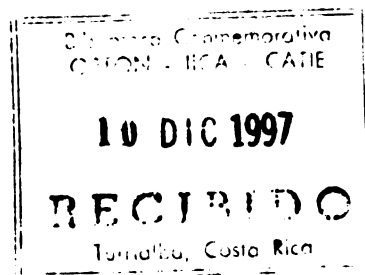
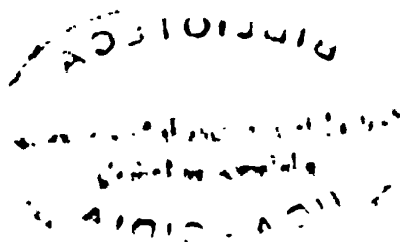


**RESEARCH PROGRAM ON SUSTAINABILITY  
IN AGRICULTURE (REPOSA)**



**Report No. 128  
Field Report No. 169**



***STUDY ON INVESTIGATIONS, PESTICIDES AND  
THE SEARCH FOR ALTERNATIVES IN COSTA RICA***

**Albert Faber**

**December 1997**

**CENTRO AGRONÓMICO TROPICAL DE  
INVESTIGACION Y ENSEÑANZA (CATIE)**

**WAGENINGEN AGRICULTURAL  
UNIVERSITY (WAU)**

**MINISTERIO DE AGRICULTURA Y  
GANADERIA DE COSTA RICA (MAG)**

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## THE REPOSA PROJECT

The Research Program on Sustainability in Agriculture (REPOSA) is a co-operation between Wageningen Agricultural University (WAU), The Centre for Research and Education in Tropical Agriculture (CATIE) and the Costarican Ministry of Agriculture and Livestock (MAG). In addition, REPOSA has signed memoranda of understanding with numerous academic, governmental, international and non-governmental organisations in Costa Rica.

The overall objective of REPOSA is the development of an interdisciplinary methodology for land use evaluation at various levels of aggregation. The methodology, based on a modular approach to the integration of different models and data bases, is denominated USTED (*Uso Sostenible de Tierras En el Desarrollo*; Sustainable Land Use in Development).

REPOSA provides research and practical training facilities for students from WAU as well as from other Dutch and regional educational institutions.

REPOSA's research results are actively disseminated through scientific publications, internal reports, students' theses, and presentations at national and international conferences and symposia. Demonstrations are conducted regularly to familiarise interested researchers and organisations from both within and outside Costa Rica with the USTED methodology.

REPOSA is financed entirely by WAU under its Sustainable Land Use in the Tropics program, sub-program Sustainable Land Use in Central America. It operates mainly out of Guápiles, where it is located on the experimental station *Los Diamantes* of MAG.

## EL PROYECTO REPOSA

REPOSA (*Research Program on Sustainability in Agriculture*, o sea Programa de Investigación sobre la Sostenibilidad en la Agricultura) es una cooperación entre la Universidad Agrícola de Wageningen, Holanda (UAW), el Centro Agronómico Trópico de Investigación y Enseñanza (CATIE) y el Ministerio de Agricultura y Ganadería de Costa Rica (MAG). Además REPOSA ha firmado cartas de entendimiento con organizaciones académicas, gubernamentales, internacionales y non-gubernamentales en Costa Rica.

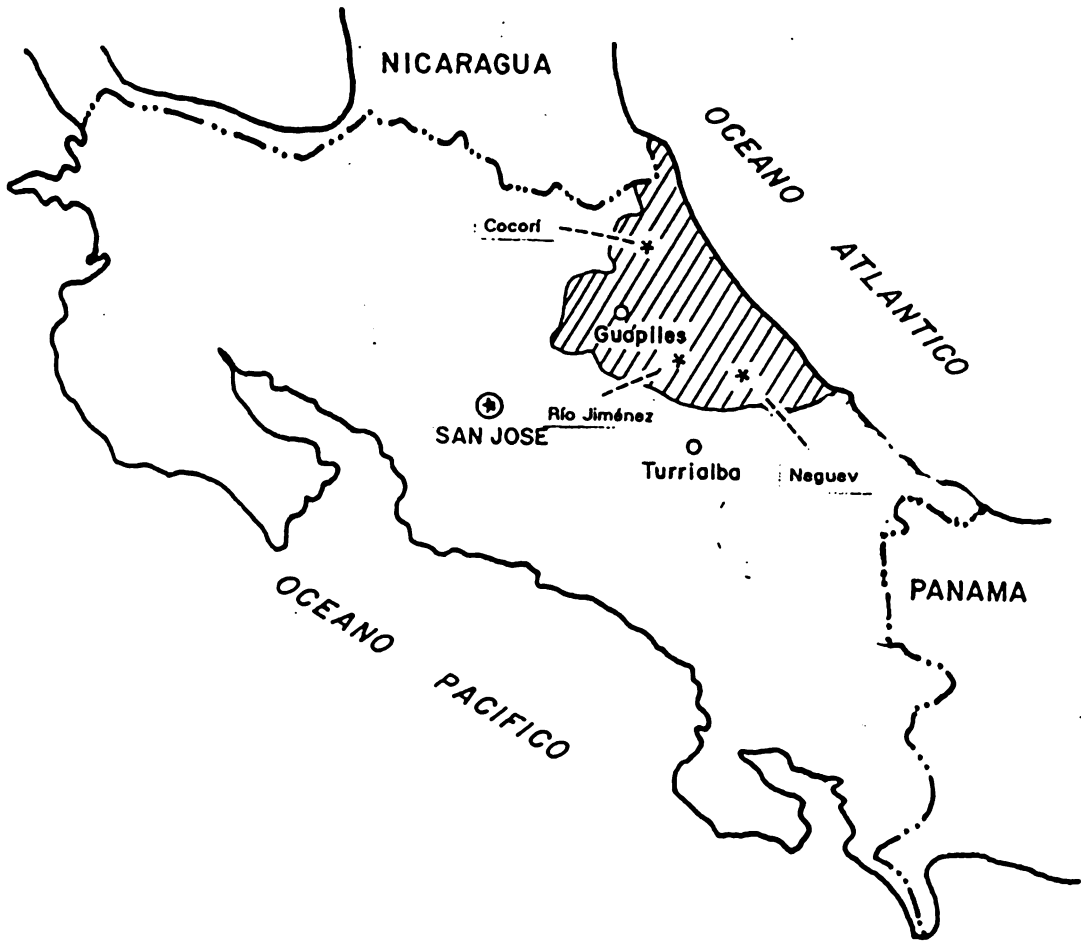
REPOSA ha desarrollado una metodología cuantitativa para el análisis del uso sostenible de la tierra para apoyar la toma de decisiones a nivel regional. Esta metodología, llamada USTED (*Uso Sostenible de Tierras En el Desarrollo*) involucra dimensiones económicas y ecológicas, incluyendo aspectos edafológicos y agronómicos.

REPOSA ofrece facilidades para investigaciones y enseñanza para estudiantes tanto de la UAW, como de otras instituciones educacionales holandesas y regionales.

REPOSA publica sus resultados en revistas científicas, tesis de grado, informes, y ponencias en conferencias y talleres. REPOSA regularmente organiza demostraciones para investigadores de Costa Rica y de otros países para familiarizarlos con la metodología USTED.

REPOSA es financiado por la UAW bajo su Programa del Uso Sostenible de la Tierra en los Areas Trópicos. La sede de REPOSA está ubicada en la Estación Experimental *Los Diamantes* del MAG en Guápiles.

MAP OF COSTA RICA



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**Map of Costa Rica**

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## PREFACE

The underlying report is the result of a three month practical trainee period at the REPOSA program in Guápiles, Costa Rica. This stage will be appraised at the department of Sociology of the Agricultural University in Wageningen, the Netherlands. To serve REPOSA's wish for an overview on knowledge on pesticides and the search for its alternatives, several interviews and a literature study were made on the subject. Although I had four months to carry out this three month awarded task, it would have been a lot more time and effort if I would have had to do everything alone, therefore some thank-you's are not misplaced here.

In the first place this was my direct co-ordinator Bas Bouman, who stimulated greatly in learning the scientific way of working and who himself explained clearly the parts I did not understand well enough in the first place. But most of all his way of co-operation is very much appreciated, by not giving orders as what I was expected to do, but by thinking and working out problems together, which is a lot more constructive way of working, I reckon.

My co-ordinator Kris van Koppen at the department of Sociology in Wageningen is thanked for giving me the opportunity of doing my practical period for the *vakgroep* in Costa Rica.

Also, the study would not have been possible without the greatly acknowledged help of all the people interviewed, who often took a moment from their busy working time to explain me the things I wanted to know. Usually the questions were asked in poor (but improving) Spanish, where I often had to ask for a repeat of the answer, but *not one* lost his/her patience with me.

By far the most of these interviews were arranged by the project's secretary Olga Carvajal Jiménez, who hereby added greatly to complete this paper on time.

By reviewing a draft version of this paper, Annick Schmeddes added greatly to get rid of mistakes, errors in the logical construction of the report, and the attention on sentences that would have worked out better in a masterpiece of literature than in a report that aims to be scientific in design and intention.

All the other people at REPOSA I will not mention here as they are many, but their efforts, friendship and social skills in making my time in Costa Rica an unforgettable one is greatly acknowledged. The student working room was made very *agradable* with all the different characters and *El Coronel* as the most insane of them all. Thanks applies as well to the *tica* - family that offered me room: Maira, Julio, Erik and Sebastian (one of the few babies that doesn't cry for every hick-up it makes).

Fortunately there exists some life after work, necessary to be able to start freshly again the next day. Thanks to Bas Wesselman and Annick Schmeddes for psychological support where I couldn't think and for physical support where I couldn't walk. It was a great time. I hope I could have mend to be some fun and support to them as well. Through all the high ups and deep downs we encountered, no better team could have coped with it.

Albert Faber  
June 1997

## LIST OF ABBREVIATIONS

<b>ANAO</b>	<b>Asociación Nacional de la Agricultura Organica</b>
<b>CATIE</b>	<b>Centro Agronómico de Investigación y Enseñanza</b>
<b>CENAP</b>	<b>Centro Nacional de Acción Pastoral</b>
<b>cif</b>	<b>cargo, insurance, freight</b>
<b>CIPROC</b>	<b>Centro de Investigación para la Protección de Cultivos</b>
<b>COPROALDE</b>	<b>Coordinadora de Organismos No Gubernamentales con Proyectos Alternativos de Desarrollo</b>
<b>CORBANA</b>	<b>Corporación Bananera Nacional</b>
<b>DBCP</b>	<b>dibromochloropropane</b>
<b>EARTH</b>	<b>Escuela de Agricultura de la Región Tropical Húmeda</b>
<b>EPA</b>	<b>Environmental Protection Agency (in the USA)</b>
<b>FAO</b>	<b>Food and Agriculture Organisation of the United Nations</b>
<b>GTZ</b>	<b>Deutsche Gesellschaft für Technische Zusammenarbeit GmbH</b>
<b>ICAFFE</b>	<b>Instituto Costarricense de Café</b>
<b>IICA</b>	<b>Instituto Interamericano de Cooperación Agrícola</b>
<b>IPM</b>	<b>Integrated Pest Management</b>
<b>INA</b>	<b>Instituto Nacional de Aprendizaje</b>
<b>ITCR</b>	<b>Instituto Tecnológico de Costa Rica</b>
<b>LUST</b>	<b>Land Use System and Technology</b>
<b>MAG</b>	<b>Ministerio de Agricultura y Ganadería (Ministry of Agriculture and Livestock)</b>
<b>MINAE</b>	<b>Ministerio de Ambiente y Energía (Ministry of Environment and Energy)</b>
<b>MS</b>	<b>Ministerio de Salud (Ministry of Health)</b>
<b>ngo</b>	<b>non governmental organisation</b>
<b>PCCMCA</b>	<b>Programa Cooperativo Centroamericano de Mejoramiento de Cultivos y Animales</b>
<b>PPUNA</b>	<b>Programa de Plaguicidas de la Universidad Nacional de Costa Rica</b>
<b>REPOSA</b>	<b>Research Program on Sustainability and Agriculture</b>
<b>UCR</b>	<b>Universidad de Costa Rica</b>
<b>UNA</b>	<b>Universidad Nacional de Costa Rica</b>
<b>UNED</b>	<b>Universidad Nacional Estatal a Distancia</b>
<b>UNEP</b>	<b>United Nations Environmental Program</b>
<b>USTED</b>	<b>Uso Sostenible de Tierras En el Desarrollo</b>
<b>WAU</b>	<b>Wageningen Agricultural University</b>
<b>WHO</b>	<b>World Health Organisation</b>

## **1 INTRODUCTION**

### **1.1 The country Costa Rica**

Costa Rica is a small country situated in Central America, bordered by Nicaragua, Panama, the Caribbean sea and the Pacific Ocean. The country lies entirely in the tropics, in between the northern longitudes of 8° 00' and 11° 15' and the western latitudes of 82° 30' and 85° 50'. In the middle of the country lies the Central Valley of Meseta Central, where the main economic activities take place and where the capital city San José is situated. (See also the map at the beginning of this report.) Although Costa Rica constitutes of only 51 000 km<sup>2</sup>, it has many different climate zones, due to the large ranges in altitude. A mountain range with a highest peak of 3820 m divides the country into two zones: a Pacific zone and an Atlantic zone. Ecological variety is larger than all of Western Europe. (Alfaro *et al*, 1994).

