOs such as Greenpeace, Friends of the Earth, Sustainable Agriculture Network (SAN) and Rainforest Alliance, Grain, and Oxfam have also developed definitions of sustainable agriculture.

Some common principles are shared throughout these statements. Sustainable agriculture:

- is ecologically sound, economically viable, socially just and inclusive, culturally appropriate and based on a holistic scientific and participatory approach,
- preserves biodiversity, maintains soil fertility and water quality, recycles and conserves natural resources, diversifies crops, reduces energy and water consumption, reduces and recycles waste,
- reduces risks to human health and the environment, precludes the use of pesticides and GMOs and minimizes the use of external inputs,
- respects the multifunctionality of agriculture and rural life, and strengthens rural communities,
- adapts farming practices to local contexts and respects regional agroecosystems, allows more efficient management of the farm and better conditions for farm workers,
- promotes the integration of traditional knowledge and modern scientific knowledge, reorients scientific research towards sustainability and equity, uses collectively knowledge, freely diffuses know-how,
- ensures food available and suitable for all, today and tomorrow, promotes sustainable consumption of healthy, natural and local food,
- enables the empowerment of small farmers, family farms and rural communities (e.g. access to land, stability of income),
- promotes fair trade with developing countries,
- promotes food sovereignty of people,
- respects the ecological principles of diversity and interdependence, and uses the contributions of modern science to improve more than derail the conventional wisdom

[1] http://csdngo.igc.org/alttreaties/AT20.htm

accumulated over centuries by innumerable farmers around the globe.

But numerous NGOs have abandoned the term 'sustainable agriculture', since the neoliberal agro-industrial agendas have integrated it. Instead they refer to food sovereignty, organic agriculture, peasants' agriculture or agroecological agriculture.[2].

3.1 Studied reports

We chose several documents (see web links in References) that reflect the work of actors with different interests and agendas, in order to analyse the use of some key terms around sustainable agriculture.

IAASTD - Summary Report of the "International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD)" from an independent, multidisciplinary and multi-stakeholder process. Under the direction of a board of 30 government representatives and 30 representatives of NGOs, the process had united 110 governments and 400 experts from NGOs, private sector, producers, consumers, the scientific community and international agencies involved in the sectors of agriculture and rural development. The report was approved in April 2008 by a series of governments from all continents. "If they show a general consensus on the importance of knowledge, science and technology for agricultural development, these reports also present a diversity of views on certain issues."

SCAR - Standing Committee on Agricultural Research established in 1974 by the European Communities Council to ensure the exchange of information related to the CAP and to coordinate agricultural research between member states. SCAR has launched an extensive foresight process in order to develop scenarios for European agriculture. The European Commission has appointed a consultancy expert group to conduct, under the supervision of SCAR and the EC (DG-RTD-E) a monitoring exercise leading to the report New challenges for agricultural research: climate change, food security, rural development, agricultural knowledge systems - 2nd SCAR foresight exercise. The latter was written by a group of outside experts at the request of SCAR and published in 2007.

Knowledge-Based Bio-Economy (KBBE) - The European Commission has published papers on the concept of bio-economy based on knowledge that can be found on the EC website dedicated to the KBBE. One important basic document is the conference report from the "New perspectives on the knowledge-based bio-economy - Transforming life sciences knowledge into new, sustainable, eco-efficient and competitive products" conference from 2005. Documents which give more detailed insights are the annual work programmes of Framework Programme 7 (Theme 2: Food, Agriculture and Fisheries, and Biotechnologies, FAFB) such as for instance the programmes for 2009, 2010 and 2011.

European Technology Platform Plants for the Future - The Platform Plants for the Future, recognised and supported by the EC, has developed a research strategy under the leadership of industry players. Plants for the Future is a technological platform created by the EC since FP6 and directly related to the implementation of the concept of bio-economy based on knowledge (KBBE). On the EC KBBE website, ETPs in general are presented like a weapon:

> *"A*n important weapon in the Commission's competitiveness arsenal and were set up to chart the strategic R&D path ahead for key European industries. Several of these 'champions for growth' are related to the KBBE as well and work together with the European Commission and with the stakeholders active in this field".[3]

Vision for Organic Research IFOAM 2025 - IFOAM, the International Federation of Organic Agriculture Movements, has published its vision for research on organic agriculture by 2025 "Food, Fairness and Ecology: An organic research agenda for a sustainable future". This report constitutes the foundation of the technology platform Organics created in 2008 at the initiative of IFOAM, other associations of sustainable agriculture and businesses of the sector.

In preparation for the semantic analysis of these documents, we also surveyed documents produced by NGOs, as a means to identify their shared visions.

[2] http://www.europeanfooddeclaration.org/

[3] http://ec.europa.eu/research/biosociety/kbbe/platforms_en.htm, October 2010

3.2 Key terms: quantitative overview

As a first step in a semantic analysis, we did a quantitative analysis. As a manner of presenting the results, the table summarises the frequency of different key terms in the various reports.

	IAASTD - Executive Summary	SCAR 2nd foresight	New perspectives on KBBE	KBBE WP 2009-3 (28/08/2008)	Plants for the Futur SRA	Vision IFOAM 2025 (2008)
biotech / biotechnology	18	6	43	94*	51#	0
sustainable / sustainability	51	116	22	136	50	63
innovation	8	92	12	27	7	19
biodiversity	7	71	4	23	68	23
food safety	19		2	1	9	
multifonctionnal/ity (agriculture)	10	7	1	1	0	6
governance	6	19	1	5	5	1
holistic	3	3	1	0	4	2
agroecology	2	2	0	2	0	
agronomy	2	4	0	3	5	21
ecology	0	4	0	8	3	14
low (external) input (agriculture)	1	13	0	13	3	
organic agriculture**	2	23	0	21	5	157
food sovereignty	2	0	0	0	0	
sustainable consumption	0	18	0	1	0	0
participative***	5	14	0	1	0	3
collaborative, cooperative**** (x, y)	7, 0	8, 11	0, 5	171, 117	3, 4	3, 1
ecosystem (including agro-eco-system)						28
multidisciplinar(ity)	1	0	0	11	1	2
pluridisciplinar(ity)	2	0	0	1	0	0
interdisciplinar(ity)	2	15	0	3	0	3
trans-disciplinar(ity)	0	1	0	0	0	6

* The word 'biotechnology' was taken into account even if it was used in a composite word such as 'nanobiotechnology'.

** including organic agriculture, organic farming, organic system, organic production.

*** including participatory breeding, research, approaches, methods, assessment, processes, collaboration.

**** including collaborative, collaboration, collaborate, cooperate, cooperation, co-operation, cooperative, co-operative.

This number doesn't take into account the institutions' name or representatives' qualification.

3.3 Semantic analysis

Starting from the quantitative overview, the semantic analysis will propose an insight into the meanings of the terms (in referring to their frequency) and the contexts in which they are used.

3.3.1 Innovation, research and participation

IFOAM stresses the need to take into account the long-term consequences of the technological development and the process of innovation on agro-ecological systems and socio-economic conditions. The document presents the organic agriculture and food as a highly innovative sector. It is also promising in its ability to respond to the challenges that the European Union fixed in the field of agriculture and food production. The authors emphasise that it is mainly the organic sector which has led European agriculture to evolve towards greater sustainability, quality and use of less risky technology.

