Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP)

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Contract Number 527-C-00-01-00091-00
Colombia Alternative Development Project

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Colombia Alternative Development (CAD) Project

Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP)

Chemonics International

October 2003

CAD PERSUAP

Action Form

Approval Request

ACTION FORM
Pesticide Evaluation Report and Safer Use Action Plan
(PERSUAP)
USAID-Colombia

PROGRAMME/ACTIVITY DATA:

Programme/Activity Number: 527-C-00-01-00091-00
Country/Region: Colombia, South America
Programme Activity Title: Expanded Strategic Objective: Provide Economic and Social Alternatives to Illicit Crop Production

Sub-activity Name: Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP) for the Colombia Alternative Development (CAD) Programme / Chemonics International, Inc.

Funding Began: FY2000 **Funding Ends:** FY 2005

PERSUAP Prepared By: Mario Pareja, Consultant on Environment and Development to Chemonics International, Inc.

Approval Final Action Form Reviewed By: Gabriel Escobar, Mission Environmental Officer (MEO), USAID-Colombia and Victor Bullen, Regional Environmental Officer, USAID-South America.

Submission Date: October 28, 2003

INTRODUCTION

This PERSUAP has been prepared to achieve the dual purpose of (a) complying with USAID environmental regulations and (b) to provide project operators with practical tools for better and safer management of their crop pests. To this effect, additionally to the pesticide analysis, a considerable amount of effort has been placed in the preparation of pest management matrices that summarise the available Integrated Pest Management (IPM) tactics for the major crop pests and provide the user with additional references to the subject as well as main contacts for technical support (see section 5.2).

This face-sheet summarises the findings of the subject PERSUAP (Attachment 1), and addresses the pesticide safer use and handling issues for the Chemonics International's Colombia Alternative Development (CAD) programme. The CAD programme, funded by USAID in the context of the larger Plan Colombia, supports farmers, farmers' families and farmer communities that have been so far involved in the production of illicit crops, such as coca and poppy, to voluntarily switch to licit crop production. Working with communities, community associations, and municipalities in the departments of Bolivar, Cauca, Caqueta, Huila, Nariño, Norte de Santander, Putumayo, and Tolima, the Chemonics' program is creating licit economic opportunities that generate income, improve the quality of life, protect the environment, and support ethnic and cultural values for peaceful coexistence. The programme uses a bidding approach to call for applications from farmers' organisations and supports basic staple crops ('*cultivos de pan cojer*') as well as 'industrial' crops targeted to internal or external markets, many of them with industrial processing and transformation.

***Crops so far supported by CAD**: (1) oil palm, (2) heart of palm, (3) cocoa, (4) cassava, (5) rubber, (6) dry beans, (7) pastures, (8) forest plantations, (9) plantain, (10) maize, (11) rice, (12) potato, (13) sugarcane, (14) nurseries, (15) vanilla, and (16) passion fruit.*

RECOMMENDED DETERMINATION

A **Negative Determination with conditions** is recommended on the basis of the completion by CAD for USAID/Colombia of a PERSUAP for pesticide use, addressing USAID's Pesticide Procedures, pursuant to 22 CFR 216.3 (b)(1)(i)(a - l). The recommended **conditions** are addressed in the section of 'findings and recommendations' below.

For future commodities, pests and pesticide products to be considered under the CAD program implemented by Chemonics, but not covered in the present PERSUAP, ***a further condition is recommended, that an amended PERSUAP shall be submitted***, pursuant 22 CFR 216.3 (b)(1)(i)(a - l). The amended PERSUAP should be submitted to USAID-Colombia MEO and USAID-South America REO within a reasonable amount of time after the bidding process is completed and Chemonics is certain of the crops to be included in the contracts. The amended PERSUAP will be prepared following the instructions that are a component of this PERSUAP (see section 5.5) and it must be cleared by the USAID-Colombia MEO and USAID-South America REO before submission to the Mission Director for signature and before approval by the BEO.

More specifically, for any pesticide not addressed in the present PERSUAP, a **Negative Determination with Conditions** is recommended pursuant to 22 CFR 216.3 (b)(1)(i)(a - l). The ***condition is that for pesticides NOT listed, in*** **Section 5.1.1: 'All CAD Pesticides', an amended PERSUAP, specific to the pesticides being proposed, shall be prepared and submitted to USAID.** The amended PERSUAP must be cleared by both the USAID-Colombia MEO and USAID-South America REO and approved by the BEO before the pesticides can be used.

FINDINGS AND RECOMMENDATIONS

1. So far, the majority of the crops supported by CAD have been of low input agricultural systems, ecologically appropriate, with an integrated, if not an ecological or organic, approach to crop production and pest management. ***It is recommended that*** **CAD continues with this eco- friendly approach to the promotion of alternative crops, leading into sustainable development, to the benefit of the Colombian environment and the health of participant farmers and their families, as well as of the consumers.**

2. The promotion of 'new and legal' crops in areas where illegal crops have been grown for years involves taking reproductive material, sexual or vegetative seeds, from traditional cropping areas to the new ones. ***It is recommended that, in order to prevent the dissemination of contaminated crop seed with pathogens, insect pests, and weed propagules, CAD establishes a strict plant sanitation-quarantine system based on international agreed and ICA certification and quarantine procedures for the movement of plant materials into the country as well as from one region to another within Colombia.***

3. Due to an extremely favourable cost/benefit ratio on the use of pesticides in illicit crops, these growers have a mentality of overusing pesticides in crop production without resorting to a rigorous health or environmental analysis. This is the major challenge that CAD faces in order to promote an environmentally friendly and sustainable alternative development programme. To change this situation, ***it is recommended that CAD follows a multifaceted strategy that (a) supports project operators to make farmers, and their families, fully aware of the health hazards of pesticides; (b) supports project operators, civil society and GO authorities to make farmers, their families, and the larger Colombian community aware of the environmental hazards, and societal costs, of pesticide abuse and misuse; and (c) provides technical assistance to project operators for them to be able to demonstrate to the participant farmers the options to pesticides available through IPM programmes that use the concepts of economic damage and action thresholds.*** .

4. A few of the pesticides being presently promoted in CAD are considered to pose serious health and environmental risks to Colombians and the Colombia's environment. ***(a) It is recommended that some of these pesticides (the insecticides: carbofuran, chlorpyrifos, and profenofos, and the fungicides: chlorothalonil and copper oxychloride be phased out in the medium term (1-1.5 years), and replaced by others or, preferably, by no-chemical tactics for***

pest control. (b) Moreover, due to higher than accepted health and environmental risks, and the availability of pest management alternatives to these molecules, a few of the pesticides (the fungicides: benzimidazole, captafol, hexaconazole, kasugamicine and ofurace, and the insecticides: cyalothrine (lambda), cyfluthrin and methomyl) should be faced out in the short term (0.5-1 year). (c) The highly toxic and easily replaceable insecticides aldicarb, isazofos, monocrotophos, methyl parathion and methamidophos and the herbicide paraquat should be phased out immediately. (d) **And finally, and additionally to this, no product listed in the prohibited pesticides category in the US or Colombia, should ever be used in this project (see section 5.1.4).**

4. In spite of a very solid and modern Colombian pesticide regulatory framework, and in spite of a large cadre of extremely well qualified Colombian agronomists, there is still need and room for interventions on Safer Use of Pesticides (SUP). ***Considering the traditional attitudes and practices of the participant farmers with respect to pesticides, as well as the isolated, and conflictive, condition of the areas where CAD is present, it is recommended that CAD implements a very strong SUP programme. The programme should (a) be based on the training programmes already available in Colombia, such as 'Agrovida', by Bayer CropScience, thought for not only farmers but also their families (women and children), and/or that of SENA-ANDI joint training programme for farmers (2 days) and trainers (5 days); (b) attempt to raise 'awareness' of the health and environmental hazards of pesticides as well as to teach 'good practices' on SUP; and (c) go hand in hand with training in 'ecological agriculture' and IPM, so SUP does not become a false panacea. Training offers for both of these latter themes are also available in Colombia through IICA, ICA, Corpoica and the university system.***

5. "Integrated pest management … is USAID policy because it is the most effective, economical, and safest approach to pest control. IPM attempts to control pests in an economically and environmentally rational manner; it emphasises non-chemical tactics, which cause minimal disruption of the ecosystem"[1]. ***In spite of the good technical level of the field technicians working within CAD and the CAD project operators, technical support in IPM should be strengthened. This may take the form of (a) an ex-ante requirement for an IPM programme for all crops promoted; (b) field demonstrations on the use of non-chemical pest control methods; and (c) support to the technical staff of the operators for farmers training in crop-specific IPM programmes.***

APPROVAL OF PERSUAP RECOMMENDED:

Bureau Environmental Officer: _____ Date:

Paul Des Rosiers Approved: _____.

Disapproved: _____

File No:

Mission Environmental Officer: _____/s/_____ Date:

Gabriel Escobar

Team Leader/ _____/s/_____ Date:

Project Manager: Erhardt O. Rupprechet Jr., Programme Officer, Alternative Programme

Regional Environmental Officer: _____/s/_____ Date:

Victor Bullen

[1] *USAID/AFR Guidance: Preparing PERSUAPs for Pesticide Programmes in Africa.*

CAD PERSUAP

PERSUAP
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Colombia Alternative Development (CAD) Project

Pesticide Evaluation Report and Safer Use Action Plan

(PERSUAP)

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CAD PERSUAP

PERSUAP REPORT

(Sections 1, 2, 3 and 4 of Table of Contents)

Fundación Chemonics
Colombia Alternative Development (CAD) Project

Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP)

1. Most Important Findings and General Recommendations

1.1. The Colombia Alternative Development (CAD) Programme

The Colombia Alternative Development (CAD) programme, funded by USAID in the context of the larger Plan Colombia, supports farmers, farmers' families and farming communities that have been so far involved in the production of illicit crops, such as coca and poppy, to voluntarily switch to licit crop production. Working with communities, community associations, and municipalities in the departments of Bolivar, Cauca, Caqueta, Huila, Nariño, Norte de Santander, Putumayo, and Tolima, the program is creating licit economic opportunities that generate income, improve the quality of life, protect the environment, and support ethnic and cultural values for peaceful coexistence. The programme uses a bidding approach to call for applications from farmers' organisations and supporting basic staple crops ('*cultivos de pan cojer*') as well as 'industrial' crops targeted to internal or external markets, many of them with associated industrial processing and transformation.

Crops so far supported by CAD: *(1) oil palm, (2) heart of palm, (3) cocoa, (4) cassava, (5) rubber, (6) dry beans, (7) pastures, (8) forest plantations, (9) plantain, (10) maize, (11) rice, (12) potato, (13) sugarcane, (14) nurseries, (15) vanilla, and (16) passion fruit.*

So far, most crops supported by CAD have been of low input agricultural systems, ecologically appropriate, with an integrated, if not an ecological or organic, approach to crop production and pest management. This is the case of cacao, where the growers association, Fedecacao, is promoting an ecological approach to crop production, being close to an organic production system (see "Cacao pests and their management" in section 5.2). It is also the case of oil palm, where the growers research centre, Cenipalma, has completely changed the pest management approaches from a very heavy reliance upon pesticides, 10 years ago, to the present IPM programme based mainly on biological controls (see "Oil palm pests and their management" in section 5.2). This is the type of alternative development that, by protecting the health of Colombians and their environment not only maximises the chances of becoming sustainable in the long term but also, by diversifying the production system it reduces production and marketing risks for the farmers.

Recommendation No.1: CAD should continue with this eco- friendly approach to the promotion of alternative crops, leading into sustainable development, to the benefit of the Colombian environment and the health of participant farmers and their families, as well as of the consumers.

1.2. Spread of insect pests and diseases

CAD is actually taking crops from traditional cropping areas to new ones in the Colombian territory. Although, the majority of these crops are not really foreign, to the country or to the regions where CAD is operating, they have been grown, if at all, only in very reduced areas. Some of the crops being promoted are multiplied by sexually produced seed but several of them, such as vanilla, cassava, and potatoes, are multiplied by asexual-vegetative propagules. Both types of materials, but more often the vegetative ones, can carry diseases and even insect pests that so move long distances and infest new territories. An example is cassava, where the reproductive stakes, if not properly chosen from healthy mother plants and/or disinfected could carry up to three pathogens: Phythophtora,

Xanthomonas, and a phytoplasm. Tree nurseries are also a place where multiplication y dissemination of, not only useful species but also of insect pests, diseases and weeds, may occur.

Recommendation No.2: In order to prevent the dissemination of contaminated crop seed with pathogens, insect pests, and weed propagules, CAD should establish a strict plant sanitation-quarantine system based on international agreed and Instituto Colombiano Agropecuario (ICA) certification procedures and quarantines for the movement of plant materials into the country as well as from one region to another within Colombia.

1.3. Present pesticide use

There is no clear evidence of abuse or misuse of pesticides in presently supported CAD crops. Two issues of concern, however, need to be mentioned. The first is that of the mentality of the farmers that are being sought for participation in the alternative development programme. Illicit crop farmers, such as those dealing with coca and poppy, have grown used to an abundance of inputs to produce these highly marketable and economically valuable crops. Due to the extremely high prices for coca and poppy, the economic and action thresholds for pest control, as traditionally used in Integrated Pest Management (IPM), are so low that they become a totally irrelevant tool for the rationalisation of pesticide use. As such, pesticides as well as other agricultural production inputs have been used in large quantities, close to the abuse and misuse. This tendency to use pesticides as the main, or even the sole, tool for pest management is one of the major challenges to be surmounted by CAD in order to 'rationalise' pest management programmes in the alternative development crops.

The distribution of pesticides in Colombia is done through large to medium size distributors located in Bogotá, Cali, Medellín, and many other major cities of the country all the way down to mid-to-small size pesticide dealers located closer to the final users. During the visits to distributors, at all levels, we perceived (1) a full compliance of Colombia manufacturers and importers with international codes for labelling and packaging of pesticides; (2) an adequate sizing of packages of pesticides according to the final users; (3) a very good degree of cleanness and organisation in all the stores visited; (4) no evidence of re-packaging of pesticides; and (5) a relatively good level of knowledge about pesticides, their toxicity and labelling on the part of the store attendants [A clear, and worrisome exception to this observation is shown in a photo in section 5.6]. A problem, although not directly observed but heard of in the field, seems to be the illegal direct distribution of smuggled foreign pesticides, including products cancelled and prohibited in Colombia. Given the general insecurity situation of the rural areas where CAD operates, Colombian authorities are limited in their capacity to fully control this illegal traffic of pesticides.

In summary, due to an extremely favourable cost/benefit ratio on the use of pesticides in illicit crops, the CAD farmers have a mentality of overusing pesticides in crop production without resorting to a rigorous health or environmental analysis. Many of the products used are highly toxic and many are environmental hazards[2]. The well-controlled legal pesticide market is altered by an illegal trading of, mainly foreign, pesticides much more difficult to control. These are major challenges that both, the Government of Colombia (CoG) and CAD, face in their promotion of environmentally friendly and sustainable alternative development.

Recommendation No.3: CAD should follow a strategy that (a) supports project operators to make farmers, and their families, fully aware of the health hazards of pesticides; (b) supports project operators, civil society and government authorities to make farmers, their families, and the larger Colombian community aware of the environmental hazards, and societal costs, of pesticide abuse and misuse; and (c) provides the technical

[2] More than 30 commercial pesticides are regularly used in Putumayo. Thirty percent of the local farmers use paraquat at least once a month and 14% regularly use metamidophos, among other products (US Embassy, 2001).

assistance to project operators for Safer Use of Pesticides (SUP) and Integrated Pest Management (IPM), based on the principles of economic injury and action levels and thresholds[3].

1.4. Pesticide evaluation

The review of CAD pesticides, involved close to 60 active ingredients presently used by farmers, recommended by technical institutions and/or so far requested by project operators for their productive activities (see section 5.1.1: "All CAD Pesticides"). Most of these pesticides were cleared based on the review of the 12 points of *22 CFR 216.3(b)(1)*. However, some of them do not fully comply with USAID environmental requirements for development projects. Of the total, only 30 active ingredients were selected, based on the criteria discussed in section 3.2, to be further studied as possible pesticides to be used in CAD crop pest management. These pesticides were then subjected to the more complete 'risk analysis', discussed throughout section 3 and shown in a table in section 5.1.3.

Recommendation No.4: Some of the pesticides being presently requested and or purchased by CAD operators are to be *phased out* following the following timeline. (a) In order to allow time for the search of alternative products, preferably non-chemical, while still protecting the crops, the insecticides: carbofuran, chlorpyrifos, and profenofos, and the fungicides: chlorothalonil and copper oxychloride should be phased out in the medium term (1-1.5 years). (b) Due to higher than accepted health and environmental risks, and the availability of pest management alternatives to these molecules, the fungicides: benzimidazole, captafol, hexaconazole, kasugamicine and ofurace, and the insecticides: methomyl, cyfluthrin, cyalothrine (lambda) and cypermethrine should be phased out in the short term (0.5-1 year). (c) The highly toxic and easily replaceable insecticides: monocrotophos, metamidophos, aldicarb, isazophos, and methyl parathion and the herbicide: paraquat should be phase out immediately. (d) And finally, and additionally to this, no product listed in the prohibited pesticides category in the US or Colombia, should ever be used in this project (see section 5.1.4).

1.5. Safer use practices

Colombia is one of the most advanced countries in Latin America in regard to pesticide registration, regulation and control, as well as in training in agronomy and associated disciplines. Colombia has very up to date registration procedures, applies international standards and codes for pesticide labelling and has a system to follow up and control pesticide manufacturers and distributors that is only limited by the insecurity situation that the country has been living during the past 25 years. The majority of Colombian technicians working in the areas of pest and pesticide management were found to have a solid knowledge and understanding of IPM and safer use of pesticide procedures. However, in spite of all these, there is still need and room for interventions on Safer Use of Pesticides (SUP). The majority of farmers in CAD areas of intervention do not use 'best practices' for SUP: less than 10% use some type of body protection when using these products and 70% of those directly exposed to pesticide spills do not do anything after the accident for clean up or decontamination (US Embassy, 2001).

Recommendation No.5: Considering the traditional attitudes and practices of the participant farmers with respect to pesticides, as well as the limited CoG presence in the isolated, and conflictive, areas where CAD is operating, it is recommended that a strong SUP programme be implemented. The programme should (a) be based on the pre-existing training offer already available in Colombia; (b) attempt to raise 'awareness' of the health and environmental hazards of pesticides as well as to teach 'good practices' on SUP; and (c) go hand in hand with training in 'ecological agriculture' and IPM, so SUP does not become a false panacea.

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[3] IPM programmes may use economic injury thresholds, e.g. when the population of a pest is such that the damage it causes is economically 'significant', and/or action thresholds, e.g. the population density or the damage level when the control should be applied to prevent the pest to reach its economic injury level.

1.6. Pest management approaches

The majority of the Colombian professional agronomists has been exposed to, trained in and has an understanding, if not a full knowledge of IPM. This has become, not only the 'official' approach to pest management at the state-government institutional level (ICA), but also it has taken root in para-statal (Corpoica) institutions, in charge of pest and pesticide R&D, as well as in private R&D organisations. This is the case of grower associations, such as Cenipalma, Cenicafé, Cenicaña, and Fedecacao. Moreover, Colombia is the headquarters for the well reputed CIAT, a centre for tropical agricultural research that has conducted pioneer research on IPM of insect pests and diseases in various crops, foremost among them cassava. Relevant to this PERSUAP, we highlight the availability of IPM programmes for oil palm, cacao, plantain, sugar-cane, rice, and timber plantations.

As shown in the tables below, Colombia is well advanced in the production of bio-inputs for pest management, such as microbial pesticides, entomopathogen fungi, bacteria and viruses, as well as nematodes and parasitic wasps. These bio-inputs are produced and sold in the country by a variety of small, mainly national, industries (see tables below). The important issue, from an IPM perspective, is that these products become a readily available, much healthy an environmentally friendly option to the chemical pesticides. As per an expert entomologist and IPM practitioner, "Colombia is better positioned than the US for the supply of biopesticides to agriculture".[4]

<u>Recommendation No. 6:</u> CAD is encouraged to disseminate, among project operators, both of the below lists of bio-pesticides (Table 1) and enterprises producing bio-products (Table 2) in an effort to promote their use in substitution of the more toxic and environmentally hazardous chemical pesticides.

As per a Reg 216 requirement, and as stated previously, in order not to transmit the false idea that pesticides, used safely, could be the sole solution to pest problems, SUP should not be promoted in isolation but rather in the context of a larger, more comprehensive approach to pest management, that of Integrated Pest Management, or IPM. Colombia is well ahead in IPM research and development as well as in IPM training. Additionally to the pesticide analysis, a considerable amount of effort in the preparation of this PERSUAP has been allocated to the development of IPM matrices that summarise the available tactics to manage the major crops pests and provide the user with additional references to the subject as well as main contacts for technical support (see the various matrices titled "Major Pests of …(crop) and their Management" in section 5.2). This is to the benefit of the CAD project operators that can find in these tables guidance for the avoidance of the most toxic pesticides as well as non-chemical options for pest management.

<u>Recommendation No.7</u>: In spite of the good technical level of the field technicians working within CAD and the CAD project operators, technical support in IPM should be strengthened. This may take the form of (a) crop specific field demonstrations on the use of non-chemical pest control methods; and (b) provision of support to the technical staff of the operators for training-of-trainers as well as for direct farmers training in crop-specific IPM programmes.

[4] Dr. Anthony Bellotti, Cassava IPM Leader, CIAT, personal communication.

Table 1: Main Biological Inputs Produced in Colombia*

Entomo-pathogen Fungi	Fungi Bio-fungicides	Parasitoids	Predators	Entomopatho-gen Bacteria	Entomopatho-gen Viruses
Beauveria bassiana	*Trichoderma harzianum*	*Trichogramma exigumm*	*Chrysoperla externa*	*Bacillus thuringiensis*	Nuclear Polyhydrosis Virus (NPV)
Metarhizium anisopliae	*T. lignorum*	*T. pretiosum*	-	-	*Baculovirus ello*
Paecilomyces fumosoroseus	*T. viridae*	*T. atopovirilia*	-	-	-
Nomuraea rilely	*Gliocadium spp.*	-	-	-	-
Paecilomyces lilacinus, minense	-	-	-	-	-
Verticillium lecanii	-	-	-	-	-

* Table courtesy of Dr. A. Bellotti, CIAT.

Table 2: Main Enterprises Producing Biological Inputs in Colombia*

Enterprise	Inputs = Organisms
Agricultura Biológica (Buga-Valle del Cauca)	Entomopathogen fungi, Parasitoids, Predators, Bio-fungicides
Agrobiol (Buga-Valle del Cauca)	Parasitoids
Bioecológicos (Palmira-Valle del Cauca)	Entomopathogen fungi, Parasitoids, Predators, Bio-fertilisers
Biocontrol (Palmira-Valle del Cauca)	Entomopathogen fungi
Productos Biológicos Perkins (Palmira-Valle del Cauca)	Entomopathogen fungi, Parasitoids, Predators
Productos Biológicos El Bolo (Palmira-Valle del Cauca)	Parasitoids
Laverlam (Cali-Valle del Cauca)	Entomopathogen fungi and viruses
Orius (Villavicencio-Meta)	Entomopathogen fungi
Biogarden (Bogotá-Cundinamarca)	Entomopathogen fungi
Biocaribe (Medellín-Antioquía)	Entomopathogen fungi
Live System Technology-LST (Bogotá-Cundinamarca)	Entomopathogen fungi, Bio-fungicides

* *Table courtesy of Dr. A. Bellotti, CIAT*

2. Background to the PERSUAP

2.1. CAD and environmental compliance

The CAD project, being implemented by Chemonics in Colombia, is in the process of establishing full compliance with USAID environmental regulations. Previous Initial Environmental Examinations (IEE) have been completed for the majority of the CAD activities, as per LAC-IEE-99-38 and LAC-IEE-00-35. A Programmatic Environmental Assessment (PEA) was completed for CAD and approved in June 2003. Among the activities required by USAID for CAD to regularise its environmental compliance was a full study of the pesticides used in the alternative crops being promoted. To this effect Chemonics International commissioned the present Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP) focused on those crops that have been so far supported by the CAD programme.

2.2. The PERSUAP

This PERSUAP has been prepared to achieve the dual purpose of (a) complying with USAID environmental regulations, and (b) to provide the CAD project operators with practical tools for better and safer management of their crop pests (see TOR in annex 6.2). The PERSUAP not only analyses pest and pesticide issues in the crops so far supported by CAD (see list in section 1.1) but it also addresses the broader issues related to pest and pesticide management in CAD and in Colombia, such as CoG regulatory and institutional frameworks, the agro-ecology of the intervention areas, training and technical capacity strengthening, and provides guidelines for SUP and IPM as well as identifying offers for these type of programmes in Colombia. Future commodities, pests and pesticide products to be considered under the CAD program implemented by Chemonics, but not covered in the present document, will be dealt with in future PERSUAP amendments that will be prepared and submitted to USAID following the instructions described in this PERSUAP in section 5.5.

During the preparation of the PERSUAP visits were made to Colombia pesticide authorities (ICA), and to major Colombian, and some international, technical institutions with a possible offer to pest management technology and training, such as Cenipalma, Fedecacao, IICA, Corpoica, Centro de Excelencia en Fitoprotección (Aphis, USDA, IICA, ICA, USAID), CONIF; to universities (Nacional) and training centres (SENA); to the private sector (Bayer CropScience, ANDI, BioEcológicos, SEG, pesticide dealers); and environmental consultant companies (Tres Elementos, CAEMA). Trips were made to Norte de Santander (Cúcuta) and Putumayo (Puerto Asís) where meetings were held with CAD project operators' technical staff and some visits made for field observations. A brief visit to Cali allowed for interviews with CIAT and IPGRI personnel (see list of interviewees in annex 6.4).

3. Pesticide Evaluation Report and Safer Use Action Plan Analysis

3.1. Pesticide registration statuses in Colombia and with US-EPA: 22 CFR 216.3 (b)(1)(i)(a)

Close to 55 pesticide active ingredients were screened for their registration status with the Colombian authority, the Instituto Colombiano Agropecuario (ICA)[5], and with US Environmental Protection Agency (USEPA)[6] (see section 5.1.1 "All CAD Pesticides"). This list of pesticides was compiled from that sent by CAD operators to Chemonics requesting purchase clearance, in June 2003, and other pesticides following the recommendations of Colombian state and private technical institutions[7].

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[5] For this, an updated "Chemical Pesticide, Bio-inputs and Generics" database was obtained courtesy of ICA authorities.

[6] For this, EPA databases were consulted at its web site.

[7] Sources for technical information were the official ICA or Corpoica, Colombia government recommendations, the growers associations or research centres, international research centres and literature references applicable to Colombian conditions, with solid technical and scientific background.

<u>Recommendation No. 8</u>: The list of pesticides to be purchased by CAD operators should be screened by the CAD Natural Resources and Environment (NRE) team, based on the pesticide lists included in this PERSUAP. Pesticides not mentioned in this PERSUAP should be subjected to a screening process, based on the guidelines described in section 5.5, and funding conditioned to their clearance. Products not registered with Colombia-ICA and with US-EPA should not, in principle, be approved (see exceptions discussed below).

<u>Recommendation No.9:</u> The summary of the pesticide analysis with the associated recommendation is:

- **<u>Products not registered in the US and Colombia or in PIC[8] list</u>. NOT TO BE USED UNDER ANY CIRCUMSTANCE: captafol, isazofol, methyl parathion and methamidophos.**
- **<u>Products not yet registered in the US or Colombia</u>. Although a microbial product, the first, and a plant extract, the second, they are NOT TO BE USED UNTIL REGISTERED in at least Colombia: *Baculovirus spodopterae* and *Swingla* (extracts).**
- **<u>Products not registered in Colombia.</u> NOT TO BE USED UNDER ANY CIRCUMSTANCE: endosulfan.**
- **<u>Products not registered with USEPA</u>. NOT TO BE USED UNDER ANY CIRCUMSTANCE: benzimidazole, hexaconazole, kasugamicine, monocrotophos, and ofurace.**
- **<u>Products not registered w/USEPA.</u> But registered in Colombia. APPROVED TO BE USED: extracts of *Glyricidia sepium*, because the resource (*Glyricidia*), the crop (vanilla) and the pest (*Cylsia*), are not present in the US; *Paecilomices liacinus*, because the crop (heart of palm) and the pest (*Leptopharsa*) are not present in the US and the pesticide is a microbial insecticide with unlikely environmental or health impact; and *Trichogramma pretiosum* and *Verticillium lecanii*, are both microbial insecticides with unlikely environmental or health impact.**
- **<u>Products are RUP with USEPA.</u> NOT TO BE USED: aldicarb, cyalothrine (lambda) cyfluthrin, chlorothalonil, chlorpyrifos, copper oxychloride, cypermethrine, methomyl, paraquat, profenofos**
- **<u>Products are RUP[9] with USEPA.</u> USE ONLY CERTAIN FORMULATIONS to reduce health or environmental risk: carbofuran (pellets/tablet), and picloram (Tordon 101R).**

The timeline for the implementation of these recommendations is given in Table 3.

