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COMPARATIVE AGROECOLOGICAL ANALYSIS BETWEEN NORTH AMERICAN AND EUROPEAN REGULATIONS ON PLANT PROTECTION PRODUCTS, AND THEIR CONSEQUENCES IN LATIN AMERICA

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ABSTRACT

This article is based on a former research of a Ph.D. thesis, performed during three years (2011-13) at the Institute of Rural Sociology and Peasants Studies of the University of Cordoba, Spain.

The purpose of this research was to evaluate the suitability of regulations on plant protection products in two different economic blocks (the European Union and the United States of America, in regards to needs and perceptions of those individuals (agrarian producers and other agents) affected by them. These data were contrasted with the derived effects of these regulations on the producers and their ecosystems in Latin America.

The approach was based on the multidisciplinary paradigm of Agroecology. It tried to value and show those aspects that are not present and not captured by these regulations. The study was a comparative analysis between environmental regulations of these economic blocks and their safety impacts.

The main techniques used for data collection were semi-structured surveys, revision of secondary sources and Delphi analysis. In the last part, some research results were shown, trying to verify the hypothesis, from the matching of data and insights.

In the case of Latin America, the main focus was put into the destructive relationship in both the local communities and their environment, based on the use of one of the most common agrotoxics: Glyphosate and its derivate products. A brief deepening was done into the knowledge of those agrochemicals related to cropping of soybean. This will establish the components of exchange of these products in the world chains of trade and the consequent economic networks that sustain them. It will be continued with a study of the consequences for the populations affected in Latin America, and for their agroecosystems.

Finally, the thesis provided a step toward the opinions of producers and experts on these issues, trying to verify hypotheses from the coincidence of data and opinions. The article concludes with a summary of recommendations to improve and influence future regulations and ecological and political agendas.

Keywords: Plant protection products; Law; Agroecology; European Union; Latin america.

1. INTRODUCTION

Pesticides are active substances intended to kill and control harmful organisms, such as insects and nematodes. They are an important part of modern industrial agricultural production. However, these products can have undesirable effects on organisms other than those intended to be attacked, including human beings².

Because of the potential harm to non-target organisms the use of pesticides in the Member States and the European Community (E.C.), and in most of the "Rule of law states", their use has been regulated. Over the years, lawmakers have been developing a system of control and risk assessment (RA) for human health and the environment. The same situation is found in the United States of America (U.S.), with some different characteristics, that will be shown in what follows.

We cannot understand this process without closing the perverse cycle that this legal chain behaves in third world countries agricultural production. At the beginning of the XXI century the best example is in the bonds of dependence on the use of pesticides by farmers from various Latin American countries. After learning about this landscape of desolation, I tried to demonstrate alternatives derived from the opinion and reports of those agents involved in these issues.

Despite the existing regulatory framework, undesirable amounts of certain pesticides are still in different locations (in particular in soil, air, and water), and pesticides are frequently detected in agricultural products with residues exceeding the regulatory limits. The risks entailed for people and the environment are very high. Human health, the environment and the entire food production system can be compromised if they are not properly managed.

From the standpoint of industrial agriculture, there is an aim to exert greater control over all the variables that determine the level of production, in order to maximize outputs and thereby profits. Pesticides and other plant protection products (PPPs) are generally thought to be necessary to achieve this aim. By the contrary, in organic farming the target is to achieve a compromise between production and respect for the natural ecosystems surrounding agro-ecosystems, with an implied rejection of synthetic organic chemical-based PPPs.

Proposed and recently enacted legislation by the European Union (E.U.) has proven to be a milestone on the path of regulating PPPs. The legislation to regulate the management of these inputs needs to be continually adjusted to reality. A clear example is the proposed Common Position (EC) No. 25/2008, adopted by the Council on September 15, 2008, focused on the adoption of new regulations on the disposal of

² Commission of the European Communities (2006) "Proposal for a directive for the European Parliament and the Council establishing a framework for Community action to achieve a use sustainable ", pp.1

pesticides and repealing Directives 79/117/EEC and 91/414/EEC, as they have brought new demands on the agrochemical sector.

Yet, this legislation also shows the continuing differences between both North America and Europe with respect to the types of agricultural production. It follows the difficulty of standardizing the different European cultures as far apart from each other for centuries and the different agro-ecosystems, connected with so many diverse and abundant life forms.

One of the most serious weaknesses of this legislative process has been the absence of a detailed official study of the consequences that this legislation could have on:

- 1 Agricultural production.
- 2 The availability of food.
- 3 Income and employment in rural areas.
- 4 Human health effects.

There has been a constant demand of legitimacy on agricultural organizations such as COAG, Via Campesina and many others. But they have not been addressed by the E.U. institutions. It seems that it is legislating in the dark, without really knowing the impact of what they decide or at least the opinion of the sectors affected by these reforms. Therefore, this study attempted to document the opinion from the points of view of those who are affected by these new laws and regulations to remedy the E.U.'s apparent lack of consideration about them.

To do this, in this paper I try to compare the new European legislation on plant protection products, to determine its influence on the reduction of environmental damages on the agro-ecosystems. This will also be compared to the U.S. legislation.

We cannot understand this process without closing the destructive cycle that this legal structure causes in third country's agricultural production. At the beginning of the XXI century the best example is in the bonds of dependence on the use of PPPs by farmers in several Latin American countries.

Thus, this study aimed to understand and shape the perceptions of producers and experts on the topic, since these perceptions largely determine their motives and opportunities to continue in farming and rural life, and also about their practices, which affect the health of the agro-ecosystems and communities where they live and work. After examining this topic, this paper tries to offer some alternatives.

2. AGROECOLOGY AS THEORETICAL PARADIGM

Agroecology is an holistic agronomic and technical approach, capable to integrate an ethical, political and cultural dimension. While its technical dimension limits its scope to the studies of agronomic management styles related to the Organic Agriculture

(Primavesi, 1997:107-156) cited by Sevilla et al. (1998: 1) it is true that it contains a valid sociopolitical and cultural dimension as a tool for political struggle and social and environmental activism. But also it has serious uncapabilities for an expanded reproduction of these same different experiences, as being based on local agroecosystems.

From a political point of view according to (Garrido, 1993) political ecology could be defined as a new political paradigm that helps, without being a science, to create a new ontology and epistemology that will help to address the ecological crisis and the social alternatives for our civilizations.

It departs from the scientific-agronomic knowledge, turning their attention to the ecological mechanisms of the biological processes of production from an environmental approach, and, secondly, the proposals for a sustainable agriculture. This transdisciplinary approach defines sustainability as the maintenance of the biotic reproduction mechanisms of the agroecosystems and the social reproduction of the cultural matrix through the social and ecological co evolution (Norgaard, 1994).

This transdisciplinarity lies in the fusion of past environmental and technical productive perspectives with an intense search for equity. It is intended therefore that the transition processes are carried out in the space of the local territories and mainly in the farm space. To do this, it tries to avoid the deterioration of natural resources, transforming the same level of social operating mechanisms in a similar approach to the paradigm of sustainable development. This is made by rescuing and developing proposals for collective social action to combat the predatory logic of the hegemonic agro-industrial productive model, to replace it with another target towards an agriculture more socially fair, economically efficient and ecologically feasible (Altieri, 1997) in (Op. cit. 1: 2).