In Costa Rica live about 3.5 million people, the vast majority of Spanish descent. Costa Rica has always been a politically stable nation in this geographical area where civil wars often raged, apart from a short uprising in 1948. Perhaps due to this stability, environmental awareness was raised very early. Already in the 1970s there have been debates about the protection of natural resources. Since the late 1980s the Costa Rican parliament has passed an impressive series of environmental laws, many of them concerning the legal status of national parks and other protected areas. Besides this, growing political attention is given to waste and other pollution problems such as the immense use of pesticides. (Aarts *et al*, 1995).

### **1.2 The use of USTED-modelling and pesticides**

In 1987 the Atlantic Zone Program was initiated by the Wageningen Agricultural University (WAU), the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE) and the Ministerio de Agricultura y Ganadería (MAG). Later this program changed its name to REPOSA, acronym for Research Program on Sustainability in Agriculture. Main focus of REPOSA is the development of an interdisciplinary methodology for the analysis and evaluation of ecologically and economically sustainable land use. Different disciplines are working to these goals, by means of modelling, experimentation, data collection and multiple goal planning. Scenarios are made to support stakeholders of land use in the Costa Rican Atlantic Zone. Recently, the program has expanded to the province of Guanacaste as well.

To support the scientific goals set by REPOSA, the so-called USTED-model was developed (see figure 1). By means of this methodology, interdisciplinary areas of research are taken into account for an evaluation of alternative land use scenarios. An important objective of USTED

(Uso Sostenible de Tierras En el Desarrollo) is to show the trade-offs which exist between various policy goals and their effects on land use. One of these policy goals could be the maximisation of regional farm income, another goal might be to use the land in a way concerned with the concept of sustainability. To be able to incorporate the factor of sustainability into the model, two quantifiable indicators were developed. The first one concerns the nutrient balance, the other one is based on the biocide index. The latter is a quantification of the use of pesticides on farming lands. (Jansen *et al*, 1995).

As the basic unit of analysis LUSTs (Land Use System and Technology) are used. This is defined as a specific combination of a land unit with a land utilisation type together with a well-defined technology. Each LUST describes a unique, quantitative relation between physical inputs and outputs. This relation is determined by various factors like soil type, weather, effect of management practices, etc. Given objectives and available resources, farm decision-making will select LUSTs for actual implementation (Alfaro *et al*, 1994). To be able to construct a LUST, one needs to know the different inputs and outputs on the land and the relationship between these inputs and outputs. Then it would be possible, for example, to model the changed yields with a reduced use of pesticides or artificial fertiliser.

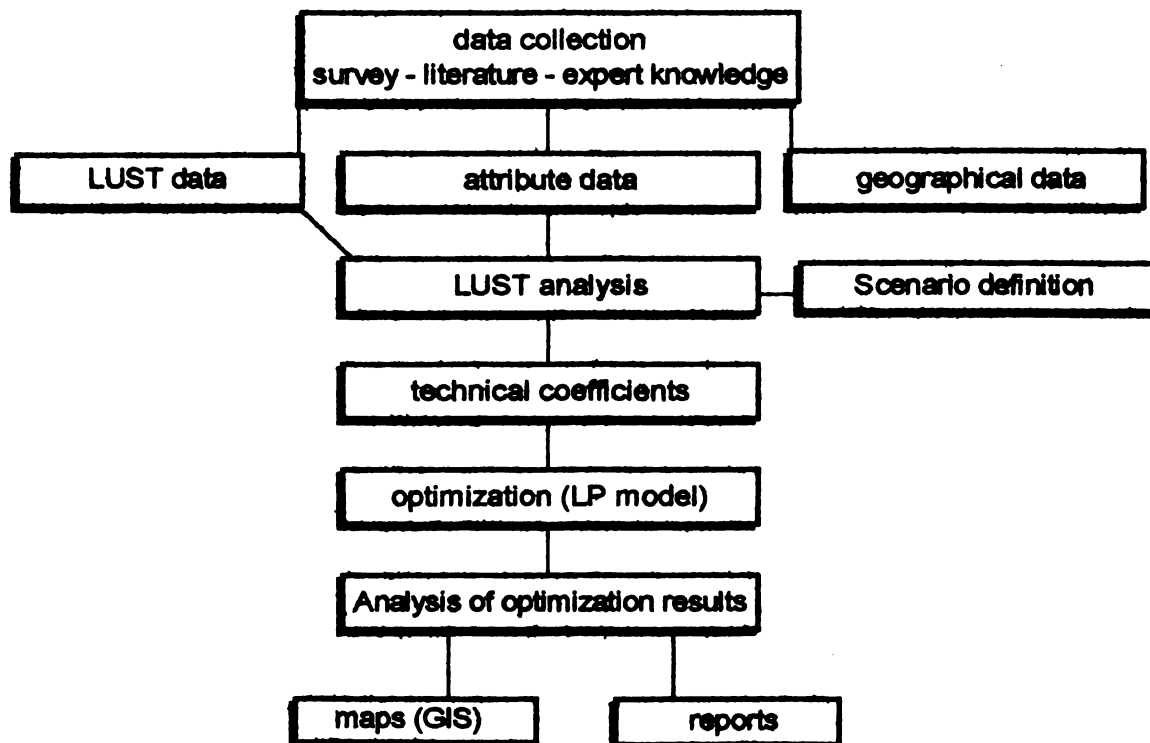


Figure 1: The USTED methodology, as it is used at the REPOSA project.



In this following study, the knowledge on pesticide use and the search for alternatives at the investigation level will be examined. This information could add to the inclusion of alternative "ecological" LUSTs in the USTED-model at a later stage in the model development. At REPOSA a lot more information on different aspects of ecological LUSTs is needed, and this paper aims to present an introduction on the available knowledge and experiments on pesticide reduction research and the search for alternatives to pesticide use in Costa Rica, facilitating the search for more knowledge and information at a later stage at REPOSA.

### ***1.3 Context of the study***

The demand by REPOSA for more information on pesticide research in Costa Rica was the main incentive to carry out the underlying study. The gathered information, possibly complemented by expanded research by others at a later stage could aid in the attempt to construct an "ecological" LUST at REPOSA.

This report is the result of a study conducted for REPOSA and the Department of Sociology of the WAU, from March to June 1997. The study is within the framework of a student practical training period for the WAU. The results consist of an overview of the research on pesticides, pesticide policies and alternatives to pesticide use in Costa Rica. A short report on the general study experiences in Costa Rica will be written in Dutch for the Department of Sociology of the WAU.

### ***1.4 Research questions***

The main aim of the research to follow, will be threefold:

- A sketch of the different actors in the field of research and interest with regard to pesticide use will be drawn.
- The information flow from the research institutes to the farmers shall be analysed, as the farmers are the ones who will have to support the ideas from the researchers.
- A closer look will be taken into the developments in the research done on alternatives to pesticide use.

In the following chapters, these aims will in the first place lead to an overview of the current status of knowledge on pesticide use and on the search for alternatives in Costa Rica. Secondly, some thoughts will be posed on the possibilities for the creation of alternative LUSTs, using the available knowledge and experiences in Costa Rica.

### **1.5 Methodology of research**

With a background of former studies done on this area of interest, sufficient information can be gathered to summarise the most recent developments in research undertaken in Costa Rica, by use of literature and interviews.

The available literature from libraries at the national universities and at CATIE should guarantee sufficient knowledge of the matter before taking on the second part of the study. This part will deal with the research institutions and with other actors of interest themselves, by means of interviews with the people in the core of research, or with people involved in extension of the research's results. All put together, this should extricate sufficient information to suit the above mentioned problem definitions. In the report no distinction will be made between information from literature and information from interviews, presenting the results as a whole.

### **1.6 Scope of the study and outline**

As stated before, this study is part of a practical trainee period for the university of Wageningen and the research results and conclusions should be viewed within the limits of such studies.

Within the study, an exception of pesticide research will be made for the large *bananeros* and the coffee growers in Costa Rica. Although pesticide use is reportedly high with these croppings, this study will be limited to smallholders in arable crops and to knowledge at an investigative level, for reasons of limited time available. It may be suggested however, that the large companies in banana and coffee conduct research on reduction of pesticides as well, because of the large economic interests involved.

With this introductory chapter, the rest of this report will deal with pesticides in Costa Rica. In the following chapter an introduction will be given to the negative side impacts involved with pesticide use and the policies on the subject in Costa Rica. This will serve as an outline of understanding to the third chapter, where the structure of knowledge in reducing pesticide use and the search for available alternatives will be outlined. Concluding comments follow in chapter 4.

## **2 PESTICIDES IN COSTA RICA**

### **2.1 Pesticide use in Costa Rica**

The Costa Rican economy is still heavily based on agriculture and it still depends heavily on the use of pesticides to improve productivity. In the years following World War II the use of pesticides has helped greatly to the results of the green revolution, generating large benefits in increased food production. In the 1960s concern started being voiced on the negative side impacts of pesticides and since then debate on risk and benefits has not ceased (Van der Werf, 1996). Like many other countries Costa Rica uses large amounts of pesticides to sustain its agricultural economy. A number of reasons have been given to explain the high use of pesticides in tropical areas like Costa Rica. In the humid and warm environment crop diseases may spread more rapidly than they would in more temperate regions (Brader, 1979). Another reason for the high use of pesticides in Costa Rica is the mono-cropping of its most important export products coffee and bananas. Plagues can spread more easily when a large area is covered with only one species (Aarts *et al*, 1995; Ruepert, personal communication).<sup>1</sup> Some data suggest that degradation rates of pesticides might be higher in tropical countries due to higher temperatures and sunlight, hence favouring a higher use of pesticides (Castillo *et al*, 1997).<sup>2</sup> Also the economic importance of the main export products favours the high use of pesticides, as many farmers and pesticide users "play it safe" and reduce economic risks involved with lower pesticide use in mono-croppings (Lutz and Daly, 1991).

Nevertheless, imports of chemical pesticides increased heavily in the past decades, from \$ 6.8 million in 1972, to \$ 35.3 million in 1982 (Thrupp, 1985), amounting to no less than \$ 84.2 million in 1994 (Agne, 1996). This amounts to an average of 4 kgs per capita annually, which is seven times higher than the average estimate for the whole world population. Per agricultural labourer the amount of pesticide used adds up to no less than 38 kgs (Aarts *et al*, 1995; La Nacion, 1997).

However, also in Costa Rica debate on the negative side effects to health and environment has started and efforts have been made to reduce the use of pesticides and to shift the kind of pesticides used. Many different laws on the field of health and environment regarding the use of pesticides have passed the Costarican parliament (Thrupp, 1985), and many investigations are made to reduce the use of chemical pesticides. It has been realised that the economic base of the country is damaged as well by an overdone use of the pesticides. One aim of this

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<sup>1</sup> With regard to the personal communications mentioned in this report, a list of interviewed persons and their organisations is given in Appendix 1.

<sup>2</sup> On the other hand, some studies show that toxicity may increase with increasing temperatures as well, as stated in Castillo *et al* (1997).

research is to make up a sketch of the different kinds of investigations on pesticide use that are done in Costa Rica.

## 2.2 Pesticide policies in Costa Rica

As stated before, pesticide use in Costa Rica is very high, amounting up to about 4 kgs per capita annually. About half of total pesticide imports in Costa Rica is used in banana cultivation (García, 1993). Other heavy users of pesticides are vegetables, coffee, rice and non-traditional crops like ornamental flowers. (Castillo *et al* 1997). See on the use of pesticides in different crops figure 1.