> "Organic agriculture is strongly based on an ethical value system which is described by the underlying principles of health, ecology, fairness and care. This value system provides a unique basis for developing complex assessment and decision tools and for modelling future sustainable food and farming systems in a practical context where stakeholders along the whole food chain can participate and where civil society is strongly involved into technology development and innovation." (IFOAM 2007, p.31)

The report also emphasises that sustainable agriculture and organic farming are heavily based on knowledge ("highly knowledge-based agriculture") by integrating scientific and farmers' knowledge. They underline that there is a crucial need for research and also question research priorities and the orientation of research. They join with this position other scientists and institutes[4] which argue that organic farming needs research and technologies but assessed according to organic farming principles. This is in contrast to some industry discourses which present organic agriculture as a backward oriented domain (back to a "candles era") and deny the possibility of organic farming to be a modern approach to problem solving because of its lack of intensive use of new technologies and scientific results. IFOAM underlines that:

> "Fundamental science and applied research are crucial drivers for improving productivity, quality, safety and sustainability of agriculture and food production. Organic agriculture makes no exception as it is not some kind of traditional production technique preserving a bygone era of pre-industrialised and small holder agriculture. In fact, the rationale of organic agriculture and food production is the sustainable use of natural resources and the respect for the inherent value of living beings, humans and non-humans alike. Organic standards and regulations are set as a code of conduct for the actors in agriculture and food production facilitating the practicability of the rationale. They are neither conservative nor impeding scientific progress, they are updated regularly and continuous learning is inherent. Learning is triggered by insights achieved by disciplinary natural sciences, complex ecosystem research, socio-economic analyses and traditional knowledge which has made farmers competitive in local contexts for centuries. Therefore, research activities are crucial in order to fully reveal the potential of organic agriculture and food production for a sustainably organized society." (IFOAM 2007, p.14)

The authors also recall the concept of common property for which research using a systemic approach is a tool of prime importance. They demand an adequate support for research in sustainable agriculture and organic food in European programmes.

SCAR, IAASTD as IFOAM consider participatory research and the integration of farmers in the process of research and innovation (farmer-based participatory breeding, participatory or action research) as part of sustainable agriculture necessary to achieve its objectives, e.g. varieties better adapted to a changing world climate or for specific conditions. SCAR reminds that the involvement of farmers is critical to the innovation process in regard to the acceptance of new innovations and to research in ecology. But the reports also marks that:

> "... farmer-based participatory breeding lacks support both within scientific establishments – that increasingly are focussed on genomics and other high tech sciences – and by the currently dominant market interests." (SCAR 2007, p.42)

The IAASTD mentions at different moments the relevance of participatory approaches in agricultural research in referring as well to existing examples as to the question of governance of research. It thus defends a still marginal approach to agricultural research which is today mainly employed in organic or low input farming research projects. These projects deal for instance with multiples varieties of cereals and vegetables such as wheat, sweet corn, beans, cauliflowers, and tomatoes or forage plants.

[4] e.g. Institute for Sustainable Development (ISD) in Ljubljana, Slovenia; FIBL, Suisse

> "Participatory collaboration in knowledge generation, technology development and innovation has been shown to add value to science-based technology development, for instance in Farmer-Researcher groups in the Andes, in Participatory Plant Breeding, the domestication of wild and semi-wild tree species and in soil and water management. (IAASTD 2008, Executive summary, p.11)
>
> "Common pool resource regimes and modes of governance that emphasize participatory and democratic approaches are needed. ... An environment in which formal science and technology and local and traditional knowledge are seen as part of an integral AKST system can increase equitable access to technologies for a broad range of producers and natural resource managers. (IAASTD 2008, Executive summary, p.6)

In the Plants for the Future strategy "participatory processes" are foreseen in order to gain social understanding and support, so more as a one-way process of communication rather than a co-developing of agendas and objectives.

> "In agriculture, the large-scale deployment of novel non-food crops constitutes the biggest change for many generations. It will require private investments of billions of euros, and participatory processes to develop social understanding and support for the transformation. Market forces will increasingly determine which crops are grown across Europe and will stimulate farmers to take the lead provided the economics are viable." (Plants for the Future 2007, Summary, p.4)

For the proponents of the KBBE and Plants for the Future, the sector allowing for significant advances in R & D and innovation is biotechnology. Innovation serves primarily to increase the competitiveness of Europe and especially of its agro-food sector (and for not falling behind in the race with the "main competitors"), and to meet the needs of European citizens. They also stress that the European biotech firms invest less in R & D and innovation than their U.S. counterparts. Regarding other partners in the innovation process, the integration of SMEs is highlighted. The report of Plants for the Future also noted that innovation needs "good regulation" for that the public and private sectors invest in R & D in biotechnology. The topic of regulation comes back at several moments especially when it concerns genetically modified plants in mentioning the "current stringent regulations governing genetically modified crops in Europe" (p.18), the "rigidity of current GM regulations in Europe" (p.31) or stating:

> "Barriers to innovation such as the stringent regulation of genetically modified crops in Europe, delay the required private investments essential for the transition to the knowledge-based economy and should be mitigated." (Plants for the Future 2007, Summary, p.4)

Intellectual property protection and patenting are also recurrent preoccupations. The discourse on regulation and patenting is accompanied by the (traditional) discourse of dependency and lacking behind competitors from other countries.

> "In plant biotechnology, many of the early basic discoveries in plant genetic engineering were made in European academic labs, but their commercial spin-offs were produced by US companies. Another important barrier is the high cost of intellectual property protection in the EU compared with the rest of the world." (Plants for the Future 2007, p.66)

The approaches regarding innovation, research and participation for sustainable agriculture therefore differ substantially, or they are almost in opposition, with the views of NGOs and researchers on the one hand and what is highlighted in the documents of the industry on the other hand.

3.3.2 Scientific disciplines: biotechnology, agronomy, ecology and agro-ecology

The term biotechnology is absent in the document from IFOAM. It is present in the IAASTD report (18 times) and the SCAR report (6 times) and is one of the dominant terms in the documents on the KBBE documents (for instance 43 times in *New perspectives* and 94 times in work programme 2009) and of Plants for the Future (51 times).

The SCAR report presents a notable difference between genomics and what they call "advanced modern technologies". This report criticizes strongly genomics and genetic engineering. If the word 'biotechnology" is used only six times in the report, it is admitted that 'advanced modern biotechnology' has got an interest in breeding and to open the space of innovation. They mention the IAASTD report:

> "Genetic engineering remains a hit and miss affair and virtually nothing at present is known about the effects of changing the context of a gene's position in a biological structure. Classical breeding, allied to other branches of advanced modern biotechnology, ICTs and robotics, in the near to medium term continues to offer a more resilient and effective way forward for certain classes of problems in breeding" (IAASTD 2008).

The IAASTD report gives a differentiated image of biotechnologies. It distinguishes classical biotechnologies (breeding techniques, tissue cultivation fermentation...) and modern biotechnologies, such as GMP. The report reminds the controversies and uncertainties about them:

> "Hence assessment of modern biotechnology is lagging behind development; information can be anecdotal and contradictory, and uncertainty on benefits and harms is unavoidable. There is a wide range of perspectives on the environmental, human health and economic risks and benefits of modern biotechnology; many of these risks are as yet unknown." (IAASTD 2008, Executive summary, p.8)

The authors also criticized the concentration on biotechnologies, which could lead to the loss of experts in other fundamental sciences in agriculture.

Ecology and agronomy are central in the IFOAM document. It is a matter of intervening on ecological intensification, ecological challenges, ecological methods and production, ecological footprint, social and ecological cohesion. Even if those words are missing in the KBBE *New perspectives* document, one can find them in the FP7 Work Programmes. In *Plants for the Future*, if the words 'agronomy' and 'ecology' are mentioned once in the end of the abstract, they are not quoted or developed in the report, which does not reference agro-ecological approaches.