From this conceptualization the sustainability notion equates to a fair allocation in participatory design methods for endogenous development (Guzmán Casado, Sevilla, & González de Molina, 2000) in (Op. cit. 1: 2), for the establishment of dynamic transformations to sustainable societies (Sevilla Guzmán and Woodgate, 1997: 83-101) in (Op. cit. 1: 3). To carry out this task, it relies on forms of collective social action in each locality with social endogenous potential (Op. cit. 1: 3).

The practical basis, or more properly, the sociological basis of this transacademic and social movement are composed by the organic agriculture (both from modern styles from the North, as the historical styles, and / or indigenous-peasant farming from the South). Thus, Agroecology offers a rural development model based on the agrarian peasant farming (Sevilla et al. 2000: 56). Currently, we observe features that show a part of peasant resistance and by the other hand a certain "recampesinización" movements (Van der Ploeg, 2001: 45) and neo-ruralization of the labor and artesanal productions, sold in local markets and through alternative channels, which are leading to new "farming styles" and social green movements (Calle, Soler, Varas. 2009).

3. RESEARCH METHODOLOGY

This thesis tried to demonstrate that the lack of rigor in the current legislation on pesticides is creating some risk factors in their practical application, and even more in third countries, due to the effects of global trade.

My hypothesis was that the new European regulations on pesticides and its American counterpart are based on regulatory processes that are far removed from actual agricultural activities, leading to regulations that do not completely reflect the producer's needs, with the consequent negative effects for the whole of society. The thesis was restricted to the perception of involved experts and farmers, and the risks arising from effects initially proposed.

It was begun outlining the content of the methodology, hypotheses, objectives, variables and analytical techniques. Once that the sources of information were detailed, I discussed a review of academic literature on:

- 1 The Sociology of Law, incorporating the current theoretical Sociological flow focused on emergencies and Post-normal science.
- 2 Agroecological Public Policies, and the agroecological perspective on PPPs.
- 3 The legislative basis for PPPs and their related environmental problems.
- 4 The E.U. and U.S. policies regarding the laws shown in the study.
- 5 The effects of excessive regulations on agricultural production in third countries, and in particular in the case of Latin America.

In the third part, I discussed the results of the research assuming the assessment of the perceptions obtained, the motivations of the stake-holders and the experts' opinion on this topic.

I concluded with an exhibition of the conclusions and recommendations to influence public agendas and for improving future legislations.

4. DATA COLLECTION AND ANALYSIS

Data were obtained from three different sources: A Delphy analysis for experts, semi-structured surveys to farmers about their opinion and perception on this issue and the revision of secondary sources. The first two methods were performed in each different economic block, thus in Spain, as relevant sub-example of the topic in the E.U. in 2010, In North America in 2011 and in the case of Latin America in 2013.

Before data analysis, all of them were obtained via e-mail, and surveying and using the website SurveyMonkey (R). Surveys were obtained using a Likert scale from 1, as being totally negative and 5 as being totally positive in perception for each item.

The statistical analysis of the questionnaires was performed using the software G - Stat student. For each of the items given, the median (Q2) was used as an average

measure. This is a variable that is used when the arithmetic mean is distorted excessively by the existence of outliers.

As a dispersion unit I used the interquartile range (Q3-Q1). It is calculated from data ordering

the highest to the lowest points, showing the difference between the 50 items, and organized into five main sections.

In data analysis, statistical analysis was performed by using the G-stat student programme, in its version for Windows XP.

4. 1. Semi-structured surveys

This method "intends, through the collection of a set of private knowledge to build social sense about individual or groups of reference's behaviour" (Vallés, 2002:54). As for this research I had to modify this method to perform them, based on a distance way.

The questionnaires were structured from closed questions, evaluated with Likert scales, where respondents were assigned to score a ranking of the importance given to the factors. Then an open further participation was allowed.

Table 1. Survey analysis

UNIVERSO	Implicados en la producción agraria
ÁMBITO GEOGRÁFICO	Unión Europea / EE.UU. / Latinoamérica
TAMAÑO MUESTRAL	➤ 2.905 encuestados
ERROR MUESTRAL	Para el conjunto de la muestra se establece el 5 %
DISEÑO MUESTRAL	Agentes gestores, expertos, (instituciones) (fincas)
TRABAJO DE CAMPO	Junio a Septiembre de 2010 Abril a Septiembre de 2011 Marzo a Mayo de 2013

Source: Own elaboration.

4. 2. Delphi Analysis.

The experiences in using the Delphi method in social sciences are wide and provide a broad background. This is a prospective technique to obtain subjective information. Its target is to collect the opinions of experts by anonymous questionnaires, analyze them and resubmit them in a new questionnaire, which contains a prior examination of the results of the first collected data, so giving them room to change or not their opinion if they wish so. It can combine knowledge and experience of experts in

various fields, tending towards a consensus of different points of views in reaching decisions that unilaterally are not assumable.

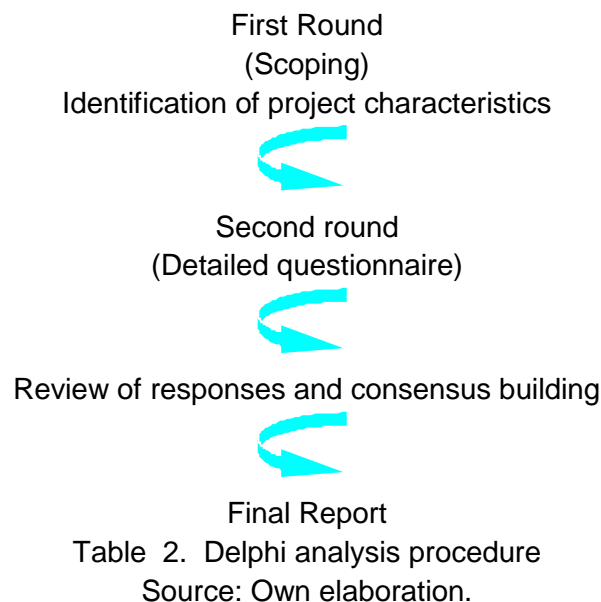
The procedure is repeated in successive rounds, usually two, up to finding the convergence of responses on the occurrence of a series of events. The basic idea of this method is that "group" knowledge is better than that individually findings, proceeding from individual experts in areas where sufficient information is not available, and this is marked by its outstanding grades: anonymity, the "feedback" response on "group" and the tendency towards consensus (Kaynak and Macaulay, 1984: 115). Its purpose is to use the advantages of the "groups" methods and reduce the negative effects (mainly psychological) of the interaction of group meetings or those made face to face.

The Delphi method has been chosen because it relies on the need to reason among the members of the expert's panel. These ideas can generate intense and qualified knowledge about all legal and/or illegal issue, as this topic somehow seems to be.

Therefore, this process began with the definition of the concepts discussed and the selection of experts on agro-environmental legislation.