The benefits of pesticide use are higher output levels (at least in the short run) and more homogeneity of the product. Costs, aside from the direct financial costs, may include human poisonings, damage to predators, the emergence of new pests, contamination of food, increased resistance of pests and water pollution through runoff (see e.g. Cisneros, 1984; Constenla, 1988; Lutz & Daly, 1991; Van der Werf, 1996). With the recognition of these negative side effects of pesticide use, efforts have been made to come to a more reduced use of pesticides, or to reduce the amount used. This induced a wide array of different laws, extension measures and research, all to suit the above mentioned aim of reduction (Thrupp, 1985). In Costa Rica, main political focus seems to be on the use of laws on the field of public health and agriculture. In practice, however, the implication of these laws seems to encounter great problems. Other governmental measures, mainly in the area of extension work, is also posed with poor execution. Various different explanations have been given to offer insight in the existence of this "executorial gap".

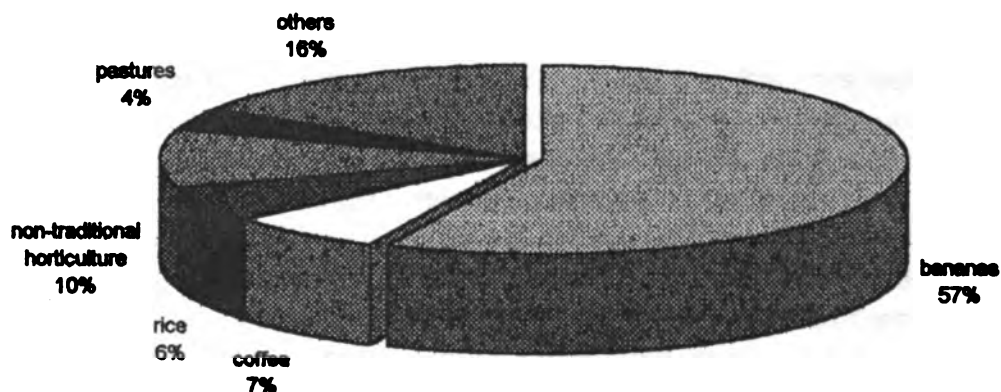


Figure 2: Pesticide use in selected crops in Costa Rica in 1993 in percentage of cif-value (Agne, 1996)

These different explanations often serve as different starting points for suggestions to improve the situation. Some of these will be given below, as to offer a clearer insight in the Costa Rican political environment with regard to pesticides.

1. A difficulty in getting desk policies to applied measures could be lying in the institutional framework in Costa Rica. Many different agencies are involved in the institutional and legal framework of environmental policy making, where a single co-ordinating environmental agency is lacking (Carriere, 1991). Two different factors are involved in the proliferation of State institutions with environmental issues. First, agencies were created at different times, during different presidential periods, in response to different government objectives, etc. Secondly, Carriere (1991) states a principle which, when applied to State bureaucracies, would indicate that ministries and other agencies will jealously guard their jurisdictional exclusivity not only over the functions originally assigned to them, but also over new activities associated with these functions. Hence many different ministries and agencies have their own environmental unit. A similar explanation is given by Pomareda (1996), who handles organisational shortcomings as a main explanation for the executorial gap, leading to a lack of complementarity between the public sector and private entities and organisations in the provision of services like research, trade promotion, veterinary services, etc.
2. Another starting point could be lying in the poor interface between governmental agencies on the one hand and farmers and other "users" of the policies on the other hand. Central in the analysis, then, are not the formal intentions of a project or a programme, but the negotiation practices of bureaucrats and farmers. In this perspective, state intervention often presupposes the existence of conflicting interests (De Vries, 1992). Such explanations can be filed under social or sociological explanations.
3. A third set of explanations can be based on economic arguments. High control costs due to the huge number of individuals dealing with pesticides, is one of the possible reasons for the difficulties in implementation of the laws. Also the few resources that are available for monitoring, and the distribution among different government agencies which mostly work independently from each other, can then be mentioned in this perspective (Agne, 1996). Besides the legislative and educational measures taken so far, it is not uncommon anymore to plea for economic measures. Taxes on pesticides are still significantly lower than taxes on various other industrial inputs, often even leading to tax exemptions, which imply a 5 million USD price subsidy, according to Agne's study. Pesticide taxation might lead to a reduction in pesticide use and at the same time generate funds to strengthen measures such as extension in Integrated Pest Management (IPM) or organic farming, special credit schemes for farmers who produce in an environmentally sound way, etc. (Agne, 1996).
4. As a fourth factor, deduced from the interviews, some personal political differences can also be given in the set of explanations. Often, people from different departments have to work together with other governmental institutions or private organisations. The small program of organic agriculture at the MAG, for example, does not seem to attach much importance to the sake of organic agriculture (Montoya, personal communication), where the MAG itself blames different organisations in the field of organic agriculture that they protect their

knowledge too much, so others cannot learn from their valuable experiences (Chavez, personal communication). At times it seems, that most important links between different actors in society on this issue are determined not by business relations but by personal friendships and mutual profitability. Clearly, this description of the actual interfaces in society comes close to the explanations of De Vries (1992) at the second point stated.

5. A very logical last but not least explanation could be, that it is simply very difficult to farm without the use of pesticides. It might well be, that it is economically impossible to meet the wishes of farming without (or with a significant lower amount of) pesticides, for various agronomic reasons.

### 2.3 Pesticide-related risks in Costa Rica

With the recognition of the persistence of many pesticides, like organochlorine compounds as DDT, aldrin, dieldrin and toxaphene, many of these substances were restricted or banned in the eighties. However, import and use of pesticides shifted during the 1980s to other less persistent but more toxic pesticides. In Costa Rica, 30 % of the 8 million kilograms of pesticide imports in 1990 were compounds classified in WHO classes 1a and 1b, chemicals to which only trained and licensed applicators have access in the United States and many other countries (Castillo *et al*, 1997). See also figure 3 on this. In 1993 about 18 % of the pesticides used in Costa Rica could be classified as either extremely dangerous or highly dangerous (Agne, 1996), which seems to indicate an improvement in the situation.

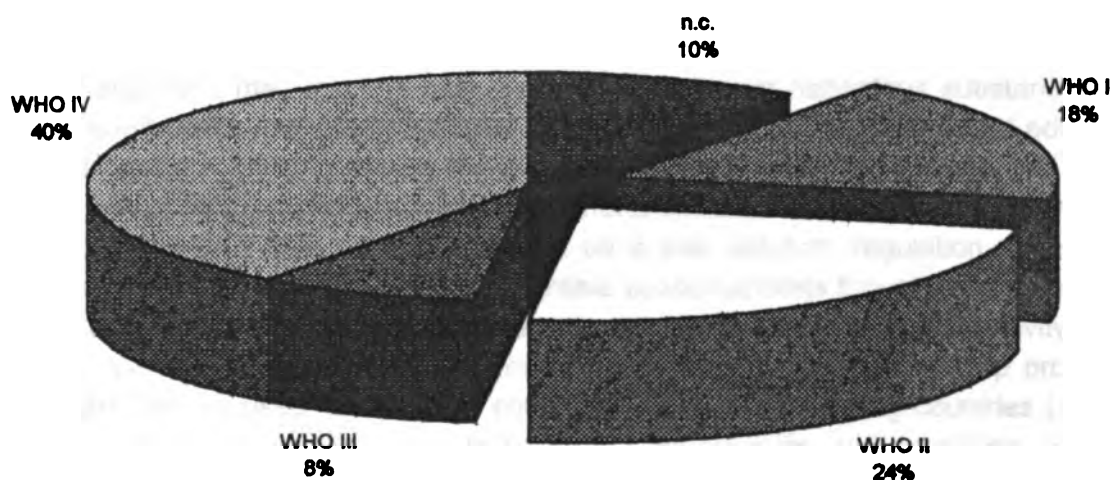


Figure 3: Volumes of pesticide imports to Costa Rica in 1993 according to WHO's toxicity classification. WHO-Ia = extremely hazardous. WHO-Ib = highly hazardous. WHO-II = moderately hazardous. WHO-III = slightly hazardous. WHO-IV = not hazardous when used properly. nc = not classified. (Agne, 1996)

Nowadays, the use of quite a few of the more dangerous pesticides has been prohibited in Costa Rica, or its use has been restricted. Use practices of pesticides however can also increase environmental risks. Frequent problems, observed during surveys and field observations, are dangerous transportation and storage conditions, unnecessary applications and overuse, use in close proximity to streams and rivers, aerial spraying over rivers and water sources, and washing of application equipment in rivers and streams. Excess pesticides and used containers are frequently disposed of inappropriately (Castillo *et al*, 1997). Human health risks are prevailing as well because of the above mentioned practices. Eating and drinking during application of pesticides, no washing or showering after application, leaking spraying equipment and no wearing of protective clothing are just some of the observed practices that might imperil human health, as has been shown in epidemiological research (Wesseling *et al*, 1996; Van Wendel de Joode *et al*, 1996; Castillo, 1989). Some reasons associated with these use practices are difficulties with understanding the labels on the products (analfabetism, difficult explanations, etc.), protection clothing that is not suitable in tropical regions because of its warm and humid climate, lack of training and education and easy access to the products (García, 1997). No Central American country requires training or certification to be able to buy or apply pesticides (Castillo *et al*, 1997).

According to Antle and Capalbo (1994), these practices can be reduced to two fundamental different situations in which pesticide-related health problems may occur:

- Farmers and farm workers may be well informed about pesticide risks, but lack effective pest control alternatives to hazardous pesticides or lack effective averting technologies, and thus choose to bear the health risks in exchange for the economic benefits of pesticide use.
- Farmers and farm workers may not be well-informed about health risks and thus inadvertently suffer the consequences of pesticide exposure, whether or not safer pest management methods are available.

Both of these situations may result in high levels of exposure to hazardous substances, but they have different policy implications. Mainly in the second case, information and education seems to be the main solution in solving the different problems. However, this may not always work out very well, as this may require a level of general education that does not exist in many agricultural populations. If thus education cannot be a sole solution, regulation of pesticide availability is a possibility. This may bear considerable economic costs though, and many more aspects have to be taken into account, like environmental risks, toxicity and productivity of the pesticide. The alternatives could then be investments in the development of crop protection technologies that can be used safely under conditions found in developing countries (Antle & Capalbo, 1994). Progress on this seems to be quite slow however, and education and safe use training tends to bear more importance so far (Castillo *et al*, 1997; Ruepert, personal communication).

### **3 PESTICIDE REDUCTION RESEARCH AND THE SEARCH FOR ALTERNATIVES**

#### **3.1 Incentives for research**

Besides legislation, educational measures and research have also been strengthened by the reconnaissance of the negative impacts of pesticide use. Since the late 1970s there has been considerable interest in "integrated" arable farming systems, which attempt to reduce inputs such as fertilisers, fossil fuels and agrochemicals. In conventional arable farming systems, the anticipated effectiveness against the pest, the risk of phytotoxicity to the crop and the cost of the application are the main factors intervening in the decision of the farmer to use a particular pesticide. In integrated farming, the environmental impact of the pesticide should be a fourth major criterion to take into account (Van der Werf, 1996). Regarding pesticides, this implies that the structure of its use is integrated in the environmental argument. Hence programs of pest management have been developed that take this argument into account, the so called integrated pest management. The objectives of IPM include minimising environmental hazards, while insuring economic return through the use of multiple control methods integrated across pests, crops, and years (Power, 1987). Still, however, the level of pesticide use is above the social, economic and ecological optimum (Agne, 1996). Therefore, an important issue of research on pesticides is within the context of the constraints mentioned in the previous chapter, trying to deal with solutions on the excess use of pesticides.

To farmers in Costa Rica, main incentive to renunciate of pesticides is often the result of illnesses or health deteriorations because of excessive use of pesticides (Montoya, personal communication), where eventually this appears to be one of the main incentives to academic and public (governmental) research as well.

The different deployed activities will all be considered in the following paragraphs, where an elaboration is made on public research (3.2), education and education (3.3), safe use training (3.4), certification (3.5), and the search for alternatives (3.6). Do bear in mind however, that these different activities are often part of an integrated approach and must not be seen as separated issues altogether.