The "basics" of the KBBE, as presented at the official EC KBBE website[5] underline the predominant (and seemingly almost matchless) role of biotechnology:

> "We may live in the high-tech information age, but our prosperity is still very much derived from the fat of the land ... the KBBE is set to become one of the most important components of the EU's efforts to forge the world's most competitive knowledge-based economy. It will take the bud of promising life science and biotech ideas and nurture them to full blossom.
>
> Without the rapid progress in the life sciences and biotechnology we have experienced, the knowledge-based bio-economy (KBBE) would not be possible. Indeed, few areas match the bio-sector for the breathtaking speed at which it is advancing. ... This cutting-edge sector can lead to applications and products in a wide range of fields, such as ... new agricultural products and practices, novel foods, biodegradable materials, as well as emission-reducing biofuels. ... " (DG Research, KBBE website, Oct.2010)[6]

The bibliographic links given on this website refer to three documents: the workshop report *Towards a European knowledge-based bio-economy* (DG Research, 2004), the conference report, *New Perspectives on the Knowledge-Based Bio-Economy: Transforming life sciences knowledge into new, sustainable, eco-efficient and competitive products* (DG Research, 2005), and *Fostering the Bio-Economic Revolution,* by the US government's Biomass Research and Development Board.

These documents refer almost exclusively to the use of biotechnology, metabolic engineering science and technology and genomics leaving aside other scientific domains such as agronomy, ecology, microbiology and pedology.

> "Despite this complexity, there is no doubt that the life sciences and biotechnology are an important component of Lisbon. "Biotechnology was singled out as playing a key role in this strategy," pointed out MEP John Purvis, who is a member of the European Parliament's Committee on Economic and Monetary Affairs. "[It is] an industry that has the potential to be one of the largest growth sectors in our economy for decades to come." (DG Research, New perspectives 2005, p.4)

Moreover, the simultaneous use of the words 'life sciences' and 'biotechnology' in these documents gives the impression that the two fields go automatically or naturally hand in hand, and that they are even interchangeable.

> "The life sciences and biotechnology can help find solutions to many of the most pressing challenges facing humanity and answers to some of the most fundamental questions about life and its meaning." (DG Research, New perspectives 2005, J. Potoznik, p.3)

The interpretation of the concept of the KBBE is nevertheless broader in its implementation through annual work programmes under the second theme of FP7 that is "Agriculture, Food, Fisheries, and Biotechnology". Here, calls for projects in organic or low input agriculture are open leaving thus place to more diverse approaches in order to meet the defined challenges.

[5] http://ec.europa.eu/research/biosociety/kbbe/kbbe_en.htm
[6] idem

(search for terms in the main text)	WP 2009	WP 2010	WP2011
biotech/	94	84	76
sustainab/	136	73	96
agroecolog/y	2	0	1
agronom/y	3	2	6
ecolog/y	8	13	23
organic agriculture	21	11	16
soil	10	23	39
participatory	1	2	2
(agro)-ecosystem	19	24	32
low-input (agriculture)	13	6	7
innovation	27	28	28
synthetic biology (microorganisms, products)	10	3	25

Table 1 Frequency of some chosen terms in the annual work programmes of theme 2 in FP7 (FAFB-Food, Agriculture, Fisheries and Biotechnology)

The predominant terms in the three work programmes are biotech (biotechnological, biotechnology) and sustainable (sustainability).

The use of biotechnology remains the dominant approach in order to achieve the aims of the KBBE.

The extensive use of the term sustainable makes of it almost a generic term which is used to describe nearly everything. The term can also be found in constructions which are rather uncommon:

> "...the cooperation shall lead to a self-sustainable and long-lasting network of programme managers in the area of industrial biotechnology, enabling the translation of information gained from innovative fundamental research into social, environmental, geographical and economic benefits.
>
> ...It is also in line with the new strategy for Europe EU 2020 which recognises that the only way to deliver new sources of growth and sustainable jobs is through research and innovation.
>
> Establishment of a long-term and sustainable training programme for young scientists ...." (DG Research, WP2011)

However, there are also steadily some calls addressing directly organic, low input and agro-ecological agriculture (e.g. *KBBE-2009-1-2-04: Improving performance and quality of crops in the context of organic and low-input systems by breeding and management)*. *In the call KBBE-2009-1-2-09: Impact and development of Conservation Agriculture techniques in developing countries – Mandatory ICPC (African ACP) it is recognised that "*Agroecology is the science of applying ecological concepts and principles to the design, development, and management of sustainable agricultural and food systems. It includes the socio-economic and environmental dimensions of sustainable development. Agroecology has already generated agricultural systems that increase productivity while preserving and restoring the environment and they are extensively used in some developed (e.g. USA) and developing and emerging countries (e.g. Brazil)."

Other calls integrate diverse agricultural approaches. According to the call *KBBE-2009-1-2-02* on *Multifunctional grasslands for sustainable and competitive ruminant production systems and the delivery of ecosystem services,* the projects shall *"*support developments and innovations in grassland use and management in different farming systems (including low-input and organic), pedo-climatic and socio-economic conditions encountered in Europe." In the *KBBE-2009-1-4-07:*

Globalisation and trade impact on developing countries – Mandatory ICPC (African ACP) it is stated that : "The objective of this Coordination Action is to analyse the impact of the reformed CAP and of the US Farm Bill on international agricultural markets, where products of EU, US or other origins compete with products from developing countries and to determine the effects they have on the relative competitiveness of products of different origins (EU – US – Emerging countries - Developing countries) on different markets. The effects of certified schemes (organic, fair trade, Global GAP) on market access and livelihood of resource poor families should also be taken into account."

Calls address also issues on health impacts for human beings such as the call *KBBE-2009-2-4-03: Combined exposure to pesticides* which indicates that "The potential effect on human health as a result of combinations of pesticides present in food should be investigated. Models and strategies for assessing risks arising from cumulative and aggregate exposure to pesticides with a similar mode of action, suspected additive or synergistic effects, or complex mixtures should be addressed." It is especially interesting here that the call emphasises the role from cumulative exposure since this addresses the question of long term exposure.

3.3.3 Holism: multi-, inter- and trans-disciplinarity

Those terms are mentioned in all the studied reports except New *perspectives for KBBE*. If SCAR uses essentially the word 'inter-disciplinarity', the Work Programme of KBBE mainly mentions 'multi-disciplinarity' but also uses the word 'inter-disciplinarity'. IFOAM chooses the word 'trans-disciplinarity' but uses from time to time the words 'multi-disciplinarity' and 'inter-disciplinarity'. IAASTD evokes multi-, pluri- and inter-disciplinarity but does not use 'trans-disciplinarity': "revalorisation of traditional and local knowledge, and an interdisciplinary, holistic and systems-based approach to knowledge production and sharing" (IAASTD 2008, Executive Summary, p.5)

It seems that those terms are considered as synonyms. The word 'trans-disciplinarity' is nearly not used by stakeholders except IFOAM.

> "Agricultural and food research are systems sciences, predominantly applying inter-disciplinary and trans-disciplinary methods and pursuing and learning from long-term impacts in complex contexts." (IFOAM 2007, p.30)

However, in the KBBE *New perspectives* document is mentioned that biotechnology should be combined with other technological fields as the right way forward. Technologies that are mentioned in this context are nanotechnology and synthetic biology.

> "For two decades, genetic engineering has been about adding or taking away individual genes from existing biological systems. "This is becoming a thing of the past. The next big leap is synthetic biology," opined de Lorenzo. Synthetic biology borrows heavily from classical engineering and revolves around the notion of designing complete bio-based systems from scratch. "Why take the whole cell? Why not extract just the parts we need for our purposes?" he asked. This would work more effectively than conventional genetic engineering " because cells have not always evolved to perform functions in the most efficient way possible and they usually contain code for tasks that are redundant for scientific or industrial purposes." ... "The next big leap is synthetic biology." (DG Research, New perspectives 2005, p.17)

In *Plants for the future*, the word 'holistic' is used to call for an holistic politics concentrated on genomics of plants, biotechnologies and their applications. This holistic approach of agriculture includes biotechnologies but it is not the definition chosen by NGOs, which support a sustainable agriculture and for which the word 'holistic' defines a global approach to ecosystems and not the use of a specific technology or technique. According to the KBBE New perspectives document, the word 'holistic' seems to mean, regarding to research, the de-compartmentalization of scientific disciplines but it only mentions the case of nanotechnologies and synthetic biology. It seems that 'holistic' goes along with converging technologies, which is a key concept in the biotech account of the KBBE.