Table 3: Summary of the Pesticides to Phase Out of CAD

To be phased out immediately:			To be phased out in 6-12 months		
Technical Name	**Trade Name**	**Uses**	**Technical Name**	**Trade Name**	**Uses**
Monocrotophos	Azodrin	Heart of palm	Benzimidazole	Benomyl+	Requested by operators
Methamidophos	Tamaron	Various crops	Captafol	Difolatan	Cassava
Aldicarb	Temik	Potato	Cyfluthrin	Bulldock	Requested by operators
Isazofos	Miral	Potato	Hexaconazole	Anvil	Requested by operators
Methyl-parathion	Methyl-parathion, etc.	Rice	Methomyl	Lannate	Requested by operators
Paraquat	Gramoxone	Various crops	Kasugamicine	Kasumin	Potato

Table continues …

[8] 'PIC List' is the Prior Informed Consent List of the Rotterdam Convention, led by UNEP and FAO, that applies to the international shipment of the most hazardous chemicals.

[9] RUP: Restricted Use Pesticide.

… Table continued.

To be phased out in 12-18 months			To be phased out in 6-12 months		
Technical Name	**Trade Name**	**Uses**	**Technical Name**	**Trade Name**	**Uses**
Carbofuran	Furadan	Cassava,Rubber, Plantain, Nurseries	Ofurace	Grolan	Requested by operators
Copper oxychloride	Agrotox	Cassava	Cyalothrine, lambda	Karate, Terminex	Potato
Chlorpyrifos	Lorsban	Plantain, Oil Palm, Cassava, Rubber, Forest Plantations	Cypermethrine	Saat Pop, Agroper, Cipermetrina	Rice
Profenofos	Curacron	Rubber	----------	----------	----------
Chlorothalonil	Bravo	Rubber	----------	----------	----------

3.2. Basis for selecting the pesticides: 22 CFR 216.3 (b)(1)(i)(b)

Of the almost 60 pesticides screened only close to 25 have been further analysed as potential candidate pesticides (see section 5.1.2: "Basis for the selection of CAD Pesticides"). Many of these, however, are subjected to a phased out process, as recommended in section 1.4 and 3.1. The main reason for selecting these pesticides is that of availability, efficacy and cost. This is typically the case of products such as chlorpyrifos and carbofurán that, although both RUPs, they are some of the most effective, and cheapest, insecticides and nematicides, as well as preferred products for ant control.

A usually overlooked criterion in the selection of pesticides is that of the formulation. On one hand, a simple way to reduce exposure risk to certain pesticides, such as chlorpyrifos, is to switch to formulations, like granules or pellets, that are not subjected to dangerous spills and drift. The same may be applicable to the reduction of the environmental impact of certain pesticides, such as the herbicide picloram, that by using injections to the bushy weeds, as opposed to sprays, there is a reduction on the total volume used and on the area impacted. Care must be exercised, however, because a granular or pellet formulation, being more attractive to them, could be more toxic to birds. So, the potential health and environmental impact of the various possible formulations from which to choose should always be considered, checked and analysed when selecting a pesticide.

Recommendation No. 10*:* CAD should implement training and capacity development in SUP for the technical staff of the operators including the theme of pesticide selection. Variables such as product toxicity (using the colour-coded labels), potential environmental impact, and the formulation are to be used among the criteria for selecting pesticides, additionally to efficacy, availability and cost.

3.3. Pesticides in the context of integrated pest management programmes: 22 CFR 216.3 (b)(1)(i)(c)

"Integrated pest management … is USAID policy because it is the most effective, economical, and safest approach to pest control. IPM attempts to control pests in an economically and environmentally rational manner; it emphasises non-chemical tactics which cause minimal disruption of the ecosystem"[10]. Pesticides should be used as the last resource for pest management after all other options have proven ineffective. Genetic (plants tolerance or resistance), biological (natural enemies), ethological (naturally occurring chemical disrupters), cultural (production practices), and mechanical (physical removal) are all preferred tactics to be used before resorting to chemical control (pesticides).

[10] *USAID/AFR Guidance: Preparing PERSUAPs for Pesticide Programmes in Africa.*

The "Decision Making Tree for IPM & a Guideline for SUP", shown in section 5.4, only in Spanish, should help in making decisions if and when to resort to pesticides. It is a guide for users for thinking about the pest problem, its magnitude, and the control options that may be available. Additionally, the matrices in section 5.2, also in Spanish, address the IPM programme menus for the various CAD crops analysed in this PERSUAP. They begin with a general introduction on IPM possibilities for that particular crop; they then list the various possible pest problems of the crop, the management options available, the specific pesticides for the pest and some of the potential problems with the control options discussed. Finally, they list some technical support offers at the level of institutions and individuals and sources of information such as literature references and web sites.

Recommendation No.11: No crop should be promoted without first establishing an IPM programme. CAD should install at least one crop specific IPM demonstration field in each of the intervention areas. To this effect CAD should work with the local UMATAS and request the technical support of the institutions and individuals listed in the pest management offers in section 5.2.

3.4. Method of application: 22 CFR 216.3 (b)(1)(i)(d)

Although a few of the farmers may have access to stationary-pump spraying systems, somehow common in illicit crop growing areas, most of the pesticide application will happen through back pack sprayers. A common situation with these sprayers is that (a) they are not properly maintained and so they often leak with significant increases in the exposure of the applicator to pesticides, and/or (b) they are not properly set for the job with nozzles that are not the most appropriate for the particular type of pesticides (insecticides-fungicides or herbicides) being sprayed. Pesticide mixing is also an issue since often farmers do not follow all the precautionary measures and the concentrated, undiluted, pesticide increases the risk of the exposure. Commonly, in some rural areas, women and children may dangerously participate or stay close to the mixing, spraying and cleaning of the pesticide spray equipment. Finally, cleaning and disposing of pesticide excesses and of the product container needs to follow strict norms in order to minimise human and environmental risks.

Recommendation No.12: CAD SUP programme must include support for three essential components: (a) a comprehensive training programme on "best practices" in SUP (see 3.11); (b) locally, climatically and technologically appropriate[11] protective clothing and equipment (gloves, masks, boots, etc.); and (c) maintenance and repair of spray equipment.

3.5. Possible toxicological hazards to humans or to the environment: 22 CFR 216.3 (b)(1)(i)(e)

A pesticide risk analysis was done on the close to 30 products that passed the first screening test (see section 5.1.3). This analysis included a look at acute and chronic toxicity of the selected pesticides to humans, its eco-toxicity and potential for water contamination. As a result, recommendations were drawn as to the general and specific mitigation activities to be conducted in order to prevent and/or reduce the potential health and/or environmental impact of the various pesticides of the programme. These mitigation activities are all encompassed within the comprehensive risk mitigation-SUP and IPM programmes.

Recommendation No. 13: CAD should socialise and share with project operators the results of the risk analysis of the pesticides and assure the full implementation of the mitigation measures recommended.

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[11] This means adequate for the local climate (temperature and humidity) and possibly adapted from local materials (plastic bottle masks, plastic bags-gloves, etc.) instead of imported clothing materials.

3.6. The effectiveness of the pesticides: 22 CFR 216.3 (b)(1)(i)(f)

Recommendations for pesticide and other pest management tactics to be used in the various crops have been gathered and or double-checked with authoritative agricultural R&D institutions of Colombia. Additionally, literary references (see annex 6.5) and relevant web sites (see annex 6.6) were consulted. It is to point out that, in Colombia, CAD has an abundance of institutions that can provide technical information and support, as well as training in pest and pesticide management (see section 3.11).

3.7. Compatibility of pesticides with target and non-target organisms: 22 CFR 216.3 (b)(1)(i)(g)

The pesticide risk analysis mentioned above, and described in section 5.1.3, discuses the main risks the pesticides pose to non-target organisms in the environment, as well as some potential impact on target organisms, such as the likelihood of encouraging the development of pest resistance. Also mentioned in the table are some of the main direct mitigation measures to prevent and reduce the potential impact of the various pesticides to non-target organisms. The more general approaches to prevent and mitigate the health and environmental impacts of pest management activities, discussed elsewhere in this PERSUAP, are SUP and IPM.

3.8. Conditions under which the pesticide will be used: 22 CFR 216.3 (b)(1)(i)(h)

The majority of the Colombian territory is formed by plains located below 500 meters above sea level (masl). The country could be roughly divided into six great geographical regions. The Andean one, including three Andean mountain ranges and the "inter-Andean" valleys; two coastal regions, the Caribbean and the Pacific ones; the plains of Antoquia region; the Amazonian forests; and finally, an insular region.

The CAD project is being implemented in Southern Colombia, in the Departments of Putumayo, Huila, Cauca, Nariño, Caquetá, and in the North East Department of Norte de Santander. The commonality of all these territories is that they are all used for illicit crops, coca and poppy, cultivation.

Colombia's climate is tropical with patterns strongly influenced by the Andes. They are normally classified as: (a) hot for ca. 84% of the territory, reaching up to 1000 masl and with an average temperature of 24 º C; (b) temperate, at altitudes between 1000 and 2000 masl, with an average temperature of 17.5 º C; and (c) cold, with average temperature of 12 º C, and at altitudes of 2000-3000 masl.

Ecologically, Putumayo, Caquetá, Norte de Santander, and Huila have a predominant pre-mountainous humid forest (Bh-pm) with close to 1000-2000 mm/yr, 18-24˚C, to low mountainous forest (Bh-mb) 2000-2500 masl 12-18˚C. So these departments are in the hot climate area. Cauca, Nariño and Tolima have predominance of pre-mountainous to mountainous forests with a much more variable level of humidity and their climate is temperate to cold.

3.9. Availability and effectiveness of other pesticides and of non-chemical Controls: 22 CFR 216.3 (b)(1)(i)(i)

As discussed in 3.3, the use of pesticides in CAD projects will be inserted into comprehensive IPM programmes. The "Decision Making Tree for IPM & a Guideline for SUP", shown in section 5.4, and discussed above, should help in making decisions if and when to resort to pesticides. But the matrices shown in section 5.2 present other available pesticide options and other pest management tactics for the crop and pest in question. There are, however, some problems with certain recalcitrant pests, such as ants, that are ubiquitous and pose a serious threat to certain crops, such as young trees, rubber, oil palm and heart of palm. Ants are not easy to control, and tend to draw to some

of the most toxic chemicals, such as carbofuran and chlorpyrifos. Non chemical options are being suggested and proposed in the pest and pest management matrices for some of the crops.

An example of a non-chemical approach to a recalcitrant pest: the case of ants

- Attractive baits
- Nest destruction early on their development
- Prevention of the emergence of winged ants with covers
- Applying cal to change pH and destroy the fungi that is used as a food by ants
- Seeding castor bean (*Ricinus communis*) in rotation or inter-cropped (inhibits ants)
- Plough-in green manure (organic matter attracts them away from crop)
- Irrigation
- Mulching with neem or *Melia azedirach* materials (inhibit ants)

3.10. The ability and capacity of Colombia to regulate and control pesticide use: 22 CFR 216.3 (b)(1)(i)(j)

As stated above, Colombia is one of the most advanced countries in Latin America with respect to pesticide registration, regulation, and control. Colombia has very modern registration procedures, applies international standards and codes for pesticide labelling and has a system to follow up and control pesticide manufacturers and distributors that is only limited by the insecurity situation that the country has been living in for the past 25 years. The Instituto Colombiano Agropecuario, ICA, in charge of pesticide regulation, has taken more than 30 actions to ban hazardous pesticides or groups of pesticides, among which DDT, methyl bromide, canfechlor, captafol, all organochlorides, and toxaphene (see section 5.1.4). Moreover, ICA requires that all Class IA and IB pesticides sold in the country have a back up 'prescription' written by a professional agronomist. Undoubtedly, the widespread insecurity in the majority of the rural territory of the country, and more specifically in the areas where CAD is active, limits the enforcing capacity of the CoG institutions. Although, the degree and effectiveness of controls in these areas is somehow limited and less than desirable, during the preparation of this PERSUAP we had first hand evidence of on going inspections to pesticide dealers in the Department of Putumayo, one of the most affected by the conflict.

Colombia pesticide regulation fits within its larger environmental framework, as per law 99 of 1993, "Fundamentals of the Colombian Environmental Policy". This law created the Ministry of Environment and the National Environmental System and established the "Environmental Licences" which were further regulated by decrees 1728 of 2002 and 1180 of 2003.

The modernisation of Colombia legislation related to pesticides begins with a major law, No.09, approved by the National Congress in January 1979, regulating "hazardous substances, pesticides, and pyrotechnic articles". This is followed by decree No.1843, from 1991, that further "regulates the use and management of pesticides". This decree defined and clarified terms and elements for the registration of pesticides, such as "efficacy", "contamination", "fumigation", "residue limits", "risk" and "toxicity", and officially adopted the four-classes WHO hazard

classification of pesticides[12]. The same decree further regulated the manufacture and distribution of pesticides in the country.

More recently, Colombia has fully adopted the regional norms that derive from the actions taken by the 'Andean Community"(Comunidad Andina, CAN), to which Colombia is a signatory. The CAN, a result of the integration of Bolivia, Colombia, Ecuador, Peru and Venezuela, began activities in 1997 and in 1998, it passed the 'Andean Norm for the Registration and Control of Chemical Pesticides for Agricultural Use" (Decision 436). In it, the five Andean countries committed themselves to a normative towards a common system for registration, control and use of pesticides. CAN decision No.436 established, among other things, (a) the requirements for pesticide registration; (b) norms for labelling and packaging; (c) maximum residue tolerances; and (d) norms for product efficacy research. Later, by resolution 532, of August 2001, CAN adopted the 'Technical Manual for the Registration and Control of Chemical Pesticides for Agricultural Use", which was fully developed and published in June 2002, in Resolution 630. This very comprehensive manual, includes detailed instructions to register chemical pesticides, with all the information requirements on the technical as well as the formulated material, as they relate to efficacy, human and eco-toxicology, residues, labelling, packaging, risks and the environmental management plan. Finally, ICA, as the CoG institution mandated with the registration and control of pesticides, fully norms the application of the CAN decrees internally to Colombia, in its resolution No.00770 of March 2003.

Given this comprehensive and detailed pesticide regulation framework, again, the capacity of Colombia to regulate and control pesticides is only restricted by the general situation of the country, with somewhat weak institutional presence in certain isolated areas. This scenario, however, does not preclude, as we reported above, that ICA authorities are still enforcing some of the pesticide rules and regulations.

3.11. Provisions for Training in SUP and IPM: 22 CFR 216.3 (b)(1)(i)(k)

The CAD supported SUP training programme should focus on risk reduction rather than on safe use of pesticides. In other words, instead of sending the message that pesticides could be used safely, the main goal of the training programme should be to reduce the risk of farmers and their families by the careful analysis, and management, of the variables that affect the components of risk:

Risk = toxicity x exposure

This means that the "safer use", through risk reduction, begins before the "use" of the product, during its selection and preparation, and continues well after its use, in the field where the product is applied[13].

The SUP training could be sub-contracted from Bayer CropScience or from Servicio Nacional de Aprendizaje-Asociación Nacional de Industriales (SENA-ANDI) (see contact references in annex 6.4). The former, a chemical company, runs a programme called "Agrovida" that focuses on SUP for farmers or farmers families. Since women and children are in the higher vulnerability group, and women are often involved in the storage of pesticides as well as in cleaning farmer's clothes, they are an audience of extreme importance to be reached with messages of risk reduction. The second is a joint programme between a GoC agency, SENA, and the association of industry and it offers two options, a two-day user targeted training course and a 5-day training-of-trainers event. CAD should consider training a few 'trainers', from the operators' staff, in each one of the regions where it operates.

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[12] The WHO classification: IA (extremely hazardous), IB (highly hazardous), II (moderately hazardous), III (slightly hazardous), and 'U' (improbable of presenting an acute risk in normal use). The LD_{50} used for chronic toxicity is either oral (O) o dermal (D). Colombia uses the same classification but classes are numbered I-IV.

[13] For more details see in section 5.3 the Power Point presentation "A Practical Guide: Reducing Pesticide Risk", in Spanish.

The contents of the training programme may need to be adjusted as per the various audiences but should include the themes listed in sections 5.3 and 5.4, such as risk management, toxicology, labels, transporting, storage, mixing, spraying, cleaning, discarding, container management, applicators protection, etc.

Recommendation No.14: Training on SUP should (a) focus on risk reduction; (b) reach the various important audiences: pesticide dealers, farmers, farmer families (women and children), staff of CAD project operators (trainers); (c) use the already available training offers in Colombia, such as the 'Agrovida' programme, by Bayer CropScience, for farmers and their families (women and children), and/or that of SENA-ANDI joint training programme for farmers and trainers.

As stated previously, in order not to transmit the false idea that pesticides, used safely, could be the sole solution to pest problems, SUP should not be promoted in isolation but rather in the context of a larger, more comprehensive approach to pest management, that of Integrated Pest Management, or IPM. Moreover, training in ecological and organic agricultural concepts and practices may always help CAD project operators to better understand, and even search for and experiment with, non-chemical options for pest control

Recommendation No.15: CAD should promote a holistic agro-ecological approach, not only to pest management but also to crop production. Training, as well as technical support, offers in topics such as IPM, organic or ecological agriculture, are available in Colombia from various institutions. A list of the possible technical partners that CAD could resort to in the search for technical support follows.

Possible technical agreements for CAD

Institution	Crop	Theme
CIAT	Cassava, dry-beans, vanilla	Pest & crop management
Fedecacao	Cacao	Pest & crop management
Cenicaña	Sugar-cane	Pest & crop management
Cenipalma	Palm oil, heart of palm	Pest & crop management
Centro de Excelencia en Fitoprotección (CEF)	Tree tomato, lulo, maracuja, tomatoes, Amazonian fruits	Quarantine, pest management, pest risk analyses
Corpoica	Various	IPM in general; training
CONIF	Forest plantations, nurseries	Pest & crop management
IICA	Various	Ecological agriculture
IPGRI	Various	Quarantine & plant introductions
ICA	Various	Pesticides: registration & control; training
SENA	Various	IPM & organic agriculture; SUP; training
ANDI	Various	SUP training
Bayer CropScience	Various	SUP training: Agrovida
SGS / BioTrópico	Various	Certifications

3.12. Monitoring effectiveness and use of the pesticides: 22 CFR 216.3 (b)(1)(i)(l)

CAD is working with farmers associations and enterprises that have a relatively good level of organisation. Most have very well trained field technicians that are regularly monitoring the pest management problems and the effectiveness of pest management methods being used. Open and regular reporting lines exist within CAD project operators and Chemonics to communicate issues such as new pests appearances as well as failures of the standard methods being used. Moreover, the Natural Resources and Environment group of Chemonics has the capacity for, and it is taking a lead role in, monitoring the most significant environment related variables of the project, including the effectiveness of pesticides.

4. Environmental Compliance

4.1. Monitoring

A set of indicators for compliance with the recommendations of this PERSUAP, grouped by major themes is being proposed and presented in the table below.

Monitoring Plan for PERSUAP Recommendations

Monitoring Theme	Recommendation	Indicator/s	Special Requirements
Sustainable alternative development	1	♦ Poly-cropping promoted & adopted by farmers ♦ System approach to alternative development in place, promoted & being implemented	Re-asses promotion of crops versus systems
Phytosanitary system for movement of plant materials	2	♦ ICA certification in place for internal movement of plant materials ♦ Quarantine in place for foreign materials	Establish links with ICA
Safer Use of Pesticides: hazard awareness, pesticide phase out, pesticide screening, training programme, equipment support, risk analysis	3, 4, 5, 8, 9, 10, 12, 13	♦ Operators aware of colour band meaning in products & using info for selecting pesticides ♦ Operators pesticide request list regularly checked by CAD-NRE[14] team ♦ Trend for decreased 'red & yellow' band pesticides request lists ♦ No monocrotofos & paraquat by Dec '03 ♦ No methomyl & others by Aug 04 ♦ No chlorpyrifos, carbofuran & others by Aug 05 ♦ SUP KAP changed ♦ Parts & repairs offered for spray equipment	Training programmes contracted & courses offered. Financial resources from CAD allocated for training & equipment
Integrated Pest Management: training (IPM, Eco), bio-pesticides, field demos	6, 7, 11, 14	♦ Ecological agriculture & IPM training contracted, offered, finished & KAP[15] monitored ♦ IPM demo fields installed & monitored for all crops ♦ Operators aware of & using bio-pesticides ♦ Operators using a wide range of pest management practices (more than 3 per pest)	Training programmes contracted & courses offered. Financial resources allocated for IPM demos
Sustainability of Environmental Compliance	16	♦ Market-led environmental compliance through: organic agriculture, EurepGap, Illicit-to-Licit or other type of certification in place, or ♦ A third party system installed for auditing environmental compliance	Contacts made, bids open, resources allocated to initiate / catalyse both processes

4.2. Long term sustainability

Environmental compliance with Regulation 216, vis-à-vis pesticide issues could be assured through the auditing role of Chemonics NRE group. This group could possibly check the pesticide lists that CAD project operators regularly

[14] Natural Resources and the Environment
[15] KAP: Knowledge, Attitude and Practices.

submit to Chemonics for approval and screen the pesticides appropriately. It may also field check project operators to inspect pesticide storage buildings, follow up some field operations and check on pesticide selection, mixing and use. [This has already been proposed in Recommendation No.8]. However, since this monitoring is based mainly on a 'policing' approach to compliance, its sustainability is somewhat questionable. Although, an important 'educational' component, on SU and IPM, has been included in this PERSUAP, farmers may 'comply' with environmental regulations only and as long as the policing pressure is maintained. And this will only happen as long as USAID and Chemonics continue with the funding and implementation of CAD. But it may end right after that …

A fundamentally similar approach, but one that promotes a more direct participation, and so appropriation of environmental compliance issues, by the Colombian civic society, is that of allocating the 'policing' role to a 'third party' local NGO, or consultant. The profile of this auditor may be similar to the NGOs or consultants that Chemonics NRE group has already contracted to do the environmental studies of CAD productive activities. The local, Colombian, NGOs and consultant companies visited have demonstrated the capacity and the interest to undertake such work. Based on the table above (see section 4.1), and on the 16 recommendations of this PERSUAP, CAD could develop a more detailed monitoring plan, agreed to among USAID, Chemonics, and the CAD operators, and assign a third party agency its verification following a system of open bids, as it is normally done in CAD.

A more sustainable path to environmental compliance may be that of a 'market-led' mechanism. If the market rewards an environmentally sound, clean, ecological or whatever the name is, produce then farmers will have to comply with certain production norms in order to be able to access and receive that reward. Third party certification is the key to this and not necessarily has to take the form of purely 'organic' production. Some of the Colombian certifying agencies contacted, such as *Biotrópico,* are working on organic produce certification, with the support of IFOAM, but also certify other producers. Among the latter are the coffee growers associated in COSURCA, exporting 'fair trade' coffee to the US market, in a project funded by USAID and UNDP. Other enterprises, such as the Swiss SGS, are certifying aromatic plant producers for EurepGap norms as well as Colombian flower exporters. Finally, the fruit growers association ASPROME, based in Cali, is exporting 'organic marmalades' to Europe, certified by Naturland-IFOAM, from fruits produced in a project funded by GTZ, the German Government and the European Community. The certification system is so simple as to work out a detail set of agreed rules, and corresponding indicators to track them, between producers, donors, project implementers and the certifying agency. The rules could easily be those established as environmental compliance requirements in Regulation 216, tracked by indicators such as pesticides registered with Colombia-ICA and US-EPA, no RUP pesticides, no class IA and IB products, etc. Again, the table in 4.1 and the 16 recommendations could be used as the basis for a framework for certification of USAID environmental compliance.

<u>Recommendation No.16</u>: CAD is encouraged to seek a sustainable mechanism for pesticide environmental compliance. This could take the form of (a) a third party independent auditor of the use and management of pests and pesticides by project operators; and/or (b) a market lead environmental (vis-à-vis pesticides) compliance mechanism through a third party, independent, certification agency that assures 'organic', 'EurepGap', 'low-intensity pesticide usage', 'IPM-based', or Regulation 216-based … agricultural production.

CAD PERSUAP

Section 5:

Technical Support Materials

CAD PERSUAP

Sub-Section 5.1:

Pesticide Analyses

Section 5.1.1
All CAD Pesticides[1]
Registration, Problem Analysis & Preliminary Decision [Reg. 216 point (a)]

Pesticide			Crop/s	Pest / s	Type of Problem, if any[2]	Recommenda-tions & alternative/s
Technical Name[3]	**Trade Name[4]**	**Type & Tox Class[5]**				
Acephate (Acefato)	Orthene, Bambolero, Bambuco	Insecticide. WHO TC III; Colombia TC III			In the 'Bad Actor' list of PAN for: cholinesterase inhibitor. Organophosfate.	**Approved.** Requested by operators
Acetamiprid	Rescate	Insecticide. TC WHO not availab. Colombia III.	Rice	Sogata		**Aproved.**
Aldicarb	Temik	Insecticide, acari-cide, nematicide TC WHO: Ia TC Colombia: I	Potato	White grab (*Premnotrypes vorax)*	RUP with USEPA for high toxicity	**Should not be used. Eliminate inmediately.**
Soybean oil (Aceite de soya)	Carrier	Adjuvant. WHO TC: not available. Cololmbia TC IV.			Registered with USEPA as insecticide & adjuvant.	**Approved.** Requested by operators.
Polyoxiethylene (Alquil polieter + alcohol etoxilado)	Inex-A	Adjuvant. WHO TC: not available; Colombia TC IV.			Registered with USEPA as insecticide & as adjuvant.	**Approved**. Requested by operators.

[1] Includes all pesticides being mentioned for the crops in question, requested by CAD project operators and/or recommended as part of pest management programmes for these crops.
[2] Toxicological class, RUP, registration in the USA, registration in Colombia.
[3] Generic name or active ingredient.
[4] Name under which is sold in Colombia.
[5] Action against …: fungicide, insecticide, herbicide, etc. As per WHO classification: IA (extremely hazardous), IB (highly hazardous), II (moderately hazardous), III (slightly hazardous), and 'U' (improbable of presenting an acute risk in normal use). The LD_{50} used for chronic toxicity is either oral (O) o dermal (D). WHO TC is that of the active ingredient. Colombia TC is that of the formulated product available in the country.

Pesticide			Crop/s	Pest / s	Type of Problem, if any	Recommenda-tions & alternative/s
Technical Name	**Trade Name**	**Type & Tox Class**				
Bacillus thuringiensis	Xentari, Ecotech-Pro, Turilav, Thuricide, Javelín, Batón, Dipel	Microbial insecti-cide: bacteria. WHO TC: not available; Colombia TC: U.	Oil palm, rubber, potato	*Loxotoma elegans* & *Erinnysello Tecia solanivora*		**Approved.**
Baculovirus spodopterae	None.	Virus: Microbial insecticide. TC not available yet.	Maize	*Spodoptera frugiperda*	Not yet registered neither in Colombia nor with USEPA	**Not to be used until registered at least in Colombia**
Beauveria bassiana	Conidia, Nativo, Brocavec, Cebio-pest, Brocaril, Agronova, Bio-expert, Botani-gard, Mycotrol	Microbial insecticide: ento-mopathogen fungi. WHO TC: not available. Colombia TC: III.	Plantain Oil palm Heart of palm	*Metamasius hemipterus, Brassolis sophorae Rinchoforus palmarum, Methamacius hemipterus*		**Approved.**
Benzimidazole (bencimidazol)	Benomyl +	Fungicide. WHO TC II; Colombia TC: not available, only in mixes.			Not registered with USEPA.	**Should not be used.** Requested by operators in mixes. Use benomyl & others.
Bitertanol	Baycor	Fungicide. WHO TC U; Colombia TC IV			Not registered with USEPA. Registered in Europe & Australasia.	Requested by operators. **Approve only as per uses: substitutes?**
Buprofezin	Oportune	Insecticide. WHO TC U; Colombia TC III			Registered with USEPA as insect growth regulator.	**Approved.** Requested by operators.

Pesticide			Crop/s	Pest / s	Type of Problem, if any	Recommenda-tions & alternative/s
Technical Name	**Trade Name**	**Type & Tox Class**				
Benomyl	Benlate, Benomil, Benoagro	Fungicide.WHO TC: U; Colombia TC III.	Rubber Cassava Plantain Nurseries Heart of palm	*Microcyclus ulei, Phyllachora, Sphaceloma manihoticola, Mycosphaerella fijiensis* & *M. musicola* *Ralstonia solanacearum* Damping off *Colletotrichum* spp.	In the 'Bad Actor' list of PAN for possible carcinogenic & reproductive toxin.	**Approved.**
Capsaicine (capscicina)	Hidrolato de ajo-ajó	Botanical repelent. WHO TC: not available; Colombia TC IV	Organic vanilla Nurseries	*Cylsia vanillana*, *Spinas floridulos, Nezara* spp. Several spp.	*Capsicum oleo-resin* registered with USEPA as botanical insecticide.	**Approved.**
Captafol	Difolatan	Fungicide. WHO TC: Ia.	Cassava	*Sphaceloma manihoticola*	**Not registered in Colombia: P y C in 1999.** **In PIC list.**	**Not to use for any reason.** Use benomyl instead.
Captan	Captan, Merpan, Orthocide	Fungicide. WHO TC: U; Colombia TC: II	Heart of Palm Cassava Nurseries Potato	Various diseases *Xanthomonas* Damping off *Phythophthora*	In 'Bad Actor' list of PAN for possible carcinogenic & acute toxicity	**Aprobado.**
Carbaryl (carbaril)	Sevin, Carbaril, Dhimefo	Insecticide, nematicide. WHO TC II; Colombia TC IV.			In the 'Bad Actor' list of PAN for cholinesterase inhibitor. Carbamato. In IRED-03 list.	**Approved.** But pending re-registration with USEPA in 2003. Requested by operators.