#### **3.2 Public research**

Public research on pesticides is mainly taking place on the two largest universities, the Universidad Nacional (UNA) and the Universidad de Costa Rica (UCR), as well as on the international institutes CATIE and EARTH. At these academies laboratories and field research facilities are available for different investigative purposes. A lot of more "desk research" takes place at the Universidad Nacional Estatal a Distancia (UNED).



The research carried out is dealing with different aspects of pesticides. Research focuses on effect studies in health and environment, and on the development of methodologies to elaborate on sound ways of pesticide use.

- Research on environmental aspects of pesticide use is not very much elaborated yet (Valverde, personal communication), as these effects are least visible and hardest to show. The most specialised laboratory is at the PPUNA (Pesticides Program at the UNA), where most ecotoxicological research is done, mainly on aquatic environments. Most other laboratories deal with investigations on foodstuffs. A famous ecotoxicological research was done at the Valle de Estrella in Talamanca by the PPUNA at the initiative of the Fundación Güilombé. Contamination with pesticides by local banana companies was proved then and the research results were used by Güilombé to summon the companies to court (Arguedas, personal communication). In measurements of ecotoxicological effects, now the need has been posed to meet demands on the development of sensitive methods to monitor effects on ecosystems. Identification of sensitive organisms of ecological or economic value that can be used in toxicity testing is a field of research coming into view (Castillo *et al*, 1997).
- Health effects of pesticides has attracted quite some epidemiological research, although this is concentrated for the most at the PPUNA. In many cases, correlations have been shown between pesticide use and health problems, although this is rarely shown as a toxical or physiological link. However, the connection between the pesticide DBCP use and the sterilisation of 1500 banana workers was shown to be very clear and led some workers to courts into the USA (Ruepert, personal communication; Wesseling *et al*, 1996). On epidemiological research at the UNA, a lot of students from different countries are attracted, elaborating the research on a wide array of pesticides and different health implications.
- As the problems associated with pesticides are recognised, research to find alternatives is stimulated. Most research at the universities and the international academies deals with IPM or ways of biological control of pests, mainly at CATIE, the UCR and EARTH. At the UNED and the UNA studies on alternatives tend to be more towards ecological ways of agriculture. This subject will be dealt with in more detail in paragraph 3.6.

Research at the different academies takes place in different ways. Laboratories for (eco)toxicological research is limited to the UNA and the UCR. Field research with biological control and IPM finds its main centres at the UCR, EARTH and CATIE. Theoretical studies take place at all the universities. A large database is present at the PPUNA, studies on the different experiences with alternative experimental agriculture is concentrated at the UNED.

### **3.3 Education and extension**

The Costa Rican academic system consists of primary schools, colleges and universities (Agne, 1996). From about the age of thirteen onwards, children in Costa Rica attend *colegios*, which is the local version of highschool. Some colleges offer a specialisation in agriculture and

hence lead to a first professional degree at an intermediate level. No specific courses on crop protection are given at these colleges, but some lessons on the use of pesticides are included (Gamboa, personal communication). At a higher educational level academic courses only occur at the UNA and the UCR. Courses at the UNA are mainly agrochemical courses, which deal with the recognition of pesticide related illnesses as well. In the starting years of the PPUNA, extension work was one of the main goals of the project. This work took place at all possible levels, from farmers to people working at the ministries. This extension work supported a lot of safe use training as well (Ruepert, personal communication). The UNED is the only university where a specific course on pesticides and its effects is given (García, personal communication).

At CATIE and at EARTH different courses on crop protection run as well. At EARTH different modules are part of the study, and students may choose to follow a module on pesticide use, which includes safe use training, lessons on the nature of plagues, health and environmental effects, etc. At CATIE education concentrates on extension of IPM research.

An interesting extension experiment is taking place at EARTH, within a course on organic agriculture. Here students do a practical trainee period in their third year in surrounding farmer communities with selected farmers. These farmers showed the intention of wanting to introduce an organic agriculture for themselves. In a mutual way of learning from each others knowledge and experience, student and farmer try to help each other in introducing organic agriculture. This project intends to run for five years, and has been running for one year so far (Alvarado, personal communication).

### **3.4 Safe use training**

Safe use training teaches farmers and pesticide users to apply pesticides in a sound way, to deal with the application equipment, to take storage measures, etc. It is very much integrated with extension work, although safe use training is usually given to the pesticide users only, where extension work often works with larger target groups.

Safe use training of farmers and pesticide users is deficient in the whole of Central America, where only roundabout a quarter to a third reports having received training in the safe use of pesticides. As stated before, legal certification and training requirements are at a rather poor level (Castillo *et al*, 1997).

Educational programs on safe use of pesticides have been developed for farmers, farm workers, housewives and children by MAG in co-operation with the representation of the chemical industry (Cámara de Insumos Agropecuarios). Participating farmers are taught basic techniques on how to apply pesticides, are recommended to wash clothes after spraying, etc. Protection gear used in northern countries is not recommended because it is not considered suitable for the tropical climate. Therefore, safe use recommendations have been confined to judicious application, and basic protective clothing like rubber boots and gloves. Appropriate protective clothing for the tropics has not been developed yet (Agne, 1996).

The Health Ministry (MS: Ministerio de Salud) carries out some extension programs and some safe use programs as well, although in rather limited numbers. As they realise that prevention work is the most important issue in their legal mission, most accent lies on extension work as well as the facilitation of improvements on technical safety applications. As a backup to extension work, some investigative labour is carried out, usually together with the Cámara de Insumos Agropecuarios. The actual extension and education work is usually field work, where people from the MS actually go into the field to the farmers. On this work, the MS works together with people from the MAG and the Cámara de Insumos Agropecuarios, as well as with the Consejo de Salud Ocupacional, a co-ordinating governmental organ. More complicated questions on pesticide issues are usually backed by research on the UNA or the UCR (Morera González, personal communication).

Originally, the PPUNA was set up as a project on safe use training and extension as well, although fairly soon the work expanded to more scientific research on all integrated aspects of pesticide use and pesticide reduction programs (Ruepert, personal communication). Other universities or academies do not seem to give safe use training, although some courses are given especially for extensionists (Valverde, personal communication).

Safe use training has been taught on a relatively small scale. Since the beginning of the MAG program in 1986 through 1993 a mere 10 % of the rural agricultural working force and less than 5 % of the rural population has been reached. In most cases, information about safe use of pesticides has been presented in full-day or half-day meetings without follow up activities. The impact of those seminars, therefore, can only be considered as limited (Agne, 1996).

### **3.5 Certification and additional research**

Still a lot of pesticides are introduced by chemical companies, because of increased resistance for older pesticides, because of commercial profits or because of increased usability or effect. In Costa Rica, new pesticides are not allowed until a certification procedure has been done. The Section of Investigation of the MAG is in charge of the registration of pesticides and of controlling their appropriate use. It analyses technical information provided by the industry and administers import statistics for agrochemicals. Investigations are made on regulations by other countries with respect to the new pesticide as well, complemented by chemical analyses. To ease the task, the MAG has got its own laboratory to investigate the chemical effects of the products on health and the environment. Often they are aided by tests at the universities as well, mainly at the PPUNA laboratories (Léon González, personal communication).

The MAG laboratory is specialised in tests on foodstuffs. Regularly, samples are taken from export products, to check whether they comply with the norms set. The work of the MS is limited to some amount of control with farmers and agricultural companies by their inspectors. The MS does not have laboratories to make checks on foodstuffs and their work is mainly based on extension and prevention work (Morera González, personal communication).

### **3.6 Search for alternatives**

Within Costa Rica, two views on alternatives to current pesticide uses prevail:

- use of pesticides is a "necessary evil" (Léon González, personal communication); working without pesticides is illusionary, hence it should be used in a way as sound as possible.
- use of pesticides can be abandoned and possibilities on alternative ways of agriculture should be elaborated, to find the most environmentally as well as economically sound way of agriculture.

These different views suggest different starting points in the research for alternatives as well, which will both be dealt with in some more detail in the following sub-paragraphs.

#### **3.6.1 Integrated pest management and biological control**

Scholars on this particular area of research tend to hold up the view, that it is economically impossible (or at least very difficult) to abandon the use of pesticides altogether. Nevertheless, the negative side effects of pesticides are recognised. Therefore investigations concentrate on the development of a sound use of pesticides, mainly through the introduction and elaboration of IPM programs. According to the UNEP (UN Environmental Program) this could aid to help reduce world wide pesticide use by 50 % (García, 1997). At the UCR different experiments on biological control of plagues are running, mainly at the experimental station Faubio Baudit in Alajuela. Much research on non-chemical alternatives here is done on request by the chemical companies, which try to keep in pace with the developments on IPM (Gamboa, personal communication).

At EARTH experiments are running at a commercial *finca* on their properties, where students of the academy partake in a practical course on IPM. The IPM module in the agronomical course at EARTH is based on the view, that pesticides must be used as safely and as little as possible, wherein an awareness is created as to educate students to think of possibilities to use pesticides in a way as sound as possible (Alvarado, personal communication).

With respect to the investigation at CATIE, research concentrates on IPM and biological control of plagues. Some work on economic restraints to decrease pesticide use is done as well. CATIE used to publish a periodical on IPM up until 1997, but financial constraints forced them to stop the issue of these periodicals (Valverde, personal communication).

#### **3.6.2 Organic agriculture**

Organic or ecological agriculture is by some regarded as a suitable alternative to conventional agriculture with its environmental problems. As this is not the place to discuss on the differences between organic or ecological agriculture, it will all be regarded as a way of agriculture without the use of chemical inputs, using only the profits of the land with regard to environmental sustainability. No overview exists on the exact area under organic agriculture in Costa Rica. One study mentions about 3000 ha under organic agriculture, which is about 0.7%

of the area covered with conventional agricultural techniques (García, 1996). Little more than 100 enterprises are estimated to work this way, mainly with production of banana, mora, platano, coffee, sugarcane and palmito (Grosch, 1994, as cited in García, 1996).

Many of the ngo's in Costa Rica working with organic agriculture are organised in umbrella organisations as ANAO and COPROALDE. While the foundations, organisations and unions do the practical field work of farming, extension and some research, the umbrella organisations co-ordinate contacts among the organisations, facilitate flows of knowledge and information among the members and occasionally play a role in obtaining finance for their different member organisations (Montoya, personal communication). Usually, the organisations do not financially support the farmers they work with. An interesting example runs with Güilombé in Talamanca, where different projects with indigenous people are running. Products here are the organically grown *Gros Michel*-bananas, as well as bananas which are processed in baby food in San José, as part of the so-called UCANEHÜ S.A.-project (Arguedas, personal communication).

Awareness of pesticide related illnesses is the main argument for farmers to start farming in an ecologically sane way, although a minor side argument involves the possibilities for exporting the products at higher prices, thus being an economic argument to start organic agriculture. Economic perspective of ecologically grown products seems to be fairly good, according mainly to the people working with these ways of agriculture (Montoya, Arguedas, García, personal communications). Consumers' demand in industrialised countries tend to be more towards a direction of organically grown products because of growing ecological awareness, hence increasing producers' possibilities. Prices of these products are usually somewhat higher than conventionally grown products, because of the larger input of labour and the relatively small enterprises working on it. Therefore, in Costa Rica the demand for these products is still very low.

Although experiments on organic agriculture in Costa Rica are mainly done with the ngo's, some research is done by the universities as well. At the UNED a lot of theoretical research is done, mainly at the economic and social possibilities of organic agriculture. The UNA does not carry out research on the topic itself, but relations with ANAO are very tight and awareness is rather great. The UCR does not seem to carry out many projects on the subject. As mentioned in paragraph 3.3, EARTH carries out some interesting experiments on organic agriculture as part of its courses, but these have not been running long enough yet as to give a thorough analysis on the benefits of these studies. Some first results however seem to be quite promising with respect to the social and agronomical possibilities of organic agriculture (Alvarado, personal communication).

Some studies are running within the large *bananeros* as well, with Chiquita leading the way with its *Eco-OK* bananas. These can be considered as commercially acceptable experiments, on which Chiquita has some large experimental fields in Honduras (Alvarado, personal communication). Surely some more experiments are done with these companies, but these are outside the scope of this study. The international academies CATIE and EARTH seem to have closest connections to the banana companies.