> Success would require increased public and private investment in AKST, the development of supporting policies and institutions, revalorisation of traditional and local knowledge, and an interdisciplinary, holistic and systems- based approach to knowledge production and sharing. (IAASTD 2008, executive summary, p.5)
>
> "This requires a holistic approach that transcends the narrow confines of scientific disciplines – blending, for example, the bio- and nano-sciences – and cuts across policy areas: from research and innovation, to trade and health and consumer affairs." (DG Research, New perspectives 2005, p.3)

3.3.4. Soil health and fertility

Reflections on soil go through the whole IFOAM and Plants for the Future strategic research papers, are very present in the SCAR report and can also be found in the yearly EC work programmes.

In the IFOAM document, the term soil is mentioned 33 times in different contexts ranging from soil protection, management, formation, erosion and degradation over soil fertility, health, diversity, and quality (e.g. physical, chemical and physiological properties) to soil micro- and macro fauna and soil as a finite resource.

The authors underline the fact that:

> "Several European, US, Australian and African studies show higher organic matter content, higher biomass, higher enzyme activities, better aggregate stability, improved water infiltration and retention capacities and less water and wind erosion in organically managed soils when compared to conventionally one." Furthermore "organic farming has shown to promote more species and abundance of organism groups than conventional farming, especially a greater species diversity and density of insects, plants, soil micro- and soil macro-fauna. (IFOAM 2007, p.20)

Concerning soil management the report proposes amendment with compost, tillage practices (e.g. conservation tillage), host plant resistance, crop rotation, and intercropping as important additional measures to lower risks of pest and disease outbreaks. The report notably proposes as research topic to improve management of soil organic matter, soil micro-organisms for the improvement of nutrient supply, soil structure, soil moisture retention and soil health as well as pest and disease prevention. IFOAM combines the reflections on soils with the promotion of agro-ecological and organic methods while insisting on their innovative character:

> "Reducing again the separation of crop and livestock production, which often has resulted in soil degradation on croplands106 and in nutrient excess in livestock operations with yet unsolved environmental problems, is another approach to better utilizing the nutrient elements in the excrements of 18.3 billion livestock animals (FAO statistics)...New small-scale farm models, integrating livestock into cropland, would be a solution for many regions in Europe. As farm technology has completely changed during the last 25 years, such mixed farms of tomorrow would not resemble the old models and would match the requirements of modern entrepreneurship." (IFOAM 2007, p.37)

Plants for the Future mentions the term soil 27 times. It is related to crop seed survival, fungicide accumulation, several times to salt accumulation but also to erosion, fertility and depletion. Even if the document refers to commonly shared observations concerning the conditions of soils, it envisages solutions which refer to greater productivity of plants by genomics, plant genetic improvement, genetic engineering techniques, molecular breeding, transgenesis and DNA sequence inventories – by contrast to to the diverse approaches proposed by IFOAM. For example, Plants for the Future promotes novel crops as a means to improve or conserve soil fertility, i.e. to fix nature, whereas IFOAM is promoting agronomic practices as the main means.

> "Plant genetic improvement could result in new opportunities for adapting agricultural practices used for plant nutrition and plant protection and combining improved efficiency with lower negative impact on the environment. " ... "For example, drought-tolerant crops will require less water for their production and this will lead to reduced erosion and soil salination." (Plants for the Future 2007, p.43)

> "Functional genomics approaches, bioinformatics tools, and systems biology models can be combined with molecular breeding approaches and, if needed, with transgenesis to obtain elite cultivars with high potential for nutrient utilisation." (Plants for the Future 2007, p.48)

The SCAR report which uses the term soil 86 times, indicates that there has been a significant increase in soil degradation processes over the last few decades and that these processes are likely to further accelerate if nothing is done to protect soils. The authors recall that decline in organic matter, erosion, compaction, salination and contamination but also soil losses contribute to the current preoccupying situation. It proposes notably breeding practices including farmers as response and, in a general manner, highlights the active (and not only passive) role of farmers in soil preservation, a diagnosis absent from the *New perspectives* document and the strategy of Plants for the Future. The report states:

> "New farmer-based breeding practices are interesting, as paying greater attention to local adaptation, nutrient-efficiency and biodiversity. This strategy appears the more important in so far as the potential for further yield increases by means of insect-resistance and herbicide-tolerance seems to have reached physiological limits in the major grain crops. ...In sensitive agro-ecological areas,...targeted research on fertility management would be required to assess, for example, the contribution of agro-forestry." (SCAR 2007, p.55)

Besides the integration of farmers knowledge, the SCAR reports comes also close to what IFOAM mentions under ecological intensification in referring to agro-ecological methods to preserve soil health.

> "Over the longer term, technically, socially and economically feasible concepts for optimal combination of soil conservation, habitat management, nature conservation and eco-functional intensification need to be developed and adopted on landscape and regional scales. They can

build on the tacit knowledge of the farmers and other land users who have long historical experience of systemic interactions in their localities, as well as taking into account the needs of civil society. Various schemes for financial incentives that reward users for landscape management as yet have to be assessed with regard to effectiveness and cost- efficiency in specific contexts, and merit further development." (SCAR 2007, p.54)

Furthermore, the SCAR report underlines the success of organic farming techniques regarding soil erosion.

"Organic farming techniques such as shallow ploughing, recycling of livestock manure onto arable cropland, composting techniques, integration of green manure, catch crops and cover crops, agro forestry and alley farming as well as diversified crop sequences all reduce soil erosion considerably and lead to increased formation of soil humus. This often results in considerable annual carbon gains (between 40 kg and 2000 kg of C per hectare)." (SCAR 2007, p.21)

Problems related to soil are also present in the EC work programmes, and in WP 2011 even more than in the two previous ones. The importance of soil issues is even mentioned in the introduction of this work programme when it is stated that "WP2011 provides support to the EU' Soil Thematic Strategy and the Waste Framework Directive, with topics focusing on "soils and bio-waste" and the plant-soil relationship."

The call *KBBE.2011.1.2-01: Sustainable management of agricultural soils in Europe for enhancing food and feed production and contributing to climate change mitigation* calls for the use of knowledge generated in scientific disciplines such as agronomy or microbiology. "If properly managed, agricultural soils can enhance farm productivity and also contribute to climate change mitigation by providing carbon sequestration opportunities. The project will explore the complexity of agricultural soils in a novel and truly integrated interdisciplinary perspective, to ensure a holistic approach and genuine collaboration between relevant scientific domains, such as agronomy, agro-ecology, microbiology, plant sciences, soil sciences and socio-economic sciences."

Considerations on soil are also integrated in calls on the preservations of forests (*KBBE.2011.1.2-07: Preserving the multifunctionality of European Mountain forests*), on the use of cover crops and mulch (*KBBE.2011.1.2-03: Development of cover crop and mulch systems for sustainable crop production*), or the use of compost (*KBBE.2011.1.2-02: Reducing mineral fertilisers and chemicals use in agriculture by recycling treated organic waste as compost and bio-char products*).