LITERATURE REVIEW

Selection of experts invited to participate in Delphi



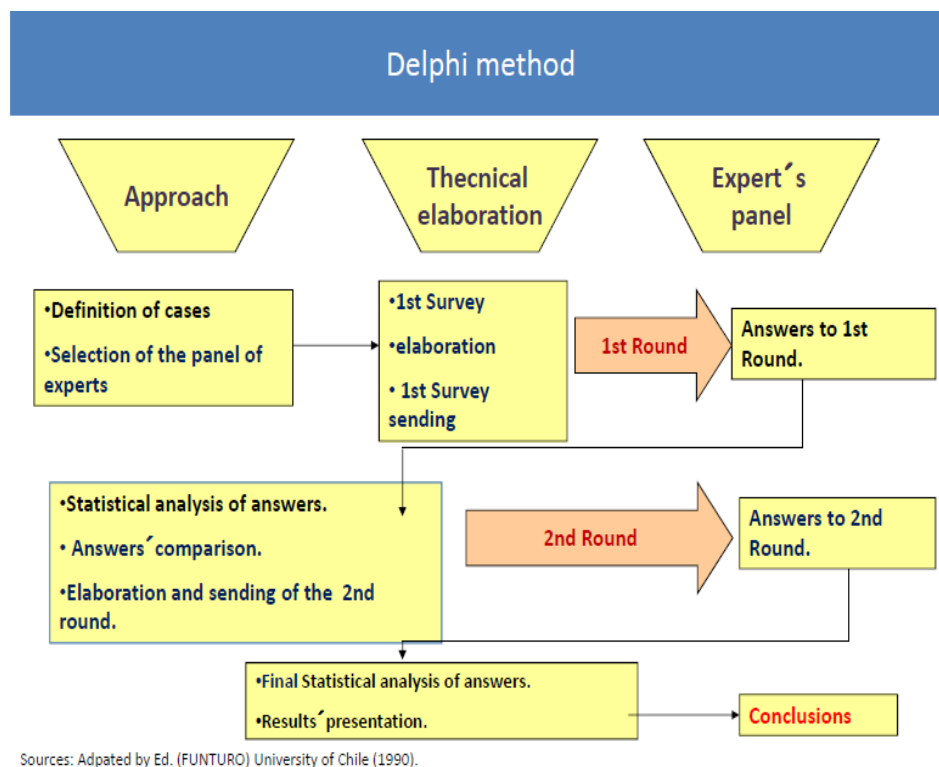


Figure 1. Delphi analysis
Source: Own elaboration, based on Unfuturo (1990).

The first step in this research consisted of reviewing the operational objectives and questions of the thesis' project. It was particularly interested in the translation of problems defined for each question. This was based on a simple literature review on the Delphi method. The next step was to identify experts and professionals who could be invited to participate in the consultation process. The sample size usually varies from 4 to 171 experts (Pulido, 2005: 118), making it difficult to be guided by a set that sample the issue on a priori basis. A large number of participants make the results more reliable, but if they are very homogeneous, it is pointless to increase the number, because few more individuals can not bring new ideas. Based on the proven experience in the literature reviewed for this study, it was established that the group of experts that should participate in this Delphi analysis would be integrated by:

- 1 University professors and researchers related to risk prevention, environment, agricultural production and environmental law.
- 2 Qualified organizations managers belonging to farm bureaus and agricultural associations.
- 3 Agricultural scientists and/or technical experts.

In any case, it was established as a condition "sine qua non" the existence of a close link between the professional, institutional and/or researching background of the experts who were invited with the topic under research.

In the Spanish case as for the first round I got the answer of 3 university professors, 7 technical qualified managers and trade union staff employees and 6 scientist participated on it.

Consequently, the criterion for the selection of experts was based on their knowledge and directly related to the topic. With most of them the contact was impersonal, clearly explaining the objectives of the study and why it was important to obtain their opinion. Similarly, the anonymity of responses was guaranteed. From those questionnaires sent in the first round, I received completed a total of 11 answers. Next, a first process started to homogenise the maximum of responses received, followed by making the tabulation of data, an analysis of results and their transcription to a final document.

The findings were sent to the experts, along with a second questionnaire that included only the responses received in the first round that had not reached a level of 2 points or less of average consensus in the interquartile range Q1 - Q3.

For the U.S. case in the first round I got the answers of 8 university teachers, 4 qualified technicians from varm bureaus or farmer's trade union organizations and 3 by agrarian scientists

From the questionnaires sent in the first round a total of 15 samples were fully received. After a process to homogenise the maximum number of responses I followed with the tabulation of

data, an analysis of results and their transcription to a document. The conclusions were forwarded to the experts, along with a second questionnaire.

Just as the previous section, in the case of Latin American countries, in the first round there were answers by 21 university professors, 6 qualified technicians on corporate agriculture and trade unions but any answer by scientific technicians.

From the questionnaires sent in the first round, a total of 27 answers were received. Subsequently, the same process began to homogenize a maximum of responses received to make the tabulation of data, analysis of results and their transcription to a final document.

The second questionnaire included a total of 18 out of 50 item, organized in one of the seven main sections. For the United States the same pattern was repeated with 53 closed questions in the first half and 27 in the second one. In the case of Latin America 50 items were delivered in the second half with a total of 47 questions, given the abundance of questions provided by the participation of these experts.

In this second round the opportunity for new contributions was eliminated as it was possible for the first round. Consequently, this questionnaire was broadly similar to the previous one, not opening a second opportunity to agree about those items that had not reached a general agreement in the first round.

5. RESULTS AND DISCUSSION

The opinion of conventional producers (Spanish respondents) on this issue, obtained from the semi-structured surveys was as follows:

- 1 They are mostly professionals who have experience and will stay working on their farms;
- 2 They are involved in many activities, ranging from consumption to the investigation and the production of Mediterranean different types of crops;
- 3 The level of activity is low regarding to their liabilities, but they are aware about this problem;
- 4 Many of them rely on others producers and are trying to defend themselves against PPPs, with their cost in time, knowledge and money, in the case of the protection of crops and soils;
- 5 The conventional producers seek help from external heterogeneous sources.
- 6 Organic farmers show a deeper understanding, pointing out these issues:
 - ◆ Periodical use of foliar fertilizer to keep plants strong and healthy;
 - ◆ Monitoring the biological balances;
 - ◆ Many investment in prevention;
 - ◆ Preventing contamination with PPPs from nearby conventional fields;
 - ◆ There is no time to evaluate, since production is the main objective and it takes all the efforts, in very intense periods;
 - ◆ Show to other professionals the capacity to manage the field, rescuing ancient agronomic wisdoms, and the use of partnerships, books on the subject and internet resources.

In their opinion, the most of the concerns to consumers are about food safety and the possible presence of pesticide residues in vegetables.

Both groups (organic and conventional) believe that these agrochemicals products are a source of public health risks, and environmental and genetic problems, with unforeseeable consequences for our future generations and the planet, both for long and short term, with unknown consequences for our health, depending on the each individual. It is emphasized by both of them that the consequences can move to the next generations. Obviously this is the greatest direct risk to health: the aerial spraying. One producer says that even knowing how to handle them the contamination cannot be easily avoided.

Producers do not agree with the assertion that the new criteria about E.U. pesticides will cause an increase in the price of food crops by becoming scarce. They believe that their ability to manage the use of pesticides is adequate.