At CATIE there is hardly any relation with the concept of organic agriculture. This is mainly due to the vision explained: it is (economically) an illusion that the world could realistically work without pesticides. To support the idea of sustainability however, a well-considered and sound use of pesticides comes closest to the realistic possibilities of this concept within agriculture. This idea is supported by the observation, that governments as well as individuals work with much more concern with pesticides than they used to do. Within the CATIE-vision however, there is no place to do much research on organic agriculture, as it is not seen as a realistic alternative for (a better managed) conventional type of agriculture. Research is limited to some experiments in conjunction with the above mentioned ngo's (Valverde, personal communication).

Governmental involvement on organic agriculture is very little. At the MAG, a small program is running on *agricola orgánica*, where only one person is working on the concept. Despite his intentions at the field and his involvement on the subject, it is too little to be able to speak of a significant governmental influence on the subject. Some co-operation, however, exists with *Jugar del Valle*, an extension project at farmers' initiative and aided by the financial revenues of the Costarican-Dutch bilateral program on Sustainable Development. (Chavez, personal communication). The general view at the MAG remains to be towards a reduction of pesticides, but abduction is not considered a realistic possibility and pesticides are considered a "necessary evil" to sustain Costa Rica's main export products and the national economy (Léon González, personal communication).

### **3.7 Farmer's Involvement**

Farmers' involvement in activities towards pesticide reduction changes with the organisations they are working with. Often contacts are limited to safe use training by the governmental institutions or some extension work by the governmental institutions and the universities. Working in a way as to mutually increase knowledge and experience is not very common yet and usually limited to the work done by the ngo's. The experiments at EARTH seem to be the only examples where farmers and scholars work closely together. Investigations at the universities are usually on a theoretical or experimental base without direct farmers' involvement, although it is not uncommon to do courses for extensionists at the academies, who then can become intermediaries inbetween universities and farmers. The MAG claims that its contacts with the farmers are very practical and that therefore they can offer the information that farmers want, without staying in research only (Léon González, personal communication). Often however, their extension work and safe use training are one-day or half-day gatherings, without any feedback afterwards (Agne, 1996).

The Costarican ngo's tend to work closer with farmers, as the experiments by Güilombé prove. Most publications by these organisations are especially written for poorly educated farmers, trying to bring about some awareness on the environmental and health problems related with excessive pesticide use (Montoya, Arguedas, personal communication).

## **4 CONCLUSIONS AND RECOMMENDATIONS**

### **4.1 Concluding comments**

As people become more aware of the negative side impacts related with the use of pesticides, research on the topic seems to be on the increase, as well as initiatives to elaborate reduction policies. These studies, as well as public and governmental initiatives, generally concentrate on four interrelated issues: ecological impact, health issues, extension work and the search for alternatives. The search for alternatives generally deals with either IPM or organic agriculture.

Actors and institutions working on the subject can be divided in three groups for the sake of this study:

- universities and other centres of academic knowledge and research
- governmental institutions
- non governmental organisations (ngo's)

A fourth group of representatives of commerce was excluded as a limitation in the scope of this study.

#### ***Universities and other centres of academic knowledge and research***

Most knowledge and research concentrates on these centres. Of the Costarican universities, the UCR and the UNA do most research, where the UNA with its *Programa de Plaguicidas* (PPUNA) carries out most interdisciplinary research. At the PPUNA studies are usually from the views of ecotoxicology and epidemiology, where the UCR seems to concentrate more on fytopathological research and the search for biological alternatives and IPM. At the UNED some theoretical work on alternative agriculture is done, which created a wide network of knowledge on this particular topic at this university. At EARTH some interesting projects run on organic agriculture as well as on IPM, on both a commercial and an experimental farm at their properties. At CATIE pesticide related research is mostly fytopathological in origin, searching for biologically sounder projects of fitoprotection. Relations with organic agriculture-projects are very limited. Some study was done on socio-economic impact of pesticide use at a joint project from the GTZ and the IICA, with participation of the economic department of the CATIE as well.

#### ***Governmental Institutions***

Ministries, that are in some way or another involved with pesticide use include the MAG, the MINAE and the MS. The MAG is a rather large ministry, with a limited number of people involved in pesticide issues. Most work is concentrated on certification of new agro-chemicals and with control of foodstuffs. Since a few years some programs on IPM were introduced,

trying to decrease the high use of pesticides in Costa Rica. Therefore some field work extension and educational programs were introduced, in co-operation with the MS and the Cámara de Insumos Agropecuarios. Criticism on these programs emphasises the structure of these programs, with an only one-way information flow and a lack of feedback afterwards. At the MAG some awareness exists on the benefits of organic agriculture, although there is only a very limited number of people involved on this issue.

The MINAE concentrates on the environmental impact, but the connection with pesticide use is still very low. Since about one year this ministry is backed by a somewhat more integrated environmental law, which increased MINAE's responsibilities on the issue. Talks between the MINAE and the small program on organic agriculture at the MAG have started, but actual activities are still limited. Most attention is now paid to reach some agreement on a system of certification of organic agricultural products, which activities take place at a slow but steady pace, albeit in little co-operation with other institutions.

At the MS as well activities extend no further than the legally set limits. This includes audits and inspections of agricultural use of pesticides and to execute sanctions when necessary (although this rarely seems to be the case), extension work as a preventionsary measure, and some research on health issues related to pesticide use. The extension programs are usually done with the MAG and the Cámara de Insumos Agropecuarios, as stated above.

As environmental contamination and health problems cannot often be related, it is surprising that no integration or even the slightest connection whatsoever exists between the MINAE and the MS with respect to the pesticide issue.

Scientific research and investigation at the ministries is generally very limited and most information is gathered from the universities, who accept research tasks offered by the ministries as well.

### ***Non governmental organisations***

At the ngo's no great amount of research is running, although they often work in some (tighter or looser) conjunction with interested scientists at the universities, increasing mutual knowledge. The ngo's that have been included in this study, all concentrate in some way or another on organic agriculture.

Interesting projects on alternative and ecologically sane projects of agriculture are running throughout the country, although it is not known how many projects exactly are present in Costa Rica. Most projects deal with banana, coffee or cacao. Often projects are set up together with farmers, who showed the intention of wanting to work on organic agriculture, usually because they want to avoid health risks involved with (excessive) pesticide use. Sometimes, economic arguments are mentioned as well by farmers as a reason to change to organic agriculture. The ngo's then work together with the farmers, because of the knowledge present at the ngo's: the projects are set up in a way of mutual exchange of knowledge and experience. Interesting projects that are running are done by the Fundación Güilombé with



indigenous people in Talamanca and by ANAO on a commercial farm in Tierra Blanca, Cartago. On other projects information is present at ANAO and to a little lesser extent at COPROALDE as well.

The ngo's do not work closely together with governmental institutions, usually because of different visions on the subject. Often the ngo's can be regarded as intermediary agents, that facilitate the flow of information from scientists to farmers.

#### **4.2 Recommending comments**

At REPOSA, the data collected will be used to evaluate ecological LUSTs in the USTED-methodology. Therefore, information is needed on relations between inputs and outputs of different ecological land uses. This report does not aim to offer this information directly, but to give an overview of where knowledge on this information in Costa Rica can be gathered. It can hence serve as a guide to follow-up students or researches on this particular field of interest. In the appendices some lists are given of organisations and institutions that can be used as information centres on pesticide research and organic agriculture.

To gather more knowledge on the nature of plagues and pesticides, interesting research is done at CATIE, the UCR and EARTH. Valuable information on environmental behaviour of pesticides is limited to the PPUNA, as is most information on health problems related to pesticides. Most interesting projects on IPM and biological control of pesticides are elaborated at the UCR, ANAO and EARTH, by some a little more extensive than by others. Projects on organic agriculture are spread throughout the country, often in co-operation with ngo's. A lot of the ngo's are united with umbrella organisations as COPROALDE and ANAO, who stay in contact with a lot more organisations on a national as well as a international level. ANAO works a lot in co-operation as well with the PPUNA, to evaluate an integrated approach to the pesticide issue.

To get a clear insight in the transition process from conventional agriculture, *via* IPM-sustained agriculture, to an organic way of agriculture, the ANAO project in Tierra Blanca, Cartago, is very interesting; experiences here could be of great value to alternative LUST-construction at REPOSA as well, although quantitative data sometimes lack. Quantitative information on land used in Costa Rica under organic agriculture seems to be rather sparse in general; most data should be available with the UNED, the UNA or ANAO.

Governmental institutions are usually working in development of legal frameworks and with extension and education. With regard to projects on pesticide reduction and the search for alternatives to pesticides, not much information can be obtained here, certainly not with practical field experiments. At the MAG there might be some more knowledge on experiments with organic agriculture, with regard to some existent co-operation between the MAG's

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Program on Organic Agriculture and the project Jugar del Valle, which is a farmers' initiative on organic horticulture.

It can be imagined, that experiments with especially the large banana-companies might have generated some interesting results as well, although it was never intended to investigate such projects within this study. The possibility of the presence of more quantitative data with the *bananeros* or companies with other products as coffee, supports the recommendation of some more research here. However, the companies generally tend to guard their information very tightly: valuable introductions then might be made with CORBANA, ICAFE, or the Cámara de Insumos Agropecuarios, in which producers and some consumers of pesticides are united.

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## APPENDIX 1

### INTERVIEWS THAT SUSTAINED THE RESEARCH

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<i>name</i>	<i>organisation</i>	<i>date</i>	<i>phone</i>
<i>governmental institutions</i>			
Ruth León Gonzalez	MAG (dep. Investigation)	12/05/97	231-2344
Carlos Chavez	MAG (dep. Organic Agriculture)	18/08/97	231-2825
Nidia Morera González	Ministry of Health (dep. Registration and control of toxic substances)	29/05/97	223-0333
Maria Guzman	MINAE (dep. Environmental Control)	30/05/97	233-4533
<i>investigative institutions</i>			
Bernal Valverde	CATIE	11/08/97	558-6431
Edgar Alvarado	EARTH	5/06/97	255-2000
Carlos Reiche	IICA / GTZ project	27/05/97	229-3691
Clemens Ruedert	UNA (PPUNA)	3/08/97	277-3584
Jaime Garcia	UNED	18/05/97	253-2121
Claudio Gamboa	UCR	30/05/97	433-9111
<i>non governmental organisations (ngo's)</i>			
Juan Arguedas	Fundación Güilombé	10/04/97	224-1770.
Felipe Montoya	Coproalce	12/05/97	228-7283
Fabio Chaverri	ANAO / PPUNA	17/08/97	224-0911
<i>representatives of commerce</i>			
Representatives of commerce were not intended to be part of this study.			

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## APPENDIX 2

### INTERVIEWS WITH REPRESENTANTS OF THE ORGANISATIONS IN THE FIELD OF PESTICIDE RESEARCH

#### ***Fundación Güilombé.***

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Interview with Mr. Juan Arguedas, co-ordinator

Date: 10th of April 1997

San Pedro

Tel.: 224-1770

*Main work of Güilombé is with farmers and indigenous people of Talamanca. Since 1991 they support farmers growing organic rice and sugar. In 1991 they made a multidisciplinary study into contamination caused by banana companies in the Valle de la Estrella which resulted in a denouncement in the International Water Tribunal. Affiliated with UNA and member of COPROALDE.*

The Fundación Güilombé is an organisation involved in the promotion of organic agriculture. They have projects with indigenous people and small farmers in the Talamanca area, in the Costa Rican province of Limón. The farmers mainly grow bananas. Güilombé facilitates the maintenance of organic agriculture for the farmers by way of education and by helping them to organise themselves, for example to evolve economic markets. These projects are set up with the purpose of reciprocity, where Güilombé learns as much from the farmers as the farmers learn from Güilombé. The farmers have a lot of experience in growing different crops, Güilombé has a lot of knowledge on how to set up an organic agricultural farming

system. An important idea on sustaining the earth is the use of a lot of different crops and shading trees (*agroforestry*), hence avoiding monocultures that impoverish the soils. Güilombé can also help in organising the farmers, for example in the accusation of contamination of the Valle de Estrella with pesticides by large banana companies. In 1991 they got their right before the International Water Tribunal in The Hague, The Netherlands.

One of the main projects carried out by Güilombé is called UCANEHÜ S.A. This management enterprise started in 1995, with the objective of promoting and developing the production and marketing of organically grown products. The group of farmers and indigenous people participating in this projects now accounts for 140 families, who obtain their main benefit of the organically grown banana, which is processed in baby food in a San José factory, to be exported to the United States. Also, perspectives for export of other products like cacao and ginger tend to be very hopeful. The organically grown *Gros Michel*-banana is produced on a mixed plantation, on which different plants all have their different functions, like the *Leucaena* tree to fix nitrogen and trees like the *Javillo* that has characteristics of nematode repellent. The density of banana plants tends to be rather low, usually no more than 400 plants per hectare.