The call KBBE.2011.1.2-06: Strategies to replace copper-based products as plant protection products in low input and organic farming systems treats the issue of soil contamination within organic and low input farming. "The project will develop new formulations or alternative compounds with effective fungicidal/bactericidal impact (i.e. potentiators of resistance, organically based products, biocontrol agents etc.) together with innovative techniques and management practices including the use of more resistant cultivars, novel disease control measures to develop sustainable strategies, optimisation of the use of existing products to replace the use of copper based products. "

These calls propose approaches to the problem of soil fertility which encounter the visions proposed by NGOs - inter-disciplinarity between scientific domains like agronomy, (agro)-ecology, pedology etc. without referring to biotechnology or nanobiotechnology, search for integrated low tech solutions and sustainable management practices, adaptation of research protocols for organic and low input agriculture needs.

3.4 Challenges of European research on sustainable agriculture

Scientists, politicians, farmers and citizens share the diagnosis that the state of our planet and of the world population requires an 'emergency reaction'. This shared diagnosis should lead to changes in the manner of seeing and dealing with agriculture. A more holistic approach of agriculture should be promoted and should integrate economic, social, cultural and ecological aspects. However, even if there is a consensus on the consequences of intensive agriculture, visions and proposals on how to reduce them are not or only partly shared amongst different actors. The 'sustainable agriculture' concept is more and more widespread, but what is considered as 'sustainable' can significantly differ from one actor to the other, from one 'interest to defend' to the other.

The question of sustainable development became prominent in European Union politics about a decade ago. In 2001 "The European Union has formulated a long-term strategy to dovetail the policies for economically, socially and environmentally sustainable development, its goal being sustainable improvement of the well-being and standard of living of current and future generations."[7] In 2006 the European Council adopted a new European Strategy for Sustainable Development. To deal with agro-environmental challenges, the European Union decided to:

- define, with the different groups of stakeholders, the objectives of social and environmental efficiency of products;

[7] http://europa.eu/legislation_summaries/agriculture/environment/l28117_en.htm

- increase the spread of environmental innovations and ecological technologies;
- reach a more sustainable management of natural resources (by recognising the value of ecosystem services and by curbing the decreasing of biodiversity);
- limit the major risks for public health (food safety and quality, elimination of risks for health and environment due to chemical products before 2020...);
- develop researches on the links between health and environmental pollution.

The *Situation Report on 2007 Strategy for Sustainable Development* gave a first overview of the situation and showed that relative progress was recorded in the field.

Furthermore, in September 2006 the European Commission published a communication entitled *Development of agri-environmental indicators for monitoring the integration of environmental concerns into the Common Agricultural Policy*, in which

> "The Commission provided an update of the progress made to build agri-environmental indicators. It planned to focus its efforts on rationalising the indicators and strengthening their policy relevance (retaining only 28 indicators in total), on consolidating all these indicators and on the long-term efficacy of the system."[8]

Since several years, the Knowledge-Based Bio-Economy (KBBE) is a new concept of the European Union. It includes all the industries and economic sectors, which produce, manage and use the biological resources such as agriculture, food, forestry, fishery, etc. For the ones who promote this idea, KBBE responds to the growing demands for safer and better quality food, to use sustainably renewable biological resources and to address the risks of epizootic diseases, to insure the sustainability and the safety of agricultural and fish production. KBBE is supposed to "secure a sustainable agriculture and fisheries production for a rising world population, on limited arable land and facing impacts of climate change"[9].

3.4.1 Sustainability and sustainable agriculture

The various documents promote different accounts of sustainable agriculture and means to achieve this.

IFOAM promotes research that will specifically serve organic agriculture, demands more support for this research and recalls that it would be good for the interest of all to invest in research for sustainable agriculture and organic farming. The vision is based on a long-term perspective concerning the development of agricultural practices and sustainable food covering the following three fields: i) the principles of organic farming, ii) scientific innovation and iii) best integration of the knowledge of farmers.

> "A long-term perspective is crucial when developing a sustainable food production. As long as most of the ecosystems services are not scarce, market economy and international politics and protocols will fail to adequately address the challenges. Therefore, an economizing use of natural resources is an ethically driven decision of well informed and independent citizens. In the context of sustainability, ethically farming, trading and consuming is an existential question for the human species." (IFOAM 2007, p.42)

The document of the supporters of organic farming links the question of sustainability with organic farming, agronomy and ecology without mentioning biotechnologies. For SCAR, the word 'sustainable' is associated with the words 'society', 'agriculture', 'production', 'agro-ecosystems', 'social sustainability', 'management' and a culture of interdisciplinary research integrating indigenous knowledge.

The reports IAASTD and SCAR emphasise the importance of sustainable agriculture. The SCAR report supports sustainability and emphaises challenges in related areas.[10] The report calls, just like NGOs, for a greater integration of farmers in both the definition of priorities in research and the application of scientific results. It also observes that local or regional production often allows farmers to go for a production system with less external inputs and less dependence on dominant market actors. The report stresses the link between alternative food chains including more direct relations between farmers and consumers and increased social resilience of food provisioning.

As an approach to sustainable agriculture, the report IAASTD is even more in line with the concerns of NGOs. It is close to positions defended by IFOAM, for example when it demands the upgrading of traditional and local knowledge and to ensure sustainable livelihoods for rural communities. It also recalls that policy options should include the ending of subsidies that award unsustainable practices

[8] http://europa.eu/legislation_summaries/agriculture/environment/l28101_en.htm
[9] http://cordis.europa.eu/fp7/kbbe/about-kbbe_en.html

[10] One can note here the reservations expressed by the SCAR Working Group (group which demanded the report and called for the expert group) in the preamble of the report. It highlights a phenomenon relatively wide spread: a position determined by the experts but rejected by policy-makers who themselves requested it to be produced.

and support others. This list of practices to encourage includes diverse approaches to management (integrated pest management and environmentally resilient germplasm management), organic and low input agriculture.

> "Investment opportunities in AKST[11] that could improve sustainability and reduce negative environmental effects include resource conservation technologies, improved techniques for organic and low-input systems; a wide range of breeding techniques for temperature and pest tolerance; research on the relationship of agricultural ecosystem services and human well-being; economic and non-economic valuations of ecosystem services; increasing water use efficiency and reducing water pollution; bio-controls of current and emerging pests and pathogens; biological substitutes for agrochemicals; and reducing the dependency of the agricultural sector on fossil fuels." (IAASTD 2008, executive summary, p.6)

NGOs had a role in influencing this report: cooperation is explicitly advocated, and priorities are set by stressing the urgency to act. The report calls for a substantial reorientation of knowledge, science and technology in agriculture (Agricultural Knowledge Science and Technology, AKST). This change would also incorporate the agricultural communities, households and farmers as producers and managers of ecosystems.

In all the above reports, the issue of sustainable agricultural development is placed in a complex and plural context at the confluence of environment, society, health, economy and culture.

In contrast with this approach, the report of the Platform Plants for the Future puts sustainable agriculture in a context of profitability, competitiveness and support for the European biotech industry.

> "Commercialisation of all products, including novel value-added compounds from 'intelligent plants', will give European bio-energy production a competitive global advantage... "The production of new compounds will require the development of new systems for plant production to achieve commercially sustainable levels." (Plants for the Future 2007, p.35)

Sustainable is used here to relate a concrete commercial or industrial objective with an environmental objective.

Plants for the Future relates directly the issue of sustainable agriculture to the use of biotechnology and genomic tools remaining mainly in a technical approach to the problems to be solved.