Pesticide			Crop/s	Pest / s	Type of Problem, if any	Recommenda-tions & alternative/s
Technical Name	**Trade Name**	**Type & Tox Class**				
Carbendazim	Carbendazim, Bavistin, Carbendacrop, Carbin, Colizym, Curacarb, Derosal, Duett, Etram, Helmistin, Kemdazin, Makio, Robendazim, Rodazim, SAAT Polka, Soler, Tecnomyl, Undazim, Agrozim	Fungicide. WHO TC: U; Colombia TC: III	Various. Dry beans	*Chollettrichum Phaesamtori.*		**Approved.**
Carbofuran	Furadan, Carbofed, Curater, Furalimor, Fursem, Carbofuran	Insecticide, nematicide. WHO TC IB; Colombia TC I	Cassava Rubber Plantain Nurseries Pastures Potato	White grubs (various species) *Erinnys ello* *Cosmopolites sordidos* Nematodes Mión *Premnotrypes* & others	RUP with USEPA (Except pellets /tablets). In 'Bad Actor' list of PAN: cholin-esterase inhibitor & acute toxicity. Organophosphate In IRED-04 list.	**Should not be used.** Excep pellets/tablets for 24 months maximum. Revise registration status in 2004.
Carboxin	Vitavax	Fungicide. WHO TC U; Colombia TC III	Heart of palms / Seed treatment	Seedling diseases	In 'Bad Actor' list of PAN for possi-ble reproductive toxin. In IRED-04 list.	**Approved.** But pending re-registration with USEPA in 2004.
Cyalotrine, lambda	Karate, Terminex	Insecticide. TC Colombia III	Rice Potato	Sogata Palomilla Stem cutters & others	RUP with USEPA IN PAN "Bad actor" list for suspected endocrine disruptor	**Should not be used. Eliminate in 12 months.**
Cyfluthrin (ciflutrina)	Baytroide, Bulldock	Insecticide. WHO TC II; Colombia TC III			RUP with USEPA.	**Should not be used.** Requested by operators.

Pesticide			Crop/s	Pest / s	Type of Problem, if any	Recommenda-tions & alternative/s
Technical Name	**Trade Name**	**Type & Tox Class**				
Chlorothalonil (clorotalonil)	Bravo, Bravonil, Centauro, Clorotalonil, Clortocaffaro, Clortosip, Control, Daconil, Diclan, Echo, Helmonil, Pugil, Ridonate, Visado	Fungicide. WHO TC U; Colombia TC II	Rubber Dry beans Potato	*Colletotrichum gloesporoides* *Phythophthora* & rust	RUP with USEPA. In 'Bad Actor' lis of PAN for possi-ble carcinogenic & acute toxicity.	**Should not be used. Phase out in 24 months.**
Chlorpyrifos (Clorpirifós)	Lorsban, Clorpirifós, Clorpiricol, Arriero	Insecticide, nematicide. WHO TC II; Colombia TC III	Plantain Oil Palm Cassava Rubber, Forest plantations Potato	*Metamasius hemipterus,* defoliant. Sting bugs. *Strategus aloeus* Ants (*Atta* spp.) & stem cutters (varias spp.) & white grubs. Erynnis ello. *Premnotrypes* & *Tecia*	RUP with USEPA In the 'Bad Actor' list of PAN: cholinesterase inhibitor. Organophosphate.	**Should not be used. Stop using formulations EC & WP within 12 months. Elimi-nate all formu-lations within a max of 24 month.** For the time being & to reduce risk, use only granular formulation.
Copper sulphate + cal [Cobre, sulfato de + Cal (carbonato de calcio)]	Bordeaux mix	Cu sulphate: fungicide, algaecide, moluscicide. WHO TC II.	Heart of palm, oil palm Vanilla Nurseries	*Pestalopsis sp.* *Colletotricum sp.* *Fusarium oxysporum &* *Phytophthora sp.* Damping off	Bordeaux mix is not registered with USEPA but Cu sulphate & Ca carbonate yes, each separately.	**Approved.**
Copper oxychloride (cobre, oxicloruro)	Agrotox, Coper-pro, Coperflow, Cuprene, Oxiclor, Oxicloruro de Cu	Fungicide. WHO TC III; Colombia TC III.	Cassava	*Xanthomonas axonopodis pv.* Manihotis	RUP with USEPA.	**Should not be used. Phase out in 24 months**
Cypermetrine	Saat Pop, Spock, Agroper, Cipermetrina	Insecticide. TC WHO no disp. TC Colombia II.	Rice	'Palomilla' Sogata	RUP with USEPA	**Should not be used. Phase out in 12 months**
Cymoxanil	Fitiraz (in mixes with propineb)	Fungicide. TC WHO III; Colombia TC only in mixes	Potato	*Phythophtora*		**Approved.** Requested in mixes by the operators

Pesticide			Crop/s	Pest / s	Type of Problem, if any	Recommenda-tions & alternative/s
Technical Name	**Trade Name**	**Type & Tox Class**				
Dicamba	Banvel	Herbicide. WHO TC III; Colombia TC III.	Pastures	Weeds	In 'Bad Actor' list of PAN for repro-ductive toxin & possible water contaminant.	**Approved.**
Dichlorvos	Vapona	Fumigant insecticide. WHO TC: Ib; Colombia TC: I	Passion fruit	*Dasiops* sp.	In 'Bad Actor' list of PAN for acute toxicity, carcinogenic, cholinesterase inhibitor. Organophosphate.	**Approved.** But pending re-registration with USEPA in 2003.
Di-chlorofenoxi-acetic acid - 2,4-D	Agritron, Anikil, Artillero,Aminex, Desyerbe, DMA, Agrogen, Formula 40, etc	Herbicide. WHO TC II; Colombia TC II ó III	Pastures	Weeds	In RED-2004 list.	**Approved**. But pendieng re-registration with USEPA in 2004.
Dichlorprop (Diclorprop)	Malezafin (with 2,4-D)	Herbicide. WHO TC III; Colombia TC not available.	Pastures	Weeds	In 'Bad Actor' list of PAN for repro-ductive toxin.	**Approved.**
Dimethoate (Dimetoato)	Sistemín, Sistoato, Trifosix, Agrixon, Agrometox, Di-metox, Perfektion, Roxion, Siscrop	Insecticide. WHO TC II; Colombia TC II	Rubber	Termites	In the 'Bad Actor' list of PAN: cholinesterase inhibitor. Organophosphate In IRED-03 list.	**Aproved**. But pending re-registration with USEPA in 2003.
Dimethomorph (dimetomorf)	Acrobat, Forum	Fungicide. WHO TC U; Colombia TC III				**Approved.** Requested by operators.
Endosulfan	Not available.	Insecticide	Various	Various	**Registration in Colombia cancelled.**	**To use under NO circumstance.**
Extracts of Glyricidia sepium	Agroil, Sincocin	Repellent. Colombia TC IV	Organic vanilla	*Cylsia vanillana*	No registration with USEPA. But the crop, the pest nor the resource exist in the US.	**Approved. A plant extract w/o any evidence of potential environmental or health impact.**

Pesticide			Crop/s	Pest / s	Type of Problem, if any	Recommenda-tions & alternative/s
Technical Name	**Trade Name**	**Type & Tox Class**				
Fenoxaprop-ethyl	Furore, Ricestar.	Herbicide. TC WHO no disp. TC Colombia IV.	Rice	*Echinocloa* spp.	In "Bad Actor" list of PAN for promoter of reproductive toxin	**Aproved**
Fentin hydroxide	Brestanid	Fungicide, moluscicide, herbicide TC WHO: II TC Colombia: III	Potato	*Phitophtora infestans*	In PAN "Bad Actor" list for possible carcinogenic, acute toxicity & reproductive toxin. In IRED list	**Aproved.**
Fenhexamid	Cabo, Teldor	Fungicide, molus-cicide. WHO TC U; Colombia TC III				**Approved.** Requested by operators as a moluscicide
Fipronil	Regent, Blitz, Cazador	Insecticide. TC WHO II; TC Colombia III	Rice	Sogata		**Approved**
Gliphosate (glifosato)	Roundup	Herbicide. WHO TC U; Colombia TC III ó IV	Cacao Oil palm, Heart of palm, Ru-bber, Plan-tain, Fores-try plantat-ions	Cacao plants affected by *Rose-llinia pepo* Weeds in general		**Approved.**
Hexaconazole (hexaconazol)	Anvil	Fungicide. WHO TC U; Colombia TC III ó IV			No registration with USEPA. Registered in Canada, Austra-lasia, Hunger & Portugal.	**Should not be used. Phase out in 12 months.** Requested by operators.

Pesticide			Crop/s	Pest / s	Type of Problem, if any	Recommenda-tions & alternative/s
Technical Name	**Trade Name**	**Type & Tox Class**				
Imidacloprid	Confidor, Gaucho, Jade, Imidacloprid, Muralla, Provado, Fandango, Agridor	Insecticide. Colombia TC III.	Rice	*Tagasodes orizicolus* (transmitter of VHB)		**Approved.** Requested by operators.
Isazofos	Miral	Insecticide TC WHO: I b TC Colombia: II	Potato	*Premnotrypes vorax*	Not registered in Colombia. Not registered with USEPA. In PAN "Bad Actor" list: acute toxicity & colinesterase inhibitor	**Should not be used. Eliminate inmediately.**
Kasugamicina	Kasumin	Insecticide, bactericide, antibiotic. TC WHO: not available. TC Colombia: IV	Potato	*Erwinia carotovora*	Not registered with USEPA	**Should not be used. Phase out in 12 months.**
Malathion	Inition, Cropthion, Fyfanon, Malathion, Algodonero	Insecticide. WHO TC III; Colombia TC II-III	Cacao Plantain Cassava	Ants (*Atta* sp.), 'stings bugs'. Defoliants. Stem borers (*Coelosternus,Lagochirus*, *Chilomima*)	In IRED-03 list. In 'Bad Actor' lis of PAN for cholinesteras e inhibitor. Organophosphate.	**Approved.** But pending of re-registration with USEPA in 2003.
Mancozeb	Manzate, Curzate, Dithane	Fungicide. WHO TC U; Colombia TC III	Plantain Oil palm & heart of palm Rubber Forestry Papa	*Ralstonia solanacearum* (Moko or maduraviche) Pudrición cogollo Mancha aerolada Mal suramericano *(Microcyclus ulei)* Oak rust. *Phythophtora*	In RED-04 list. In 'Bad Actor" lis of PAN for possible carcino-genic & repro-ductiv e toxin.	**Approved.** But pending re-registration with USEPA in 2004.

Pesticide			Crop/s	Pest / s	Type of Problem, if any	Recommenda-tions & alternative/s
Technical Name	**Trade Name**	**Type & Tox Class**				
Metalaxyl (Metalaxil)	Ridomil (only in mixes with mancozeb)	Fungicide. WHO TC III; Colombia TC III	Cacao, Potato Cassava Rubber	*Phytophthora Phythophtora y Xanthomonas Phytophthora palmivora*	It was in re-registration with US-EPA.	**Approved.** Re-registration approved by USEPA in Sep 1994.
Metarhizium sp.	Destruxin, Detruxin	Micro-biological insecticide: entomopathogen fungi. TC not available.	Heart of palm	*Rinchoforus palmarum, Methamacius hemipterus*	Registered with USEPA *M. anisopliae*, var, Anisopliae, strain ESF1.	**Approved.**
Methyl parathion	Metacap, Metacide, Metil Paration, Penncap	Insecticide. TC Colombia I	Rice	Chinche	Registration cancelled by USEPA due to high toxicity	**Should not be used under any circumstances. Eliminate immediately.**
MCPA (only in mixes)	Tiller, Aniten	Herbicide. WHO TC III; Colombia TC not available	Pastures	Weeds	In RED-04 list. In 'Bad Actor" list of PAN for possible acute toxicity.	**Approved.** But pending re-registration with USEPA in 2004.
Monocrotophos (Monocrotofós)	Azodrín, Elan-cron, Fersacrón, Fosacrón, Inisán, Monocrón, Mono-crotofós, Nuva-crón, Protofós, Ronecrón, Trifo-tóx	Insecticide, Acaricide. WHO TC IB; Colombia TC I	Oil palm & heart of palm	*Leptopharsa gibbicarina* (Chinche encaje)	Presently CANCELLED in US. It was RUP with USEPA. In PIC list.In 'Bad Actor" list of PAN for choli-nesterase inhi-bitor. Organophosphate.	**Should not be used. Phase out IMMEDIATELY**
Methamidophos	Tamarón	Insecticide, acaricide. WHO TC Ib; Colombia TC I	Many	Many	RUP with USEPA In PIC list. In 'Bad Actor" list of PAN for choli-nesterase inhibitor & acute toxicity. Organophosphate.	**Should not be used. Phase out IMMEDIATELY Solicitado por los operadores**

Pesticide			Crop/s	Pest / s	Type of Problem, if any	Recommenda-tions & alternative/s
Technical Name	**Trade Name**	**Type & Tox Class**				
Methomyl (Metomil)	Lannate, Mercamil, Methavin, Methomex, Metomil, Pilarmate	Insecticide. WHO TC I; Colombia TC I			RUP with USEPA. In 'Bad Actor" list of PAN for acute toxicity & choli-nesterase inhibitor.	**Should not be used. Phase out in 12 months.** Requested by operators.
N-Alquil	Timsen	Fungicide. TC WHO: III; TC Colombia: III	Potato	*Phitophtora infestans,Rhizocto nia, Erwinia, Alternaria, Spongospora, Rosillinia*		**Approved.**
Ofurace	Grolan (Only in mixes with mancozeb)	Fungicide. WHO TC U; Colombia TC not available.			Not registered with USEPA. Registered only in Portugal & UK	**Should not be used. Phase out in 12 months.** Requested by operators in mixes with mancozeb.
Oxycarboxin	Plantvax	Fungicide. WHO TC U; Colombia TC IV.	Oak Potato	Rust Rust		**Approved.**
Paecilomices liacinus	Biostat	Microbiological insecticide: ento-mopathogen fungi. Colombia TC III	Heart of palm	Chinche de encaje *(Leptopharsa gibbicarina)*	Not registered with USEPA. However, crop & pest do not exist in the USA.	**Approved.** Microbial product with unlikely environmental impact.

Pesticide			Crop/s	Pest / s	Type of Problem, if any	Recommenda-tions & alternative/s
Technical Name	**Trade Name**	**Type & Tox Class**				
Paraquat	Gramoxone, Agroquat, Calli-quat, Paraquat	Herbicide. WHO TC II; Colombia TC I	Cacao, Plantain, Heart of plam	Weeds, eradication of badly diseased cacao plants	RUP with US-EPA.	**Should not be used. Phase out IMMEDIATELY** . Alternatives: gliphosate; picloram 101R
Picloram	Tordon, Closser, Grazón	Herbicide. WHO TC U; Colombia TC II, III, ó IV	Cacao Pastures	Diseased cacao plants c/*Rose-llinia pepo* Bushy weeds	RUP with US-EPA – except Tordon 101R	**Not to be used, in general.** If no substitute available, use only Tordon 101R.
Potassium salts (K) (Potasio, sales de)	K.S.I.	Acaricide. WHO TC not available; Colombia TC III			K laureate is registered with USEPA.	**Approved.** Requested by operators
Profenofos	Curacrón, Lancero, Awake	Insecticide. WHO TC II; Colombia TC II ó III	Rubber Potato	Termites (*Coptotermes* sp.) Stem cutters & others	RUP with USEPA. In 'Bad Actor" list of PAN for choli-nesterase inhibitor. Organophosphate	**Should not be used. Phase out in 24 months.**
Propanil	Propanil, Propaflow, Kilex, Prop, Propadox	Herbicide. TC WHO III; TC Colombia III.	Rice	*Echinocloa* spp.		**Approved**
Propamocarb-HCl	Previcur, Tattoo, Propanil, Agropropanil, Bextonil, Calriz, Kilex, Propanex, Proparroz, Sierra, Stam, Curcopur, Stamfos	Fungicide. TC WHO: not available. TC Colombia: IV	Potato	*Phitophtora infestans*		**Approved.**
Propineb	Format, Punto, Antracol	Fungicide. WH TC U; Colombia TC II ó III	Nurseries Potato	Damping off *Phythophtora*	In 'Bad Actor" list of PAN for repro-ductive toxin.	**Approved.**

Pesticide			Crop/s	Pest / s	Type of Problem, if any	Recommenda-tions & alternative/s
Technical Name	**Trade Name**	**Type & Tox Class**				
Sulfur (Azufre)	Elosal, Kimatio, Kumulus, Micro-azufre, Microthiol, Polythion, Pro-hortícola, Suffa, Sulfaplant, Teisco, Top-Sul, Agrozul, Azuco, Azufral, Azufre, Cryzufre, Elocrop	Fungicide. WHO TC U; Colombia TC III	Nurseries, potato	**Damping off, *Phytophthora***	Registered with USEPA as fungicide & insecticide.	**Approved.**
Swingla sp., extracts of		Fungicide	Organic vanilla	Wilting *(Fusarium oxysporum & Phytophthora sp.). Antracnosis (Colletotrichum vanillae) & rust (Puccinia sp.)*	Not registered with USEPA. It appears that there is not registration in Colombia, yet.	**Not to be used until registration in Colombia is confirmed.**
Tebuconazole	Folicur,	Fungicide. WHO TC III; Colombia TC III				**Approved.** Requested by operators
Teflutrine	Force	Insecticide TC WHO: Ib TC Colombia: II	Potato	*Premnotrypes vorax*	In PAN "Bad Actor" list for acute toxicity & suspected endocrine disruptor . High toxicity to fish	**Aprobado**
Thiabendazole	Mertect	Fungicide. WHO TC U; Colombia TC III ó IV	Heart of palm	*Fusarium sp.*	In 'Bad Actor" list of PAN for carcinogenic effects & repro-ductiv e toxin. It was in re-registration with USEPA.	**Approved.** Re-registration approved by USEPA in October 2002.

Pesticide			Crop/s	Pest / s	Type of Problem, if any	Recommenda-tions & alternative/s
Technical Name	**Trade Name**	**Type & Tox Class**				
Thiram	(Only in mixes)	Fungicide.	Heart of palm, seed treatment	Seedling diseases	In RED-04 list. In 'Bad Actor" lis of PAN for reproductive toxin.	**Approved.** But pending re—registration with USEPA in 2004.
Triadimefon	Bayleton	Fungicide. WHO TC III; Colombia TC IV	Rubber, Forestry plantations	*Thanatephorus cucumeris, Prospodium*	In 'Bad Actor" list of PAN for repro-ductive toxin.	**Approved.**
Trichoderma sp. (harzianum y lignorum)	Tricobac, Mycobac, Tricodex, Tricho	Microbial fungicide: antago-nistic fungi. WHO TC not available; Colombia TC III ó IV	Heart of palm Oil Palm	*Phythophtora palmarum*	*T. lignorum* is not registeterd with USEPA. However, both crop & pest do not exist in the USA. *T. harzianum* is registered with USEPA.	**Approved**. Microbial product with unlikely environmental impact. Similar species registered
Triclorfon	Dipterex, Profitox	Insecticide organophosphote TC WHO: not available. TC Colombia: II	Potato	Stem cutters & others	In PAN "Bad actor" list for carcinogenic & moderate acute toxicity	**Approved**
Trichogramma pretiosum	Trichogramma	Biological antagonist of insects: parasitoid wasp. TC not available.	Various	Various	Registered in Colombia. Not yet with USEPA	**Approved**. Microbial product with unlikely environmental impact
Validacin A	Validacin	Fungicide bactericide TC WHO: U TC Colombia: IV	Potato	*Rhizoctonia solani*	Not registered with USEPA	**Approved**

Pesticide			Crop/s	Pest / s	Type of Problem, if any	Recommenda-tions & alternative/s
Technical Name	**Trade Name**	**Type & Tox Class**				
Verticillum lecanii	Vertisol	Microbial insecti-cide: entomo-pathogen fungi. TC not available.	Heart of palm	Defoliants	Not registered with USEPA. Both crop & pest do not exist in the USA. Registered in Finland, UK & Holland.	**Approved.** Microbial product with unlikely environmental impact.

Sección 5.1.1
Todos los plaguicidas del CAD[1]
Registro, Análisis de Problemas y Decisión Preliminar [Reg 216 punto (a)]

[1] Incluye todos los plaguicidas para los cultivos bajo consideración, solicitados por los operadores del CAD y/o recomendados para dichos cultivos como parte de programas de MIP.

Plaguicida			Cultivo/s	Plaga / s	Tipo de Problema, si hay alguno[2]	Recomendación y alternativa/s
Nombre Técnico[3]	**Nombre comercial[4]**	**Tipo y Clase Toxicológica[5]**				
Acefato (acephate)	Orthene, Bambolero, Bambuco	Insecticida. CT OMS III; CT Colombia III			En lista de 'Mal Actor' de PAN por inhibidor de colinesterasa. Organofosfato.	**Aprobado.** Solicitado por los operadores
Aceite de soya (soybean oil)	Carrier	Coadyuvante. CT OMS: no dispopnible. CT Cololmbia IV.			Registrado con USEPA como insecticida y como co-adyuvante.	**Aprobado.** Solicitado por los operadores
Acetamiprid	Rescate	Insecticida. CT OMS no disp.; CT Colombia III.	Arroz	Sogata		**Aprobado.**
Aldicarb	Temik	Insecticida, acaricida, nematicida CT OMS: Ia CT Colombia: I	Papa	Gusano blanco (*Premnotrypes vorax)*	PUR con USEPA por alta toxicidad	**No debe usarse. Eliminar inmediatamente.**
Alquil polieter + alcohol etoxilado (polyoxiethylene)	Inex-A	Coadyuvante. CT OMS: no dispopnible; CT Colombia IV.			Registrado con USEPA como insecticida y como co-adyuvante.	**Aprobado**. Solicitado por los operadores

[2] Clase toxicológica, PUR, registro en USA, registro en Colombia.
[3] Nombre genérico o principio activo.
[4] Nombre bajo el cual es vendido en Colombia.
[5] Acción contra …: fungicida, insecticida, herbicida, etc. De acuerdo a la clasificación de la OMS: IA (extremadamente peligroso), IB (altamente peligroso), II (moderadamente peligroso), III (levemente peligroso), y 'U' (improbable de presentar un riesgo agudo en uso normal). La DL_{50} usada para toxicidad aguda es oral (O) o dérmica (D). Colombia usa la misma clasificación pero las clases numeradas I-IV. La CT de la OMS es la del ingrediente activo. La CT de Colombia es la del producto formulado disponible en el país.

Plaguicida			Cultivo/s	Plaga / s	Tipo de Problema, si hay alguno	Recomendación y alternativa/s
Nombre Técnico	**Nombre comercial**	**Tipo y Clase Toxicológica**				
Azufre (sulfur)	Elosal, Kimatio, Kumulus, Micro-azufre, Microthiol, Polythion, Pro-hortícola, Suffa, Sulfaplant, Teisco, Top-Sul, Agrozul, Azuco, Azufral, Azufre, Cryzufre, Elocrop	Fungicida. CT OMS U; CT Colombia III	Viveros, papa	Damping off, gota (*Phytophthora*)	Registrado con USEPA como fungicida e insecticida.	**Aprobado.**
Baculovirus spodopterae	None	Virus: insecticida microbiano. CT no disponible.	Maíz	*Spodoptera frugiperda*	Sin registro en Colombia ni con USEPA	**No usar hasta que se registre**
Bacillus thuringiensis	Xentari, Ecotech-Pro, Turilav, Thuricide, Javelín, Batón, Dipel	Insecticida micro-biológico: bacte-ria. CT OMS: no disponible; CT Colombia: U.	Palma de aceite. Caucho. Papa	*Loxotoma elegans* Gusano cachón (*Erinnys ello*) Polilla Guatemalteca (*Tecia solanivora*)		**Aprobado.**
Beauveria bassiana	Conidia, Nativo, Brocavec, Cebio-pest, Brocaril, Agronova, Bio-expert, Botani-gard, Mycotrol	Insecticida micro-biológico: hongo entomopatógeno. CT OMS: no disponible. CT Colombia: III.	Plátano Palma de aceite Palmito	*Metamasius hemipterus* (picudo rayado) *Brassolis sophorae* *Rinchoforus palmarum, Methamacius hemipterus*		**Aprobado.**

Plaguicida			Cultivo/s	Plaga / s	Tipo de Problema, si hay alguno	Recomendación y alternativa/s
Nombre Técnico	**Nombre comercial**	**Tipo y Clase Toxicológica**				
Bencimidazol (benzimidazole)	Benomil + (sólo en mezclas con benomil)	Fungicida. CT OMS II; CT Colombia: no disponible, sólo en mezcla			No tiene registro con la USEPA.	**No debe usarse.** Solicitado por los operadores en mezcla. Usar benomil y otros.
Bitertanol	Baycor	Fungicida. CT OMS U; CT Colombia IV			No tiene registro con la USEPA. Registrado en Europa y Australasia.	Solicitado por los operadores. **Aprobar según los usos: ¿sustitutos?**
Buprofezin	Oportune	Insecticida. CT OMS U; CT Colombia III			Registrado con USEPA como regulador de crecimiento de insectos.	**Aprobado.** Solicitado por los operadores
Benomyl	Benlate, Benomil, Benoagro	Fungicida. CT OMS: U; CT Colombia III.	Caucho Yuca Plátano Palmito Viveros	Mal suramericano (*Microcyclus ulei*) Costra negra (*Phyllachora*) Superalargamiento (*Sphaceloma manihoticola* Sigatoka negra (*Mycosphaerella fijiensis)* y amarilla (*M. musicola)* Moko (*Ralstonia solanacearum*) Damping off	En lista de 'Mal Actor' de PAN por posible carcinogénico y toxina reproductiva.	**Aprobado.**

Capscicina (capsaicine)	Hidrolato de ajo-ajó	Repelente botánico. CT OMS: no disponible; CT Colombia IV	Vainilla orgánica Viveros	Torcedoras (*Cylsia vanillana*) Chinches (*Spinas floridulos, Nezara* spp.) Varias spp.	*Capsicum oleoresin* regis-trado con USEPA como insecticida botánico.	**Aprobado.**
Captafol	Difolatán	Fungicida. CT OMS: Ia.	Yuca	*Sphaceloma manihoticola*	**No tiene registro en Colombia: P y C en 1999.** **En lista PIC.**	**No usar bajo ninguna condición.** Reemplazar por benomyl.
Captan	Captan, Merpan, Orthocide	Fungicida. CT OMS: U; CT Colombia: II	Palmito Yuca Viveros Papa	Varias enfermedades *Xanthomonas* Damping off *Phytophthora*	En lista de 'Mal Actor' de PAN por posible carcinogénico y toxicidad aguda	**Aprobado.**
Carbaril (carbaryl)	Sevin, Carbaril, Dhimefo	Insecticida, nematicida. CT OMS II; CT Colombia IV.			En la lista de 'Mal Actor' de PAN por inhibidor de colinesterasa. Carbamato. En lista IRED-03.	**Aprobado.** Pero pendiente del re-registro con USEPA en 2003. Solicitado por los operadores
Carbendazim	Carbendazim, Bavistin, Carbendacrop, Carbin, Colizym, Curacarb, Derosal, Duett, Etram, Helmistin, Kemdazin, Makio, Robendazim, Rodazim, SAAT Polka, Soler, Tecnomyl, Undazim, Agrozim	Fungicida. CT OMS: U; CT Colombia: III	Varios. Fríjol	Anthracnosis y mancha angular.		**Aprobado.**

Plaguicida			Cultivo/s	Plaga / s	Tipo de Problema, si hay alguno	Recomendación y alternativa/s
Nombre Técnico	**Nombre comercial**	**Tipo y Clase Toxicológica**				
Carbofuran	Furadan, Carbofed, Curater, Furalimor, Fursem, Carbofuran	Insecticida, nematicida. CT OMS: IB, CT Colombia: I	Yuca Caucho Plátano Viveros Pastos Papa	Chizas blancas (varios géneros y especies) Gusano cachón Picudo negro *(Cosmopolites sordidos)* Nemátodos Mión *Premnotrypes vorax,*Chisa, trozadores,tierrero	PUR con US-EPA (Excepto pellets /tabletas). En lista de 'Mal Actor' de PAN: inhibidor colinesterasa y toxicidad aguda. Organofosforado. En lista IRED-04.	**No debe usarse.** Excepto pellets/tabletas por 24 meses maximo. Revisar situación de registro con USEPA en 2004.
Carboxin	Vitavax	Fungicida, CT OMS U; CT Colombia III	Palmito / Tramiento de semilla	Enfermedades de las plántulas	En lista de 'Mal Actor' de PAN por posible toxina reproductiva. En lista IRED-04.	**Aprobado.** Pero pendiente del re-registro con USEPA en 2004.
Cialotrina, lambda	Karate, Terminex	Insecticida. CT Colombia III	Arroz Papa	Sogata Palomilla Chiza, trozadores, terreros	PUR con USEPA En lista de "Mal actor" de PAN por sospecha disruptor endocrina	**No debe usarse. Eliminar en 12 meses.**
Ciflutrina (cyfluthrin)	Baytroide, Bulldock	Insecticida. CT OMS II; CT Colombia III			PUR con USEPA.	**No debe usarse.** Solicitado por operadores