The Fundación Güilombé facilitates aspects of organisation and administration for the farmers that start experimenting with the organic way of growing products. Usually, the farmers themselves indicate that they want to experiment in developing a more sustainable way of land use, where then Güilombé will help them with some of the pre-mentioned practical help and with a more theoretical background to assist in the change to organic agricultural land use. The principal ideas that serve as a background to Güilombé's activities involve the maintenance of biodiversity, preventing illnesses by farmers because of a (bad) use of pesticides and the improvement of the earth's fertility.

Right now there are projects with roundabout 360 farmers altogether, who all tend small pieces of land (less than 2 ha) in the region around Bribri and Sixaola in Talamanca. Güilombé does not do very much research itself, although they can be seen as an intermediate actor in between the farmers and the researchers at the universities (mainly the UNA). In Costa Rica some more non governmental organisations like Güilombé are present, ten of which are united in the co-ordinating organ COPROALDE.

### **COPROALDE**

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Interview with Mr Felipe Montoya,  
co-ordinator

Date: 12th of May 1997

Paso Ancho, San José

Tel: 226-7283

*The Co-ordinating Organ of Non Governmental Organisations in the field of Projects on*

*Alternative Development (Coordinadora de Organismos No Gubernamentales con Proyectos Alternativos was started in 1988, as to offer a response to the dominant developments in agriculture, which are non-sustainable in socio-economic and environmental terms. COPROALDE seeks to find ways of reaching an alternative way of rural development, according to the leading principles of social justice, environmental protection and human solidarity. With rural labourers COPROALDE promotes alternative projects in a way of mutual learning with these labourers, to eventually establish an example at a national as well as at the international level.*

COPROALDE is an umbrella organisation with ten member organisations working on alternative ways of agriculture, mainly on organic agriculture. The work of the member organisations covers almost the whole country. The members all work more or less as regional organisations. COPROALDE's task in this, is to co-ordinate co-operation and to facilitate flows of information and knowledge among the members. Also COPROALDE may play a role in obtaining financing for the different member organisations. COPROALDE does not support their members nor the farmers with direct financial credits.

The organic way of agriculture which COPROALDE wants to promote, implies an agriculture without the use of pesticides or artificial fertiliser and with parts of the land fallow every few years. It also implies, that all the resources of the land are used, with balanced inputs and outputs of nutrients. These prepositions are the conditions for a sustainable agricultural land use. In the usual practice, it appears that the organic maintenance of an agricultural unit can be done at lower costs than conventional maintenance, mainly because the



pesticides are not used. However, it will cost more labour input to maintain an organic way of agriculture.

Farmers who choose to start on organic agriculture, will usually not change their attitudes and practices from one day to another. They may start maintaining only part of their land without the use of pesticides, while the years after more and more land is converted. Economically, a fast transition could be rather risky, because of the increased vulnerability of the soils and the disturbed balance of resources.

The change in attitude towards a biologically sounder way of farming, is in most cases the result of illnesses or deterioration in health because of excessive use of pesticides. Another but minor argument involves the possibilities for exporting the products at higher prices. The rising demand from mainly industrialised countries for environmentally sound products could secure this argumentation. Nationally however, the demand for these products is still very low, mainly because of the higher prices.

With regard to pesticide use, COPROALDE does not undertake much research on the topic. Most publications deal on issues involved when changing to organic agriculture, and are not scientific in the usual sense of the word. Extension work is by far the most important activity within the subject. The information is greatly sustained by the collective experience of the different member organisations, of which for example CENAP (Centro Nacional de Acción Pastoral) has been working for over 20 years on organic agriculture.

Scientific information and co-operation on this field is usually done with the department of Agrarian Sciences at the National University (UNA) in Heredia. Contacts with governmental institutes like the Ministry of Agriculture are not very close, because of the differences in attitudes with the people at the small office of Organic Agriculture at the MAG, as Mr Montoya states it.

A comparable organisation to COPROALDE is the ANAO (Asociación Nacional de la Agricultura Organica), which works as an organisational umbrella to member organisations as well. Experiences and contacts are exchanged between these organisations.

#### ***MAG: Department of Investigation***

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Interview with Mrs. Ruth León Gonzalez, researcher at the department of fytoprotection.

Date: 12th of May 1997

Sabana, San José

Tel: 231-2344 / 231-5055

*MAG is the Costarican Ministry of Agriculture and Livestock (Ministerio de Agricultura y Ganadería). With respect to pesticides, they are responsible for the certification of new agrochemical products. Therefore, at the department of Investigation research is done to the history of new pesticides, to the treatment and laws in other countries, to their chemical and environmental effects, etc. Mrs. León is responsible for the investigations on insecticides at her department.*

#### ***History***

The importance of alternatives to chemicals as pesticides became clear in 1989,

according to Mrs. León, when a plague of *Liriomyza Huidobrensis* raged in the province of Guanacaste. This insect never used threat local crops, but because of the abundant use of pesticides against other threats, the insect managed to build up resistance to the common chemical pesticides. Hence, when all the other insects were reduced to small numbers or extinguished completely, the *Liriomyza* got a chance to breed very quickly to become a new threat. Because of its resistance, it was of little use to spray the conventional chemicals. Therefore, biological pest control was introduced, as part of an integrated pest management (IPM). This event was important in the facilitation of the introduction of IPM, both for the MAG as well as for the local farmers. Beforehand, it was not a common thought to use IPM as a means for pest control.

#### *Research and co-operation*

Still pesticides are widely used in Costa Rica, and according to Mrs. León it is "a necessary evil." To increase effects, many new pesticides are still introduced and as stated, one of the tasks of the MAG is to investigate them for certification. The Section of Investigation is in charge of the registration of pesticides and of controlling their appropriate use. It analyses technical information provides by the industry and administers import statistics for agrochemicals. At the same time, it is responsible for pesticide residue analysis in foodstuffs carried out by two national residue analysis laboratories (Agne, 1996, in addition to the personal communication with Mrs León).

To ease the task, the MAG has got its own laboratory to investigate the chemical effects of the products. They work together

with the University of Costa Rica (UCR) and the National University (UNA) as well, but their work is regarded to be much more theoretical by Mrs. León. As she says, the MAG executes general research much closer to the needs and wishes of the farmers. "The MAG knows what the farmers want, the universities often do still more and more research, without taking the actual situation much into account." With other research institutes, like the IICA, ties are very weak.

Execution of laws on the field of pesticides is not regarded as one of the tasks by the MAG, because these are usually laws on public health, which the Ministry of Public Health should care for. Through extension work however, a lot of farmers can be addressed on a more sensible use of pesticides. Strangely enough the ministries do not work together on the pesticide issue. To work with farmers in the country, the MAG works closely together with its regional offices. Through these offices, a lot of extension work is done. Main aim of a more sensible use of pesticides seems to be to achieve a lower content of chemicals in the end food product. Besides this, information is given on the use of pesticides and on some health issues involved in using the pesticide.

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#### **UNED**

interview with Jaime García,  
extensionist/researcher  
date: 16th of May 1997  
San Pedro  
tel.: 253-2121

According to Mr García, the work at the Universidad Estatal a Distancia differs from

other universities, mainly with respect to education. This takes place at many different places throughout the country. Where universities usually research is very important, at the UNED education is the most important task; research is done mainly on a theoretical base. The UNED does not have any laboratories for applied research.

The UNED is the first university in Costa Rica to have a full course on the different aspects of pesticides. This course has been running for five years now and is meant for students and scholars. Mr García wrote the book that serves as a base to this course. The focus of the course lies on the prevention of problems, as opposed to protection and dealing with pesticide problems after it was used. To Mr García this implies, that biological control of crops is neither a real option, because it does not deal with *prevention* of plagues. A better option then would be a more organic way of agriculture, where the natural resources supply in a sustainable land use.

The UNED does not have formal connections with others on the field of research or education with respect to pesticides. However, some unofficial relations they have with other universities, mainly the UCR and the UNA. Also, some mutual extension work is done with organisations on organic agriculture, like COPROALDE and ANAO. Generally speaking, Mr García states, the knowledge on pesticides in Costa Rica is rather dispersed.

## IICA

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Interview with Carlos Reiche, specialist on management and conservation of natural resources

date: 27th of May 1997

Guadalupe, San José

Tel: 229-0222

Mr Reiche works for the IICA/GTZ project, which is a joint research effort on agriculture, natural resources and sustainable development. The IICA is in Interamerican research foundation on agriculture, the GTZ stands for Deutsche Gesellschaft für Technische Zusammenarbeit GmbH. The objective of the project is to strengthen IICA's institutional and operating capabilities to provide co-operation in areas linked to natural resources management and sustainable agricultural development. They have no research *specifically* on pesticides, although some economic analysis has been made within the German Pesticide Policy Project by Stefan Agne. This project has liaisons with the IICA/GTZ project. Within this context, 5 economic studies on the use of pesticides have been made in El Salvador, Guatemala, Panamá, Honduras and Costa Rica.

As part of the project, valorisation of different parameters of environmental impact have been made. One of the achievements is the establishment of indicators for sustainable development. Within this framework, projects are carried out now in Cartago at the Rio Reventado, where measurements are done on health effects. The project here works together with the FAO, the MAG and the local farmers. In Puriscal extension projects with local farmers are carried out on organic

agriculture. Demonstrations are done on agroforestry systems for organic coffee. The project here works together with Fundación Ecotrópica and local farmers, as well as with a small German foundation. In general, at the IICA hardly any research is done on pesticides in Costa Rica.

***Ministry of Health: Department of Registration and Control of Work Related Toxic Substances and Medicines***

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name: Nidla Morera González, director  
Section of Work related illnesses  
date: 29th of May 1997  
San José  
Tel: 229-0333

*The Costarican Ministry of Health (Ministerio de Salud: MS) is responsible for the general public health protection. The Department of Registration and Control of Work Related Toxic Substances and Medicines started in 1989. Their work is to control the use of toxic substances at working places. They have to evaluate whether or not toxicity levels of pesticides are tolerable for human beings. The Ministry of Labour then is responsible for the supervision of occupational risks related to pesticide use (Agne, 1996).*

Among other laws, the labour of the MS is backed by a 1990 law, which regulates the use of pesticides and other toxic substances on banana plantations. Inspectors working for the MS check throughout the country whether the laws are obeyed properly. More than half of the inspectors are solely involved in the control of banana cultivators.

The MS does not carry out significant amounts of research, because they do not have a legal obligation to do so. As they realise that prevention work is the most important issue in their legal mission, most accent lies on extension work as well as the facilitation of improvements on technical safety applications. As a backup to extension work some investigative labour is carried out, usually together with the Cámara de Insumos Agropecuarios, the National Chamber of Producers, Importers and Distributors of Agricultural Inputs. The actual extension and education work is usually field work, where people from the MS actually go into the field to the farmers. On this work, the MS works together with people from the MAG and the Cámara de Insumos Agropecuarios, as well as with the Consejo de Salud Ocupacional, a co-ordinating governmental organ. More complicated questions on pesticide issues are usually backed by research on the UNA or the UCR.

As far as the execution of pesticide related laws is concerned, the MS does work together with the MAG at occasions, usually on collective inspections. No relations whatsoever are held with the MINAE, which is concerned only by negative effects of pesticides on the environment.

***MINAE: Controlario Ambiental***

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Interview with Maria Guzman  
Date 30th of May, 1997  
San Pedro  
Tel. 233-4533

The section of the MINAE that is called the Controlario Ambiental is involved with the

maintenance of a wide array of environmental laws. This controlling department was created by a law from November 1995,<sup>1</sup> and it came into existence in 1996. Because of its very recent existence, the department is still elaborating on its priorities and policies. So far, control on pesticide residues in the environment has not received priority yet, because of this initiating problems and because of the lack of human resources on the department. Co-operation with other ministries like MAG and MS would seem probable, because of overlapping responsibilities, but so far no serious attempts have been made for optimisation. Contacts are sustained with the UNA and the UCR, mainly for research questions on contamination of environments in the country. The MINAE employees that inspect environmental contamination cases have rights of imposing financial penalties, but also environmental compensation penalties can be used as a sanction.