> "Therefore Europe will have to find ways of boosting its contribution to global output of food, feed and renewable resources in a more sustainable way. To achieve this will require the use of novel tools to study plants at various biological and environmental levels. At the same time, genomics could help to enhance plant breeding techniques, leading to improved varieties and agricultural practices. An array of novel technologies has emerged which allow researchers to identify the sources of crop and tree improvement, namely the genes that contribute to the improved productivity and quality of modern crop varieties and the genes that enhance tolerance to stresses, whether biotic or abiotic, or to a better utilisation of inputs." (Plants for the Future 2007, Summary)

The terms 'biotechnology' and 'sustainable' are repeatedly directly associated with each other. The report presents sustainable agriculture as a natural and integral part of genomics and biotechnology and gives these domains almost the exclusivity in the scientific ability to produce solutions thus neglecting domains such as agronomy, ecology, agroecology, pedology.

> "The plant science and plant breeding communities must seriously consider that they, almost exclusively, have the scientific understanding and tools that can help to bring about sustainable global plant production." (Plants for the Future 2007, p.76)

Plants for the Future emphasises also the role of future GM plants for sustainability without discussing other ways of sustainable plant production.

> "There are strategies available in the design of GM plants that can be considered as 'best practice' when it comes to minimising identified and unidentified risks associated with GM plants. Thus, future generations of transgenic plants suitable for the EU market should ideally have certain characteristics. They should yield high-quality products which can be produced in a more environmentally friendly, cost-effective and sustainable manner." (Plants for the Future 2007, p.82)

Thus, if Europe wants to improve the sustainability of its agriculture and its forestry, it will inevitably and almost exclusively use genetic techniques and biotechnology.

The EC documents on the KBBE share this primary reference to biotechnological tools and approaches. Some basic theoretical documents – e.g. the *New perspectives* documents or the workshop report from 2004 "Towards a European knowledge-based bio-economy" – refer mainly to life sciences and biotechnology. But the FP7 annual work programmes, which implement the KBBE concept, are open also to other possibilities.

In the KBBE *New perspectives* document, biotechnologies are presented as the essential core of knowledge to allow industries to produce sustainably at an economic and environmental level. There

[11] AKST = Agricultural Knowledge Science and Technology

is no reference to other scientific domains such as agronomy or ecology which could or should play a role for sustainability. These terms are not mentioned once.

> "The knowledge-based bio-economy will play an important role in this emerging reality. It is a sector estimated to be worth more than €1.5 trillion per year. The life sciences and biotechnology are significant drivers of growth and competitiveness here. These sciences will help us to live in a healthier and more sustainable fashion by finding more environmentally friendly production methods and pushing forward the frontiers of science." (DG Research, New perspectives 2005, forward by J. Potoznik)

> "The knowledge-based bio-economy (KBBE) is a desirable path to tread. It will enhance Europe's competitiveness, rural development, sustainability and the environment," (Christian Patermann, director of Biotechnology, Agriculture and Food Research at the European Commission). ... The KBBE would not be possible without massive advances in the life sciences and biotechnology." (DG Research, New perspectives 2005, p.2)

One of the most stressed points in the research strategy of Plants for the Future is the fact that renewable plant-derived products - biochemicals and biofuels - should be developed as an alternative to the current fossil fuel-based system and should become the basis of a global industrial system in replacing fossil fuels. Biofuels are presented as "the solution" for sustainability and "sustainable growth". The report calls for strong public policy support while underlining the predominant role of the market.

> "However, global climate change and the need for sustainable food and fuel production provides a strong social imperative for change, and a combination of 'technology push' and 'market pull' will make the transition to a sustainable bio-based economy a reality." (Plants for the Future 2007, summary, p.3)

> To meet this challenge (the KBBE) we will need policies to support the sustainable growth and development of bio-based industry across the European Union and globally. In particular, policy decisions will have to be taken in relation to competing demands for land use from food and feed production to non-food products including biofuels. Reform of the Common Agricultural Policy (CAP), in which market forces will increasingly determine which crops are grown across Europe, will have to address these issues. (Plants for the Future 2007, p.18)

Furthermore, in the *New perspectives* report, the term sustainability is used in an uncommon sense in order to emphasise biotech companies and the need of "sustaining" them. Under the titles 'Establishing sustainable biotech firms' and 'Sustained efforts', the report proposes:

> "Part of the problem is that biotech firms need a sustained commitment from investors before they become self-sufficient and viable entities. [...] "Sustaining innovation in Europe would require a bigger cake of foreign direct investment, a bigger slice of the cake for European companies, and better use of that slice," he suggested". (DG Research, New perspectives 2005, p.14)

Sustainability is here used far from its original considerations - on the state of environment and the responsibility towards future generations - in order to describe the support to an industry branch and companies. This "fancy" interpretation meets with a similar interpretation, here to sustain a technology, proposed in the Plants for the Future document.

> "This new research paradigm (systems biology) must be fuelled by sustained investment in whole genome sequencing." (Plants for the Future 2007, summary, p.9)

The discourse on biotechnology and sustainability is also used to tackle the "education enigma" and the question of the number of scientists.

> ""Many young people want to make a difference. We need to show them that they can make a difference as biotech researchers…... Young people are often concerned about the state of the environment and the sustainability of our way of life. If they realise that the shift towards a knowledge-based bio-economy offers a sustainable alternative to the fossil-fuel economy, they are more likely to become a part of it, suggested Lange." (DG Research, New perspectives 2005, p.15)

3.4.2 Agricultural research priorities in EC Framework Programmes

Following the semantic analysis, we also had a short look into research funding on biotechnological and organic/low input farming research under Framework Programmes.

Although the European Commission did not strongly finance research on agriculture, food and environment until the 1990s, biotechnological research (including biomedical research) became a priority at the European level. Programmes were: the Biotechnology Action Programme, BAP, 1986-1989, Biotechnology for Innovation, Development and Growth in Europe, BRIDGE, 1990-1993, BIOTECH 1992-1998 and « Quality of Life and Management of Living resources » in FP5.[12]

[12] Friends of the earth report, 2007, A scoping study on how European agricultural biotechnology will fail the Lisbon objectives and on the socio-economic benefits of

In FP3, organic farming research represented less than 0.1% of the total budget. Since then, the net amount of European subsidies for organic and low input research constantly increased. However, as the FPs' global budget were always raising, the relative support of the European Commission for organic farming did not increase since 1994 and stagnates at a very low level (around 0.22%) in the FPs 4, 5 and 6.

FP	Organic Farming Budget (M€)	FPs Global Budget (M€)	% of budgets for Organic Farming Research on Global FP budget
FP3 (1990-1994)	5	6600	0.08
FP4 (1994-1998)	11	13215	0.22
FP5 (1998-2002)	33	14960	0.20
FP6 (2002-2006)	41	17500	0.23

Table 1: Funding of organic farming research projects in different FPs

Sources: IFOAM, briefing note, September 2006, Organic farming research in the 7th research framework programme and EC funded project STACS (Science, technology and civil society, 2009)

Concerning the priority 'Food quality and safety' of FP6, the financial support of biotechnological agriculture was nearly 4 times bigger than the support of organic farming projects. In FP6, all programmes included, there is a 3.25% rate between biotechnological and organic/low input farming projects.

	Organic agriculture €	Biotechnological agriculture €
FP6 (17,5 M €)	41.141.000	133.922.000
FP6-Food (685 M€)	32.293.000	126.767.000
% of FP6-Food budget	4,71	18,51

Table 2: Comparison of support to research for organic and biotechnological research under FP6

NB. Since FP6-Food was the programme which unified the largest number of projects and subsidies funded under one programme as well for organic agriculture as for biotechnological agriculture, we compared the budgets spent on respective projects. Key words were used to find the relevant projects. (see STACS report: Research priorities in Europe - Scientometric and budget analyses of some national European research priorities, 2009)

ecologically compatible farming

At present FP7 links agriculture and environment by emphasising agricultural biotechnologies, which is at the core of the KBBE strategy. The programme combines two tendencies: the environmental re-adaptation of agriculture and agronomic research (changes in the R&D systems) and the promotion of biotechnological tools as solutions for greater eco-efficiency of agriculture. Those two approaches are partly complementary: with post-genomics, it could be possible to link the modelling at a molecular level and the eco-physiological and ecological modelling at a higher level. But those two approaches are partly contradictory: the biotechnological discourses elaborated since 1970 promise to solve complex ecological problems by proposing simplistic technological solutions; this approach excludes systemic approaches at the level of farms, agro-ecosystems and landscapes.