Plaguicida			Cultivo/s	Plaga / s	Tipo de Problema, si hay alguno	Recomendación y alternativa/s
Nombre Técnico	**Nombre comercial**	**Tipo y Clase Toxicológica**				
Clorotalonil (chlorothalonil)	Bravo, Bravonil, Centauro, Clorotalonil, Clortocaffaro, Clortosip, Control, Daconil, Diclan, Echo, Helmonil, Pugil, Ridonate, Visado	Fungicida. CT OMS U; CT Colombia II	Caucho Friujol Papa	Antracnosis (*Colletotrichum gloesporoides*) Antracnosis y Mancha angular *Phythophthora* y roya	PER con USEPA. En lista de 'Mal Actor' de PAN por posible carcinogénico y toxicidad aguda.	**No debe usarse. Eliminar en 24 meses.**
Clorpirifós (chlorpyrifos)	Lorsban, Clorpirifós, Clorpiricol, Arriero	Insecticida, nematicida. CT OMS: II; CT Colombia: III	Plátano Palma de aceite Yuca Caucho, Bosques Papa	*Metamasius hemipterus* (picudo rayado), defoliadores. Chinche amarilla y roja. *Strategus aloeus* (barrenador de raíz) Hormigas (*Atta* spp.) y trozadores (varias spp.) y Chizas blancas Gusano cachón y hormiga arriera *Premnotrypes* y *Tecia*	PUR con US-EPA Lista de 'Mal Actor' de PAN: inhibidor colinesterasa. Organofosforado	**No debe usarse. Dejar de usar formulaciones CE y PM en un plazo máximo de 6 meses. Eliminar todas las formulaciones en un plazo máximo de 1 año.** Por ahora, para reducir riesgo, usar formulación granular.
Cobre, sulfato de + Cal (carbonato de calcio).	Caldo bordelés	Sulfato de Cu: fungicida, algui-cida, moluscicida. CT OMS: II. Ca	Palmito y palma de aceite Vainilla Viveros	*Pestalopsis sp.* *Colletotricum sp.* Marchitéz *(Fusarium oxysporum y Phytophthora sp.)* Damping off	Caldo bordelés no registrado con US-EPA pero sí sulfato de Cu y carbonato de Ca c/u por separado.	**Aprobado.**

Plaguicida			Cultivo/s	Plaga / s	Tipo de Problema, si hay alguno	Recomendación y alternativa/s
Nombre Técnico	**Nombre comercial**	**Tipo y Clase Toxicológica**				
Cobre, oxicloruro (copper oxychloride)	Agrotox, Coper-pro, Coperflow, Cuprene, Oxiclor, Oxicloruro de Cu	Fungicida. CT OMS III; CT Colombia III.	Yuca	Añublo bacteriano (*Xanthomonas axonopodis pv.* Manihotis)	PUR con USEPA.	**No debe usarse. Eliminar en 24 meses.**
Cymoxanil	Fitiraz (en mezclas con propineb)	Fungicida. CT OMS: III; CT Colombia: sólo en mezclas	Papa	*Phythophthora*		**Aprobado.** Solicitado por los operadores en mezcla
Cypermetrina	Saat Pop, Spock, Agroper, Cipermetrina	Insecticida. CT Colombia II.	Arroz	'Palomilla' Sogata	PUR por oncogeneicidad y peligrosidad para organismos no meta	**No debe usarse. Eliminar en 12 meses.**
Dicamba	Banvel	Herbicida. CT OMS: III; CT Colombia: III.	Pastos	Malezas	En lista de 'Mal Actor' de PAN por toxina reproductiva y posible contaminación de aguas.	**Aprobado.**
Diclorvos	Vapona	Insecticida fumigante. CT OMS: Ib ; CT Colombia: I	Maracujá	Mosca del ovario	En lista de 'Mal Actor' de PAN por inhibidor de la colinesterasa, carcinogénico, alta toxicidad aguda. Organofosforado.	**Aprobado**. Pero pendiente del reregistro con USEPA en 2003.
Di-clorofenoxi-acétic, ácido - 2,4-D	Agritron, Anikil, Artillero,Aminex, Desyerbe, DMA, Agrogen, Formula 40, etc.	Herbicida. CT OMS: II, CT Colombia: II ó III	Pastos	Malezas	En lista RED-2004.	**Aprobado**. Pero pendiente del reregistro con USEPA en 2004.
Diclorprop (dichlorprop)	Malezafin (con 2,4-D)	Herbicida. CT OMS: III, CT Colombia: no disponible solo	Pastos	Malezas	En lista de 'Mal Actor' de PAN por toxina reproductiva.	**Aprobado**

Plaguicida			Cultivo/s	Plaga / s	Tipo de Problema, si hay alguno	Recomendación y alternativa/s
Nombre Técnico	**Nombre comercial**	**Tipo y Clase Toxicológica**				
Dimetoato (dimethoate)	Sistemín, Sistoato, Trifosix, Agrixon, Agrometox, Di-metox, Perfektion, Roxion, Siscrop	Insecticida. CT OMS II; CT Colombia II	Caucho	Termites o comejenes	Lista de 'Mal Actor' de PAN: inhibidor colines-terasa. Organo-fosforado. En lista IRED-03.	**Aprobado**. Pero pendiente del re-registro con USEPA en 2003.
Dimetomorf (dimethomorph)	Acrobat, Forum	Fungicida. CT OMS U; CT Colombia III				**Aprobado.** Solicitado por los operadores
Endosulfan	No disponible.	Insecticida	Varios	Varios	**Registro cancelado en Colombia**	**No usar bajo ninguna condición**
Fentin hidroxido	Brestanid	Fungicida, molusquicida, herbicida CT OMS: II CT Colombia: III	Papa	Gota o tizón tardío (*Phitophtora infestans)*	En lista de "Mal Actor" de PAN por posible carci-nogénico, toxicidad aguda y toxina reproductiva. En lista de IRED	**Aprobado.**
Fenhexamid	Cabo, Teldor	Fungicida, molus-cicida. CT OMS U; CT Colombia III				**Aprobado.** Solicitado por los operadores como moluscicida
Fenoxaprop-etil	Furore, Ricestar.	Herbicida. CT Colombia IV.	Arroz	*Echinocloa* spp.	En lista de "Mal Actor"de PAN por promotor toxina reproductiva	**Aprobado**
Fipronil	Regent, Blitz, Cazador	Insecticida. CT OMS:II; CT Colombia III	Arroz	Sogata		**Aprobado**

Plaguicida			Cultivo/s	Plaga / s	Tipo de Problema, si hay alguno	Recomendación y alternativa/s
Nombre Técnico	**Nombre comercial**	**Tipo y Clase Toxicológica**				
Glifosato	Roundup	Herbicida. CT OMS: U; CT Colombia: III ó IV	Cacao Palma de aceite, Palmito, Caucho, Plátano Plantaciones forestales	Plantas de cacao enfermas c/ *Rose-llinia pepo* Malezas en general Malezas varias		**Aprobado.**
Glyricidia sepium (Madre Cacao), extractos de	Agroil, Sincocin	Repelentes, CT Colombia IV	Vainilla orgánica	Torcedoras (*Cylsia vanillana)*	No tiene registro con USEPA. Pero, ni cultivo ni la plaga ni el recurso existen en USA.	**Aprobado. Extracto vegetal sin evidencias de impacto potencial sobre la salud o el ambiente.**
Hexaconazol (hexaconazole)	Anvil	Fungicida. CT OMS U; CT Colombia III ó IV			No tiene registro con USEPA. Registrado en Canada, Austra-lasia, Hungría y Portugal.	**No debe usarse. Eliminar en 12 meses.** Solicitado por operadores.
Imidacloprid	Confidor, Gaucho, Jade, Imidacloprid, Muralla, Provado, Fandango, Agridor	Insecticida. CT Colombia III.		*Tagasodes orizicolus* (transmisor VHB)		**Aprobado.** Solicitado por operadores
Isazofos	Miral	Insecticida CT OMS: I b CT Colombia: II	Papa	Gusano blanco (*Premnotrypes vorax)*	No registrado en Colombia. No registrado en USEPA. En lista "Mal Actor" de PAN: toxicidad aguda e inhibidor de colinesterasa	**No debe usarse**

Plaguicida			Cultivo/s	Plaga / s	Tipo de Problema, si hay alguno	Recomendación y alternativa/s
Nombre Técnico	**Nombre comercial**	**Tipo y Clase Toxicológica**				
Kasugamicina	Kasumín	Insecticida, bactericida, antibiótico CT OMS: no disp. CT Colombia: IV	Papa	Pata negra (*Erwinia carotovora)*	No registrado en USEPA	**No debe usarse. Eliminar en 12 meses.**
Malathion	Inition, Cropthion, Fyfanon, Malathion, Algodonero	Insecticida. CT OMS: III; CT Colombia: II-III	Cacao Plátano Yuca	Hormiga arriera (*Atta* sp.), chinche amarilla y roja. Defoliadores. Barrenadores del tallo(*Coelosternus ,Lagochirus*, *Chilomima*)	En lista de IRED-03. En lista de "Mal Actor" de PAN por inhibidor de colinesterasa. Organofosforado.	**Aprobado.** Pero pendiente del re-registro con USEPA en 2003.
Mancozeb	Manzate, Curzate, Dithane	Fungicida. CT OMS: U; CT Colombia: III	Plátano Palma de aceite, palmito Caucho Plátano Forestales Papa	*Ralstonia solanacearum* (Moko o maduraviche) Pudrición cogollo Mancha aerolada Mal suramericano *(Microcyclus ulei)* Moko (*Ralstonia solanacearum*) Roya del roble *Phythophtora*	En lista de RED-04. En lista de "Mal Actor" de PAN por posible carci-nogénico y toxina reproductiva.	**Aprobado.** Pero pendiente del re-registro con USEPA en 2004.
Metalaxil (metalaxyl)	Ridomil (sólo en mezclas con mancozeb)	Fungicida. CT OMS: III; CT Colombia: III	Cacao,Papa Yuca Caucho	*Phytophthora* *Phythophtora y Xanthomonas* *Phytophthora palmivora*	Estuvo en re-registro con US-EPA.	**Aprobado.** Re-registro aprobado por USEPA en sep 94.
Metarhizium sp.	Destruxin, Detruxin	Insecticida micro-biológico: hongo entomopatógeno. CT no disponible.	Palmito	*Rinchoforus palmarum, Methamacius hemipterus*	Registrado con USEPA *M. anisopliae*, var, Anisopliae, strain ESF1.	**Aprobado.**

Plaguicida			Cultivo/s	Plaga / s	Tipo de Problema, si hay alguno	Recomendación y alternativa/s
Nombre Técnico	**Nombre comercial**	**Tipo y Clase Toxicológica**				
MCPA (en mezclas solamente)	Tiller, Aniten	Herbicida. CT OMS: III; CT Colombia: no disponible solo	Pastos	Malezas	En lista RED-04. En lista de "Mal Actor" de PAN por posible toxicidad aguda.	**Aprobado.** Pero pendiente del re-registro con USEPA en 2004.
Monocrotofós (monocrotophos)	Azodrín, Elan-cron, Fersacrón, Fosacrón, Inisán, Monocrón, Mono-crotofós, Nuva-crón, Protofós, Ronecrón, Trifo-tóx	Insecticida, Acaricida. CT OMS IB; CT Colombia I	Palma de aceite y palmito	*Leptopharsa gibbicarina* (Chinche encaje)	CANCELADO EN USA. Antes: PUR con USEPA. En lista PIC.En lista de "Mal Actor" de PAN por inhibidor coli-nesterasa. Organofosforado.	**No debe usarse. Eliminar INMEDIATA-MENTE.**
Metamidofós	Tamarón	Insecticida, acaricida. CT OMS: …; CT Colombia I	Muchos	Muchos	PUR con USEPA. En lista PIC.En lista de "Mal Actor" de PAN por inhibidor coli-nesterasa y toxicidad aguda. Organofosforado.	**No debe usarse. Eliminar INMEDIATA-MENTE. Solicitado por los operadores**
Metomil (methomyl)	Lannate, Mercamil, Methavin, Methomex, Metomil, Pilarmate	Insecticida. CT OMS I; CT Colombia I			PUR con USEPA. En lista de "Mal Actor" de PAN por toxicidad aguda e inhibidor de colinesterasa.	**No debe usarse. Eliminar en 12 meses.** Solicitado por los operadores

Plaguicida			Cultivo/s	Plaga / s	Tipo de Problema, si hay alguno	Recomendación y alternativa/s
Nombre Técnico	**Nombre comercial**	**Tipo y Clase Toxicológica**				
N-Alquil	Timsen	Fungicida. CT OMS: III; CT Colombia: III	Papa	*Phitophtora infestans,Rhizoctonia, Erwinia, Alternaria, Spongospora, Rosillinia*		**Aprobado**
Ofurace	Grolan (En mezclas solamente con mancozeb)	Fungicida. CT OMS: U; CT Colombia: sólo en mezclas			Sin registro con USEPA. Registrado sólo en Portugal y Reino Unido	**No debe usarse. Eliminar en 12 meses.** Solictado por los operadores en mezcla con mancozeb.
Oxicarboxin	Plantvax	Fungicida. CT OMS: U; CT Colombia IV	Roble Papa	Roya Roya		**Aprobado.**
Paecilomices liacinus	Biostat	Insecticida microbioógico: hongo entomopatógeno. CT Colombia III	Palmito	Chinche de encaje *(Leptopharsa gibbicarina)*	Sin registro con USEPA. Sin embargo tanto cultivo como la plaga no existen en USA	**Aprobado.** Producto microbiano sin probable impacto ambiental.
Paraquat	Gramoxone, Agroquat, Calli-quat, Paraquat	Herbicida. CT OMS: II; CT Colombia: I	Cacao, Plátano Palmito	Malezas, erradicación de cultivo atacado	PUR con USEPA.	**No debe usarse. ELIMINAR DE INMEDIATO**.Alternativos: glifosato; picloram 101R
Paration metílico	Metacap, Metacide, Metil Paration, Penncap	Insecticida. CT Colombia I	Arroz	Chinche	Registro cancelado por la USEPA por alta toxicidad aguda	**No debe usarse bajo ninguna circumstancia. Eliminar de inmediato**

Plaguicida			Cultivo/s	Plaga / s	Tipo de Problema, si hay alguno	Recomendación y alternativa/s
Nombre Técnico	**Nombre comercial**	**Tipo y Clase Toxicológica**				
Picloram	Tordon, Closser, Grazón	Herbicida. CT OMS: U; CT Colombia: II, III, ó IV	Cacao Pastos	Plantas de cacao enfermas c/*Rose-llinia pepo* Malezas arbustivas	PUR con US-EPA – excepto Tordon 101R	**No usar en general.** Si no hay substituto, usar solamente Tordon 101R.
Potasio, sales de (K) (potassium salts)	K.S.I.	Acaricida. CT OMS no disponible; CT Colombia III			Laureato de K registrado con USEPA.	**Aprobado.** Solicitado por los operadores
Profenofós	Curacrón, Lancero, Awake,	Insecticida. CT OMS: II, CT Colombia: II ó III	Caucho Papa	Comején/termites (*Coptotermes* sp.) Chiza, trozadores	PUR con USEPA. En lista de "Mal Actor" de PAN por inhibidor coli-nesterasa. Organofosforado.	**No debe usarse.**
Propanil	Propanil, Propaflow, Kilex, Prop, Propadox	Herbicida. CT OMS III; CT Colombia III.	Arroz	*Echinocloa* spp.		**Aprobado**
Propamocarb-HCl	Previcur, Tattoo, Propanil, Agropropanil, Bextonil, Calriz, Kilex, Propanex, Proparroz, Sierra, Stam, Curcopur, Stamfos	Fungicida CT OMS: no disponible CT Colombia: IV	Papa	*Phitophtora infestans*		**Aprobado.**
Propineb	Format, Punto, Antracol	Fungicida. CT OMS: U; CT Colombia II ó III	Viveros Papa	Damping off *Phythophtora*	En lista de "Mal Actor" de PAN por toxina repro-ductiva.	**Aprobado.**

Plaguicida			Cultivo/s	Plaga / s	Tipo de Problema, si hay alguno	Recomendación y alternativa/s
Nombre Técnico	**Nombre comercial**	**Tipo y Clase Toxicológica**				
Swingla sp., extractos de		Fungicida	Vainilla orgánica	Marchitéz *(Fusarium oxysporum y Phytophthora sp.). Antracnosis (Colletotrichum vanillae) y roya (Puccinia sp.)*	Sin registro con USEPA. Apa-rentemente, aún no tiene registro en Colombia.	**No debe usar hasta no confirmar su registro en Colombia.**
Tebuconazole	Folicur,	Fungicida. CT OMS III; CT Colombia III				**Aprobado.** Solicitado por los operadores
Teflutrina	Force	Insecticida CT OMS: Ib CT Colombia: II	Papa	Gusano blanco (*Premnotrypes vorax)*	En lista de "Mal Actor" de PAN por toxicidad aguda y sospecha disruptor endocrina. Alta toxicidad en peces	**Aprobado**
Thiabendazole	Mertect	Fungicida. CT OMS: U; CT Colombia: III ó IV	Palmito	*Fusarium sp.*	En lista de "Mal Actor" de PAN por efectos carcinogénicos y toxina reproduc-tiva. Estuvo en re-registro con US-EPA.	**Aprobado.** Re-registro aprobado por USEPA en octubre 2002.
Thiram	Solo en mezclas	Fungicida.	Palmito, tramiento de semilla	Enfermedades de las plántulas	En lista RED-04. En lista de "Mal Actor" de PAN por toxina reproductiva.	**Aprobado.** Pero pendiente del re-registro con USEPA en 2004.
Triadimefon	Bayleton	Fungicida. CT OMS III; CT Colombia IV	Caucho, Forestales (roble)	Mancha aerolada (*Thanatephorus cucumeris*), roya (*Prospodium*)	En lista de "Mal Actor" de PAN por toxina reproductiva.	**Aprobado.**

Plaguicida			Cultivo/s	Plaga / s	Tipo de Problema, si hay alguno	Recomendación y alternativa/s
Nombre Técnico	**Nombre comercial**	**Tipo y Clase Toxicológica**				
Trichoderma sp. (harzianum y lignorum)	Tricobac, Mycobac, Tricodex, Tricho	Fungicida micro-biano: hongo antagonista. CT OMS: no disponible; CT Colombia: III ó IV	Palmito Palma de aceite	*Phythophtora palmarum*	*T. lignorum* no registrado con US-EPA. Sin embargo, tanto el cultivo como la plaga no existen en USA. Si lo está *T. harzianum*.	**Aprobado**. Producto microbiano sin probable impacto ambiental.
Triclorfon	Dipterex, Profitox	Insecticida organofosforado CT OMS: no disp. CT Colombia: II	Papa	Chisa, trozadores y tierreros	En lista de "Mal actor" de PAN por carcinogénico y toxicidad aguda moderada	**Aprobado**
Trichogramma pretiosum	Trichogramma	Antagonista biológico de insectos: avispas parasitoides. CT no disponible.	Varios	Varias	Registrado en Colombia. No registrado con USEPA.	**Aprobado.** Producto microbiano sin probable impacto ambiental.
Validacin A	Validacin	Fungicida bactericida CT OMS: U Ct Colombia: IV	Papa	Rhizoctoniasis (*Rhizoctonia solani)*	No registrado en USEPA	**Aprobado.** Producto biológico sin probable impacto ambiental
Verticillum lecanii	Vertisol	Insecticida micro-biano: hongo entomopatógeno. CT no disponible.	Palmito	Defoliadores	No registrado con US-EPA! Pero tanto el cultivo como la plaga no existen en USA. Registrado en Finlandia, Reino Unido y Holanda.	**Aprobado.** Producto microbiano sin probable impacto ambiental.

Section 5.1.2
Basis for the selection of CAD Pesticides
[Addresses Reg. 216 point (b)]

Pesticide		Uses		Basis for Selection
Technical Name or Active Ingredient	**Trade or Commercial Name in Colombia**	**Crop**	**Pest**	
Bacillus thuringiensis	Xentari, Ecotech-Pro, Turilav, Thuricide, Javelín, Batón, Dipel	Oil palm & rubber	*Loxotoma elegans* & *Erinnys ello*	Effectiveness; No health & environmental impacts
Beauveria bassiana	Conidia, Nativo, Brocavec, Cebio-pest, Brocaril, Agronova, Bio-expert, Botani-gard, Mycotrol	Plantain Oil palm Heart of palm	*Metamasius hemipterus, Brassolis sophorae* *Rinchoforus palmarum, Methamacius hemipterus*	Effectiveness; No health & environmental impacts
Benomyl	Benlate, Benomil, Benoagro	Rubber Cassava Plantain Heart of palm Nurseries	*Microcyclus ulei, Phyllachora, Sphaceloma manihoticola, Mycosphaerella fijiensis* & *M. musicola* *Ralstonia solanacearum* Damping off	Cost. Availability. Effectiveness. Wide spectrum of pathogens controlled.
Captan				
Capsaicine	Hidrolato de ajo-ajó	Organic vanilla Nurseries	*Cylsia vanillana*, *Spinas floridulos, Nezara* spp. Several spp.	Effectiveness; No health & environmental impacts
Carbendazim	Carbendazim, Bavistin, and many others	Dry beans	Colletotrichum	Cost. Availability. Effectiveness.
Carbofuran	Furadan, Carbofed, Curater, Furalimor, Fursem, Carbofuran	Cassava Rubber Plantain Nurseries Pastures	White grubs (various species) *Erinnys ello* *Cosmopolites sordidos* Nematodes Mión	Cost. Availability. Effectiveness. Wide spectrum of insect pests controlled.
Carboxin	Vitavax	Heart of palms / Seed treatment	Seedling diseases	Cost. Availability. Effectiveness.

Pesticide		Uses		Basis for Selection
Technical Name or Active Ingredient	**Trade or Commercial Name in Colombia**	**Crop**	**Pest**	
Chlorotalonil	Bravo, Bravonil, Centauro, Visado, Clorotalonil, Clortocaffaro, Clortosip, Control, Daconil, Diclan, Echo, Helmonil, Pugil, Ridonate	Rubber	*Colletotrichum gloesporoides*	Cost. Availability. Effectiveness.
Chlorpyrifos	Lorsban, Clorpirifós, Clorpiricol, Arriero	Plantain Oil Palm Cassava Rubber, Forest plantations	*Metamasius hemipterus,* defoliant. Sting bugs. *Strategus aloeus* Ants (*Atta* spp.) & stem cutters (various spp.) & white grubs. Erynnis ello.	Cost. Availability. Effectiveness. One of the very few products used for ant control. Wide spectrum of insect pests controlled
Copper sulphate + cal (Bordeaux mixture)	Bordeaux mix	Heart of palm, oil palm Vanilla Nurseries	*Pestalopsis sp.* *Colletotricum sp.* *Fusarium oxysporum & Phytophthora sp.* Damping off	Effectiveness. Limited health & environmental impacts. Easiness to prepare.
Copper oxychlor-ide	Agrotox, Coper-pro, Coperflow, Cuprene, Oxiclor, Oxicloruro de Cu	Cassava	*Xanthomonas axonopodis pv.* Manihotis	Cost. Availability. Effectiveness.
Dicamba	Banvel	Pastures	Weeds	Cost. Availability. Effectiveness.
Dichlorvos	Vapona	Passion fruit	*Dasiops* sp.	Cost. Availability. Effectiveness.
Di-chloro-fenoxi-acetic acid (2,4-D)	Agritron, Anikil, Artillero,Aminex, Desyerbe, DMA, Agrogen, Formula 40, etc.	Pastures	Weeds	Cost. Availability. Effectiveness.
Dimethoate	Sistemín, Sistoato, Trifosix, Agrixon, Agrometox, Di-metox, Perfektion, Roxion, Siscrop	Rubber	Termites	Cost. Availability. Effectiveness. One of the few products for termites.

Pesticide		Uses		Basis for Selection
Technical Name or Active Ingredient	**Trade or Commercial Name in Colombia**	**Crop**	**Pest**	
Gliphosate	Roundup	Cacao Oil palm, Heart of palm, Rubber, Plantain, Forestry plantations	Cacao plants affected by *Rose-llinia pepo* Weeds in general	Effectiveness. Reduced health & environmental impacts. Cost. Availability.
Malathion	Inition, Cropthion, Fyfanon, Malathion, Algodonero	Cacao Plantain Cassava	Ants (*Atta* sp.), 'stings bugs'. Defoliants. Stem borers (*Coelosternus,Lagochirus*, *Chilomima*)	Cost. Availability. Effectiveness.
Mancozeb	Manzate, Curzate, Dithane	Plantain Oil palm Rubber Heart of palm	*Ralstonia solanacearum* (Moko or maduraviche) Stem rottening Round spot Southamerican disease*(Microcyclus ulei)*	Cost. Availability. Effectiveness.
Metalaxyl	Ridomil (only in mixes with mancozeb)	Cacao Cassava Rubber	*Phytophthora* *Phythophtora y Xanthomonas* *Phytophthora palmivora*	Cost. Availability. Effectiveness. Unique product for Phytophthora control.
Metarhizium	Destruxin, Detruxin	Heart of palm	*Rinchoforus palmarum, Methamacius hemipterus*	Effectiveness. No health & environmental impacts.
MCPA	Tiller, Aniten	Pastures	Weeds	Cost. Availability. Effectiveness.
Oxycarboxin	Plantvax	Forestry: oaks	Rust	Cost. Availability. Effectiveness.
Paecilomices liacinus	Biostat	Heart of palm	Sting bug *(Leptopharsa gibbicarina)*	Effectiveness. No health & environmental impacts
Picloram	Tordon, Closser, Grazón	Cacao Pastures	Diseased cacao plants c/*Rose-llinia pepo* Bushy weeds	Cost. Availability. Effectiveness.

Pesticide		Uses		Basis for Selection
Technical Name or Active Ingredient	**Trade or Commercial Name in Colombia**	**Crop**	**Pest**	
Profenofos	Curacrón, Lancero, Awake	Rubber	Termites (*Coptotermes* sp.)	Cost. Availability. Effectiveness. One of the few products for termites.
Triadimefom	Bayleton	Rubber	*Thanatephorus cucumeris*	Cost. Availability. Effectiveness.
Trichoderma	Tricobac, Mycobac, Tricodex, Tricho	Heart of palm Oil Palm	*Phythophtora palmarum*	Effectiveness. No health & environmental impacts
Trichograma pretiosum	Trichogramma	Various	Various	Effectiveness. No health & environmental impacts
Verticilium lecanii	Vertisol	Heart of palm	Defoliants	Effectiveness. No health & environmental impacts

Sección 5.1.2
Bases para la selección de los Plaguicidas de CAD
[Trata con la Reg. 216 punto (b)]

Plaguicida		Usos		Bases para la Selección
Nombre Técnico o Ingrediente Activo	**Nombre Comercial en Colombia**	**Cultivo**	**Plaga**	
Bacillus thuringiensis	Xentari, Ecotech-Pro, Turilav, Thuricide, Javelín, Batón, Dipel	Palma de aceite y palmito	*Loxotoma elegans* y *Erinnys ello*	Efectividad; sin impacto sobre salud o ambiente
Beauveria bassiana	Conidia, Nativo, Brocavec, Cebio-pest, Brocaril, Agronova, Bio-expert, Botani-gard, Mycotrol	Plátano Palma de aceite Palmito	*Metamasius hemipterus, Brassolis sophorae Rinchoforus palmarum, Methamacius hemipterus*	Efectividad; sin impacto sobre salud o ambiente
Benomyl	Benlate, Benomil, Benoagro	Caucho Yuca Plátano Palmito Viveros	*Microcyclus ulei, Phyllachora, Sphaceloma manihoticola, Mycosphaerella fijiensis* & *M. musicola Ralstonia solanacearum* Damping off	Costo. Disponibilidad. Eficacia. Controla un espectro amplio de patógenos.
Captan				
Capsaicine	Hidrolato de ajo-ajó	Vainilla orgánica Viveros	*Cylsia vanillana*, *Spinas floridulos, Nezara* spp. Varias spp.	Eficacia. Sin impactos sobre salud o ambiente
Carbendazim	Carbendazim, Bavistin, y otros	Fríjol	Colletotrichum	Costo. Disponibilidad. Eficacia.
Carbofuran	Furadan, Carbofed, Curater, Furalimor, Fursem, Carbofuran	Yuca Caucho Plátano Viveros Pasturas	Gallina ciega (varias species) *Erinnys ello* *Cosmopolites sordidos* Nemátodos Mión	Costo. Disponibilidad. Eficacia. Amplio espectro de plagas insectiles controladas .
Carboxin	Vitavax	Palmito /Tratamiento de semilla	Enfermedades de las plántulas	Costo. Disponibilidad. Eficacia.

Plaguicida		Usos		Bases para la Selección
Nombre Técnico o Ingrediente Activo	**Nombre Comercial en Colombia**	**Cultivo**	**Plaga**	
Chlorotalonil	Bravo, Bravonil, Centauro, Visado, Clorotalonil, Clortocaffaro, Clortosip, Control, Daconil, Diclan, Echo, Helmonil, Pugil, Ridonate	Caucho Frijol	*Colletotrichum gloesporoides*	Costo. Disponibilidad. Eficacaia.
Chlorpyrifos	Lorsban, Clorpirifós, Clorpiricol, Arriero	Plátano Palma de aceite Yuca Caucho,Plantaciones forestales	*Metamasius hemipterus,* defoliantes. Chinches. *Strategus aloeus* Hormigas (*Atta* spp.) & cortradores (varias spp.) & gallina ciega Erynnis ello.	Costo. Disponibilidad. Eficacia. Uno de los pocos productos para control de hormigas. Amplio especto de insectos controlados
Cobre, sulfato de + cal	Caldo bordelés	Palmito, Palma de aceite Vainilla Viveros	*Pestalopsis sp.* *Colletotricum sp.* *Fusarium oxysporum & Phytophthora sp.* Damping off	Eficacia. Impactos sobre la salud y ambiente limitados. Facilidad de preparación.
Cobre, oxicloruro	Agrotox, Coper-pro, Coperflow, Cuprene, Oxiclor, Oxicloruro de Cu	Yuca	*Xanthomonas axonopodis pv.* Manihotis	Costo. Disponibilidad. Eficacia.
Dicamba	Banvel	Pasturas	Malezas hoja ancha	Costo. Disponibilidad. Eficacia.
Diclorvos	Vapona	Maracujá	Mosca del ovario	Costo. Disponibilidad. Eficacia.
2,4-D (ácido di-clorofenoxiacético)	Agritron, Anikil, Artillero,Aminex, Desyerbe, DMA, Agrogen, Formula 40, etc.	Pasturas	Malezas hoja ancha	Costo. Disponibilidad. Eficacia.
Dimetoato	Sistemín, Sistoato, Trifosix, Agrixon, Agrometox, Di-metox, Perfektion, Roxion, Siscrop	Caucho	Termitas	Costo. Disponibilidad. Eficacia. Uno de los pocos productos para las termitas.