The above mentioned law has a chapter on organic agriculture, stating some governmental stimulation of these agricultural products. At the MINAE work is done to try to introduce the legally mentioned certification of organic products, a work they try to finish before the February 1998 presidential elections, because policy priorities then change from one day to another, as Mrs Guzman states it. However, so far relations with other organisations on this field have been very sparse and progress seems to be rather slow.

With regard to pesticide policies and research, it can be stated that no one at the MINAE is specifically involved.

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**University of Costa Rica: Estación  
Faubio Baudt**

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Interview with Claudio Gamboa Hernandez  
Date: 30th of May, 1997  
Estación Faubio Baudt, Alajuela  
Tel: 433-9111

*The university of Costa Rica (UCR) is one of the largest in the country. The university's Agronomical Faculty is made up of 4 escuelas, of which one is the Escuela de Fitotécnica, where all the phytological research is done. The interesting sections on this Escuela with regard to this research, are the CIPROC (Centro de Investigación para la Protección de Cultivos, Centre for research on protection of cultural crops) and the Estación Faubio Baudt, and experimental station with a lot of research on Integrated Pest Management (IPM).*

With regard to education and extension, an explanation is given by Mr Gamboa on the situation in Costa Rica. On a college level, it is possible to specialise in agriculture at an intermediate educational level, but here no courses on crop protection are given. Especially in the rural areas, some lessons on pesticide use are part of the general agricultural courses. To learn more about pesticide use, extension programs have been developed by the MAG in co-operation with representants of the chemical industry (Cámara de Insumos Agropecuarios). They offer courses and training on safe use of pesticides to farmers, where they learn techniques on safe application, to wash their hands and

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<sup>1</sup> Ley N° 7554: Ley Organica del Ambiente

clothes after spraying, etc. From the universities initiatives have been made to educate children as well on some basics with regard to pesticide use.

More elaborated educational programs on an academic level are taking place on different universities, mainly the UNA and the UCR. At the UNA runs a course on chemicals in agriculture, which focuses on plague combat and health issues. Different courses run at the UCR, with field experiences involved as well. Many of these courses are given on annexes of the universities throughout the country. Academies like EARTH and CATIE offer some courses too, as well as the INA and the ITCR (Instituto Tecnológico de Costa Rica), which has an agronomical course near San Carlos. Specialised extension work towards farmers on bananas and coffee is given by their respective producers organisations CORBANA and ICAFE.

In general, the producers organisations and the governmental initiatives tend to be more practical, with a focus on application and the use of pesticides, while the universities elaborate more on the theoretical background issues.

As mentioned above, the University of Costa Rica has an agronomical sciences faculty, which comprises of several different sections. Most investigative work on pesticides is done at the CIPROC and at the experimental station Faubio Baudit, where Mr Gamboa is working. Working areas here are investigation as well as education. Focus lies on developments in Integrated Pest Management and research on non-chemical alternatives for plague combats. Many projects, but by far not all, are on requests by the chemical

companies, which try to keep in pace with developments on IPM. At the university's laboratories tests are done as well to aid with the registration investigations for the MAG. Most researchers at the station are biologists or chemists, which lies the focus of research on their area of speciality. A lack of socio-economic research at the university is recognised, according to Mr Gamboa. Hence especially on this specific speciality a lot of work is done with people from other universities, like the UNA and the UNED.

Internationally, Costa Rica plays a leading role within Central America on pesticide research, although the experience in Guatemala is highly valued as well. This experience is largely due to the presence of the large chemical companies in Guatemala. The higher level of knowledge in Costa Rica is because of better education research and extension facilities in Costa Rica, compared to the other countries in Central America. International congresses, seminars and scientific journals are usually organised by either CATIE or the Central American Program on the Improvement of Crops and Animals (PCCMCA: Programa Cooperativo Centroamericano de Mejoramiento de Cultivos y Animales). Compared to the other Central American countries, the use of pesticides is very high in Costa Rica. An interesting reason that Mr Gamboa mentioned, are the more advanced methods of application of pesticides, compared to the other countries.

**Pesticide Program of the Universidad Nacional (PPUNA)**

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Interview with Clemens Ruepert

Date: 3th of June 1997

Heredia

tel. 277-3584

*Since 1982 the Universidad Nacional in Heredia carries out a Pesticide Program, with accents on environment, health and alternatives. Many extensional and educational programs have been running since, indicating the close connection with social reality of pesticide use. The scientific research is mainly concentrating on aquatic ecotoxicology and epidemiology with respect to pesticide use.*

The PPUNA project at the Universidad Nacional in Heredia started in 1982 as a project for save pesticide use by agricultural workers. At first it was mostly a broadly set up extension program for farmers as well as governmental officials. Main aims were to attend on the risks involved in working with pesticides and to promote a save use of pesticides. Later the PPUNA project extended towards research on many other aspects of pesticide use: health effects, environmental impact, socio-economic impacts, alternatives for pesticides, governmental policies, etc. The scientific research integrates the following aspects:

1. The search for alternatives
2. Analysis of health related issues
3. Analysis of environmentally related issues

On all these areas research is done, complemented by courses and extension programs that are running (investigación, extensión, docencia). In aid of the research

on mainly the environmental issues the program has a fairly large laboratory, where a lot of research on aquatic environments is done. For the one part the people at the UNA try to identify traces of pesticides in monsters of rivers, lakes and other aquatic environments, for the other part ecotoxicological work is done to try to find methods of prevention of intoxication. At the analysis of health effect, research is mainly epidemiological. Many students are involved on this specific area of research on occupational health problems. See for specifications on the search for alternatives the interview done with Luis Brenes of the ANAO, who is involved with the PPUNA as well.

A very important part of the research at the PPUNA is the maintenance of a large database with information on pesticides in the whole of Central America, with regard to imports and exports, use of pesticides, environmental effects, health effects, etc.

Pesticide use in Costa Rica is very high compared to other developing countries and the negative side effects become increasingly more visible, mainly with regard to health effects. One of the aims of the research is to show health effects through epidemiological research, as well as to show environmental impacts, which usually are not very visible. The high use and the large effects of pesticides in Costa Rica stimulate research highly, but in other Central American countries a lot of research is done as well, although infrastructure of knowledge in Costa Rica is higher. Unique in the area is the database of information at the PPUNA, which involves a lot of information of governmental registration and which the

governmental institutions serve as well to support their policy making process.

In the search for alternatives to the use of pesticides, the co-operation with the ministries is a lot less, although some co-operative projects are running. Mr Ruepert explains this lack co-operation to the different visions on pesticide use from the PPUNA compared to the MAG for example. The people at the PPUNA state, that pesticides should not be used in the first place, because of the risks involved and because of the lack of knowledge on the possible effects. This view is conflicting with the one at the MAG and of course with other (governmental) institutions as well. Through the years however, the official view tends to bend more and more towards the scientific based view at the PPUNA and co-operation hence seems to become easier, where now some co-operative projects are running, ten years ago these organisations would not even talk with each other, according to Mr Ruepert.

At the extension level, the people of the PPUNA try to increase the knowledge gaps on pesticides with all people involved, from ministries to farmers and their women and children. Awareness on the risks and minimising of pesticide related accidents is the main goal of the UNA extensionists, sustained by their scientific research at the laboratories. Also (inter)national studies on politics and policies are running, which should offer some insight in the decision making process on the issues involved. Some analyses are made on politics and policy, to offer more insight in the decision making progress at this level.

Finances at the university are rather poor and the PPUNA project is therefore largely supported by external sponsors like the Swedish government, the GTZ from Germany and the European Community. Also quite a lot of co-operational projects are carried out with other organisations and universities. Still, the laboratory is one of the few existent in Costa Rica equipped to carry out investigations on pesticides. Other labs are at the UCR and at the MAG, the latter carrying out research on foodstuffs. The speciality of the PPUNA lab is aquatic ecotoxicological research, which means that relatively small traces of pesticides can be found in the water.

Other issues that make the project unique in Costa Rica is the amount of routine research done here, the epidemiological research on the relation between pesticide use and intoxication, and the integrated research within the whole field of pesticide use.

## **EARTH**

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Interview with Mr Edgar Alvarado

Date: 6th of June 1997

Guácimo

tel. 255-2000

*EARTH stands for Escuela de Agricultura de la Región Tropical Húmeda. It is a private international school which offers four-year academic level programs, to teach students from all over (Latin) America about sustainable methods of agriculture in the tropics. With regard to pesticides, some modules are offered on IPM and on sustainable agriculture. A commercial and an experimental farm are available to sustain the educational goals set by EARTH.*



At EARTH there are 3 professors involved some way or another with pesticide research or education. Mr Alvarado, who works as an entomologist, is only involved at the educational part of the story, hence the information extracted from this interview is with a strong emphasis on the educational work at EARTH.

The education at EARTH is a four year course, raising students to agronomists in the widest sense. Within the course of the study, the students can choose between modules on IPM and ecological agriculture.

#### *Integrated Pest Management*

The IPM module contains the basic view, that pesticides must be used as safely and as little as possible. Main goal is to prevent the negative side effects as much as possible. Within the course an awareness on these side effects is created, as to educate students to think of possibilities to use pesticides in a way as sound as possible. The course involves safe use training in the widest sense, practise at the commercial farm, waste management, entomological, toxicological, epidemiological and environmental aspects of the use of pesticides, resulting in a seminar organised in the last year, where the focus lies on discussion and problem solving with respect to IPM and pesticide use.

#### *Sustainable Agriculture*

Within this module, the course leads to an organic way of agriculture, with (practical) lessons at different levels. In the second year of this course, after a first year general introduction, specialisation is made on organic banana cropping, biological plague control, use of medicinal plants and herbs and an introduction to the organically

managed farm. This leads to a practical period on this farm in the third year of the course. This farm is managed in a holistic way, meaning that everything is done in an ecological sound way: no use of pesticides or artificial fertiliser, no monocropping, no use of machines, etc. These practices are also developed with farmers in communities in the direct surroundings of EARTH. Farmers who are willing to develop an organic way of agriculture are selected to work together with students, as to create a mutual flow of knowledge on this way of cropping. Students also work within other institutions of the communities, as to develop a wide scope of experience and insight in the way organic agriculture can be enveloped within this community.

The co-operation project with the farmers has been running for one year now, intended to run for five years for a first review of the experiences made. Although the course has not been running for more than one year, educational as well as experimental experiences seem to be quite promising. So far, all the main aspects have been tried to integrate in the project, as agroforestry, social integration in the community, biological diversity, agronomy, etc.

#### *Co-operation*

Realisation of the international character of EARTH, without respect to the local communities, was a strong motive to develop this project. Therefore, EARTH tries to make serious contacts with organisations as COPROALDE and ANAO to aid the experimental projects in a serious way. Also, some co-operation exists with the Costarican universities, with CATIE and a wide array of international institutions, like universities in France, the USA and Chile,

as well as with governmental institutions, mainly in Costa Rica.

## **CATIE**

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Interview with Bernal Valverde

Date: 11th of June 1997

CATIE, Turrialba

tel. 556-1632

*CATIE stands for the Centro Agronómico Tropical de Investigación y Enseñanza. The centre comprises of about 1000 ha dedicated to tropical agricultural research and education. Research interests at CATIE include conservation of crop genetic diversity, high-yield/low impact farming techniques for small farms and development of agricultural strains suitable for tropical environments world-wide.*

Dr Bernal Valverde is working as a grassland scientist at the department of *phytoprotection* at CATIE on IPM. Various courses are given at CATIE, with parts on IPM and pesticide use. Valverde's work mainly consists of research, as well as educational work. Main focus is to develop a sound use of pesticides. Projects and experiments on this are with specialised Integrated Pest Management within grassland (*Rottboellia cochinchinensis*) in Costa Rica, Mexico and Bolivia, financed by the British government. Part of the project is also to develop methods of biological control. Another project in which CATIE is partaking involves genetic research on resistance in rice. Valverde is not involved in socio-economic research as such, although another department at CATIE does some research from this viewpoint. Extension work is hardly done at CATIE; this would be very difficult because

of the international character of CATIE, according to Mr Valverde. However, extensionist often are educated at CATIE.