Under FP7, research approaches to low input and organic farming have been broadened in including agroecological research. This is in line with a general shift in use from the more narrow term "organic" to the broader concept "agroecological", though it is rarely explicit in documents. Analysis of funding under FP7 would have to account for this.

European research policy for sustainable agriculture responds to different accounts. The biotechnological account is dominant, as well in discourses as in support to projects. Additionally, under “Emerging trends in biotechnology” in WP2011, synthetic biology gains more and more land (four calls including the creation of an ERA-Net). However, the landscape of agricultural research widened. More holistic considerations of agro-ecosystems raise and the use of agro-ecological approaches (encompassing organic and low input) are addressed in calls. Opposed trends thus exist in parallel.

A question for the future: whether policy changes will take agro-ecological research beyond its marginal role and realise its full potential.

3.5 Workshops results

3.5.1 Processes, research projects and calls

How to deal with agriculture and environment together between researchers, peasants' and civil society organisations and ordinary people? It is difficult for peasants to find researchers who are able to respond to their questions. Either, researchers are not willing to exchange with peasants (to let them come “into their laboratories”), either there are no scientists working on the questions peasants are interested in. Following this, peasants share a feeling of abandon by the research that seems “light years” away from what they are doing and by what they are preoccupied. On the other hand, researchers who want to engage in participatory research often face barriers from their hierarchy, feel the strong need to work in interdisciplinary teams (for instance with social scientists) without having experiences in this, and experience difficulties in publishing their results. Researchers engaged in participatory research with peasants witness that they profoundly modified their way of working, their practices.

Participants also stated that since more and more importance is given to a highly technological and expensive innovation, few room is left for other approaches, less technological but not less knowledge intensive as for instance organic agriculture issues. Also, in the current publication system, systemic approaches are often less valued as analytical approaches.

Both parties at the workshops – researchers and peasants – confirmed that the conceptions of the world between researchers and peasants are sometimes so different that this can block the process of dialogue if there is not enough room given to exchange and mutual learning. Some peasants reported that, after some years of difficult cooperation with researchers, they stopped working with them and favoured the exchange only amongst peasants. International participatory research projects (e.g. European projects) often impede cooperation of researchers with non researchers, partly because of language barriers where English is the dominant language.

Responding to calls for projects becomes today the major way to finance concrete research projects. The participants agreed to the fact that nowadays there is a certain language needed in the presentation of projects for that they have a chance to be accepted by evaluators and by funders (EC, national agencies, ministries, research institutions).

Civil society organisations should be associated to the formulation of calls and research questions. Today, according to one participant from a civil society organisation, the calls for projects are too often “calls for results” where participants nearly “have to know in advance the results of the research”, and where there is an imperative to publish papers in specific journals. Participatory research projects have difficulties to correspond to this since the process of the research is as important as the results and since the results are very open. Also, the time needed to prepare a participatory research project is often not taken into account.

In the frames of participatory research projects, there seems to be a need to clarify the relation between the different knowledges of the actors and the way of cooperation, of what is considered being profitable and efficient or not, and how knowledge has to be protected (ex. very often today research leads to a commercial product, and as soon as a patent is recognised, traditional or popular knowledges disappear since they will be forbidden for free use).

This led to a discussion about the question of how to solve problems. There are two modes of approaching a problem - either trying to solve it, or else trying to suppress it without solving the problem. It is essential to make a diagnosis of a situation or problem while keeping in mind that this diagnosis is framed by the underlying values. Accordingly, different results and conclusions can come out of the diagnosis of one and the same situation. In agriculture there are no agronomic solutions that do not have at the same time also social and environmental consequences, so one should stop the process of externalisation of social and environmental costs and reintegrate them into economic calculations. Concerning the concept of ecological efficiency (used for instance for sustainable development at the European level) one should be aware that there is no “eco-efficiency” without social efficiency (in the sense of social improvement).

The researchers confirmed that a majority of researchers from INRA do not or few know the rural world.

How to integrate into research projects a notion of “simplicity” (in the sense of “Why making it complicate when one can make it easy?”)? Simplicity should allow to go for alternative solutions that seem sometimes “too easy”, not enough scientific, not enough to commercialise.

3.5.2 Agricultural and environmental issues

One participant from a civil society organisation raised the question about the relation between organic agriculture and agroecology in saying that one could not put the two terms on the same level since organic agriculture can also be industrialised. Agroecology is a mode of production that calls for the relocalisation of production and for complementarity in production (no “hyper”-specialisation) in order to feed populations. So how to encourage peasants to develop diversity in production?

One question the subgroup of researchers discussed was if the domain of agroecology necessarily implies participatory research approaches. If ever this might not be the case, agroecological research implies at least to recognise the existence and importance of different forms of knowledge and to question the current dominant mode of knowledge production. This leads to the questioning of the balance between efficiency and sustainability.

The researchers also pointed out the danger that participatory research could be misused by scientists in order to create a better social acceptation of certain innovations and thus instrumentalising the whole process. This can already be observed by so called participatory projects that are in fact only “decentralised” projects (in the sense that part of the work takes place on peasants' fields) without associating peasants to the process. Furthermore it was mentioned that Internet plays a growing role as a source of knowledge.

More specifically concerning the situation in France, the fact that there exist technical institutes as intermediary institutions between public research laboratories and peasants might be a factor that slows down the development of participatory projects between researchers and peasants. The questions is how far these intermediary institutions should be involved in such projects since up to now they were not implicated and did not express interest in participatory projects.

Climate change should be one of the major concerns when considering agriculture. The question of how to reduce climate change and its impacts should play an important role in research projects. How to go for an agriculture that has less impact on climate change and what at the same time is more resilient in order to support better climatic unpredictability? Nowadays there is the risk that commercialisable responses are favoured as in the case of geo-engineering and nanotechnology. Systemic approaches including the social, ecological and economic dimensions should be favoured in order to work on climate change issues. This permits to place a problem in its context and to identify imbalances.

There exists only few research about juridical questions and questions of intellectual property rights (e.g. seed rights), and about the health state of peasants (the latter since epidemiological studies are long and relatively expensive). Also it seems to be difficult to find funding for research projects with researchers in agronomy, ecology and doctors.

3.6 Further activities

3.6.1 REPERE Call for Projects

Shortly after our two workshops, the French Ministry of Ecology launched a call on “Recherche et expertise pour piloter ensemble la recherche et l’expertise” (REPER), or “Research and expertise to pilot together research and expertise”. The call aims at inviting research organisations, NGOs and other actors to reflect, through different actions, on the governance of research and the implication of civil society organisations in the definition of research priorities and in collaborative research projects.

We immediately thought of some colleagues - peasants and scientists - who had participated in our workshops. We contacted them in order to propose them a common project. They were all interested and accepted our idea. Thus, FSC, the peasants organisation Réseau Semences Paysannes and several scientists from two public research institutions (CNRS and INRA) and from different scientific backgrounds (genetics, agronomy, sociology) submitted at the beginning of January 2010 the project “”Co-construction des savoirs et des décisions dans la recherche : l'exemple de la sélection participative en agri-environnement” - “Co-construction of knowledge and decision in research : the example of participatory breeding in the field of agri-environment”.