They do not believe that plant protection products ensure the production and profitability of their crops, that cannot assure lower prices for consumers and that the ban on plant protection products will cause to consumers to stay away from fresh food consumption.

The ban on plant protection products is perceived as better for our environment. But it encourages a black market, believing that it will increase the consumption of those PPPs that will remain on the market.

They believe that the biological control methods are essential to reduce the dependence from the large chemical industry.

In the case of the U.S. respondents they showed the lack of a clear knowledge from the participants about how the Environmental Protection Agency (EPA) helps to producers, importers and exporters to meet the regulatory requirements of international trade mechanism and to minimize barriers. Their opinion are negative regarding the role of the government to maintain a fair competition and strict safety standards.

This is even more negative in perception, when declaring that the aim of the changes in legislation is not to protect the human health and the environment from harmful effects of certain hazardous chemicals, which contradicts the opinion that the formal emphasis role of regulations is to reduce the risks to humanity and the environment, instead of taking care of the safety and efficacy regarding to agricultural production.

There is a slightly negative perception about the current effect of the United States Department of Agriculture's (USDA) changes in rules, on how it has had a positive impact on organic producers, how it has undertaken the responsibility for a right use of pesticides by their applicators, and how it monitors the state agencies that put into effect the regulations on pesticides.

Producers have a positive opinion regarding how the Clean Sweep program works and how it fosters hazardous waste regulations, addressing issues of accountability. Also about how it properly provides information to potential participants.

According to the producers the industry does not adequately use the policies to prevent the management of responsibilities, regarding the negative impact of PPPs. In fact, they do not believe that they can demonstrate by themselves a working knowledge on pesticides' problems and control operations, including the storage, use, handling and disposal of pesticide containers and packaging.

One reason can be found in that they are not easily obtaining much information on hazardous chemicals, that could affect their community and they do not obtain preparations to deal with potential chemical emergencies. Other issue can be simply the limits assumed by risk assessors, which estimate the potential risks of pesticides are unrealistic.

Thus, it is not a matter of measures, in their opinion because even when legally applied, many pesticides leave residues in processed foods, such as fruits, vegetables, grains and other commodities. Residues are difficult to be removed by washing the

products, since most pesticides do not dissolve easily in water. They are thought as being absorbed systemically through the plant and distributed throughout the plant tissue.

The main trouble for some farmers is to find organic seeds on stock, including livestock grain, as it increases the cost of organic production. To manage the certificatory paperwork is in general a problem.

Not many farms participated in government programs over the past five years, specific to organic land and/or products. They declared that did not receive help from federal or state marketing orders and these are relatively not equal to the benefits received by conventional producers, for the same range of products. The majority of them have not participated in the Agricultural Health Study and consequently they have not got the experience provided from their participation.

There is not enough trust about if private applicator can demonstrate their ability to understand the label of a pesticide and if this is enough for this use, if a label can maximize the effectiveness of the product and about the use of the applicators protection, the consumer's welfare and the environment.

Most of them had not endured any sort of special status that would allow them to use a pesticide in a situation not covered by an approved label. Also most of them did not put into action any kind of emergency exemption that would allow them to use a pesticide in a situation which would not be covered by an approved label.

Producer's opinion showed their perception about what degree of conditions in delivering their certified organic product(s) to markets are mostly related and taken from the economic production side: production conditions, weather-related production losses, weed-related production losses, market conditions, obtaining organic price premiums and the lack of organic price information, high input costs and high labor costs and production losses, due to plagues or diseases.

Other not so crucial factors are related to plants production, like finding desired seeds/stocks, which are appropriate to organic production, unavailable (for crops and/or livestock) organic processing facilities, pesticide or herbicide drift/contamination of the products, and the contamination of them from genetically modified organisms (GMOs).

Finally, other not crucial factors are related to organic markets. The main factors conditions that have served as specific problems to deliver their certified organic product(s) to markets are related to market conditions, like finding organic markets, obtaining access to them, the improper competition with unverified organic products and above all those that are related to organic certification costs. Other issues are related to the food safety and regulatory requirements/ standards; customer volume requirement limits sales in certain markets, those competitions with organic product imports from other countries and with non-organic "Eco-labels" and customer packaging and/or transport requirements limits sales in certain markets.

Producers are not sure, neither they have had a clear opinion about how USDA National Organic Program Final Rule works and if it had positive and/or negative impacts on organic producers. There are no problems related to these normative, up to the moment.

Almost half of producers believe that this regulations favor large scale, non-diversified commodities produced by large farms. The standards are poor regarding to the integrity of organic labels. In their opinion these problems will continue as the laws will favor large scale business and producers. The availability of organic seed will remain as a problem.

In their opinion, the cost of organic certification will be increased and the integrity of the organic product/label will be decreased. The paperwork, and its recordkeeping will be a problem. Because of those troubles possibly or definitely many producers will no longer seek to obtain organic certifications. As we have seen their main problems are of economic type and those from marketing issues and therefore, other aspects like pest management seems deluded.

Finally, as a nexus of consequences the perceptions and opinions of these issues are shown as follows: There is no clear criterion on whether phytosanitary regulations in Europe and the U.S. have a direct impact on agricultural production in these countries, although producers agree with this statement. Even smaller and more neutral is the assessment of whether there are other countries that have more influence on exports, such in the case of China. It is not clear that there is a causal link, while the benefits of using these seeds and products are derived to consumers in their countries, and producers in other countries. It is not clear that the main objective of these legislative changes are focused to protect imports from the rest of the world.

In the other case, ALA respondents overwhelmingly opt for claiming that these regulations changes will have some impact on their production and sales expectations for the next years. There is an strong bias in both bands on whether the new criteria on pesticides will cause an increase in the price for food as crops will become scarcer.

Respondents claim that their ability to manage the use of pesticides is adequate, but there is no a clear assessment, given the bias in the responses, on whether PPPs can ensure the availability of their crops.

According to respondents these plant protection products do not guarantee the profitability of crops and profits for producers, nor guaranteed lower prices for consumers. It is unclear whether the ban on pesticides will cause a rising of prices of inputs. They do not believe that the ban of pesticides will cause to consumers to turn away from fresh foods. In that case it is not clear whether it will provoke a change in their work styles, due to the polarization of responses.

They strongly agreed that the regulatory changes will have impacts in other countries: they will have to reduce the use of agrochemicals. They will have to change their model of production and increase the consumption of those PPPs that will remain in the market.

They agree that the ability of farmers to manage the use of agrochemicals is not adequate. Respondents understand that banning pesticides will cause changes in work styles.

They strongly agreed that consumers are worried about food safety and the possible presence of pesticide residues in vegetables. But they are less committed to believe that the main objective of these legislative changes is intended to promote a sustainable development model, and that these changes will be able to incorporate environmental criteria.

There is a total agreement about the possibility of researching new substances as being acceptable. Although so far the participants are very polarized, in their opinions and it is quite surprising that they agree that biological control methods are crucial to reduce the use of pesticides. They also agree that the biological control methods are a tool, but not the solution.

They do not agree that the use of transgenic seeds is efficient for the production of their crops, or that the use of Roundup RR will help in the production of them, or that relying on these seeds and products is a strength, but a possible threat.