Plaguicida		Usos		Bases para la Selección
Nombre Técnico o Ingrediente Activo	**Nombre Comercial en Colombia**	**Cultivo**	**Plaga**	
Glifosato	Roundup	Cacao Palm de aceite, Palmito, Caucho, Plántano,Plantaciones forestales	Plantas de cacao afectadas por *Rose-llinia pepo* Malezas en general	Eficacia. Impacto reducido sobre salud y ambiente. Costo. Disponibilidad.
Malathion	Inition, Cropthion, Fyfanon, Malathion, Algodonero	Cacao Plátano Yuca	Hormigas (*Atta* sp.), chinches. Defoliantes. Taladradores (*Coelosternus,Lagochirus*, *Chilomima*)	Costo. Disponibilidad. Eficacia.
Mancozeb	Manzate, Curzate, Dithane	Plátano Palm de aceite Palmito Caucho	*Ralstonia solanacearum* (Moko o maduraviche) Pudrición cogollo Mancha aerolada Mal suramericano *(Microcyclus ulei)*	Costo. Disponibilidad. Eficacia
Metalaxyl	Ridomil (sólo en mezclas con mancozeb)	Cacao Yuca Caucho	*Phytophthora* *Phythophtora y Xanthomonas* *Phytophthora palmivora*	Costo. Disponibilidad. Eficacia. Producto único para el control de Phytophthora.
Metarhizium	Destruxin, Detruxin	Palmito	*Rinchoforus palmarum, Methamacius hemipterus*	Eficacia. Sin impactos sobre la salud y ambiente.
MCPA	Tiller, Aniten	Pasturas	Malezas	Costo. Disponibilidad. Eficacia.
Oxicarboxin	Plantvax	Forestales: robles	Roya	Costo. Disponibilidad. Eficacia.
Paecilomices liacinus	Biostat	Palmito	Chinche de encaje *(Leptopharsa gibbicarina)*	Eficacia. Sin impactos sobre la salud y el ambiente
Picloram	Tordon, Closser, Grazón	Cacao Pasturas	Plantas de cacao enfermas con *Rose-llinia pepo* Malezas arbustivas	Costo. Disponibilidad. Eficacia.

Plaguicida		Usos		Bases para la Selección
Nombre Técnico o Ingrediente Activo	**Nombre Comercial en Colombia**	**Cultivo**	**Plaga**	
Profenofos	Curacrón, Lancero, Awake	Caucho	Termitas (*Coptotermes* sp.)	Costo. Disponibilidad. Eficacia. Uno de los pocos productos anti- termitas.
Triadimefom	Bayleton	Caucho	*Thanatephorus cucumeris*	Costo. Disponibilidad. Eficacia.
Trichoderma	Tricobac, Mycobac, Tricodex, Tricho	Palmito, Palma de acite	*Phythophtora palmarum*	Eficacia. Sin impactos sobre la salud y el ambiente
Trichograma pretiosum	Trichogramma	Varios	Varios	Eficacia. Sin impactos sobre la salud y el ambiente
Verticilium lecanii	Vertisol	Palmito	Defoliantes	Eficacia. Sin impactos sobre la salud y el ambiente

Section 5.1.3
CAD Pesticides – Risk Analysis

Pesticide [1]	Acute Tox Class[2]	Type	Chronic Toxicity	Eco-toxicity	Groundwater Contamination Potential	Mitigation of risks / Comments [3]
Acetami-prid	WHO:n/a Colombia III	Insect icide	Not a cholinesterase inhibitor	Insufficient data	Insufficient data	No comments
Bacillus thurin-giensis	WHO: not availa-ble. Colom-bia: III	Micro bial insec-ticide bac-teria	Unlikely to cause any effect. No indication of reproductive, teratogenic & carcinogenic effects. Possible some mutagenic effects in plants.	Bio-product with unlikely environmental impact. Not toxic to fish, birds & other animals.	No evidence for potential ground water contamination.	Repeated applications over extended periods may promote the development of resistance. Rotate products.
Beauveria bassiana	WHO: not availa-ble. Colom-bia: III	Micro bial insec-ticide fungi	Unlikely to cause any effect. No indication of carcinogenic, teratogenic, reproductive or mutagenic effects.	Bio-product with unlikely environmental impact.	No evidence for potential ground water contamination.	
Benomyl	WHO: U; Colom-bia: III	Fungi cide	Possible carcino-genic & inducer of developmental & reproductive toxin promoter. Suspected endocrine disrupter.	Moderately toxic to birds & highly toxic to fish	There is insufficient data regarding poten-tial ground water contamination.	Uses of benomyl should be controlled vis-à-vis possible environmental impacts on non-target spp.
Captan	WHO: U Colombia: II	Fungi cide	Possible carcinogenic , acute toxicity. Unlikely reproductive effects. Non mutagenic, non teratogenic.	Non toxic to birds & bees. Very high tocity to fish. Moderate toxicity to moluscs, insects & zooplancton.	Low persistence in soils & water bodies. Degrades rapidly in neutral water.	Use with precaution protecting humans.

[1] Technical name or active ingredient

[2] As per WHO classification: IA (extremely hazardous), IB (highly hazardous), II (moderately hazardous), III (slightly hazardous), and 'U' (unlikely to present acute hazard in normal use). The LD_{50} used for acute toxicity is either oral (O) or dermal (D). Colombia uses the same scale but classes numbered I-IV.

[3] General mitigation tactics to (a) reduce human exposure risks: protective clothing (mask, hat, glasses, long sleeves shirt, long pants, boots, gloves or plastic bags, washing clothing, no food, no drink, no smoking, no re-entry to fields, etc.) and (b) reduce environmental risks (mix exact amounts, no spray close to water bodies, to bee hives, to bird nesting areas, avoid windy days, etc.) are part of a more general SUP.

Pesticide	Acute Tox Class	Type	Chronic Toxicity	Eco-toxicity	Groundwater Contamination Potential	Mitigation of risks / Comments
Capsai-cine	WHO: not availa-ble; Colom-bia: IV	Botani-cal repe-llent & insecti-cide.	Unlikely to pose any hazards to humans. Component of human diet for centuries: no adverse effects.	No potential significant risks beyond some possible skin irritation.	No evidence for potential ground water contamination	
Carbenda zim	WHO TC: U; Colomb ia TC: III	Fungici de	Possible carcinogen & suspected endocrine disrupter.	Moderately toxic to birds & highly toxic to fish	There is insufficient data regarding poten-tial ground water contamination.	Uses should be controlled vis-à-vis possible environmental impacts on non-target spp.
Carbo-furan	WHO: IB; Colom-bia: I. High acute toxicity	Insecti-cide, nemati-cide	Organophosphate = cholinesterase inhibitor. Liquid formulations pose serious threat to applicators (RUP reason). Highly toxic by ingestion & inhalation & modera-tely by dermal exposure.	Granular formulations pose serious threat to birds & possible other animals (RUP reason). Highly toxic to birds & fish.	High water solubility & so potential for ground water contamination.	RUP. Carbofuran uses should be minimised & carefully controlled to prevent human & envi-ronmental contamination. In IRED-04. Revise registration status in 2004
Carboxin	WHO: U; Colom-bia: III	Fungi-cide	Posible reproductive toxin promoter. No other effects have been observed.	Non toxic to bees & birds but highly toxic to fish.	No evidence for potential ground water contamination has been found.	In IRED-04. Revise registration status in 2004. Care should be taken not to expose fish
Chlorota-lonil	WHO: U; Co-lombia: II.	Fungi-cide	Possible carcinogenic; unclear potential. No other effects except the fact that it is a strong eye & skin irritant	Non toxic to birds & bees. Highly toxic to fish, aquatic invertebrates & marine organisms.	Some potential but yet unclear.	RUP. Chlorothalonil should be used carefully & in supervised manner to prevent human health & environmental impacts
Chlorpyri-fos	WHO: II; Colom-bia: III	Insecti-cide, nemati-cide	Organophosphate = cholinesterase inhibitor. No other adverse effects except those associated to central nervous system.	May be toxic to some plants, e.g. lettuce. Mod-very toxic to birds & very highly toxic to fish & aquatic organisms	Unlikely to leach & contaminate water.	RUP. There is a 24 hour minimum re-entry time for field treated with it. Applications should be carefully supervised to prevent human & environmental exposure.

Pesticide	Acute Tox Class	Type	Chronic Toxicity	Eco-toxicity	Groundwater Contamination Potential	Mitigation of risks / Comments
Copper sulphate + cal (Bordeaux mixture)	WHO: II; Colom-bia: n/a	Fungi-cide	No evidence for chronic effects in humans is available.	No evidence for adverse effects on the environment.	No evidence for potential for water contamination.	
Copper oxychlor-ide	WHO: III; Colombi a: III	Fungi-cide	Acute effects include irritation of eyes & skin. Chronic toxicity includes hepatic cirrhosis & brain damage.	No evidence for adverse effects on the environment.	No evidence for potential for water contamination.	RUP To be used with caution because of its possible human health impacts.
Cyperme-trina	WHO: not availabl Colom-bia: II	Insecti-cide.	Not a cholinesterase inhibidor. Moderatly toxic by dermic absorption or ingestion. Possible carcinogenic. May cause adverse effects in bervous system.	Severe marine contaminant. Very high toxicity to fish & acquatic invertebrates. Practically non toxic to birds. Highly toxic to bees.	Moderate persistency in soils. Not water soluble. It is not likely to cause ground water contamination.	RUP. Dangerous to non-target organisms. To be very carefull and precautions to be taken because of high fisk toxicity.
Dicamba	WHO: III; Colom-bia: III	Herbi-cide	Reproductive toxin. Otherwise no carcinogenic, mutagenic, or teratogenic effects have been noted.	Practically non-toxic to birds & low toxicity to fish. Not toxic to bees.	Highly soluble in water & does not bind to soil so it is a potential water contaminant	Should be used with care to prevent contamination of water bodies.
Diclorvos	Vapona	Insectic ide fumiga nt.	Affects liver & accumulates in lungs. Possible carcinogenic, not teratogenic, not mutagenic. Cholinesterase inhibitor.	Highly toxic to birds, not toxic fish but toxic to bees.	Possible water contaminant: does not bind to soils & stays in solution.	In IRED-03. Revise registration status in 2003. Manage with care because acute toxicity. Do not use close to water bodies. Special care with birds & bees.
Di-chloro-fenoxi-acetic acid (2,4-D)	WHO: III; Colom-bia: II or III	Herbi-cide	Possible carcinogenic & suspected endocrine disrupter. Possible reproductive effects. Acutelly may be a serious eye & skin irritant.	Possible accumulation in the environment with effects on wildlife. Unclear status.	Potential contaminant	In IRED-04. Revise registration status in 2004. Handle with care to avoid skin & eye irritation

Pesticide	Acute Tox Class	Type	Chronic Toxicity	Eco-toxicity	Groundwater Contamination Potential	Mitigation of risks / Comments
Dimetho-ate	WHO: II; Colom-bia: II	Insecti-cide	Organophosphate = cholinesterase inhibitor. Possible carcinogenic & promoter of reproductive toxin.	Moderately to very highly toxic to birds, highly toxic to honeybees & moderately toxic to fish.	Highly soluble in water & poorly adsorbed in soils so it is a potential water contaminant.	In IRED-03. Revise registration status in 2003. Should be used very carefully to prevent water contamination & effects in bees & birds.
Fentin hidróxido	WHO: II Colom-bia: III	Fungici-de, molus-cicide, herbici-de	Possible carcinogenic, acute toxicity & reproductive toxin. Suspected endocrine disruptor.	Very high toxicity to fish. Highly toxic to moluscs & zooplancton.	No evidence for water contamination.	IRED. Revise registration status in 2004. Applications carefully supervised to prevent human & environmental exposure
Fenoxa-prop-etil	WHO: not availabl Colom-bia: IV	Herbici de	Low acute toxicity. Not a cholinesterase inhibitor Develop or promotes reproductive toxin.	Moderatly toxic to crustaceous. Moderatly to highly toxic to fish. Highly toxic to zooplancton.	Insufficient data.	In PAN "Bad Actor" listfor promotor of reproductive toxin
Fentin hidróxido	WHO: II Colom-bia: III	Fungici-de, molus-cicide, herbici-de	Possible carcinogenic, acute toxicity & reproductive toxin. Suspected endocrine disruptor.	No acute toxicity to crustaceous. Very high toxicity to fish. Highly toxic to moluscs & zooplancton.	No evidence of possible groound water contaminant.	In IRED. Revise registration status in 2004 Aplications should be carefully sypervised to prevent human & environmental exposure.
Fipronil	WHO: II Colom-bia: III	Insecti cide.	Moderate acute toxicity. Possible carcinogenic. Not a cholinesterase inhibidor. Suspected endocrine disrupter.	Highly toxic to bees. Some formulations are risky to birds, fish & aquatic invertebrates. Fipronil & some of its metabilites may bio-acumulate, particularly in fish.	Degrades slowly in soils & water. Relatively imobile in soils & has low potential for ground water contamination.	Careful with non target fauna.

Pesticide	Acute Tox Class	Type	Chronic Toxicity	Eco-toxicity	Groundwater Contamination Potential	Mitigation of risks / Comments
Forato	WHO: I Colom-bia: II	Insectic ide; orga-nophos phate	Acute toxicity. Highly toxic orally . Colinesterase inhibitor. Unlikely reproductive effects. Non teratogenic. Non mutagenic. Non carcinogenic.	Highly tosic for fish & crustaceous. Very high toxicity for zooplancton & insects. Moderately toxic to moluscs.	Reduced potential to stay in soils & contaminate water. Non toxic in water. No residues detected in vegetation	RUP due to high toxicity Applications carefully supervised to prevent human & environmental exposure
Gliphosat e	WHO U; Colom-bia: III-IV	Herbi-cide	No evidence of any carcinogenic, teratogenic, mutagenic effects.	Slightly toxic to birds, non toxic to fish & bees.	Unlikely due to soil adsorption.	
Imidaclo-prid	WHO: II Colom-bia: III	Insecti-cide.	Moderate acute toxicity. Not a probable carcinogenic. Not a cholinesterase inhibitor. May be slightly mutagenic.	Toxic to a great variety of birds. Moderatly low toxicity to fish. Highly toxic to bees. May be very toxic to aquatic invertebrates. Sistemic.	Moderatly soluble & with moderate afinity for organic compounds in soils. Potentially may move through porous soils, like sand, pending on irrigation practices.	Applications must be carefully supervised to prevent risks to human health & enironmental contamination.
Malathio n	WHO III; Colom-bia: II-III	Insecti-cide	Organophosphate = cholinesterase inhibitor. Possible carcinogenic & suspected endocrine disrupter	Highly toxic to honey bees, moderately toxic to birds & variable toxicity to fish	Possible contaminant. It has been detected in well & ground waters.	In IRED-03. Revise registration status in 2003. Malathion should be used with great care in order not to expose workers & prevent water contamination & effects on bees & birds
Mancozeb	WHO: U; Colom-bia: III	Fungi-cide	Possible carcinogenic, reproductive toxin promoter & endocrine disrupter	Moderately to highly toxic to fish, slightly toxic to birds & not toxic to bees	Not a possibility.	In IRED-04. Revise registration status in 2004. Use with care to minimise workers exposure.

Pesticide	Acute Tox Class	Type	Chronic Toxicity	Eco-toxicity	Groundwater Contamination Potential	Mitigation of risks / Comments
Metalaxyl	WHO: III; Colom-bia: II	Fungi-cide	Carcinogeneicity still unknown. No other effects on humans.	Practically not toxic to birds, bees & fish	Potential water contaminant	Re-registration approved by USEPA in Sep. 94
Metarhizi um	WHO & Co-lombia: not availa-ble	Micro-bial insecti-cide: fungi	Unlikely to cause any effect. No indication of carcinogenic, teratogenic, reproductive or mutagenic effects.	Bio-product with unlikely environmental impact. Not toxic to fish, birds & other animals.	No evidence for potential ground water contamination.	
MCPA	WHO: III; Colom-bia: not availa-ble	Herbi-cide (in mixes only)	Possible carcinogen. Significant reproductive effects have been observed in rats. Weakly mutagenic.	Not toxic to fish, slightly toxic to bees & moderately toxic to birds	Not likely. It is degraded rapidly by water micro-organisms	In RED-04. Revise registration status in 2004. Protect applicators.
Oxy-carboxin	Plant-vax	Fungici de.	Non teratogenic, non mutagenic, non carcinogenic.	Highly toxic to fish. Relatively non toxic to birds & bees.	Not likely. It breaks down rapidly in water.	Protect fish.
N- alquil	WHO: IV Colom-bia: IV	Bacteri cide, fungici de, viricide	Non teratogenic, non mutagenic, non carcinogenic.	No data available.	It shows aquatic toxicity	Do not use near water bodies.
Paecilomi -ces liacinus	WHO: not availa-ble; Colom-bia III.	Micro-bial insecti-cide: fungi	Unlikely to cause any effect. No indication of carcinogenic, teratogenic, reproductive or mutagenic effects.	Bio-product with unlikely environmental impact.	No evidence for potential ground water contamination.	Not registered with USEPA. However, crop & pest do not exist in the USA.
Picloram	WHO: U; Colom-bia: IV (G)	Herbi-cide	Non teratogenic, weakly to no mutagenic, weakly carcinogenic.	Slightly toxic to birds & fish & not toxic to bees. Hazard for no-target plants, crops & others	Potential for ground water contamination.	RUP with USEPA except Tordon 101R formulation. Use only this one.

Pesticide	Acute Tox Class	Type	Chronic Toxicity	Eco-toxicity	Groundwater Contamination Potential	Mitigation of risks / Comments
Profenofos	WHO: II; Colombia: II-III	Insecticide.	Organophosphate = cholinesterase inhibitor	Highly toxic to fish	Potential ground water contaminant	RUP with USEPA . Application should be a reduced rate, protect applicators, do not apply near water bodies.
Propamocarb-HCl	WHO: not available. Colombia: IV	Fungicide	Unlikely carcinogenic	No data available	No data available	None.
Propanil	WHO: III Colombia: III	Herbicide	Slight acute toxicity. Not a cholinesterase inhibitor. No reproductive, no carcinogenic effects.	Slightly toxic to zooplancton, insects, cruatceous, amphibious. Moderatly toxic to fish & birds. No acute toxicity to moluscs. Not toxic to bees. Moderatly to highly toxic to a great variety of aquatic species.	Low persistence in soils. Soluble in water. Breaks down rapidly in soils by action of micro-organisms. No potential contamination risks for graind water.	Use with care near water bodies.
Teflutrine	WHO: I b.Colombia: II	Insecticide	Acute toxicity & suspected endocrine disruptor. Unlikely carcinogenic.	Very high toxicity to fish.	No data available	Application with care not to contaminate humans & njot to reach water bodies.
Thiabendazole	WHO: U; Colombia: III-IV	Fungicide.	Possible carcinogenic & promoter of reproductive toxin. Toxic effects in various organs.	Low toxicity to fish. No data on birds. Not toxic to bees. Very toxic to earthworms.	Not likely. Probably bound to sediment & low solubility.	Re-registration approved by USEPA in Oct 02
Triadimefom	WHO: III; Colombia: IV	Fungicide.	Possible carcinogenic, possible reproductive toxin promoter & suspected endocrine disrupter	Slightly toxic to birds & fish & not toxic to bees.	Potential for ground water contamination	Protect applicators & minimise exposure

Pesticide	Acute Tox Class	Type	Chronic Toxicity	Eco-toxicity	Groundwater Contamination Potential	Mitigation of risks / Comments
Tricho-derma	WHO: not availa-ble; Colom-bia: II-IV.	Biolo-gical anta-gonist: micro-bial fungi-cide.	Unlikely to cause any effect. No indication of carcinogenic, teratogenic, reproductive or mutagenic effects.	Bio-product with unlikely environmental impact.	Unlikely contaminant.	Some spp. not yet registered with USEPA but the genus Trichoderma is.
Tricho-grama pretiosum	WHO & Colom-bia: not availa-ble.	Biolo-gical anta-gonist: parasi-tic wasp.	Unlikely to cause any effect. No indication of carcinogenic, teratogenic, reproductive or mutagenic effects.	Bio-product with unlikely environmental impact. No adverse effects in animals. Naturally occurring in soils.	Unlikely contaminant.	Not yet registered with USEPA.
Triclor-fon	WHO: II Colom-bia: II	Insecti-cide organo-phosph ate	Cholinesterase inhibitor. Carcinogenic & moderate acute toxicity. Unlikely teratogenic & reproductive effects. Moderatly toxic by ingestion or dermic absortion	Slightly toxic to amphibios, anelids, fish, zooplancton. Moderatly toxic to crustaceous, insects, moluscs. Moderatly toxic to birds. Very high toxicity to a great variety of achuatic species. Low toxicity to bees.	Low persistence in soils. Rapidly degradated in alkiline water.	Application with care not to contaminate humans & njot to reach water bodies. Damage has been reported to apple leaves & carnations.
Validacin A	WHO: U Colom-bia: IV	Fungici de, bacteri-cide	Unlikely carcinogenic. No acute toxicity	No acute toxicity to fish	Suffers rapid microbial degradation in soils.	Not registered with USEP but both human as well as eco-toxicology does not indicate any foreseable risks. Continue using it with precautions.

Pesticide	Acute Tox Class	Type	Chronic Toxicity	Eco-toxicity	Groundwater Contamination Potential	Mitigation of risks / Comments
Verticilium lecanii	WHO & Colom-bia: not availa-ble.	Micro-bial insecti-cide: fungi	Unlikely to cause any effect. No indication of carcinogenic, teratogenic, reproductive or mutagenic effects.	Bio-product with unlikely environmental impact.	Unlikely contaminant.	Not yet registered with USEPA but both crop (heart of palm) & pest absent from the US

Sección 5.1.3
Plaguicidas del CAD – Análisis de riesgos

Plaguicida [1]	Clase Tox Agu-da[2]	Tipo	Toxicidad Crónica	Eco-toxicidad	Potencial para la Contaminación de Aguas	Mitigación de Riesgos / Comentarios [3]
Acetami-prid	OMS: no disp. Colom-bia: III	Insecti-cida.	No es inhibidor de colinesterasa	Insuficientes datos.	Insuficientes datos	
Bacillus thurin-giensis	OMS: no disponi ble. Colom-bia: III	Insectic ida microbi ano: bacteria	Improbable que cause ningún efecto. No hay indicación de efectos reproductivos, terato-génicos o carcinogénicos. Posible algún efecto mutagénico en plantas.	Bio-produco con impacto ambiental improbable. No toxico para peces, pájaros y otros animales.	No hay evidencia de posible contaminación de aguas profundas.	Aplicaciones repetidas sobre largos períodos de tiempo puede promover resistencia en las plagas. Rotar productos.
Beauveria bassiana	OMS: no disponi ble. Colom-bia: III	Insectic ida microbi ano: hongo	Improbable que cause ningún efecto. No hay indicación de efectos reproductivos, terato-génicos o carcinogénicos.	Bio-produco con impacto ambiental improbable.	No hay evidencia de posible contaminación de aguas profundas.	
Benomyl	OMS: U; Colom-bia: III	Fungi-cida	Posible carcinogénico e inductor de toxina de desarrollo y reproductiva. Sospechoso disruptor endócrino.	Moderadamente tóxico a pájaros y altamente tóxico a peces.	Insuficientes datos en relación al potencial de contaminación de aguas profundas.	El uso de benomyl debe ser controlado para evitar posible impact ambiental sobre especies no metas.

[1] Nombre técnico o ingrediente activo

[2] De acuerdo a la clasificación de la OMS: IA (extremadament peligroso), IB (altamente peligroso), II (moderadamente peligroso), III (levemente peligroso), y 'U' (improbable de presentar un riesgo agudo en uso normal). La DL_{50} usada para toxicidad aguda es oral (O) o dermal (D). Colombia usa la misma clasificación pero las clases numeradas I-IV. La CT de la OMS es la del ingrediente activo. La CT de Colombia es la del producto formulado disponible en el país.

[3] Las tácticas generales de mitigation para (a) reducir los riegos de la exposición humana: ropa protectora (mascara, sombrero, lentes, camisas de manga larga, pantalones largos, botas, guantes o bolsas plásticas, lavar la ropa, no somer, no beber, no fumar, no re-entradas a los campos, etc.) y (b) para reducir los riesgos ambientales (mezclar cantidades exactas, no aplicar cerca de fuentes de agua, cerca de colmenas de abejas, de áreas de anidado de pájaros, evitar días ventosos, etc.) son parte de un program de UMS (Uso Más Seguro).

Plaguicida	Clase Tox Aguda	Tipo	Toxicidad Crónica	Eco-toxicidad	Potencial para la Contaminación de Aguas	Mitigación de Riesgos / Comentarios
Captan	OMS: U Colombia: II	Fungicida	Posible carcinogénico y toxicidad aguda. Improbable que cause efectos reproductivos en el hombre. No mutagéni-co, no teratogénico.	No tóxico para pájaros y abejas. Muy alta toxicidad para peces. Moderadamente tóxico para anfibios, insectos, moluscos, zooplancton.	Baja persistencia en suelos y terrenos de agua. Se degrada rápidamente cerca a agua neutra.	Usarlo con precaución y protección al hombre.
Capsicina	OMS: no disp. Colom-bia: IV	Repelente botá-nico e insecti-cida.	Improbable que coloque en riego a los humanos. Componente de la dieta humana por siglos: no se esperan efectos adversos.	No hay potencial de riesgo significativo más allá de posible irritación de los ojos y piel.	No hay evidencia de potencial para contaminar aguas subterráneas.	
Carbenda zim	CT OMS: U; CT Colom-bia: III	Fungicida	Posible carcinogénico y sospechoso disruptor endócrino.	Moderadamente tóxico a pájaros y altamente tóxico a peces.	Insuficientes datos en relación al potencial de contaminación de aguas profundas.	El uso debe ser controlado para evitar posible impact ambiental sobre especies no metas.
Carbo-furan	OMS: IB; Colom-bia: I. Alta toxici-dad aguda	Insecti-cida, nemati-cida	Inhibidor de la colinesterasa. Las formulacicones líquidas colocan a los aplicadores en riesgo serio (razón para ser PUR). Altamente tóxico por ingestión e inhalación y moderada-mente por exposición dérmica.	Formulaciones granulares son riegosas para los pájaros y porsiblemente para otros animales (razón para PUR). Altamente tóxico para pájaros y peces.	Alta solubilidad en agus y, por eso potencial de contaminación de aguas profundas.	PUR. El uso de carbofuran debe ser minimizado y cuidadosamente controlado para prevenir contaminación humana y ambiental. En IRED-04. Revisar situación de registro en 2004
Carboxin	OMS: U; Colom-bia: III	Fungi-cida	Posible promotor de la toxina reproductiva. Ningun otro efecto se ha observado.	No es tóxico a abejas y pájaros pero altamente tóxico a peces.	No hay potencial evidente de contaminación de aguas profundas.	En IRED-04. Revisar la situación de registro en 2004. Tomar cuidados para no exponer a los peces.
Clorota-lonil	OMS: U; Co-lombia: II.	Fungi-cida	Posible carcinogénico; potencial no claro. No hay otros efects excepto por el hecho de que es un potente irritante de ojos y piel	No es tóxico a pájaros y abejas. Altamente tóxico a peces, invertebrados acuáticos y organismos marinos.	Cierto potencial de contaminación pero todavía no clarificado.	PUR. Clorothalonil debe ser usado cuidadosa-mente y de una forma supervisada para prevenir impactos sobre la salud humana y el ambiente.