The project is designed to follow up the WP6 activities in CREPE. It includes two workshops with peasants and scientists on participatory research, a regional forum for a large public, a handbook on governance of research mainly addressing scientists and an analysis of participatory processes in the domain of participatory breeding. Our proposal was successful and began in late 2010.

3.6.2 CRID Working Group

Fondation Sciences Citoyennes is involved in the CRID network (Research and Information Centre for Development, http://www.crid.asso.fr/). CRID is a network of French NGOs for International Solidarity (Associations de Solidarité Internationale - ASI) which :

- share the same conception of a humane and sustainable development in a spirit of solidarity, through the strengthening of the civil society,

- work in partnership with Southern and Eastern NGOs,

- implement development education projects in France and promote public opinion campaigns,

- participate in the construction of a “ global movement for international solidarity ” and try to develop it further in France.

CRID is actually launching a reflection on European involvement of its members in research programmes. Fondation Sciences Citoyennes will be part of it and will bring agricultural and scientific themes to the group.

3.6.3 Connection with West Africa

Fondation Sciences Citoyennes is involved in the *Science and Democracy World Forum* process. We recently organised a meeting in France with 30 French organisations involved in sciences and research. It gave us the opportunity to meet an activist from West Africa, Moussa Mbaye (Dakar, Senegal) who accepted to co-prepare the 2nd Science and Democracy World Forum, which will take place in Dakar in january 2011. Moussa Mbaye is working for ENDA DIAPOL (http://www.endadiapol.org/), an organisation quite similar to Fondation Sciences Citoyennes. We decided to work together especially on cooperation with peasants (especially with cotton producers in ENDA DIAPOL case) and fisheries. The idea behind this cooperation is to improve political dialogues locally between politicians, scientists, peasants and fishers.

4 Relevance to Overall Project

4.1 Agri-environmental issues

Agri-environmental issues are the basis of our document analysis. More precisely, these issues will be discussed through research priorities and through their relevance for CSOs. In the best case, and without pretention, our WP could provide arguments to our partners who are working on more precise and action-oriented actions. In that sense, WP6 and WP7 are giving a more academic information on agri-environmental issues (even if FSC is not a research centre). As a hypothesis, we could add that the recommendations we will give, which will be one of the results of our project will be useful for other WPs as non-specific and transversal proposals to the questions they are dealing with.

4.2 Priority-setting

The final aim of our WP is to be able to deliver recommendations to European stakeholders and institutions in order to answer to the expectations of civil society. These recommendations will include the questions of co-operative and participatory research. As the STACS project showed us, those approaches are very innovative and would lead to another way of orientating and of programming new kinds of research priorities.

Even if not 'all' research priorities have necessarily to become cooperation or participation-oriented, we think it would be relevant for European Commission to increasingly integrate CSOs or 'local knowledge representatives' in the process, which lead to the definition of research priorities.

In the current socio-economic context, financial crises seem to become an excuse for putting environment and agri-environmental issues aside. But new approaches need to be evaluated and proposed to make things change, keeping in mind the emergency of the situation. Our WP should give a panorama offering a good evaluation of the situation and giving the opportunity to reaffirm the relevance of changing research priorities by presenting concrete recommendations.

4.3 Solutions

The workshops we held allowed us to give recommendations concerning methods and processes for a better understanding of agricultural and environmental issues for researchers and non profit organisations.

Stakeholder relations and participatory research

To strengthen the relation between CSOs and researchers, peasant organisations propose, on the specific question of orphaned research to build, on a national level, a website on which peasants could directly address questions to the researchers and their institutions. This website could be helpful in the reformulation of those questions and open discussions on web-forums. Such websites would be a good opportunity to share experiences and experiments and a good manner for researchers to know which topics would be really relevant for peasants. In direct relation to this website, mediator organisations (such as in France FSC or Bede) could organise several times a year meetings, which would gather the two sides (as it was done during the CREPE workshops) to exchange, more or less formally, on issues which could lead to co-operative research projects or programmes.

It would be also helpful to launch calls that allow the creation of long term contacts between different actors ("mise en réseau" des acteurs) upwards the creation of common research projects. This would be beneficial especially in terms of mutual understanding, trust and common bases to problems. What kind of mechanism could be developed to support these contact building and networking?

As it was said by one of our participants: "It is impossible to create something sustainable without having sustainable modes of work." What kind of mechanism to build up common research projects? Participatory research projects, if they want to be really successful, need to associate closely all partners from their very beginnings in order to assure that the research done is useful to all and particularly to the civil society partner, and that the results will be accepted by the latter. A research programme on best methods of how to organise participatory research would be welcomed.

In-person meetings

It came clearly out of the meeting that nothing replaces and that nothing is more important than personal, physical meetings. Reasons are: to become acquainted with each other, trust building, mutual understanding, sharing of knowledge, ideas and visions, developing of a shared language, mutual definition of problems as well as methods and protocols to solve them, ongoing confirmation and eventual reorientation of the work during common projects, use of results and dissemination. In public research institutions different spaces for common meetings are necessary - at the level of

individual laboratories, at the level of directions of scientific departments, at the level of directions of research institutions. This implies the question of how research questions formulated by peasants reach the scientists in the institutions.

Research institutes

Currently it seems easier to establish participatory research projects in universities than in big public research institutions such as INRA (that is the biggest public research organism on agriculture in Europe). This discrepancy might be linked to different research cultures in these entities. Efforts should be undertaken to overcome this.

Public commons

It should be integrated into the research project contract between the different partners that all results will stay in the public sphere and that no private appropriation is allowed. Eventual advantages shall be shared by all.

The research and higher education system

There are numerous approaches to how to influence the future evolution of research - two of them are the social demand and the education of students as the future generation of researchers. Research and reflections at different levels should be engaged about the functioning of the scientific world.

4.4 Co-operative and participatory research

As we already mentioned in the STACS project: 'Knowledge production in conventional research is both discipline-based, evaluated by publications, and increasingly shaped by an industrial logic, to the extent that science has come to be seen mainly as a purveyor of technological innovation and increased competitiveness on a globalized market, as illustrated by the Lisbon agenda. As a consequence technological innovation is often framed as "one way" progress, and there is not much consideration about the direction of such progress. Different technological choices can have different impacts on society, but the implicit assumptions that frame these choices, and their social implications, are rarely evaluated and discussed. This narrow framing of the role of research and this focus on new technologies often leads to a piecemeal approach in the design of research agendas, inadequate for tackling the multi-dimensional challenge of moving our societies towards Sustainable Development. This perceived lack of relevance of a linear model of research focused on competitiveness in addressing the ecological, economic and social crisis in an integrated way has fostered the emergence of problem-based approaches, that emphasize trans-disciplinarity and that see knowledge not only as a product, but also as a process.

Terms like "Participatory" or "Community-Based" Research refer to research conducted in partnership between traditionally trained experts, usually academics, and members of a "community" or CSOs. The degree of involvement of the CSO partners at the different stages of the research process (problem definition/issue selection, research design, conducting research, collecting data, interpreting the results, determining how the results should be disseminated and used for action) can vary according to their nature, their capacity and to the purpose of the research project. The diversity of the models reflects the diversity of possible partners (local communities, ethnic groups, practitioners, CSOs dedicated to a particular purpose). CSO-researchers partnerships, and the infrastructure and incentives put in place to encourage them, can operate at local, regional, national or international levels. Initiated in social sciences and in the health sector, participatory approaches are increasingly used in sectors where natural sciences have a more prominent place, such as environmental sciences or agriculture.'

In such a context, Fondation Sciences Citoyennes tries to develop and to impulse a new kind of long-term cooperation between researchers and CSOs. The CREPE project will be a good opportunity to experiment this cooperation in practice.

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