With respect to the investigative part, there is hardly any relation with the concept of organic agriculture. This is mainly due to the vision explained: it is (economically) an illusion that the world could realistically work without pesticides. To support the idea of sustainability however, a well-considered and sound use of pesticides comes closest to the realistic possibilities of this concept within agriculture. Mr Valverde notices as well, that governments as well as individuals work with much more concern with pesticides than they used to do. Within the CATIE-vision however, there is no place to do much research on organic agriculture, as it is not seen as a realistic alternative for (a better managed) conventional type of agriculture. However, the experiences from organic agriculture are taken very seriously, as proved by an international conference on the subject organised a few years ago.

Collaborations CATIE takes with the universities in Costa Rica; as usual these are the UNA and the UCR. Because of the international character of the academy, CATIE tends lots of international contacts as well, with universities as well as with governmental institutions as the EPA. Connection with the Costarican government consists mainly of consultancy relations. Some relations exist with ngo's like COPROALDE and ANAO, on a project with organic tomatoes. Three years ago they also worked together on a large international congress with some references to organic agriculture.

Mr Valverde agrees on the leading role of Costa Rica in Central America within the field of pesticide research, mentioning the higher state of education and the high use of pesticides, due to the economically important monocroppings.

**MAG: Programa nacional de agricultura orgánica**

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Interview with Carlos Chavez

Date: 16th of June, 1997

San José

Tel. 231-2625

At the MAG a small scale program on organic agriculture is running, where at the time of the interview only Mr Chavez was working. His work is backed by some impressive laws and decrees, of which the *Ley Orgánica del Ambiente*<sup>2</sup> is the most important one, showing the good intentions of the government on this particular policy field. In practice, the Programa Nacional does some work on certification of products from organic agriculture, although this has not been very far developed yet. Usually the foreign norms are used to certificate (export) products, where the above mentioned law is one of the most progressive in the world, according to Mr Chavez.

A lot of extension work is done as well, albeit within the scope of the limited finances and human resources available. Here co-operation exists between this MAG-program and Jugar del Valle S.A. in the Lake District, province of Alajuela. Jugar del Valle is the result of a collective

effort by small stakeholders who want to develop an ecological but commercially interesting way of growing horticultural products. To the MAG this project is interesting, because of the commercial parameter involved, which to Mr Chavez is an important term in the development of organic agriculture. Besides, Mr Chavez states, many other organisations are often to expensive for the farmers, as they have to pay a lot to become a joint member. At Jugar del Valle a 17 ha. *finca* exists with only organically grown products, and it is integrated in different programs of extension and education and different courses are offered for other farmers.

The MAG has some regional offices which deal with projects on organic agriculture. The office in the main building in San José is mainly dealing with generating money from a wide array of (usually international) organisations and distributing it to different projects, selected by the regional offices. Money is sparse however, says Mr Chavez, and the MAG generally is not very much inclined to offer many financial resources. Eventually, this is the limiting factor in all the projects the Programa is carrying out (or wants to carry out). A second important task is promoting the transformation progress with producers as well as consumers, preferably in the same pace. It still is a difficult task, with expensive labour in Costa Rica as an extra complication, because it increases prices of organic products (which are grown with a higher labour input).

The Programa works together with some other interested governmental institutions, who are mainly working with the MINAE. Usually this is limited to meetings on

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<sup>2</sup> Ley N° 7554 (13th of November 1995)

financial distribution, control measures, and various other issues that governments are usually associated with. The co-operation with ngo's mainly consists of a mutual exchange of information, although Mr Chavez reproaches them for often being very protective to their own projects, not wanting to share information and experiences with others. Co-operation with the universities is more open and a lot of knowledge is gathered from the UCR, the UNA, the UNED and the ITCR. Mr Chavez would prefer more practical research however, instead of the high level abstract theoretics that prevail at the academies.

## **ANAO**

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Interview with Fabio Chaverri Fonseca

Date: 17th of June 1997

Heredia

Tel. 224-0911

*ANAO (Asociación Nacional de Agricultura Orgánica - Costa Rica) is an umbrella organisation for producers in organic agriculture. Most members are foundations or organisations. ANAO regulates publications and activities to promote organic agriculture by extension work, facilitating scientific information from universities to farmers' level.*

ANAO is a organic agriculture producers' umbrella organisation. Most members are associated with banana, coffee and cacao, which are so far the most interesting ecological products from a commercial point of view. Exact numbers on the areas in Costa Rica grown with different ecological products are not available as yet, however. Nationally, ANAO offers an information and facilitation network to

different organisations, where they are internationally embedded in various networks as well. Main activity is *capacitación*, the extension and information of farmers in Costa Rica who are willing to transform to organic agriculture and to farmers who are willing to learn more about the (commercial) possibilities. Difference with COPROALDE is, according to Mr Chaverri, that ANAO is somewhat less strict in working solely with small stakeholders, as COPROALDE does.

As extension work is most important, ANAO can be regarded as an intermediary actor in between farmers and the more or less scientific knowledge often used to introduce them to an organic way of agriculture. To inform potential producers, programs are set up rather carefully, as not to create false hopes with producers who then might encounter a closed off consumers market. The extension activities focus at biological control, maintaining biological diversity, etc., with the notion that working in an ecological way is more labour intensive. To support these activities, many booklets and brochures are issued.

A good example on ANAO's activities is given by a commercial farm on horticulture they are working with in Tierra Blanca, province of Cartago. Co-operation has been going on since about 1984, when a plan on *Manejo Seguro de Plaguicidas* (secure maintenance of pesticides) was initiated. After some ten years, this phase made place for Integrated Pest Management, which in its turn was replaced by a completely organic way of agriculture three years ago. The interest of the project is lying in the rather slow and well considered way the transition was taking place, from conventional pesticide intensive

way of agriculture to organic agriculture. Another interesting comment is, that this *finca* is lying in a rather pesticide intensive agricultural area of the country, where such transitions could have some great effect if the project appears to work out well in other farmers' view. The "transitioned" farmers now are partaking in extension work to other farmers too in other parts of the country.

Nationally there are not many projects which have developed so far yet, according to Mr Chaverri, certainly not in co-operation with universities. It must be underscored however, that the farm in Tierra Blanca is not an experimental farm, but a fully commercial farm. Studies on the different

biological, economic or environmental effects do not seem to be priorities to ANAO, these are given to practical aid.

As Mr Chaverri is working for the PPUNA as well, he has a fairly good overview on the peers working on the subject at an academic level: this certainly is not very many, in the whole of Costa Rica maybe roundabout 10 people spread over three universities. Some more however are studying on related subjects from economic, agronomical or other points of view.

## APPENDIX 3

### ORGANISATIONS IN THE FIELD OF INFORMATION AND EXTENSION ON ORGANIC AGRICULTURE AND AGRO-ECOLOGY IN COSTA RICA

<i>organisation</i>	<i>phone</i>	<i>fax</i>
Asociación Nacional de Agricultura Orgánica (ANAO)	224-0911	224-0911
Asociación Nacional de Pequeños Agricultores Orgánicos (ANAPAO)	236-5198	240-5866
Asociación para la Conservación y el Desarrollo de los Cerros de Escazú (CODECE)	228-0183	228-0183
Centro de Capacitación en Agricultura Orgánica de JUGAR del Valle S.A.	225-8789	234-0603
Centro Nacional de Acción Pastoral (CENAP)	460-1022	460-4592
Coordinadora de Organismos no Gubernamentales con Proyectos Alternativos de Desarrollo (COPROALDE)	226-7283	226-7283
Corporación Educativa para el Desarrollo Costarricense (CEDECO)	236-5198	240-5866
Fundación Güilombé para la Agricultura Biológica y la Comunicación	224-1770	283-4895
Oficina de Extensión Comunitaria y Conservación del Medio Ambiente de la Universidad Estatal a Distancia (UNED)	253-2121	234-6547
Programa de Agricultura Orgánica del Instituto Nacional de Aprendizaje (INA)	232-9311	232-9311
Programa de Agricultura Orgánica (PAO) de la Universidad de Costa Rica (UCR)	433-9111	433-9086
Programa de Plaguicidas de la Universidad Nacional (PPUNA)	277-3584	277-3583
Programa Nacional de Agricultura Orgánica del Ministerio de Agricultura y Ganadería (MAG)	231-2625	296-0858
Servicio de Información sobre Agroecología y Agricultura Orgánica (SIAAO) del Centro de Documentación e Información Ambientales (CEDIA) de la Universidad Estatal a Distancia (UNED)	253-2121	253-4990

Source: García 1997

## APPENDIX 4

### INFORMATIONAL CENTRES ON PESTICIDES AND INTEGRATED PEST MANAGEMENT IN COSTA RICA

**Base de datos sobre importaciones de plaguicidas en Costa Rica de la Escuela de Ciencias Ambientales de la Universidad Nacional (UNA)**

Info: Data on import of pesticides in the country. In the future databases will be set up on export of pesticides from Costa Rica to other countries.

Tel. 277-3292. Fax 237-3289

**Biblioteca de la Organización de las Naciones Unidas para la agricultura y la alimentación (FAO)**

Info: Politics of the FAO, residues of pesticides, codex on alimentation, data on imports and exports of pesticides.

Tel. 220-0511. Fax 232-8848

**Centro de Derecho Ambiental y de los Recursos Naturales (CEDARENA)**

Info: Legislation on pesticides in Costa Rica

Tel. 253-7239. Fax 225-5111

**Centro de Documentación e Información Ambientales (CEDIA) de la Universidad Estatal a Distancia (UNED)**

Info: Databases on pesticides, with emphasis on descriptions with respect to Costa Rica.

Tel. 253-2121, ext. 2260. Fax 253-4990

**Centro de Información de Medicamentos de la Facultad de Farmacia de la Universidad de Costa Rica**

Info: Toxicology of pesticides.

Tel. 207-4299 or 225-7230. Fax 207-4694

**Centro de Investigaciones en Protección de Cultivos (CIPROC) de la Universidad de Costa Rica (UCR)**

Info: Databases on the researches carried out in the country on agricultural sciences.

Tel. 207-4141. Fax 234-6164

**Centro Nacional de Control de Intoxicaciones del Ministerio de Salud**

Info: Treatment and control of pesticide intoxications. Data on different kinds of intoxications.

Tel. 223-1028. Fax 255-4907

**Centro Regional de Información del area de Fitoprotección del Centro Agronómico Tropical de Investigación y Enseñanza (CATIE)**

Info: Bulletin on Pesticides, approved by the North American Environmental Protection Agency (EPA). Integrated Pest Management. Tolerances of non-traditional crops to pesticides.

Tel. 556-1632 or 556-8431. Fax 556-0606 or 556-1533

**Comisión de Plaguicidas del Colegio de Ingenieros Agrónomos**

Info: ....

Tel. 235-6909 or 236-2841. Fax 240-2642

**Departamento de Registro y Centro de Sustancias Tóxicas y Medicina del Trabajo del Ministerio de Salud**

Info: Health issues in relation to pesticides.

Tel. 233-1001 or 222-9758 or 233-1081.

Fax. 222-9625

**Oficina de Extensión Comunitaria y Conservación del Medio Ambiente (OECyCMA) de la Universidad Estatal a Distancia (UNED)**

Info: Analysis of pesticide residues, residue dynamics in the environment, causes and consequences of uncontrolled use of pesticide and different options for improval.

Tel. 253-2121, ext. 2244 or 2255.

Fax 234-6547 or 253-4990

**Programa de Información Agropecuaria (Piagro) del Ministerio de Agricultura y Ganadería (MAG)**

Info: Economic data on pesticides and prices.

Tel. 232-1939 or 232-1468. Fax 232-1939

**Programa del Plaguicidas de la Universidad Nacional (UNA)**

Info: Research on the negative side effects of the use of pesticides in Central America. Databases on pesticide imports in Central America.

Tel. 277-3584. Fax 277-3583

**Programa de Sanidad Agropecuaria del Instituto Interamericano de Cooperación para la Agricultura (IICA)**

Info: databases on different economic aspects on the use of pesticides in various countries on the American continent, including research on legislation.

Tel. 229-0222. Fax 229-4741

**Secretaría Ejecutiva de Planificación Sectorial Agropecuaria y de Recursos Naturales Renovables (SEPSA)**

Info: Basic economic information

Tel. 296-2060. Fax 232-1939

**Subprograma de Registro y Control de Calidad del Programa de insumos Agrícolas de la Dirección de Protección Agropecuaria del Ministerio de Agricultura y Ganadería (MAG)**

Info: Registration of pesticides. Statistics on pesticide imports.

Tel. 260-8300