The mono-cropping models do not entail economic advantages, since uniformity in crops has environmental risks. It is not clear that the use of these seeds favors reduced bio-ecological erosion by reducing the use of the plow, but they agree that it produces excesses in nitrogen and phosphorus, due to the use of chemical fertilizers.

They agree that soybean expansion has consequences for local biodiversity, due to deforestation and that the expansion of soy plantations has consequences for the local nature and its biodiversity.

They believe that glyphosate has long-term health effects, as it accumulates in the food chain. As well as the number and variety of insects of their crops, as in the case of bees, in their local areas. They realize about the creation of resistances in insects to those agrochemicals. They believe that glyphosate has effects on other organisms other than pests.

They believe that glyphosate has consequences on human health. The extension of soybeans has increased the inequality in the distribution of land, as it has increased the income of many farmers from the property of land as it has been expelled by the pressure on the use of these products by the multinationals, due to the agreements with the national governments to promote the expansion of these products.

These agreements do not favor farmers but the profits of the chemical industry. The benefits of using these seeds and products are obtained by the industry rather than by the producers. Again, their opinions are polarized on the claim that farmers and ranchers are affected by the chemical and mechanical industry.

No clear criteria exist on whether this changes will cause an increase in exports from their countries to the North or whether the prohibition of pesticides will cause agro-inflation. They know that there are social groups against these practices but it is not clear for them that their motivations are appropriate, or their results can be adequate. Yet, it appears that rural conflicts are increasing.

Regarding to the contributions of the Spanish experts we can find that they almost fully agree that:

- 1 The main objective of EU plants' health legislation is to protect the safety of foods derived from plants and to ensure the health and quality of crops in all Member States.
- 2 It is a minor priority to protect imports from the rest of the world, in accordance with international standards and commitments related to plants health.
- 3 The most concerns to consumers about food safety would be about the possible presence of pesticide residues in vegetables.
- 4 They believe that the integrated control of pests will be favored by new legislations.
- 5 The evaluation of training programs for a proper use of pesticides is not clear.
- 6 It will increase the paperwork requirements for farmers, weakening their competitiveness against non-E.U. producers.
- 7 It will be favorable to divide the Union into three geographical zones; north, central and south when approving new pesticides.
- 8 General inspections should be carried out, focusing on companies that do not meet E.U. phytosanitary standards, by the same reason.
- 9 They do not believe that farmers will successfully register treatments and they will be successfully retained for 5 years, providing information to the competent authorities, as it is required.
- 10 They believe that the European legislation regarding to the use of these chemicals is beginning to undertake the regulation of the intermediate stage of the production chain (especially about their use).
- 11 The new legislation does not provide new criteria for the approval of active substances, based on the intrinsic hazard of the same, rather than be an assessment of risks from the use. That involves an adaptation of the Common agriculture Policy (CAP), related to good protection practices and good environmental practices.
- 12 Considering the impacts on the food chain, food safety and food hygiene, the CAP and rural development, these policies are considered as positive.
- 13 The experts believe that the European Parliament and the Commission should propose to the European Food Safety Agency (EFSA) to conduct an impact assessment.
- 14 The authors believe that the ban on pesticides will cause changes in work styles.

- 15 The framework will be achieved as a combination of biological, biotechnological, chemical, and cultural or plant breeding, so that the use of plant protection products can be limited to the minimum necessary to control pests.
- 16 They should change the model of production and increase the consumption of those which remain in the market.
- 17 The possibility of synthesizing new substances is, according to the authors, feasible and desirable in the medium term.
- 18 The biological control methods are a tool, but not a panacea.
- 19 They believe that the role of government and standards organizations and certification is still relevant.
- 20 The experts assessed that there is a causal relationship between the exposure to a specific chemical compound and the risk of suffering from cancer.
- 21 The phyto-pharmaceuticals products may represent a hazard to humans, animals and the environment in general, if the stringent conditions of utilization are not respected.
- 22 A further professionalization of farmers and their organizations would lead to a more rigorous monitoring procedures to improve the quality of care.
- 23 The experts believe that the role of the governments and standards organizations in certification is to ensure proper risk management.
- 24 The experts find that there has been an absence of detailed official studies on the impacts of this legislation. It responds to lobbying strategies which are very specific and are far beyond to their initial justifications.
- 25 The experts believe (with consensus) that systematic benchmarking involve the replacement of certain active substances with more feasible and safe alternatives.
- 26 All of them continue to believe that the same problems cannot be prevented from food and commodities polluted with prohibited substances, produced outside the E.U. They will continue to arrive, due to their minor costs of production and regulations standards.
- 27 There must be an obligation to notify to neighbors who may be exposed to application drifts before the product is used, and for any other residents, when they request it.
- 28 The ability of farmers to manage the use of pesticides is generally adequate.
- 29 The prohibition of plant protection products will cause agro-inflation.
- 30 There is an underground market, which extent is unknown.
- 31 It is not necessary nor fair to use pesticides when they are banned in other countries and in other economic blocks.
- 32 They should change the model of production and increase the consumption of those products that remain on the market.
- 33 It is necessary to correct some conditions of utilization and make recommendations on the elimination, safety, and packaging of residues and wastes, to reduce the risks to the communities and the environment.
- 34 The agricultural over-reliance on pesticides is used with exclusion of other pest management techniques that accelerate the development of pest resistance and it degrades the agro-ecosystems.
- 35 A pesticide, when used according to the label, in countries where there is a scientifically up-to-date pesticide regulatory program, seems to endanger neither human life nor natural ecosystems.

- 36 Pesticides are toxic by design. They can be used carelessly and negligently, causing accidents and killing wildlife. The price of using any technology is always cheaper than discovering some new and unexpected side effect tomorrow.
- 37 Legislators will continue to be asked to perform a job that is technically and excruciatingly difficult, with inadequate funds and under a constant brain drain to the private sector.
- 38 The number of public-sector scientists doing research in support of pesticide risk assessment science will decline.
- 39 A wider and wider gap will continue to grow between our ability to detect and estimate exposures and our understanding of what those exposures mean.

In the U.S. the experts almost fully agree that:

- 1 Consumers are worried about the possible presence of pesticide`s residues.
- 2 Even when legally applied, many pesticides leave residues in processed foods, such as fruits, vegetables, grains and other commodities. Some pesticides are absorbed systemically through the plant and distributed throughout the plant tissue.
- 3 The EPA is committed to help producers.
- 4 But the EPA is not capable of fulfilling the expectations of those productive sectors.
- 5 Even though all, EPA aims to promote a shared responsibility between exporting and importing countries as this is not its relevant role.
- 6 Its actual goal is to promote the protection on human health and the environment, from harmful effects, reducing the risks to the humanity and the environment.
- 7 The USDA has not undertaken the responsibility to properly train pesticide applicators. Improving the skills of farmers and their organizations is performing a more rigorous monitoring procedure to improve the quality of plants care.
- 8 The responsibility to put into effect the regulations on pesticides is not well monitored.
- 9 Communities can obtain relevant information from the agency on hazardous chemicals and preparations could affect their community because of potential chemical emergencies.
- 10 The legislation to regulate the management of these inputs needs to be continuously adjusted to the reality.
- 11 The possibility of synthesizing new agrochemical substances is feasible and desirable in the medium term. The biological control methods are a tool, but not the solution.
- 12 The role of the government, regarding to the standards organizations and the certification agencies is still relevant regarding to private agencies.
- 13 Labels are designed to maximize the effectiveness of the product and to improve the protection of consumers and the environment.
- 14 The impact of pesticides on human health is considered as well-known.
- 15 Pesticides can be dangerous to humanity, animals and the environment in general, when their strict conditions of utilization are not respected.
- 16 Working with pesticides is dangerous, because they provoke serious secondary health problems. There are symptoms that appear weeks or even months after an

- acute exposure, so it is difficult to be diagnosed, at the first instance, as food poisoning.
- 17 A relatively high exposure to pesticides can result from spills pesticides, equipment maintenance accidents, and accidental immersion or certain spot spraying operations.
 - 18 The Re-registration method results achieved to reduce risks.
 - 19 It is necessary to make recommendations on the removal, safety, and the packaging of wastes, to reduce the risks to the community and the environment.
 - 20 The industry generally has not a policy of responsible reporting in order to prevent the negative impact of the product.