Plaguicida	Clase Tox Aguda	Tipo	Toxicidad Crónica	Eco-toxicidad	Potencial para la Contaminación de Aguas	Mitigación de Riesgos / Comentarios
Clorpiri-fos	OMS: II; Colom-bia: III	Insecti-cida, nemati-cida	Inhibidor de la colinesterasa. No hay otros efectos adversos exceptuando a aquellos asociados al sistema nervioso central	Puede ser tóxico a algunas plantas, ej. lechuga. Moderadamente a muy tóxico a pájaros y altamemnte tóxico a peces y organismos acuáticos.	Lixiviación y contaminación de aguas improbable.	PUR. 24 hour requeri-miento minimo para re-entrada al campo tratado. Aplicacions deben ser cuidadosamente supervisadas para prevenir exposición humana y ambiental
Cobre, sulfato + cal (mezcla Bordeaux)	OMS: II;Colo-mbia: no dispon.	Fungi-cida	No hay evidencia de efectos crónicos en humanos.	No hay evidencia de efectos adversos en el ambiente.	No hay evidencia de contaminación potencial de aguas.	
Cobre, oxicloruro	OMS: III; Colomb ia: III	Fungi-cida	Efectos agudos incluyen irritación de ojos y piel. Toxicicidad crónica incluye cirrosis hepática y daño cerebral.	No hay evidencia de efectos negativos sobre el ambiente .	No hay evidencia de posible contaminación de aguas.	PUR Se debe usar con mucho cuidad y precaución por sus efectos tóxicos sobre el humano.
Cyperme-trina	OMS: no disp. Colom-bia: II	Insecti-cida.	No es inhibidor de colinesterasa. Modera-damente tóxico por absorción dérmica o ingestión. Posible carcinogénico. Puede causar efectos adversos en el sistema nervioso.	Contaminante marino severo. Muy alta toxicidad para peces e invertebrados acuáticos. Prácticamente no tóxico para pájaros. Altamente tóxico para abejas	Moderada persistencia en suelos. Sujeto a degradación microbiana bajo condiciones aeróbicas. No soluble en agua. No es probable que cause contaminación de aguas profundas.	PUR. Peligroso para organismos no meta. Mucho cuidado y precaución por su alta toxicidad en peces.
Dicamba	OMS: III; Colom-bia: III	Herbi-cida	Promotor de toxina reproductiva. No carcinogénico, no mutagénico, o teratogénico.	Practicamente no tóxico a pájaros y baja toxicidad a peces. No tóxico a abejas.	Altamente soluble en agua y no se adhiere a suelos lo que lo hace un posible contaminante de aguas.	Debe usarse con precaución de no contaminar cuerpos de agua.

Plaguicida	Clase Tox Agu-da	Tipo	Toxicidad Crónica	Eco-toxicidad	Potencial para la Contaminación de Aguas	Mitigación de Riesgos / Comentarios
Diclorvos	Vapona	Insecticida fumigante.	Efectos en el hígado y se acumula en pulmones. Posible carcinogénico, no teratogénico ni mutagénico. Inhibidor colinesterasa.	Altamente tóxico para pájaros, no es tóxico a los péces pero sí a las abejas.	Posible contaminante: no se adsorbe al suelo y permanece en solución.	En IRED-03. Revisar registro en 2003. Manejar con cuidad por toxicidad aguda. Usar lejos de fuentes agua. Cuidados especiales con aves y abejas.
Di-cloro-fenoxi-acetico, ácido (2,4-D)	OMS: III; Colombia: II o III	Herbicida	Posible carcinogénico y sospechoso disruptor endócrino. Posibles efectos reproductivos. Toxicidad aguda: puede ser un irritante serio de ojos y piel.	Posible acumulación en el ambiente con efectos sobre la vida silvestre. Situación no clara.	Potencial contaminante	En IRED-04. Revisar el estado de registro en 2004. Manejar con cuidado para evitar irritación de ojos y piel.
Dimetoato	OMS: II; Colombia: II	Insecticida	Inhibidor de la colinesterasa. Posible carcinogénico y promotor de la toxina reproductiva.	Moderadamente a muy tóxico a pájaros, muy tóxico a abejas y moderadamente tóxico a peces.	Altamente soluble en agua y pobremente adsorbido en suelos: potencial contaminante de aguas.	En IRED-03. Revisar estado de registro en 2003. Usar con precaución; prevenir contaminación de aguas y efectos en abejas y pájaros.
Fentin hidróxido	OMS: II Colombia: III	Fungicida, moluscquicida, herbicida	Posible carcinogénico, toxicidad aguda y toxina reproductiva. Sospecha disruptor endócrino.	No presenta toxicidad aguda en crustáceos. Muy alta toxicidad para peces. Altamente tóxico para moluscos y zooplancton.	No hay evidencia de posible contaminación de aguas profundas.	IRED. Revisar estado de registro en 2004 Aplicaciones deben ser cuidadosamente supervisadas para prevenir exposición humana y al ambiente.
Fenoxa-prop-etil	OMS: no disp. Colombia: IV	Herbicida	Leve toxicidad aguda. No es inhibidor de colinesterasa. Desarrollo o promotor de toxina reproductiva.	Moderadamente tóxico para crustáceos. De moderada a altamente tóxico para peces. Altamente tóxico para zooplancton.	Insuficientes datos.	En lista de "Mal Actor" de PAN, por promotor de toxina reproductiva

Plaguicida	Clase Tox Agu-da	Tipo	Toxicidad Crónica	Eco-toxicidad	Potencial para la Contaminación de Aguas	Mitigación de Riesgos / Comentarios
Fipronil	OMS: II Colom-bia: III	Insecti-cida.	Moderada toxicidad aguda. Posible carcinogénico. No es inhibidor de colinesterasa. Sospechoso disruptor endócrino.	Altamente tóxico para abejas. Algunas formulaciones riesgosas para pájaros, peces e invertebrados acuáticos y marinos. Fipronil y algunos de sus metabolitos puede bioacumularse particularmente en peces.	Degrada lentamente en suelos y agua. Relativamente inmóvil en suelos y tiene bajo potencial para contaminación de aguas profundas.	Tener cuidado con la fauna no meta.
Forato	OMS: I Colom-bia: II	Insecticida orga-nofosfo-rado	Toxicidad aguda. Altamente tóxico via oral Inhibidor de colinesterasa. Improbable que cause efectos reproductivos. No causa efectos teratogénicos. No mutagénico. No carcinogénico.	Altamente tóxico para peces y crustáceos. Muy alta toxicidad para zooplancton e insectos. Levemente tóxico para moluscos.	Potencial mínimo para permanecer en el suelo y contaminar terrenos de agua. Como se desintegra en agua, es no tóxico para productos solubles en agua formados. No detectable residuos en vegetación	PUR por toxicidad aguda Aplicaciones deben ser cuidadosamente supervisadas para prevenir exposición humana y al ambiente
Glifosato	OMS U; Colom-bia: III-IV	Herbi-cida	No tiene evidencia de efectos carcinogénicos, teratogénicos, o mutagénicos.	Levemente tóxico a pájaros, no tóxico a peces o abejas.	Inprobable debido a adsorpción a suelos.	

Plaguicida	Clase Tox Agu-da	Tipo	Toxicidad Crónica	Eco-toxicidad	Potencial para la Contaminación de Aguas	Mitigación de Riesgos / Comentarios
Imidaclo-prid	OMS: II Colom-bia: III	Insecti-cida.	Moderada toxicidad aguda. No probable carcinogénico. No es inhibidor de colinesterasa. Puede ser levemente mutagénico.	Es tóxico para amplia variedad de pájaros. Toxicidad moderadamente baja para peces. Altamente tóxico para abejas. Puede ser muy tóxico para invertebrados acuáticos. Sistemico.	Moderadamente soluble, tiene moderada afinidad a los compuestos orgánicos en suelos. Sin embargo hay potencial para moverse a través de suelos pososos como gravilla, dependiendo de las prácticas de irrigación.	Aplicaciones deben ser cuidadosamente supervisadas para prevenir riesgos en salud humana y contaminación ambiental.
Malation	OMS III; Colom-bia: II-III	Insecti-cida	Inhibidor de la colinesterasa. Posible carcinogénico y sospechoso disruptor endócrino.	Altamente tóxico a abejas, moderadamente tóxico a pájaros y variable toxicidad a peces	Posible contaminante. Ha sido detectado en aljibes y aguas profundas.	En IRED-03. Revisar estado de registro en 2003. Malation debe ser usado con mucho cuidado para no exponer a los trabajadores y prevenir contaminación de aguas y efectos sobre abejas y pájaros.
Mancozeb	OMS: U; Colom-bia: III	Fungi-cida	Posible carcinogénico, promotor de toxina reproductiva y disruptor endócrino.	Moderada a altamente tóxico a peces, levemente tóxico a pájaros y no tóxico a abejas	No es factible.	En IRED-04. Revisar estado de registro en 2004. Usar con cuidado: minimizar exposición de trabajadores.
Metalaxyl	OMS: III; Colom-bia: II	Fungi-cida	Su carcinogencidad es todavía desconocida. No hay otros efectos en humanos.	Practicamente es no tóxico a pájaros, abejas y pecses.	Potencial contaminante de aguas	Re-registro aprovado por la USEPA en Sep. 94
Metarhizi um	OMS & Co-lombia: no disponi ble	Insectic ida microbi ano: hongo	Inprobable que cause ningún efecto. No hay indicaciones de efectos carcinogénicos, terato-génicos, o reproductivos.	Bio-producto con impactos ambientales improbables. No es tóxic a peces, pájaros u otros animales.	No hay evidencia de potencial de contaminación de aguas profundas.	

Plaguici-da	Clase Tox Agu-da	Tipo	Toxicidad Crónica	Eco-toxicidad	Potencial para la Contaminación de Aguas	Mitigación de Riesgos / Comentarios
MCPA	OMS: III; Colom-bia: no disponi-ble	Herbi-cida (solo en mez-clas)	Posible carcinogénico. Efectos reproductivos significativos han sido observados en ratas. Débil mutagenicidad.	No es tóxico peces, levemente tóxico a abejas y moderadamente tóxico a pájaros.	Improbable. Rápidamente degradado por los micro-organismos acuáticos.	En RED-04. Revisar el estado de registro en 2004. Proteger a los aplicadores.
N- alquil	OMS: IV Colom-bia: IV	Bacteri cida, fungici da, viricida	No teratogénico, no mutagénico, no carcinogénico.	No hay datos disponibles	Presenta toxicidad acuática	No aplicar cerca de cuerpos de agua.
Oxi-carboxin	Plant-vax	Fungici da.	No teratogénico, no mutagénico, no carcinogénico.	Altamente tóxico a peces. Relativamente no tóxico a pájaros y abejas.	Improbable. Se degrada rápidamente en agua.	Proteger peces.
Paecilomi-ces liacinus	OMS: no dis-ponible; Colom-bia III.	Insectic ida micro-biano: hongo	Improbable que cause efectos. No hay indicación de efectos carcinogénicos, terato-génicos, mutagénicos o reproductivos.	Bio-producto con efectos ambientales improbables.	No hay evidencia de potencial de contaminación de aguas profundas.	No tiene registro con USEPA. Sin embargo, cultivo y plaga no existen en USA y el producto es biológico..
Picloram	OMS: U; Colom-bia: IV (G)	Herbi-cida	No teratogénico, débil a no mutagénico, débil carcinogénico.	Levemente tóxico a pájaros y peces y no tóxico a abejas. Riesgos a plantas, cultivos y otras, no metas	Potencial de contaminación de aguas profundas.	PUR con USEPA excepto la formulación Tordon 101R. Usar solamente ésta.
Profeno-fos	OMS: II; Colom-bia: II-III	Insecti-cida.	Organofosfato = inhibidor de la colinesterasa	Altamente tóxico a peces	Potencial de contaminación de agues profundas.	PUR con USEPA . Aplicación a dosis reducidas, proteger a los aplicadores, no aplicar cerca de cuerpos de agua.
Propamo-carb-HCl	OMS: no disp. Colom-bia: IV	Fungici da	Improbable carcinogénico	No hay datos disponibles	No hay datos disponibles	Ninguno

Plaguici-da	Clase Tox Agu-da	Tipo	Toxicidad Crónica	Eco-toxicidad	Potencial para la Contaminación de Aguas	Mitigación de Riesgos / Comentarios
Propanil	OMS: III Colom-bia: III	Herbici da	Presenta leve toxicidad aguda. No es inhibidor de colinesterasa. No causa efectos reproductivos. No evidencia de carcinogenecidad.	Levemente tóxico para zooplancton, insectos, crustáceos, anfibios. Moderadamente tóxico para peces y pájaros. No presenta toxicidad aguda para moluscos. No tóxico para abejas. Puede mode-radamente a altamente tóxico para gran variedad de especies acuáticas.	Baja persistencia en suelos. Soluble en agua. Degrada rápidamente en suelos por acción de los microorganismos. Por lo tanto, no presenta potencial para contaminación de aguas profundas.	Aplicar con cuidados cerca de cuerpos de agua.
Teflutrina	OMS: I b Colom-bia: II	Insecti-cida piretroi de	Toxicidad aguda y sospecha de disruptor de endocrina. Improbable carcinogénico.	Muy alta toxicidad para peces.	No hay datos disponibles	Tener cuidado para no exponer a trabajadores y prevenir contaminación de agua y efectos en peces
Thiabend azole	OMS: U; Colom-bia: III-IV	Fungi-cida.	Posible carcinogénico y promotor de toxina reproductiva. Efectos tóxicos en varios órganos.	Baja toxicidad a peces. No hay datos en pájaros. No tóxico a abejas. Muy tóxico a lombrices de tierra.	Improbable. Probablemente adherido a sedimentos y baja solubilidad.	Re-registro aprobado por USEPA en Oct 02
Triadime-fom	OMS: III; Colom-bia: IV	Fungi-cida.	Posible carcinogénico, posible promotor de toxina reproductiva y sospechoso de ser disruptor endócrino	Levemente tóxico a pájaros y peces y no tóxico a abejas.	Potencial de contaminación de agues profundas	Proteger aplicadores y minimizar exposición
Tricho-derma	OMS: no dispo-nible; Colom-bia: II-IV.	Antago nista biológi-co: fun-gicida microbi ano	Improbable que cause algún efecto. No hay indicación de efectos carcinogénicos, terato-génicos, mutagénicos o reproductivos.	Bio-producto con impacto ambiental improbable.	Improbable.	Algunas especies todavía no registradas con USEPA pero el género Trichoderma sí lo está.

Plaguici-da	Clase Tox Agu-da	Tipo	Toxicidad Crónica	Eco-toxicidad	Potencial para la Contaminación de Aguas	Mitigación de Riesgos / Comentarios
Triclor-fon	OMS: II Colom-bia: II	Insecti-cida organo-fosfora do	Inhibidor colinesterasa. Carcinogénico y toxicidad aguda moderada. Improbable efectos teratogénicos y reproductivos. Moderadamente tóxico por ingestión o absorción dérmica	Levemente tóxico para anfibios, anélidos, peces, zooplancton. Moderada-mente tóxico para crustáceos, insectos, moluscos. Moderadamente tóxico para pájaros. Muy alta toxicidad para gran variedad de especies acuáticas. Baja toxicidad para abejas	Baja persistencia en suelos. Se degrada rápidamente en agua alcalina	Tener cuidado para no exponer a trabajadores y prevenir contaminación de agua y efectos en especies acuáticas. Daños han sido reportados en follaje de manzanas y claveles
Tricho-grama pretiosum	OMS y Colom-bia: no disponibl e.	Antago nista bio-lógico: avispa parasí-tica	Improbable que cause algún efecto. No hay indicación de efectos carcinogénicos, terato-génicos mutagénicos o reproductivos.	Bio-producto con impato ambiental improbable. No hay efectos adversos en animales. Ocurre naturalmente en suelos.	Improbable.	Todavía no está registrado con USEPA.
Validacin A	OMS: U Colom-bia: IV	Fungici da, bacteri-cida	Improbable carcinogénico. No presenta toxicidad aguda	No presenta toxicidad aguda en peces	Experimenta rápida degradación microbiana en suelos	No registrado en USEPA pero la información toxicológica tanto en humanos como en el ambiente no indica riesgos en absoluto. Continuar usando con precaución.
Verticiliu m lecanii	OMS y Colom-bia: no disponibl e.	Insectic ida mi-crobia-no: hongo	Improbable que cause algún efecto. No hay indicación de efectos carcinogénicos, terato-génicos mutagénicos o reproductivos.	Bio-producto con impacto ambiental improbable.	Improbable.	Todavía no registrado con USEPA pero ambos, cultivo (palmito) y plaga no están en los EE.UU.

Section 5.1.4
THE PROHIBITED ONES
Pesticides PIC, Prohibited, Restricted or Cancelled
In Colombia and/or in the USA[1]

Pesticide[2]	PIC List[3]	Registration status in[4]	
		Colombia	United States
Aldrin	Yes	P (1974 in tobacco), C (1988)	No
BHC		P (1974 in tobacco), P (1978 in coffee), P (1993)	No
Methyl Bromide		P except for quarantine (1996)	RUP
Canphechlor		P (1978 in coffee), C (1988), P (2000)	No
Captafol	Yes	P & C (1989)	No
Chlorinated in tobacco		P (1974)	No
Chlordane		P (1974 in tobacco), C (1988), P (1993)	No
Chlordimeform		P (1987), C (1988)	No
DBCP (di-bromo-chloro-propane)		P (1982)	No
DDT		P (1974 in tobacco), P (1978 en café), P except in health (1986), P (1993)	No
Dicofol		P (1993)	Yes
Dieldrin		P (1974 in tobacco), C (1988), P (1993)	C
Dinoseb		P (1987)	C
Dodecachlor (Mirex)		P (1993)	C
2,4,5-T & 2,4,5-TP		C (1979)	C
Endosulfan		P except for coffee borer (1993 & 1997)	RUP
Endrin		P (1974 in tobaco), P (1985)	No
Ethylene di-bromine (EDB)		P (1985)	No
Fonofos		P (1992)	No
Fosfamin		C (1997)	RUP?
Mercury Fungicides		C (1974)	No

[1] It is not an inclusive list for the US or PIC. It is based on Colombian prohibited products.
[2] Technical name.
[3] The list of products for '**Previous International Consent**', or '**PIC**' (1998), of the United Nations Environment Programme (UNEP) and the Food and Agriculture Organisation (FAO). FAO leads in relation to pesticides. Alow importing countries to better know the potentially hazardous products that may be sent.
[4] '**P'** = '**Prohibited**' = '**Banned**" = the uses of the product are not permitted in the country, by explicit decision of the regulatory agency. '**R**' = '**Restringido**' = '**Restricted**' = in the sense of the USEPA, it is a pesticide that can only be applied by a certified applicator. '**C**' = '**Cancelado**' = '**Cancelled**' = registration cancelled without a specific prohibition. **No:** not registered.

Pesticide	CIP List	Registration status in	
		Colombia	United States
Heptachloro		P (1974 in tobacco), C (1988) P (1993)	No
Isazofos		C (1996)	No
Leptofos (Phosvel)		C 1977	No
Lindane		P (1978 in coffee), C (1993), P except in health (1993), P (1997)	RUP
Maneb		C (1989), P (1993)	Yes
Metamidophos	Yes	Yes	Yes
Monocrotophos	Yes	Yes	Yes
Organochlorines in general		P (1974 in tobacco), P (1978 in coffee)	No
Paraquat		P aerial application (1989)	RUP
Parathion & methyl-parathion	Yes	R only for cotton & rice (1991)	RUP
Pentachlorophenol (PCP)		P (1993)	GUP & RUP (treatment of wood)
Posphamidon	Yes	No	No
Toxaphene		P (1975 in tobacco), P (2000)	No
Zineb		P (1993)	No

Sección 5.1.4
LOS PROHIBIDOS
Plaguicidas PIC, Prohibidos, Restringidos o Cancelados en Colombia y/o en EE.UU.[1]

Plaguicida[2]	Lista CIP[3]	Situacion de registro en[4]	
		Colombia	Estados Unidos
Aldrin	Si	P (1974 en tabaco), C (1988)	No
BHC		P (1974 en tabaco), P (1978 en café), P (1993)	No
Bromuro de metilo		P excepto cuarentena (1996)	PUR
Canfecloro		P (1978 en café), C (1988), P (2000)	No
Captafol	Si	P y C (1989)	No
Clorados en tabaco		P (1974)	No
Clordano		P (1974 en tabaco), C (1988), P (1993)	No
Clordimeform		P (1987), C (1988)	No
DBCP (di-bromo-cloro-propano)		P (1982)	No
DDT		P (1974 en tabaco), P (1978 en café), P excepto salud (1986), P (1993)	No
Di-bromuro de etileno (EDB)		P (1985)	No
Dicofol		P (1993)	Si
Dieldrin		P (1974 en tabaco), C (1988), P (1993)	C
Dinoseb		P (1987)	C
Dodecacloro (Mirex)		P (1993)	C
2,4,5-T y 2,4,5-TP		C (1979)	C
Endosulfan		P excepto p/broca de café (1993 y 1997)	PUR
Endrín		P (1974 en tabaco), P (1985)	No
Fonofós		P (1992)	No
Fosfamín		C (1997)	PUR?
Funguicidas Mercuriales		C (1974)	No

[1] No es completa patra los EE.UU. o los PIC. Se basa en aquellos plaguicidas probibidos en Colombia.
[2] Nombre técnico.
[3] La lista de productos de '**Consentimiento Fundamentado Previo**', o '**PIC**' (1998), del Programa para el Medio Ambiente de las Naciones Unidas (PNUMA) y de la Organización para la Agricultura y la Alimeemntación (FAO). FAO lidera en cuanto a plaguicidas. Permite a los países importadores conocer mejor acerca de productos potencialmente riesgosos a serles enviados.
[4] '**P'** = '**Prohibido**' = '**Banned**" = los usos del producto no son permitidos en el país, por decisión explícita de la agencia reguladora. '**R**' = '**Restringido**' = '**Restricted**' = en el sentido de la USEPA, un plaguicida que solo puede ser aplicado por un aplicador certificado. '**C**' = '**Cancelado**' = '**Cancelled**' = cuando los registros se han cancelado sin una prohibición específica. **No:** no registrado.

Plaguicida	Lista CIP	Situacion de registro en	
		Colombia	Estados Unidos
Heptacloro			
Isazofós			
Leptofos (Phosvel)			
Lindano			
Maneb			
Metamidophos			
Monocrotophos			
Organoclorados en general			
Paraquat		P vía aérea (1989)	PUR
Parathión y metil-parathión	Si	R sólo p/ algodón y arróz (1991)	PUR
Pentaclorofenol (PCP)		P (1993)	PUG y PUR (tramiento de maderas)
Posphamidon	Si	No	No
Toxapheno		P (1975 en tabaco), P (2000)	No
Zineb		P (1993)	No

CAD PERSUAP

Sub-Section 5.2:

IPM Offers: Crop Pests and their Management

(In Spanish only)

Sección 5.2
Plagas del Arroz (*Oryza sativa*) y su Manejo

Comentario General: Este resúmen ha sido prepardo de materiales varios, no necesariamente colombianos. Algunos de los problemas fitosanitarios puede que no estén presentes en Colombia.

Plaga/s	Métodos de Control	Plaguicidas[1]	Problemas
Enfermedades:			
VHO (Virus de la hoja blanca)	Genético: CV resistentes		Trasmitido por sogata (ver más abajo). Problema complejo y de manejo difícil.
	Supervisión: muestreos (ver instrucciones porque puede ser complejo)		
	Químico: Alternar productos para reducir probabilidad de resistencia		
	Cultural: Destruir rastrojos, mantener canales y cultivos libres de malezas gramíneas (hospedantes alternos de sogata), fangeo		
Añublo o quemazón del arroz (*Pyricularia* spp)	Genético: CV resistentes		
	Químicos: no son muy recomendables		
	Cultural: manejo agua, fertilización, densidad siembra		
Añublo de la vaina (*Rhizoctonia solani*)	Genético: CV resistentes (índicas > japónicas, maduración tardía > tempranas, porte alto > porte bajo)		
	Cultural: Altas densidades siembra, fertilizar, selección cv (ver arriba), fecha siembra, manejo suelo y residuos.		
	Químico: ünica solución en ciertas regiones.		
Pudrición de la vaina (*Sarocladium oryzae*)	Genético: CV resistentes		
	Cultural: Eliminar residuos cosecha, buena nutrición, densidad de siembra		
	Químico: Como último recurso.		

[1] Los plaguicidas mencionados en esta tabla NO necesariamente son los recomendados para los projectos del CAD. Esto desben ser chequeados en los cuadros sobre plaguicidas correspondientes.

Plaga/s	Métodos de Control	Plaguicidas	Problemas
Artrópodos:			
Sogata (*Tagosodes orizicolus*)	Supervisión: Muestreo con jamo entomológico y aplicación de umbrales de acción.		
	Cultural: Eliminar rastrojos de cosecha y malezas. Fecha de siembra		
	Genético: Variedades resistentes (importante).		
	Biológico: Enemigos naturales: *Paranagrus perforator* y *Tytthus parviceps*.	*Beauveria bassiana,* cepa Empoasca. *Metarhizium anisopliae,* cepa Niña Bonita.	
	Químico: Sólo en caso de que los otros fallen	Imidacloprid, cipermetrina, acetamiprid.	
Picudo acuático (*Lissorhoptrus brevirostris)*	Supervisión: ver instrucciones		
	Cultural: No drenar campos; época de siembra; eliminar restos de cosecha y malezas		
	Biológico:	*Beauveria bassiana* y *Metarhizium anisopliae*	
	Químico:	Carbofurán. fipronil	
Chinche del arroz (*Oebalus insularis*)	Supervisión: ver instrucciones		
	Cultural: Eliminar restos de cosecha; época siembra		
	Genético: CV resistentes (no?)		
	Biológico:	*Metarhizium anisopliae*	
	Químico:	Metil paratión	Plaguicida de uso restringido en ambos países, USA y Colombia.
Palomilla (*Spodoptera frugiperda)*	Supervisión: ver instrucciones		
	Cultural: eliminación restos cosecha y malezas; época de siembra; manejo del agua		
	Biológico: Depredadores: *Coleomegilla, Chelonus, Telenomus*	*Bacillus thuringiensis*	
	Químico:	Cialotrina, metil paratión	MP es p laguicida de uso restringido en ambos países, USA y Colombia

Plaga/s	Métodos de Control	Plaguicidas	Problemas
Malezas:			
Echinocloa spp	Químico:	Propanil, 2,4-D, fenoxaprop-etil	
Arroz rojo	Químico:	Glifosato, paraquat	Paraquat es the uso restringido en USA
	Cultural: prepatración suelo, diques (caballones), aniego permanente		

Fuentes de Asistencia Técnica, Capacitación y Contactos:

1. Jairo A. Osorio, Investigator Principal y Coordinador de MIP, Coorporación Colombiana de Investigación Agropecuaria (Corpoica), Tibaitatá, Josorio@corpoica.org.co

Referencia/s Bibliográfica/s Principales:

1. Pantoja, A. et al. 1997. MIP en Arroz: Artrópodos, Enfermedades y Malezas. CIAT, Fedearroz, Fundación Polar, y FLAR.
2. Meneses C, R. et al. 2001. Guía para el Trabajo de Campo en el Manejo Integrado de Plagas del Arroz. CIAT.

Sección 5.2

Plagas del Cacao (*Theobroma cacao)* y su Manejo

Comentario General: El cacao ofrece una oportunidad excelente para la implantación de un sistema de manejo de las plagas agrícolas que minimize el uso de insumos externos, principalmente plaguicidas químicos y promueva el uso de prácticas ambientalmente 'límpias'de manejo del cultivo. Esta propuesta de cultivo "ecológico" se adapta muy bien a lo que los agricultores normalmente practican y a lo que FEDECACAO, la asociación de productores de cacao está promoviendo.

Plaga/s	Métodos de Control	Plaguicidas[1]	Problemas
Enfermedades:			
Moniliophthora roeri (Moniliasis)	Cultural: disminuir humedad interna; control de la sombra, de las malezas, podar y fertilizar bien	Funguicidas no han funcionado bien.	Ataca el fruto Los fungicidas sistémicos son de costo elevado
	Físico: podas sanitarias de mazorcas enfermas a intervalos de 8 días al inicio de lluvias/floración y luego, más seco, pasar cada 15 días.		
Crinipellis perniciosa (Escoba de bruja)	Cultural: poda y regulación de sombra, control de malezas		Ataca tronco y ramas y causa menos daño que la monilia
	Físico: arrancar 'escobas' (17 semanas de ciclo)		
Phytophthora sp. (Fitoftora o pudrición parda de la mazorca y cáncer de tronco)	Cultural: disminuir humedad interna; control de la sombra, de las malezas, podar y fertilizar bien	Puede ser necesario usar metalaxyl con la pasta cicatrizante que se coloca sobre el tronco cuando los cortes.	Ataca frutos y tronco. Más severa en zona más frías o sea más altas.
	Físico: Mismo que el de monilia. Difícil la diferenciación de síntomas entre las dos.		
Rosellinia pepo (Roselinia o llaga estrellada)	Cultural: manejo de sombra y fertilización adecuada		Ataca raíces leñosas. Un saprófita que pasa oportunísticamente a parásito si puede. Inga, usado como sombra, es muy susceptible al hongo.

Plaga/s	Métodos de Control	Plaguicidas	Problemas

[1] Los plaguicidas mencionados en esta tabla NO necesariamente son los recomendados para los projectos del CAD. Esto desben ser chequeados en los cuadros sobre plaguicidas correspondientes.

Rosellinia pepo (Roselinia o llaga estrellada)	Físico: destrucción de árboles en manchones si es necesario, con quema de raíces y permitir solarización		
	Químico:	En caso extremos usar un herbicida que termine rápidamente con los árboles, tal como glifosato o mejor aún picloram injectado.	PUR. Ver recomendación . Atención que sólo hay un uso del picloram que no es restringido y éste es el que se recomienda.
Ceratocystis fimbriata (Mal del machete)	Cultural: podas sanitaria en ramas Físico: quema en casos extremos	Desinfección de herramientas es importante.	De baja incidencia y poco impacto. *Cyleborus,* insecto asociado que lo transmite al igual que las herramientas.
Artrópodos:			
Monalonium dissimulatum (chinche amarilla) y *M. annulipes* (chinche roja)	Cultural: disminuir sombra y podas		Ataques focalizados.
	Mecánico: matar larvas apretando la mazorca con la mano		
	Físico: pasar teas de fuego		
	Químico:	En casos muy excepcionales (menos del 5%) hay que usar malathión.	
Hormiga arriera (*Atta* spp.)	Físico: Disturbio mecánico de los nidos. Evitar emergencia de alados.		Ataca las plántulas pero no hace daño a los árboles adultos
	Químico:	Cal para cambiar pH y afectar los hongos que las nutren. En casos muy extremos se usa malathión o clorpirifós localizado	Clorpirifós es PUR. Ver recomendación

Fuentes de Asistencia Técnica, Capacitación y Contactos:

1. Sr. Jacob Rojas Ardila, Gerente Técnico, FEDECACAO. Muy buen conocedor de todos los problemas fitosanitarios del cacao y dispuesto a dar asistencia téncica y organizar capacictaciones si son necesarias.
2. Dr. Jairo Osorio, Co-ordinador de MIP, Corpoica. Están investigando en uso de antagonistas y resistencia genética.