The Spanish experts included a number of factors, based on their opinions.

The USA experts did not include any factor, so it shows how far different in involvement with the research have been both groups.

In the case of the Latin-American experts the fluency and participation in opinions grows again, by including many others opinions offered by their knowledge and experience.

Regarding to these research objectives the issue seems to be more complicated than expected because:

- ◆ The public oversight systems of pesticides in the food that we eat is insufficient.
- ◆ Results are not made public and analyzed to improve the health of people. Therefore, the “polluter pays principle” is not being met and often is not put into practice.
- ◆ The most important issue, though, is not to legislate, but to put the necessary mechanisms to enforce what is legislated.
- ◆ -The economic interests of the multinationals are important and crucial on these issues.
- ◆ Organic farmers do not have enough presence and thus political pressure into the legislative institutions.
- ◆ The Professional Schools (Agricultural, veterinary, etc...) should be more interested in this topic.
- ◆ The professional associations listed above must be present in the distribution chain.
- ◆ A handler course is not enough; a professional college may assume this responsibility, inform and educate the farmer.
- ◆ There is a need on further research and dissemination of results regarding pests and injuries. Usually, the farmer does not know well his enemies (life cycle of pests) and therefore, it is difficult to combat them.
- ◆ Registration books in the field should be required to stop sales consultants and to take further responsibility for the recommendations provided by consultants.
- ◆ The integrated farming systems are good alternatives as a first step to organic production.

- ◆ There is an interest in the trading of agrochemicals by transcontinental companies.
- ◆ There is a concern about the appearance of resistant organisms to the active authorized substances.
- ◆ Appearance of new pests and/or diseases.
- ◆ Absence of sufficient means and/ or mechanisms of control and inspection.
- ◆ Lack of sufficient information on the effects of long term exposure.
- ◆ Aging of agricultural producers.
- ◆ Proper protection of the environment but sometimes without thinking too much about the whole agro ecosystems.
- ◆ Reform of the agricultural markets.
- ◆ Need for greater professionalization of certain hazardous agricultural sectors.
- ◆ Differentiation of agricultural policies between northern vs. southern EU-25.
- ◆ Pressure of "lobbies" of French agriculture.
- ◆ Little or no Research & Development in ecological farming systems.
- ◆ Pressure from major retailers (prices) on the farmer making the best attempt to produce the cheapest products.
- ◆ Prevalence of big business interests (seeds, fertilizers...), and distributors on product quality.
- ◆ Absence of production alternatives for the farmer.
- ◆ Influence of the new legislation on the reduced production and increased imports and reduced exports.
- ◆ The compelling reasons to prohibit the use of certain substances in Europe should be the same at the time of closing the borders to imported products which have been treated with prohibited substances.
- ◆ Lack of development of systems for detecting residues of chemical and biological active substances banned in the EU on imported products.
- ◆ Greater control of the application of herbicides by the autonomous communities.
- ◆ To make more control over the entry of products from third countries which do not comply with Spanish regulations, creating unfair competition.
- ◆ Greater control at the points of sale, which are not qualified and auto sale vans that are out of all control.
- ◆ Most inspections of cattle-farmers to purchase only when are controlled and authorized.
- ◆ At the point of sale, the issue of a recipe as for medicines and products only would be given by qualified staff.

In the case of the Latin-American the experts introduced several comments on the issue of the possible chains among the soybean crops and the livestock extension in the Northern hemisphere.

These are:

- ◆ Lack of other causal factors, including the expulsion of small farmers, such as provoked by government corruption and political patronage.
- ◆ Failure to include the role of the state that often has a double standard, because it encourages soy crops advance and their exports to raise taxes (currency) but publicly condemns environmentalist damages.

- ◆ Any chemical product (including medicinal active ingredients) can cause serious health damage, which depends on the chemical, the dose, the exposure time, the capacity of detoxification in the environment, etc.
- ◆ The Argentina soybean production is changing the land use on forested land, labile soils and that does not allow sustainable production over time.
- ◆ The use of irrigation in water scarce areas, just enough for some companies at the expense of water used by communities.
- ◆ The soybean expansion has moved livestock into marginal areas, such as the Delta del Paraná, with serious environmental impacts such as fire.
- ◆ Cultural impacts also can affect the way of life of small farmers, for their impoverishment or expulsion, and also changes the production of medium and large producers, and the applicators of simple recipes.
- ◆ The effect of glyphosate on water eutrophication and water pollution.
- ◆ Effect of the most toxic herbicides other than glyphosate.
- ◆ Expanding the use of GMO crops resistant to the herbicide glyphosate has a much greater effect on the loss of habitats for the biodiversity associated to a direct toxic effect on the spontaneous biota.
- ◆ The use of GMO crops, especially of herbicides resistant, is closely associated with the spread of direct seeding.
- ◆ It is likely that the emergence of resistant weed biotypes to herbicides are determined by their application under unfavorable climatic conditions (i.e. Higher wind speed to that suggested for effective practice).
- ◆ European agro rural policies stimulate the advance of the agricultural frontier and deforestation in ALA.
- ◆ The needs of European multinationals are moving towards a continuous flow of cheap imported soybeans to feed European intensive farming.
- ◆ The European transnational firms push for protein fallow despite that there are many lands that could be useful to feed humans based on low meat diets.
- ◆ Special permits for soybean cultivation of certain chemicals (i.e. Endosulfan until 2012 in Uruguay).
- ◆ Continuous rotations in soy - wheat crops generate vulnerable soil erosion and hence drag compounds or colloidal suspension.
- ◆ Climate change is developing pesticide resistances by pests and it fosters to search for natural products with biocide capability.
- ◆ Lack of state support to find productive alternatives
- ◆ Lack of commitment of public institutions, such as universities,
- ◆ Consumers are not concerned about what they are eating and they rely on State controls.
- ◆ The mass media facilitates the adoption of technology package.
- ◆ A high proportion of the tax charged by the state is derived from soybean exports.
- ◆ The agricultural professionals have a biased perspective about the impact of monoculture and are confident that science will find solutions to what was provoked by themselves.
- ◆ No specific policy support for the development of environmental proposals.
- ◆ The nature artificialisation has extended throughout society.
- ◆ Differentiation of local production and expanding application of regulations that limit the expansion of agricultural frontier and increase protected areas.

- ◆ The new paradigm for GMO crops is affecting the political and economic interests.
- ◆ Training, awareness campaigns, education in primary schools, increased awareness to operators, controls and incentives to avoid misuse of chemicals and farming systems in general.
- ◆ Establish laws, including environmental effects of the use of pesticides, for the regulation of pesticide use.
- ◆ University education is more focused to Agro business than to Agroecology.

As a summary of all these materials, it seems that if the E.U. wants to be effective to change their PPP policies, the regulations which entered into force on September 1, 2008, need to be respected by those countries that are exporting agricultural products to it. Otherwise these imported products cannot guarantee the safety of consumers and in fact are actually creating an unfair competition to farmers for third countries' exporters and producers.

As regards to rural development policy, compliance with minimum environmental standards is a necessary condition for the eligibility for various aids schemes under a number of measures for rural development by the EAFRD (European Agricultural Fund for Rural Development).

Member States have options to fulfill this obligation: firstly extending this aid to offset the environmental commitments, set general mandatory requirements (based on environmental legislation), and introducing specific environmental standards.

Thus, under the guide of respect for nature, the Community has set a target to achieve a balance between competitive agricultural productions and environmental friendliness. With respect to some lobbies the profit and benefit from the market and income policy, the key instrument is the cross-compliance.

The reform of the CAP in 2003 is decoupling most of all direct payments. Since 2005, there was a transition to the current model. It established a unique payment scheme by reference to those amounts previously and historically granted.

This meant reducing many of the incentives for intensive production that have been related to increased risks for the environment. So, this legislation changes should help to meet these targets, discouraging scale productions. In cases where farmers do not comply with environmental requirements they are unable to apply for appropriate sanctions, including the possible reduction or withdrawal of direct support, creating a serious problem of competitiveness.

For most of the Experts in the three blocks, pesticides are tools that permit us to keep the abundant supply of food and high standard of living that we enjoy in the United States and the European Union. However, most of the public opinion and producers today think that pesticides are unacceptably dangerous to the environment and to humanity.

Citizens and producers should want to know more about pesticides, their benefits, their risks, and the ways the government regulates them. With good information, citizens

would be better able to analyze the arguments of both, opponents and supporters of the pesticide use.

The problem is related to that discourse which promotes the strategy of hiding the problem under a false lack of interest and mobilization that exist regarding to this debate, in both sides of the Atlantic Ocean.

Lulled into a false sense of security, conventional producers use to consume pesticides in pursuit of measured, “sterilized” habitats of pests. Under constant chemical pressure pests become resistant to pesticides and non-target plants and animals are harmed, but the logic of the short way to profitability stop their awakening to that problem.

In fact, the exposure to many pesticides produces significant changes in the structure and function of the immune system, including the reduction and impairment of T lymphocyte activity, reduced the proliferative response of lymphocytes, reducing the activity of killer cells and infectious disease risks and cancers, which are associated with immunosuppression.

Clinicians agree that sensitive groups are more likely to suffer adverse health consequences from any immunosuppression. The majority of people in developing countries, including children, sick persons, and those who are malnourished are in this category.

Although pesticides are designed to provide high specificity of action, their use generates many side effects, such as the generation of resistant organisms. The environmental persistence of toxic waste and the loss of biodiversity can lead to the proliferation of those antagonistic species in extinction, causing new ecological imbalances and new plagues.

Collaboration of farmers in pest management ensures that the best results are achieved when most local farmers adopt practices of integrated pest management, such as in the occasional combination of pesticide use with crop rotation or intercropping culture of different species or varieties.

Producers are under a “Damocles sword” regarding to the use of herbicides, insecticides, and fungicides. Without pesticides, food production would drop and food prices would soar. With lower production and higher prices, U.S. and E.U. farmers would be less competitive in their own markets. Without herbicides, farmers would probably have to cultivate more fields and to control more frequently weeds, which would lead to increased soil losses from erosion, by using moldboard plowing.

Other countries, like those of Latin America where lower standards of environmental concern are fewer than in the Northern blocks, would increase pesticide use to boost crop production and take advantage of reduced U.S. and E.U. food supplies.

Obviously the standard of living that we take for granted in our developed countries would not be possible without the benefits of pesticides. But from the conventional

industrial agriculture, the benefits are usually measured in economic terms, whereas the risks are measured in terms of human and environmental health.

Producers differ in the priorities that they give to these two factors. In the worst case, this means the existence of opposing ideological groups, comparing money with health and short and long run decisions.

After reading the above lines we can conclude that a hypothetical answer to the general question is not met since the new European regulations on plant protection covers the initial budget justification. And the U.S. stable normative shows us that there are many producers that do not feel protected and supported by the government and the EPA, in a transition panorama to two polarized types of agriculture management, in which the conventional agriculture is walking towards and dividing the efforts and resistance of old and new initiatives in the fields.

So, we find a panorama of polarization in production, consumption and maximization in the producer's positions, due to consumers demands. But as for the moment, these are regulations that do not meet the needs of their producers and users, being partial and focused on the satisfaction of certain interest groups, with consequent negative effects, of which our E.U. experts are also deeply involved and aware.

These new legislations are a symptom of a cynical double standard, common in public administration in ALA, when related to promoting exports of commodities and natural resources to obtain currencies and in Europe and in the U.S., and also related to the policies helping to the cuts of the CAP and in the Farm Bills to provide the maintenance of revenues to primary producers.

The defense of the environment is a supposed pillar of European and U.S policies, and an essential global objective without borders. But it matters less whether the alleged damage to the environment occurs outside of European and North American territories.

As a result, a producer in ALA knows that he/she can use extra products banned in the European Union and the U.S. that would not exceed a maximum residue limit in these markets. These foods or products may be imported into the European Union, leading to a significant degree of helplessness in our primary sector, forced to produce with higher costs than their non-E.U. direct competitors.

However, in the same way, the policy is aimed to reduce agricultural production, through the eco-conditionality of the CAP. The reason is simple. Europe and the U.S. find themselves involved in a long process of liberalization of international trade through different rounds and under the rules committed by the GATT and the World Trade Organization.

This scheme requires that the primary products from third countries will progressively come into our markets in exchange for our manufactured industrial goods going into their own. The lack of competitiveness will be especially evident with the production of third countries (especially in the case of Latin America), which may use

unauthorized PPPs, as it has been shown with the soybean as a commodity) in our markets, in a further inconsistency, creating a problem of environmental and economic dumping, and social problems for our farmers and for those working on third countries.

Likewise, the budget surplus for the maintenance of the income of farmers through the European CAP and the U.S. farm Bills require their limitation through the reduction of excess of commodities. Therefore, these regulations affect the aspects that are related to a decrease in agrarian production, which are adequate for the most overlapping interests of the many industrial lobbies and exporters of goods, with higher added value within both economic zones and for the greening and steady reduction of farming as a way of life, leaving only large dark spaces to large scale agro-industrial, competitive firms and a dual model of resistance linked to organic agriculture, based on the respect to consumers and local environments.

In short, these regulations are suited with a clear environmental trend, based on a political will that has incorporated the technical conditions, but are unable to meet the expectations between public safety and maintenance of prices and incomes for consumers and producers in those three blocks of our world.