Sección 5.2

Plagas del Cacao (*Theobroma cacao)* y su Manejo

Comentario General: El cacao ofrece una oportunidad excelente para la implantación de un sistema de manejo de las plagas agrícolas que minimize el uso de insumos externos, principalmente plaguicidas químicos y promueva el uso de prácticas ambientalmente 'límpias'de manejo del cultivo. Esta propuesta de cultivo "ecológico" se adapta muy bien a lo que los agricultores normalmente practican y a lo que FEDECACAO, la asociación de productores de cacao está promoviendo.

Plaga/s	Métodos de Control	Plaguicidas[1]	Problemas
Enfermedades:			
Moniliophthora roeri (Moniliasis)	Cultural: disminuir humedad interna; control de la sombra, de las malezas, podar y fertilizar bien	Funguicidas no han funcionado bien.	Ataca el fruto Los fungicidas sistémicos son de costo elevado
	Físico: podas sanitarias de mazorcas enfermas a intervalos de 8 días al inicio de lluvias/floración y luego, más seco, pasar cada 15 días.		
Crinipellis perniciosa (Escoba de bruja)	Cultural: poda y regulación de sombra, control de malezas		Ataca tronco y ramas y causa menos daño que la monilia
	Físico: arrancar 'escobas' (17 semanas de ciclo)		
Phytophthora sp. (Fitoftora o pudrición parda de la mazorca y cáncer de tronco)	Cultural: disminuir humedad interna; control de la sombra, de las malezas, podar y fertilizar bien	Puede ser necesario usar metalaxyl con la pasta cicatrizante que se coloca sobre el tronco cuando los cortes.	Ataca frutos y tronco. Más severa en zona más frías o sea más altas.
	Físico: Mismo que el de monilia. Difícil la diferenciación de síntomas entre las dos.		

Plaga/s	Métodos de Control	Plaguicidas	Problemas
Rosellinia pepo (Roselinia o llaga estrellada)	Cultural: manejo de sombra y fertilización adecuada	En casos extremos usar un herbicida que termine rápidamente con los	Ataca raíces leñosas. Un saprófita que pasa oportunísticamente a

[1] Los plaguicidas mencionados en esta tabla NO necesariamente son los recomendados para los projectos del CAD. Esto desben ser chequeados en los cuadros sobre plaguicidas correspondientes.

	Físico: destrucción de árboles en manchones si es necesario, con quema de raíces y permitir solarización	árboles, tal como glifosato o mejor aún picloram injectado.	parásito si puede. Inga, usado como sombra, es muy susceptible al hongo. PUR. Ver recomendación . Atención que sólo hay un uso del picloram que no es restringido y éste es el que se recomienda.
	Químico:		
Ceratocystis fimbriata (Mal del machete)	Cultural: podas sanitaria en ramas	Desinfección de herramientas es importante.	De baja incidencia y poco impacto. *Cyleborus,* insecto asociado que lo transmite al igual que las herramientas.
	Físico: quema en casos extremos		
Artrópodos:			
Monalonium dissimulatum (chinche amarilla) y *M. annulipes* (chinche roja)	Cultural: disminuir sombra y podas		Ataques focalizados.
	Mecánico: matar larvas apretando la mazorca con la mano		
	Físico: pasar teas de fuego		
	Químico:	En casos muy excepcionales (menos del 5%) hay que usar malathión.	
Hormiga arriera (*Atta* spp.)	Físico: Disturbio mecánico de los nidos. Evitar emergencia de alados.		Ataca las plántulas pero no hace daño a los árboles adultos
	Químico:	Cal para cambiar pH y afectar los hongos que las nutren. En casos muy extremos se usa malathión o clorpirifós localizado	Clorpirifós es PUR. Ver recomendación

Fuentes de Asistencia Técnica, Capacitación y Contactos:

3. **Sr. Jacob Rojas Ardila**, **Gerente Técnico, FEDECACAO**. Muy buen conocedor de todos los problemas fitosanitarios del cacao y dispuesto a dar asistencia téncica y organizar capacictaciones si son necesarias.
4. **Dr. Jairo Osorio, Co-ordinador de MIP, Corpoica.** Están investigando en uso de antagonistas y resistencia genética.

Sección 5.2
Plagas de los Cultivos Forestales y su Manejo

Comentario General: En general los Pinos tienen más problemas con insectos plagas mientras que los Eucalyptus con las enfermedades. Las especies siendo promovidas son: alisio (*Alnus* sp.), roble (*Quercus* spp.), laurel (*Myrica pubescens*), motilón (?), teca (*Tectona grandis*), melina (*Gmelina arborea*), ceiba roja (*Bombacopsis* sp.), nogal cafetero (*Cordia aliodora*), guaycán rosado u ocobo (*Tabebuia rosea)*, tara (?), cedro (*Albizzia guachapele, Cedrela montana*), caoba (*Swetenia* sp.). Elementos básicos del programa MIP para fotrestales incluye la siembra de plantaciones míxtas y el diagnóstico adecuado que lo realiza Conif.

Plaga/s	Métodos de Control	Plaguicidas[1]	Problemas
Enfermedades:			
Damping off: complejo hongos del suelo (*Phytium, Rhizoctonia, Phythophtora,* etc.)	Químico: Tratmiento de semilla, desinfección del suelo Cultural: sembrar a baja densidad, evitar encharcamiento, preferir suelos ácidos, evitar alta MO		
Agallas y pudrición radicular: nemátodo *Meloydogine incognita*	Prevención Químico: suelos desinfectados		Principalmente en *Tabebuia* spp., *Cordia* sp., *Hevea brasiliensis*, *Ceiba pentandra* y *Erythrina* spp.
Agalla de la corona: *Agrobacterium radiobacter pv. Tumefaciens*	Químico: desinfección de suelos Cultural: ver damping off.		En *Eucalyptus* spp.
Muerte de estacas en anraizamiento: Complejo de hongos (*Fusarium, Rhizoctonia*, etc.)	Químico: estacas	Benomyl ó hipoclorito de Na Desinfeccion: Formol	
Secamiento ascendente del Eucalypto: *Mycosphaerella eucalypti*	Ninguno?		
Roya del Eucalypto (*Puccinia psidii*)	Genético: hay clones resistentes		
	Cultural: usar especies precoces		

Plaga/s	Métodos de Control	Plaguicidas	Problemas
Secamiento descendiente	Genético: spp. resistentes		

[1] Los plaguicidas mencionados en esta tabla NO necesariamente son los recomendados para los projectos del CAD. Esto desben ser chequeados en los cuadros sobre plaguicidas correspondientes.

de Pinos por Diplodia (*Sphaeropsis sapinea*)	Cultural: podas tempranas, podar en épocas de baja temperatura, remover residuos		
Roya del roble (*Prospodium bicolor*)	Químico:	Triadimenol, mancozeb, oxicarboxin	
	Cultural: remoción de partes atacadas		
Chancro del Eucalipto (*Cryphonectria* spp)	Genético: resistencia?		
Secamiento de las yemas del Eucalipto (*Botryosphaeria dothidea*)	Genético: resistencia?		
Mancha foliar de la *Gmelina (Cercospora rangita)*	Cultural: control malezas, densidad de plantación razonable		
Mancha necrótica foliar del Eucalipto *(Cylindrocladium* spp).	Genético: hay clones resistentes		
	Cultural: usar especies precoces		
	Cultural: raleos, aclareos, mayor distancia entre árboles		
Artrópodos:			
Defoliadores: ver referencia No. 2 más abajo, páginas 14-57	Cultural: manejo del dosel, aperturas, aclareos, prmoción de la vegetación secundaria, etc.		Plaga más importante.
	Microbiológico: para larvas	*Bacillus thuringiensis*	
	Biológico: liberación de la avispa *Telenomus,* la cuál es criada.		
Chupadores: : ver referencia No. 2 más abajo, páginas 58-72			
Formadores de agallas: ver referencia No. 2 más abajo, página 73			
Que atacan brotes y yemas: ver referencia No. 2 más abajo, páginas 74-77			
Que atacan raíces: ver referencia No. 2 más abajo, páginas 78-79			
Plaga/s	**Métodos de Control**	**Plaguicidas**	**Problemas**

Que atacan frutos y semillas: ver referencia No. 2 más abajo, páginas 81-83			
Que atacan tronco y ramas: ver referencia No. 2 más abajo, páginas 84-91			
Hormiga arriera (*Atta* spp.)	Físico-químico: cebos atrayentes		
	Químico:	Clorpirifós	PUR (ver recomendación)
Escolítico en *Alisio*			
Malezas:			
Varias	Mecánico: manual con machete o guadaña		
	Químico:	Glifosato	

Fuentes de Asistencia Técnica, Capacitación y Contactos:

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2. **Conif:** Carlos Barrera, Tecnico Asesor, Bogotá, Tel. 341-7000

Referencia/s Bibliográfica/s Principales:

1. Ramírez C., L. A. 1997. Guía de Enfermedades en Plantaciones Forestales. CONIF.
2. Pinzón F., O.P. 1997. Guía de Insectos Dañinos en Plantaciones Forestales. Prograna de Protección Forestal, CONIF.
3. CONIF. 1999. Boletín de Protección Vegetal. Diciembre 1999.
4. CONIF. 1998. Boletín de Protección Vegetal. Diciembre 1998.
5. CONIF. 1997. Guía de Insectos Dañinos en Plantaciones Forestales.
6. CONIF. 1996. Boletín de Protección Vegetal. Diciembre 1996.
7. Laranjeiro, A.J. 2000. Manejo de hormigas cortadoras en bosques plantados. Páginas 34-43: Boletín de Protección Vegetal No.6. CONIF.
8. Pinzón F., O.P. y H. Moreno B. 1998. Entomofauna asociada a plantaciones forestales en Colombia. Paginas 3-29: Boletín de Protección Vegetal No.3. CONIF.
9. Pinzón, O.P. y H. Moreno B. 1999. Problemas fitosanitarios de *Tectona grandis* y *Gmelina arborea*: Una revisión. Paginas 11-16: Boletín de Protección Vegetal No.4. CONIF.

Sección 5.2

Plagas del Fríjol (*Phaseolus vulgaris*) y su Manejo

Plaga/s	Métodos de Control	Plaguicidas[1]	Problemas
Enfermedades:			
Anthracnosis (*Cholletotrichum*)		**Chlotrothalonil, carbendazim**	**En condiciones de laderas, clima frío y húmedo**
Mancha angular (*Phaesamphtori*)	**Químico: extractos vegetales**	***Swingla* spp.**	**Todavía no registrado en Colombia?**
Xanthomonas			
Artrópodos:			
Malezas:			
Varias	**Químico:**	**Glifosato, metolachlor, linuron**	

Fuentes de Asistencia Técnica, Capacitación y Contactos:

1. Jairo A. Osorio, Investigator Principal y Coordinador de MIP, Coorporación Colombiana de Investigación Agropecuaria (Corpoica), Tibaitatá, Josorio@corpoica.org.co

[1] Los plaguicidas mencionados en esta tabla NO necesariamente son los recomendados para los projectos del CAD. Esto desben ser chequeados en los cuadros sobre plaguicidas correspondientes.

Sección 5.2

Plagas del Maíz (*Zea mays*) y su Manejo

Plaga/s	Métodos de Control	Plaguicidas[1]	Problemas
Enfermedades:			
Mildeo velloso	Químico: fungicidas para tratamiento de semilla	Benomyl	
Cercospora	Cultural: Manejo de residuos de cosecha		Mayor incidencia en sistemas de labranza reducida
Artrópodos:			
Aves	Físico: Espantapájaros y ruidos		
Diatraea sp.	Cultural: control de malezas gramíneas		Problema creciente en altillanura.
Cogollero (*Spodoptera frugiperda*)	Cultural: semilla de buena cálida y vigor y buen manejo del cultivo. Coontrolar malezas gramíneas. Evitar sembrar en áreas muy infestadas en el pasado.		Principal limitante en Altillanura.
	Químico:	Clorpirifós	PUR. Ver recomendación. Usar, temporalmente, sólo el granulado aplicado al cogollo.
	Microbiológico:	Baculovirus spodopterae	Aún no tiene registro en Colombia
Malezas:			
Varias spp.	Químico:	Paraquat	PUR. Ver recomendación. Si necesario usar glifosato.

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1. Jairo A. Osorio, Investigator Principal y Coordinador de MIP, Coorporación Colombiana de Investigación Agropecuaria (Corpoica), Tibaitatá, Josorio@corpoica.org.co

[1] Los plaguicidas mencionados en esta tabla NO necesariamente son los recomendados para los projectos del CAD. Esto desben ser chequeados en los cuadros sobre plaguicidas correspondientes.

Sección 5.2
Plagas del Maracujá (*Passiflora edulis* f. flavicarpa) y su Manejo

Comentario General: Por ser un cultivo de polinización cruzada para dar origen a la formación de frutos, la cual es realizada por insectos polinizadores los métodos mas utilizados son el control cultural, basado en podas de limpieza, recolección de botones y frutos afectados y control de malezas.

Plaga/s	Métodos de Control	Plaguicidas[1]	Problemas
Enfermedades:			
Alternaria sp (Mancha parda)	Cultural: podas de limpieza, recolección de botones y frutos afectados y control de Malezas		Ataca el área foliar
	Químico:	Oxicloruro de Cu	
Colletotrichum (Peca)			Ataca tallos, botón floral y hojas
Cladosporium herbarum (Roña o costra)	Químico:	Sulfato de Cu + cal	Ataca fruto
Phitophthora (yaga)			Ataca el sistema radicular
Fusarium (Pudrición Seca)	Cultural: plantar en suelos bien drenados. Regar por la calle y NO por el surco		Ataca las raíces secundarias y el cuello de la raíz de la planta
		Sulfato de Cu + cal	
Artrópodos:			
*Tetranichidae (*Arañita roja)	Químico: insecticidas de contacto o ingestión		Ataca fruto
Dasiops sp o *Lonchea* sp. (Mosca del Ovario)	Biológico: liberación de insectos parasitoides para control de mosca del ovario.		Ataca Flores
	Químico: como último recurso	Vapona por la mañana temprano (gas)	
	Físico: recoger botones florales del suelo, ya infestados, y eliminar (rompe el ciclo)		

[1] Los plaguicidas mencionados en esta tabla NO necesariamente son los recomendados para los projectos del CAD. Esto desben ser chequeados en los cuadros sobre plaguicidas correspondientes.

Plaga/s	Métodos de Control	Plaguicidas	Problemas
Defoliadores (*Diabrótica, Agraulis*) y Lepidoptera y gusano cochero (*Agraulis*)	Físico: remoción de larvas manualmente.		
	Biológico: natural: varios depredadores y parasitoides	*Bacillus thuringiensis*	
	Químico: insecticidas sistémicos.		
Ceroplastes sp. (Escama tortuguilla)			No usar químicos. No le llegan.
Thrips	Aplicación foliar de insecticidas biológicos para control de larvas e insectos chupadores. Químico: como último recurso		Insectos chupadores que atacan los primordios en las ramas afectando el crecimiento.
Leptoglossus spp (Chinche paton)	Aplicación foliar de insecticidas biológicos para control de larvas e insectos chupadores. Químico: como último recurso	*Bacillus thuringiensis*	Ataca frutos

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2. **Pasicol.** Juan Carlos Arrollave. Chinchiná, Caldas. Tel 096 8507575, jcarrollave@passicol.com

Referencia/s Bibliográfica/s Principales:

1. Ruggiero, C. 1991. A Cultura do Maracujá No Brasil. Fotocopia en Chemonics.
2. Ruggiero, C. et al. 1998. Simpósio Brasileiro sobre a Cultura do Maracujazeiro. Anais do 5o. Simpósio. FAPESP. (Fotocopia en Chemonics).
3. SIESA. S/f. Based dedatos en computador central de Chemonics, Bogotá.

Sección 5.2
Plagas de la Palma de Aceite (*Elaeis guineensis)* y su Manejo

Comentario General: Cenipalma apoya sólidamente los principios y la aplicaci;on del MIP. En los últimos 10 años Cenipalma ha cambiado al cultivo de palma de aceite de ser uno de los más gastadores de plaguicidas a un mínimo uso de éstos productos. Los principios son los de (1) apoyar la mortalidad natural de las plagas a través de (1a) un aumento de la biodiversidad dentro de las plantaciones (plantas nectaríferas en lugar del monocultivo de kudzú) adaptando espaciamientos entre plantas para ésto; (1b) revisión de plagas para identificar focos iniciales en el cultivo y luego (1c) manejar esos focos reduciendo las aplicaciones de productos.

Plaga/s	Métodos de Control	Plaguicidas[1]	Problemas
Artrópodos:			
Gusano cuernito menor (*Stenoma cecropia)*	Biológico y micro-biológico:	Liberación de *Trichogramma pretiosum*. Aplicación de *Beauveria bassiana* o *Bacillus thuringiensis* en épocas de alta humedad. Más reciente virus de poliedrosis nuclear.	Plaga del follaje en la zona N y W. Cenipalma aisla y selecciona las cepas de *Beauveria* que son entregadas a las plantaciones para multiplicar. ("Palma de Oriente" produce para ellos y vende a terceros).
	Cultural: recolección manual de estuches		
	Biológico natural: *Trichogramma* spp., parasitoides *Rhysipolis* y *Elasmus* en larvas y *Brachymeria* y *Tripoxilon* en pupas.		
Gusano cuernito mayor *(Loxotoma elegans)*	Cultural: Plantas nectaríferas, cómo 'pata de tórtola' (*Croton trinitatis*).		Plaga del follaje en zona E.
	Natural: *Trichogramma* spp. en huevos y un *Tachinido* y un *Pteromalidae* en pupas. *Beauveria* en larvas.		
	Micro-biológico:	Liberación de *Trichogramma* spp. y *Bacillus thuringiensis*	

[1] Los plaguicidas mencionados en esta tabla NO necesariamente son los recomendados para los projectos del CAD. Esto desben ser chequeados en los cuadros sobre plaguicidas correspondientes.

Plaga/s	Métodos de Control	Plaguicidas	Problemas
Gusano cabrito de las palmas *(Opsiphanes cassina)*	Cultural: Plantas nectaríferas.		Defoliador en todo el país
	Natural: *Telenomus sp*. y *Ooencyrtus* parasitos de huevos*; Caccoleptus wicki*, depredador; *Apanteles alius* parasitoides de larvas. *Spilochalcis* spp. parásitos de pupas. Depreda-dores: *Alcaeorrhynchus.* Larvas con *Beauveria* y *Nomouraea*		
	Mecánico: Trampas cebadas c/materiales fermentados. Recolección de pupas.		
	Microbiano:	*Bacillus thuringiensis* y liberaciones de *Telenomus sp*	
Darna (*Euprosterna elaeasa)*	Natural: *Thricogramma* parasita huevos, *Casinaria*, *Rhogas, Stenomesius y Sarcodexia* la larva. *Alcaeorrhynchus* depreda larvas. La pupa la parasita *Theronia, Barycerus, Spilochalcis, Brachymeria y Pseudobrachymeria.*		Defoliador en Centro y E.
	Mecánico: recolección manual de pupas.		
	Microbiológico:	*Bacillus thuringiensis, Beauveria* (cepas seleccionadas) y virus polihedrosis nuclear	
Gusano caballito (*Sibine spp.)*	Natural: muchos parásitos y depredadores naturales		En todo el país
	Cultural: Mantener plantas nectaríferas.		
	Microbiológico:	Virus de polihedrosis preparado con larvas enfermas recolectadas de la plantación.	

Plaga/s	Métodos de Control	Plaguicidas	Problemas
*Minador de las hojas (*Hispoleptis diluta)	Natural: varios parásitos y depredadores		
	Cultural: mantener plantas nectaríferas, poda de hojas afectadas		
	Químico: insecticida sistémico por absorción radicular o injección		
Gusano tornillo, barreno de los racimos *(Cyparissius daedalus = ex Castnia sp.)*	Natural: parasitides de huevos y depredadores. También la prepupa.		Plaga grave, típica de la Amazonía. Práctica mejorada: cazar adultos con manta – colocarlos en jaula diseñada para que los huevos caigan – recoger los huevos – multiplicar parasitoide *Ooencyrtus* sp. en ellos – liberar parasitoide. 4 plantaciones lo están haciendo.
	Mecánico: Normalizar la cosecha c/ciclos cortos y buen regimen de podas.		
	Químico: inoperante cuando injección o absorción radical.		
	Cultural: plantas nectaríferas		
	Biológico: liberación del parasitoide *Ooencyrtus* sp. multiplicado en huevos de la misma plaga. Nemátodo para larva: *Stainerema carpocapsae*		
Barrenador de raíces *(Sagalassa valida)*	Agronómico:Aporque con MO: tusa / raquis (barrera física); riego.		Grave paga del suelo en todo el país.
	Biológico: Nemátodo *Steinerma carpocapsae.*		
	Químico:	En publicaciones viejas se recomienda endosulfán pero su registro está ahora cancelado en Colombia. Carbofurán.	Endosulfán tiene el registro cancelado. Carbofurán es PUR. Ver recomendación.
Raspador de frutos *(Imatidium neivai)*	Natural: Hormiga *Crematogaster* es excelente depredador		Causa péridas enormes por el raspado de frutos externos.
Hormiga arriera (*Atta* sp.)	Cultural: evitar emergencia de adultos en época de lluvia		

Sección 5.2

Plagas del Palmito (*Bactris* sp.) y su Manejo

Comentario General: Muchos de los problemas fitisanitario del palmito (chontaduro) son compartidos con otras palmáceas. Por eso, se recomienda ver la tabla de resúmen para Palma de Aceite que es muy completa y posee información directa de Cenipalma.

Plaga/s	Métodos de Control	Plaguicidas[1]	Problemas
Artrópodos:			
Gusano de los cogollos, etc. *(Rhynchophorus palmarum*)	Microbiológico:	*Beauveria bassiana, Metarhizium* sp.	
	Etológico: trampeo sistemático para capturar adultos con feromona de atracción y plantas en fermentación.		Daño más importante relacionado a la transmisión del nemátodo *Rhadinaphelenchus cocophilus*, agente causal del anillo rojo.
	Cultural: para la enfermedad, revisión oportuna y eradicar palmas enfermas. Manejo y picado de residuos de cosecha, destronque sellando las heridas.		
*Picudo (*Geraeus *sp.)*			Afecta chontadouro para fruto
Methamacius hemipterus	Cultural: Manejo y picado de residuos de cosecha, destronque sellando las heridas.		
	Microbiológico:	*Beauveria bassiana, Metarhizium* sp.	
Comedores follaje	Cultural: Deshierba y limpia de vivero.		
	Microbiológico:	*Verticillum sp.*	
Enfermedades:			
Fusarium sp.	Cultural: Selección de semilla, evitar exceso de humedad y adecuado almacenamiento.		
	Químico: protectante	Thiabendazole	
Phytophtura palmarum	Cultural: Manejo de humedad en vivero, selección adecuada de sustrato y buen embolse		
	Microbiológico:	*Trichoderma* sp.	

Plaga/s	Métodos de Control	Plaguicidas	Problemas

[1] Los plaguicidas mencionados en esta tabla NO necesariamente son los recomendados para los projectos del CAD. Esto desben ser chequeados en los cuadros sobre plaguicidas correspondientes.

Colletotricum sp. (Mancha negra de las hojas)	Cultural: Seleccione material sano. Distancia de siembre adecuadas. Fertilizar. Deshoje hojas viejas		
	Químico:	Caldo Bordeles, benomyl, mancozeb	
Chinche de encaje *(Leptopharsa gibbicarina)*	Natural: Insectos, arañas y hormigas (*Crematogaster*) depredadoras. Hongos *Beauveria*, *Paecilomices y Sporotrix insectorum*.		Principal daño causado por los hongos *Péstalopta, Pestalotiopsis* y otros que causan la 'Pestalopsis
	Biológico-cultural: redistribución de colonias de *Crematogaster*		
	Cultural: sembrar 'bajagua' (Cassia reticulata) p/las hormigas.' Para la enfermedad: fertilización y podas semanales.		
	Químico: injección o absorción radicular	Monocrotofós, Caldo bordelés	Monocrotofós es PUR. Ver recomendación
	Microbiológico: hongo entomopatógeno	*Paecilomices liacinus*	
Gusano de los cogollos, etc. *(Rhynchophorus palmarum*)	Etológico: trampeo sistemático para capturar adultos con feromona de atracción y plantas en fermentación.		Daño más importante relacionado a la transmisión del nemátodo *Rhadinaphelenchus cocophilus*, agente causal del anillo rojo. Plaga importante del chontaduro sultivado para palmito.
	Cultural: para la enfermedad, revisión oportuna y eradicar palmas enfermas.		

Fuentes de Asistencia Técnica, Capacitación y Contactos:

1. Hugo Calvache Guerrero, Co-ordinator Area de Fitoprotección, Centro de Investigación en Palma de Aceite, Cenipalma, Bogotá hugo.calvache@cenipalma.org . Ceniplama ofrece capacitaciones para los técnicos y forma 'plagueros' de campo que son los responsables de la identificación de los focos. La oferta está abierta a todos los interesados. ***CAD debería enviar participantes a ambos tipos de eventos***.
2. Jairo A. Osorio, Investigator Principal y Coordinador de MIP, Coorporación Colombiana de Investigación Agropecuaria (Corpoica), Tibaitatá, Josorio@corpoica.org.co.
3. Leonor Romero, Centro de Información en Palmáceas, Fedepalma, Carrera 10A, No.71-98, Bogotá.

Referencia/s Bibliográfica/s Principales:

1. Moreno B., H. 1998. Plagas y enfermedades más frecuentes del chontaduro. Páginas 40-52: Boletín de Protección Vegetal No.3. CONIF.
2. SIESA. S/f. Based dedatos en computador central de Chemonics, Bogotá.

Plaga/s	Métodos de Control	Plaguicidas	Problemas
Asocio Artrópodo-Patógenos			
Chinche de encaje *(Leptopharsa gibbicarina)*	Natural: Insectos, arañas y hormigas (*Crematogaster*) depredadoras. Hongos *Beauveria*, *Paecilomices y Sporotrix insectorum*.		Principal daño causado por los hongos *Péstalopta, Pestalotiopsis* y otros que causan la 'Pestalopsis
	Biológico-cultural: redistribución de colonias de *Crematogaster*		
	Cultural: sembrar 'bajagua' (Cassia reticulata) p/las hormigas.' Para la enfermedad: fertilización y podas semanales.		
	Químico: injección o absorción radicular	Monocrotofós, Caldo bordelés	Monocrotofós es PUR. Ver recomendación.
	Microbiológico: hongo entomopatógeno	*Paecilomices liacinu,*	
Gusano de los cogollos, etc. *(Rhynchophorus palmarum*)	Etológico: trampeo sistemático para capturar adultos con feromona de atracción y plantas en fermentación.		Daño más importante relacionado a la transmisión del nemátodo *Rhadinaphelenchus cocophilus*, agente causal del anillo rojo.
	Cultural: para la enfermedad, revisión oportuna y eradicar palmas enfermas.		
Enfermedades:			
Phytophtura palmarum	Cultural: Manejo de humedad en vivero, selección adecuada de sustrato y buen embolse		
	Microbiológico:	*Trichoderma* sp.	
Pudrición del cogollo	Manejo agronómico adecuado.		Más grave en el E
Mancha anular (virus)	Cultural: manejo de coberturas para reducir las poblaciones de gramíneas (asociadas a la enfermedad): kudzú, *Arachis*		Ataca palmas jóvene. En Tumaco.
Marchitéz sorpresiva (posible fitomona)	Cultural: manejo de coberturas para reducir las poblaciones de gramíneas (asociadas a la enfermedad): kudzú, *Arachis*		Clásica en el Norte de Santander. Termina con plantaciones
Pudrición del estipe (basal por *Gamoderma*)	Cultural: manejo del agua del suelo, mejorar drenaje.		

Fuentes de Asistencia Técnica, Capacitación y Contactos:

4. Hugo Calvache Guerrero, Co-ordinator Area de Fitoprotección, Centro de Investigación en Palma de Aceite, Cenipalma, Bogotá hugo.calvache@cenipalma.org . Ceniplama ofrece capacitaciones para los técnicos y forma 'plagueros' de campo que son los responsables de la identificación de los focos. La oferta está abierta a todos los interesados. ***CAD debería enviar participantes a ambos tipos de eventos***.
5. Jairo A. Osorio, Investigator Principal y Coordinador de MIP, Coorporación Colombiana de Investigación Agropecuaria (Corpoica), Tibaitatá, Josorio@corpoica.org.co.
6. Leonor Romero, Centro de Información en Palmáceas, Fedepalma, Carrera 10A, No.71-98, Bogotá.

Referencia/s Bibliográfica/s Principales:

1. Cenipalma. 2002. Plagas de la plama de aceite en Colombia. Cenipalma, Fedepalma, Fondo de Fomento Palmero.
2. Cenipalma. 2002. Manejo integrado de plagas en palma de aceite. Curso Nacional, Cenipalma, Fonade, Marzo 2002.