Thus, landscapes, technology, infrastructure and even cultural patterns are being changed as a result of the increased integration of external inputs to production systems, under the progressive industrialization of agriculture and livestock industry, which is nothing more than substitution of production factors of labor for capital and biotechnology.

This phenomenon, which has been called green revolution has led to a series of impacts that far from being neutral, have generated a wider unequal distribution of revenues and the general socialized extension of harms results of various sizes, in different areas. Soybean cultivation is the exact representation of this process. It is characterized by intensive use of capital and technologies with direct seeding and tillage system; biocides as quasi-hegemonic strategy for the control of pests, weeds and diseases, and the only transgenic soybean seed as been economically imposed and used. Most efforts in the past (and in the present) have been focused on improving seeds and ensuring that farmers are provided with a set of inputs that allow them to increase yields, replicating the model of industrial processes where external inputs serve to produce outputs under a linear model of production.

Thus, soybean production has become the new paradigm of agricultural production in Latin-American, displacing traditional productions of pastoral agricultural rotations systems, and even advancing on areas without agricultural history, which dominated the natural field and livestock for the first time in human history. The implementation of this model technology has brought about a number of impacts both on the ecosystem and on human health. Among them, the level of environmental stresses, degradation and soil erosion as the problem studied and quantified, and that has raised of major concerns in the public sphere. Possibly this is due to two main reasons:

First, the soil is more and more one strategic renewable natural resource that does not stop to be extracted and trade for agricultural development of these countries. Furthermore, the adverse effect of soy monoculture as for the sustainable management of this precious resources by its extensive poisoning.

Regarding to water, beyond not having accurate information about the impacts associated with the technology package soybean causes, it is possible to identify the potential causes of pollution thereof. It has come due to the erosion that it generates, and the massive use of biocides and their impact through soil sediments, drift and deep percolation, as the principal agents of pollution. Regarding to the biodiversity impacts it has been suggested that they provoke the loss of genetic and species diversity, as a result of the expansion of the agricultural frontier, the indiscriminate use of biocides and the simplification of agricultural systems.

Finally at the level of human health, it may be pointed out that, primarily due to the widespread use of biocides in general and glyphosate, in particular, there are numerous cases of poisoning currently occurring, which severely impair the quality of life of those affected. Glyphosate, despite its relatively low toxicity, has become the most damage biocide ever being generated. This work has focused in the study of agronomic and environmental problems and less on the human health. Therefore, these issue cannot be reduced in all its factors and all the impacts that are associated with the process of depavation of soil resources must be studied in future works.

Moving towards sustainability is vital for food security in the future and is one essential component of the right to food. However, to successfully undertake this transformation will require consistent action in various areas. Many states will need to invest in activities that are developed over several years to those based strategies that are able to determine the necessary steps to carry out this transition. It is possible; however, to improve agricultural productivity, while improving the livelihoods of small farmers and preserving agro-ecosystems in co-evolution.

To meet these increased requirements is necessary to reallocate human consumption and livestock's grains, used to produce feed for the excessive production of meat, with the derived health problem arising from these excesses of proteins and fat in our diets.

Finally, as a result of several policies tending to promote the production and use of biofuels, the reorientation of cultures are meeting the nutritional needs towards meeting energy needs that contribute to increasing pressures on genetically modified seeds and the extension of poisoning technological packs.

6. CONCLUSIONS

Among the various recommendations for action the most important ones are that nongovernmental organizations, farmers' organizations and citizen groups should bring forward to local, national and international initiatives, including:

- ◆ End public funded research on transgenic crops that enhance agrochemical use and that pose environmental risks or at least if it is done try to do not permit long term researches, based on impartial, non-chrematistics results;
- ◆ Transgenic food crops should be labeled as in such category, in order to permit consumer to buy or not this products and leave them enough room to not transgenic producers to be in the market via quality and differentiation, considering the labelling of ethical and healthy products;
- ◆ Trends set by biotechnology must be balanced by public policies and consumer choices, in support to sustainability;
- ◆ Some measures should encourage sustainable and the multiple use of biodiversity at the community level, with emphasis on technologies that would promote self-reliance and local control of economic resources, as means to foster a more equitable distribution of profits.

An answer (among many others) can come from Agroecology. It aims to improve the sustainability of agroecosystems by mimicking nature, not by the industrial imposition of human greed. As part of its obligation to devote the maximum available resources to give effect gradually to the right to food, Latin-American states could implement public policies to support the adoption of agroecological practices in the following ways:

- ◆ Promoting references to Agroecology and sustainable agriculture in national strategies to help to permit the right to food by local farmers, from their wisdom and necessities, and incorporating the measures taken in the agricultural sector in national adaptation plans;
- ◆ Redirecting public spending in agriculture, by prioritizing the provision of public goods, such as extension services, rural infrastructure and agricultural research, leveraging the complementary strengths of agroecological methods and genetic selection of seeds and plant varieties, allocating resources to fertilizer subsidies, when linked directly to agroecological investments made on the farm ("subsidies to sustainability");
- ◆ Supporting decentralized participatory research and dissemination of knowledge on best practices of sustainable agriculture, with the collaboration of farmers, organizations, and current and future networks;
- ◆ Improving accessibility to markets for producers who put into practice sustainable agriculture models, using instruments such as public procurement, credit, farmers markets, and creating a framework for trade and macroeconomic environment;
- ◆ Increased budgets in the agroecological research field (design of sustainable and resilient agroecological systems), at the level of the farm and the community (impact of various practices on incomes and livelihoods), at the national and subnational levels (impact on socioeconomic development, participatory strategies

spread and impact of public policies), and develop research with the intended beneficiaries, in accordance with the principles of participation and joint construction;

- ◆ To train scientists in the design of agroecological approaches, participatory research methods and research processes in collaboration with farmers, and ensure that their organizational culture promotes innovations and participatory research;
- ◆ To evaluate the projects on the basis of a comprehensive sets of performance criteria (impact on income, resource efficiency, impact on hunger and malnutrition, empowerment of beneficiaries, etc.)
- ◆ To decolonize the minds of farmers and primary producers from the false low self-esteem feelings that have been created since many decades in their minds, from those that are wishing to profit from their lack of confidence in their ancient abilities to manage their farms, and the replicative effects of their wisdoms in their communities.

The reinvestment in agriculture, in a context of food, ecological and energy crisis accelerate demands not in much but how to invest in agriculture. Agroecological methods may require intensive labor during its implementation period, due to the complexity of the tasks arising from the management of different plants and animals on the farm, and the processes of recycling wastes in traditional practices that require the availability of certain public goods. The dissemination of Agroecology knowledge should encourage farmers, especially small farmers living in remote areas, to seek innovative solutions, working with experts in a work of joint construction of knowledge (UN, 2010).

Policies developed in collaboration with farmers have a high degree of legitimacy and, therefore, can lead to better investment plans as their productions are more likely to be adopted by other farmers. The clue is how to combine the valuable experience of small farmers with the best results that scientists can offer to develop common participatory learning models. And taking into account the theoretical framework of the Sociology of absences, of how to promote and obtain those knowledge and experiences from and with those farmers and producers.

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