Sección 5.2

Plagas de la Papa (*Solanum tuberosum)* y su Manejo

Plaguicida			Plaga/s	Tipo de Problema[1]	Alternativas a ese plaguicida
Nombre Técnico[2]	**Nombre Comercial[3]**	**Tipo[4]**			
Clorotalonil	Bravonil, Centauro, Clortocaffaro, lortosip, Control, aconil, ictan, Echo, Bravo, elmonil, Pugil, Ridonate, Visado	Fungicida	Gota o tizón tardío (*Phytophora infestans)* Roya común (*Puccinia pitteriana)*	PUR (Uso restringido)	Uso de semilla sana, destrucción de fuentes potenciales del inóculo. <u>Químico</u>: Usar para Gota: Mancozeb, Captan, Metalaxil, Azufre elemental, Fentin hidróxido, Propamocarb-HCl, Propineb, Cymoxanil Para roya: oxicarboxin
Kasugamicina	Kasumín	Insecticida, bactericida, antibiótico	Pata negra (*Erwinia Caratovora)*	No registrado en USEPA	Sembrar en suelos bien drenados. Evitar riego excesivo, fertilizar adecuadamente con nitrógeno, entresacar las plantas infectadas. <u>Químico:</u> Usar n- alquil
Validacin	Validacin A	Fungicida, bactericida	Rhizoctoniasis (*Rhizoctonia solani)*	Falta registro con USEPA	Sembrar en suelos bien drenados. Evitar riego excesivo, fertilizar adecuadamente con nitrógeno, entresacar las plantas infectadas. <u>Químico:</u> Usar n- alquil

[1] Clase toxicológica I (a o b), PUR (Producto de Uso Restringido), registro con la EPA-USA, registro con ICA-Colombia, otros.
[2] Nombre técnico o genérico o el ingrediente activo del producto.
[3] Nombre bajo el cual es vendido en Colombia.
[4] Tipo de acción: funguicida, insecticida, herbicida, etc.

Plaguicida			Plaga/s	Tipo de Problema	Alternativas a ese plaguicida
Nombre Técnico	**Nombre Comercial**	**Tipo**			
Carbofuran	Furadan, Carbofed, Curater, Furalimor, Fursem, Carbofuran	Insecticida, nematicida	Gusano blanco (*Premnotrypes vorax)* Chisas, trozadores y tierreros	PUR (excepto pellets y tabletas) IRED- 04 Toxicología: I b	Preparación del suelo adecuada, uso de semilla certificada, control de malezas, aporque adecuado, rotación de cultivos. Uso de "cultivos trampa" <u>Químico:</u> Usar carbofuran en pellets o tabletas. O: Teflutrina
Teflutrina	Force	Insecticida piretroide	Gusano blanco (*Premnotrypes vorax)*	Toxicología: I b	Preparación del suelo adecuada, uso de semilla certificada, control de malezas, aporque adecuado, rotación de cultivos. Uso de "cultivos trampa" <u>Químico:</u> Usar Teflutrina, o Carbofuran en pellets y tabletas
Isazofos	Miral	Insecticida	Gusano blanco (*Premnotrypes vorax)*	Sin registro en Colombia Sin registro en USEPA Toxicología: I b	Preparación del suelo adecuada, uso de semilla certificada, control de malezas, aporque adecuado, rotación de cultivos. Uso de "cultivos trampa" <u>Químico:</u> Usar Teflutrina, o Carbofuran en pellets y tabletas

Plaguicida			Plaga/s	Tipo de Problema	Alternativas a ese plaguicida
Nombre Técnico	**Nombre Comercial**	**Tipo**			
Forato	Thimet	Insecticida organofosforado	Gusano blanco (*Premnotrypes vorax)*	PUR en USEPA	Preparación del suelo adecuada, uso de semilla certificada, control de malezas, aporque adecuado, rotación de cultivos. Uso de "cultivos trampa" Químico: Usar Teflutrina, o Carbofuran en pellets y tabletas
Aldicarb	Temik	Insecticida, acaricida, nematicida	Gusano blanco (*Premnotrypes vorax)*	PUR en USEPA por alta toxicidad	Preparación del suelo adecuada, uso de semilla certificada, control de malezas, aporque adecuado, rotación de cultivos. Uso de "cultivos trampa" Químico: Usar Teflutrina, o Carbofuran en pellets y tabletas
Clorpirifos	Lorsban, Clorpirifós, Clorpiricol, Arriero	Insecticida, nematicida	Gusano blanco (*Premnotrypes vorax)*	PUR en USEPA	Preparación del suelo adecuada, uso de semilla certificada, control de malezas, aporque adecuado, rotación de cultivos. Uso de "cultivos trampa" Químico: Usar Teflutrina, o Carbofuran en pellets y tabletas

Plaguicida			Plaga/s	Tipo de Problema	Alternativas a ese plaguicida
Nombre Técnico	**Nombre Comercial**	**Tipo**			
Lambda-cihalotrina	Karate	Insecticida piretroide	Chisa, trozadores y tierreros	PUR en USEPA	Inspección del campo, eliminación oportuna de malezas, riego oportuno, aplicación de cebos en cultivos ya germinados. Química: Aplicación preventiva. Usar Carbofuran en pellets y tabletas O triclorfon
Profenofos	Curacrón, Lancero, Awake	Insecticida	Chisa, trozadores y tierreros	PUR en USEPA	Inspección del campo, eliminación oportuna de malezas, riego oportuno, aplicación de cebos en cultivos ya germinados. Química: Aplicación preventiva. Usar Carbofuran en pellets y tabletas O triclorfon

Sección 5.2

Plagas de Plátano (*Musa* spp.) y su Manejo

Plaga/s	Métodos de Control	Plaguicidas[1]	Problemas
Enfermedades:			
Sigatoka negra (*Mycosphaerella fijiensis)* y Sigatoka amarilla (*M. musicola)*	Cultural: deshoje sanitario, quema de plantas afectadas >50% y drenaje oportuno		
	Cultural-químico-preventivo:	Ceniza en agua	
	Químico:	Benomyl	
Moko o maduraviche (*Ralstonia solanacearum* Raza 2)	Cultural: eliminar plantas enfermas, sembrar colinos sanos, control malezas		
	Químico:	Benomyl, Manzate	
Bacteriosis de seudotallo (*Erwinia crisantemi)*	Químico:	Hipoclorito de Na	
Artrópodos:			
Picudo negro (*Cosmopolites sordidos)*	Químico: cebos	Carbofurán	PUR. Ver recomendación
	Cultural: limpias		
	Mecánico: trampas		
Defoliadores	Químico:	Clorpirifos, malathion	
Gusano tornillo (*Castnia humboldtii)*	Cultural: plateo, descalce, sembrar colinos sanos		
	Químico: antes de que la larva ingrese al seudotallo		
Abeja corta cabello (*Trigona* spp.)	Cultural: desbellote y muestreos		
Picudo rayado (*Metamasius hemipterus)*	Micobiológico:	*Beauveria bassiana*	
	Químico: dirigido	Clorpirifós	PUR. Ver recomendación
	Cultural: semilla libre de daño		
Malezas:			
Malezas	Manual: machete o guadaña		
	Químico:	Gramoxone, glifosato	PUR. Ver recomendacion.

Sección 5.2

Plagas de la Vainilla (*Vanilla spp.)* y su Manejo

[1] Los plaguicidas mencionados en esta tabla NO necesariamente son los recomendados para los projectos del CAD. Esto desben ser chequeados en los cuadros sobre plaguicidas correspondientes.

Comentario General: La vainilla se presta para cultivo orgánico siempre y cuando se practiquen lpos principios básicos de un buen cultivo (manejo cultural) algunos de los cuales se mencionan más abajo.

Plaga/s	Métodos de Control	Plaguicidas[1]	Problemas
Enfermedades:			
Marchitéz *o* pudrición de la raíz *(Fusarium oxysporum* f.sp. vanillae, posiblemente asociado a *Phytophthora sp.)*	Cultural: evitar encharcamiento, espaciamiento adecuado (densidad de siembra), usar MO sana, buena relación luz-sombra, usar rastrojo con lignina		
	Genético: Híbridos resistentes. Siembra de varios materiales para heterogeneizar la plantación.		
	Químico: fungicidas vegetales.	Extractos de *Swinglia* sp., Caldo bordelés	Disponibles en el mercado Colombiano como Ecoswin (Ecoflora) o a través de Natuagro. Registro? Ver recomendación
Pudrición del tallo (Fusarium moniliforme)	Genético y físico: sembrar materiales libres de la enfermedad		Se transmite por los esquejes
Antracnosis o manchas de quemaduras (Colletotrichum vanillae)	Cultural: evitar encharcamiento, espaciamiento adecuado, usar MO sana, buena relación luz-sombra, usar rastrojo con lignina		
	Químico: fungicidas vegetales	Extractos de *Swingla* sp.	Disponibles en el mercado Colombiano como Ecoswin (Ecoflora) o a través de Natuagro. Registro? Ver recomendación

Plaga/s	Métodos de Control	Plaguicidas	Problemas
Enfermedades:			
Viruses: Cymbidium Mosaic Virus (CyMV) & Tomato Ringspot Virus (TRV).	Genético y cultural: usar material genético limpio		

[1] Los plaguicidas mencionados en esta tabla NO necesariamente son los recomendados para los projectos del CAD. Esto desben ser chequeados en los cuadros sobre plaguicidas correspondientes.

Roya u hongillo (*Puccinia sinamononea)*	Cultural: evitar encharcamiento, espaciamiento adecuado, usar MO sana, buena relación luz-sombra, usar rastrojo con lignina		
	Químico: fungicidas vegetales	Extractos de *Swingla* sp.	Disponibles en el mercado Colombiano como Ecoswin (Ecoflora) o a través de Natuagro. Registro? Ver recomendación
Artrópodos:			
Torcedoras (*Cylsia vanillana*)	Cultural: raleo, sombra, poda, rejuvenecimiento		
	Químico:	Extractos de chile (*Capsicum* spp.) y de hojas de Madre Cacao o Cuchi (*Gliricidia sepium)*	
Animales domésticos (gallinas, cerdos, cabras) y pájaros	Físico: proteger siembras con alambrados o ubicarlas lejos de las viviendas y animales.		
Chinches (*Spinas floridulos, Nezara* spp.)	Cultural: raleo, sombra, poda, rejuvenecimiento		
	Químico	Extractos de chile (*Capsicum* spp.) y de hojas de Madre Cacao o Cuchi (*Gliricidia sepium)*	
Otros:			
Caracóles y babosas	Físico: trampas con sal		

Referencia/s Bibliográfica/s Principales:

1. El Cultivo Orgánico de la Vainilla. Mimeo S/f y sin autor.

2. Pearson, M.N., G.V.H. Jackson, F.W. Zettler, E.A. Frison. (eds). 1991. FAO/IBPGR Technical Guidelines for the Safe Movement of Vanilla Germplasm. FAO / IBPGR, Rome.

3. Laws, Nancy. 2002. Vanilla Production and Markets. Páginas 10-11: 'Vanilla-Pests and Diseases'. Report to Chemonics International.

Sección 5.2

Plagas de Viveros y su Manejo

Comentario General: La presencia y el atque de las plagas en viveros es función principal de la cuarentena, o sea de las precauciones que se tienen al introducir material al vivero, de su manejo y de la experiencia del viverista. Dado el alto valor de los materiales en vivero, por unidad de

superficie, las medidas preventivas y la detección temprana de focos de problemas es muy importante. Para mayor detalle sobre problemas fitisanitarios en viveros, ver las referencias bibliográficas más abajo.

Plaga/s	Métodos de Control	Plaguicidas[1]	Problemas
Enfermedades:			
Damping off o mal del talluelo (*Phythophtora, Phytium, Fusarium, Rhizoctonia, Cylindrocladium)*	Cultural: manejode la densidad de siembra y de la humedad		
	Preventivo: desinfección de sustratos con formol o solarización	Formol	
	Químico:	Benomyl, propineb, oxicloruro de Cu	Ver recomendación
Varias enfermedades			
Artrópodos:			
Grillos y chizas (*Phylophaga* spp.)	Químico:	Carbofurán	PUR. Ver recomendación.
Afidos y pulgones (Aphis sp. y Cinara sp.)			
Chiza (Phylophaga spp.)			
Hormiga arriera (*Atta* spp)			
Otros:			
Nemátodos en viveros (ej. *Meloydogine* in *Tabebuia rosea)*	Químico:	Carbofurán	PUR. Ver recomendación.
	Preventivo: desinfección de sustratos con formol o solarización		

Referencia/s Bibliográfica/s Principales:

1. CONIF. 2002. Manual de Viveros Forestales. Serie de Documentación No.45. CONIF y MAyDR, Colombia. Paginas: 51-65.
2. Arguedas, M. 2000. Problemas fitosanitarios en viveros forestales. Páginas 19-29: Boletín de Protección Vegetal No.6. CONIF.

Sección 5.2

Plagas de la Yuca (*Manihot* spp.) y su Manejo

Comentario General La yuca tiene condiciones ideales para el control biológico ya que su fase vegetativa es larga (8-14 meses). Principios claves: (a) no es necesario tener altos niveles de resistencia a la plaga; (b) el clima, principalmente la precipitación juega un papel clave; (c) el control cultural, prácticas agronómicas, juega un papel fundamental: selección material de siembra, rotación de cultivos, etc.; (d) usar insecticidas sólo cuando necesario y juiciosamente**.**

Plaga/s	Métodos de Control	Plaguicidas[1]	Problemas

[1] Los plaguicidas mencionados en esta tabla NO necesariamente son los recomendados para los projectos del CAD. Esto desben ser chequeados en los cuadros sobre plaguicidas correspondientes.

Artrópopdos			
Acaros (varias especies)	Genético: cerca de liberación de cv. resistente		Todavía no disponible comercialmente.
	Biológico: algunos depredadores y hongo entomopatógeno en desarrollo		Idem.
Moscas blancas (varios géneros y especies)	Genético: ya liberada el cv. resistente NATAIMA - 31		Limitada al Valle Cálido del Alto Magdalena
	Cultural: asocio yuca-caupí, siembra en época de lluvias, desmalezar,		
	Biológico: *Beauveria bassiana*, *Metarhizium anisopilae* y *Verticillium lecanii*		No todos facilmente disponibles para los agricultores.
	Físico: trampas amarillas		
Gusano cachón (*Erinnys ello*)	Biológico: (a) parasitoides, *Trichogramma* sp., y depredadores, *Chrysopa* sp. y (b) microorganismos, *Bacillus thuringiensis* y Baculovirus		Disponible a través de la empresa comercial BioCaribe.
	Mecánico: recolección manual de larvas		
	Cultural: voltear tierra, desmalezar, rotar cultivos Físico: trampa de luz negra		
Trips (varias especies)	Genético: hay cv resistentes disponibles basada en vellosidad de las yemas foliares		Método ideal pero no totalmente disponible y conocido.
	Cultural: suelos, fertilidad y agua adecuados y evitar aplicación de plaguicidas temprano		

Plaga/s	Métodos de Control	Plaguicidas	Problemas
Chinche subterranea (*Cyrtomenus bergi*)	Cultural: intercultivo con *Crotalaria*		*Crotalaria* tiene poco valor comercial y disminuye un poco el rendimiento de la yuca. Hay mercado para *Crotolaria* en desarrollo.
	Genético: vaiedades con HCN son más resistentes		Exploratorio.
	Biológico: nemátodos y hongo (*Metarhizium*)		Exploratorio
Chizas blancas (varios géneros y especies)	Biológico: hongos entomopatógenos (*Metarhizium anisopliae* y *Beauveria basiana*) y bacteria *Bacillus popilliae*		

[1] Los plaguicidas mencionados en esta tabla NO necesariamente son los recomendados para los projectos del CAD. Esto desben ser chequeados en los cuadros sobre plaguicidas correspondientes.

	Químico	Clorpirifós y carbofurán al suelo y a las estacas	Ambos son PUR con US-EPA. Ver recomendación.
Trozadores (varios géneros y especies)	Químico-cultural: Cebos envenenados o aplicaciones localizadas	Clorpirifós	PUR
Barrenadores del tallo (*Coelosternus* spp., *Lagochirus araneiformis*, *Chilomima clarkei*)	Cultural: recolectar y quemar residuos de cosecha, captura de adultos con estacas trampa, seleccionar estacas de siembra		Difícil control químico.
	Biológico: *Trichogramma* sp., *Bacillus thuringiensis*		
	Químico:	Malathion	Aplicación dirigida a los agujeros minimizando el impacto ambiental
Hormigas cortadoras (*Atta* spp.)	Cultural: cambio de pH del hormiguero, con cal, para matar hongos alimentos de la reina		
	Químico: con ensufraldora al hormiguero	Clorpirifós	PUR. Ver recomendación.
Enfermedades:			
Añublo bacteriano (*Xanthomonas axonopodis pv.* manihotis)	Genético: hay algunas tolerantes		Disponbilidad?
	Cultural: estacas sanas, rotación con maíz o sorgo, barreras de maíz, suelo bien drenado, desmalezar, fertilizar, erradicar plantas enfermas, sembrar al final de las lluvias		
	Químico: tratamiento de estacas	Oxicloruro de Cu, metalaxyl, captan	PUR. Ver recomendación.
Superalargamiento (*Sphaceloma manihoticola*)	Genético: variedades resistentes		Disponibilidad dudosa?
	Cultural: estacas sanas, rotar con gramíneas, plantar en épocas de menor precipitación		
	Químico: tratamiento de estacas	Captafol o benomyl	Captafol no tiene registro en Colombia. NO se debe usar. Ver.

Plaga/s	Métodos de Control	Plaguicidas	Problemas
Pudrición de las raíces (*Phythophtora* spp.)	Genético: variedades resistentes i.d. en investigación participativa		Disponibilidad de cvs?
	Cultural: seleccionar suelo adecuado y profundo, sembrar sobre caballones y drenar, eradicar focos de plantas enfermas, usar semilla limpia		
	Químico: tratar estacas si necesario	Metalaxyl	Tramiento de plantas no funciona
	Físico: tratamiento térmico a estacas (49°C por 49 minutos)		
	Biológico: *Trichoderma*		No comercial todavía.

Fuentes de Asistencia Técnica, Capacitación y Contactos:

1. **CIAT: Dr. Anthony Bellotti, Líder MIP Yuca,** a.bellotti@cgiar.org, especialista en entomología y MIP de yuca y coordinador de un programa que incluye a patólogos de yuca y otros expertos.
2. **Corpoica: Dr. Jairo Osorio, Co-ordinador de MIP, Tabaitatá,** josorio@corpoica.org.co; trabajando en insecto *Chyllomimma,* malezas y mosca blanca.
3. **CLAYUCA: Dr. Bernardo Ospina, Director,** bospina@cgiar.org; CLAYUCA es un Consorcio LatinoAmericano y del Caribe de Apoyo a la Investigación y Desarrollo de la Yuca y tienen una capacidad muy diversificada de asistencia técnica y capacitación.

Referencia/s Bibliográfica/s Principales:

1. Ospina, B. y H. Ceballos. (eds) 2002. **La Yuca en el Tercer Milenio: Sistemas Modernos de Producción, Procesamiento, Utilización y Comercialización**. **Páginas 131-268: Parte C: Manejo de Enfermedades y Plagas.** CIAT / CLAYUCA / MAyDR-Colombia / FENAVI.
2. Ospina, B. y H. Ceballos. (eds) 2002. **Guía Práctica para el Manejo de las Enfermedades, las Plagas y las Deficiencias Nutricionales de la Yuca.** Varios autores. CIAT / CLAYUCA / MAyDR-Colombia / FENAVI.
3. Arias, B., C.J. Herrera, A.C. Bellotti, y G.L. Hernandez. 2001. Plegable Técnico: **Control biológico y microbiológico del gusano cachón de la yuca** (*Erinnys ello*). MAyDR-Colombia / CIAT / BioCaribe S.A.
4. Corpoica, MAyDR, CIAT. 2002. Plegable Técnico: **NATAIMA-31: Variedad de yuca (*Manihot esculenta* Crantz) resistente a la mosca blanca (*Aleurotrachelus socialis* Bondar) para el Valle Cálido del Alto Magdalena.**
5. CIAT, UMATA, FIDAR, Universidad Nacional. 1998. Plegable Técnico: **Pudrición Radical y Marchitez de la Yuca.**

CAD PERSUAP

Sub-Section 5.3:

A Practical Guide to Reduce Risks from Pesticides

(A Power Point Presentation in Spanish only)

CAD PERSUAP

Sub-Section 5.4:

A Decision Tree in IPM & Guidelines for SUP

(In Spanish only)

Sección 5.4

Un Arbol de Decisión en MIP y Una Guía para el Uso Más Seguro de Plaguicidas

1. **Evalúe el impacto que la plaga está causando antes de decidir si controlarla:**
   - ¿Conoce usted la plaga?
   - ¿Conoce su biología: ciclo, hábitos, daño que causa?
   - ¿Conoce sus enemigos naturales?
   - ¿Cuánta plaga hay? ¿Puede muestrear la plaga o el daño que causa y así hacer su seguimiento? ¿Está ella en focos o distribuída uniformemente en el cultivo?
   - ¿Puede tratar el/los foco/s y así evitar tratar todo el cultivo?

2. **Evalúe las posibles opciones de manejo**
   - ¿Cuáles son las posibles pérdidas (producción) y ganancias (ambiente, salud) si no se usa ningún control?
   - ¿Cuáles son las posibles pérdidas (dinero, ambiente, salud) y ganancias (producción) si se usa algún control?

3. **Evalúe si existen opciones no-químicas de control a las cuales recurrir en primera instancia**
   - Visite técnicos de extensión e investigación
   - Consulte bibliografías o sitios web

4. **De todas las opciones químicas y no-químicas de control**
   - ¿Cuál es su aplicabilidad a la situación bajo consideración?
   - ¿Cuál la disponibilidad de dicho método de control?
   - ¿Cuál su eficacia?
   - ¿Y cuál su costo?

5. **Supongamos que agotó las posibilidades de métodos no-químicos y tiene que usar plaguicidas.** Lo que hay que hacer es "**<u>reducir el riesgo al máximo posible</u>**". Recuerde que el riesgo al que se expone al usar un plaguicida es igual a la toxicidad del plaguicida por la exposición del aplicador o manipulador:
   - Riesgo = toxicidad x exposición

   Para reducir el riesgo se puede: reducir la toxicidad Y/O reducir la exposición.

6. **Entonces, las reglas para la reducción del riesgo son …**

   6.1 Minimizar los niveles de toxicidad de los productos a usar:
   - Use los plaguicidas registrados para ese uso
   - Elija los plaguicidas de banda VERDE o AZUL, los menos tóxicos
   - No use plaguicidas de banda ROJA o AMARILLA, los de las clases Ia y Ib de la OMS

- No use plaguicidas de uso restringido: PUR o RUP
- De preferencia no use plaguicidas listados en los convenios de PIC y POP
- Considere las varias formulaciones disponibles y sus toxicidades

6.2 Reducir el tiempo de exposición a los plaguicidas or reducir el grado de exposición:

- **Antes del uso:**
  - Transporte:
    - Separe los plaguicidas de los otros materiales que están siendo transportados
    - Nunca los transporte junto con alimentos
  - Empaquetado:
    - Utilize los paquetes originales
    - No re-empaque plaguicidas
  - Almacenamiento:
    - De preferencia NO dentro de la casa
    - Lejos de los alimentos y ropas
    - Fuera del alcance de los niños
    - Desarrolle lineamientos bien claros y estrictos para el almacenamiento a nivel de bodegas regionales o locales
  - Etiquetado:
    - Conozca y siga las normas de etiquetado Colombianas
    - Aprenda y disemine entre sus colegas y asociados el conocimiento sobre cómo leer las etiquetas de los productos
    - Conozca, respete, y siga por sobre todas las cosas, las bandas de color correspondientes a las clases toxicológicas
  - Formulación:
    - Use la más adecuada para el problema a tratar y el equipo de aplicación disponible
    - Sin embargo, sepa que un mismo ingrediente activo puede cambiar de nivel de toxicidad cuando formulado
- **Uso:**
  - Equipo de aplicación
    - Adaptado a sus necesidades y posibilidades
    - Asegurese que el mantenimiento es correcto: funcionamiento adecuado (boquillas, por ejemplo) y que no tenga pérdidas, etc.
    - Prepar las mezclas de plaguicidas y agua con el máximo cuidado y protección
    - No prepar más producto que el que se va a usar
    - No permitir que mujeres y niños participen del mezclado
  - Equipo de protección y ropa

    - Adaptados a las condiciones de clima local
    - Adaptados a las necesidades y posibilidades del usuario (presupuesto)
    - No debe reducir sino minimizar la exposición
- **Después del uso**
    - Conozca, respete y haga respetar los períodos de exclusión después de la aplicación
    - Asegure la limpieza y enjuague de
        - El aplicador,
        - Las ropas del aplicador,
        - El equipo de aplicación
    - Tenga ciudado de no contaminar fuentes de agua, y el ambiente en general, con la aplicación y el lavado.
    - Respete el período de carencia para las cosechas

CAD PERSUAP

Sub-Section 5.5:

Amending the PERSUAP

(Procedure for reviewing new crops & possible new pesticides - in Spanish only)

Amending the CAD_PERSUAP
Procedure for reviewing new crops & possible new pesticides
Chemonics – CAD – PERSUAP - Colombia[1]

New crops in CAD

↓

Identify the main plant protection problems and what is being presently done & pesticides used to control them. ***Consult with project operators & technical field staff and use Form No.1.***

↓

List all pesticides being used, recommended, or considered for possible use in this particular crop, specifying their use. ***Summarize the information collected about the pesticides in Form No.2 and complete other columns of the form with the help of the information sources listed in Annex No.1***

↓

Identify the "problem pesticides" based on their registration with US-EPA, with ICA-Colombia, or if it is a RUP, either in theUSA or in Colombia, or due to being in WHO Toxicological Class I (a o b). *Consult the data basis indicated in Annex 1 and use Form No.3 as a summary, leaving blank for the time being, the last column. column.*

↓

Search for chemical (other pesticides) and, mainly, non-chemical (other pest control methods) options to the "problem pesticides", identifed in the previous step. ***Follow the instructions Annex 2 and now complete the last column of Form No.3***

↓

Consolidate all the information about pest & pesticides for the new crop and now write up a mini-PERSUAP for this crop covering the 12 points of Regulation 216 but referring to the general framework of the CAD-PERSUAP already prepared. ***Follow the instructions described in Annex No.3 and complete Form No.4 and the Pesticide Form, already approved by USAID to review these types of products.***

↓

Submit the PERSUAP amendment for the consideration & approval by the USAID-Colombia MEO, in the context of theCAD-PERSUAP already approved

[1] In green: instructions

Sección 5.5
Corrigiendo el CAD-PERSUAP
Procedimiento para la revisión de nuevos cultivos y nuevos posible plaguicidas
Chemonics – CAD – PERSUAP – Colombia

Nuevos cultivos en CAD

↓

Identificar los principales problemas fitosanitarios y los plaguicidas que se están usando o lo que se está haciendo para manejarlos en la actualidad *Consultar a los operadores y a los técnicos de campo y usar*

↓

Listar todos los plaguicidas que están siendo utilizados, recomendados y/o considerados para ese cultivo, especificando sus usos. ***Hacer un resumen de la información recogida sobre los plaguicidas en el Formulario No.2 y completar las otras columnas del formulario con la ayuda de las fuentes de información indicadas en el Anexo No.1.***

↓

Identificar los "plaguicidas problemas" de acuerdo a su registro con US-EPA, con ICA-Colombia, o si es un PUR, ya sea en USA o en Colombia, o por estar en Clase Toxicológica I (a o b) de la OMS. *Consultar las bases de datos indicadas en Anexo 1 y usar el Formulario No.3 como resumen dejando en blanco, por ahora, la última columna.*

↓

Buscar opciones químicas (otros plaguicidas) y, principalmente, no químicas (otros métodos de control de las plagas) a los "plaguicidas problemas" identificados en el paso anterior. ***Seguir las instrucciones que se describen en el Anexo 2 y completar, ahora sí, la última umna del Formulario No.3.***

↓

Integrar toda la información sobre las varias plagas y plaguicidas en el nuevo cultivo y redactar un mini-PERSUAP para el nuevo cultivo cubriendo los 12 puntos de la Reglamentación 216 y haciendo referencia al marco del PERSUAP más general (mitigación, seguimiento) ya preparado. ***Seguir el instructivo que se describe en el Anexo No.3 y completar el Formulario No.4 y la Ficha de Pesticidas aprobada por USAID para la revisión de estos productos.***

↓

Someter el mini-PERSUAP para la consideración y eventual aprobación del OAM (MEO) de USAID-Colombia, en el marco del PERSUAP-CAD general ya aprobado.

En verde: instrucciones a seguir

Section 5.5
Annex 1
Learning about the registration status and the toxicology of the pesticide
Chemonics - CAD – PERSUAP - Colombia

1. **Registration status with USA-EPA, including if it is a RUP and toxicological class:**

Specifically search for the re-registration status of the pesticide with EPA.

- **See EPA:** www.epa.gov/pesticides
- **See bio-pesticides:** www.epa.gov/pesticides/biopesticides/ingredients/index.htm
- **See re-registration status:** http://cfpub.epa.gov/oppref/rereg/status.efm
- **See banned pesticides:** www.epa.gov/oppfead1/international/picklist.htm
- **See Special Review pesticides:** www.epa.gov/oppsrrd1/specialreview.htm
- **See PAN:** www.pesticideinfo.org/Index.html or, more specifically, for active ingredients: www.pesticideinfo.org/Search_Chemicals.jsp, or for commercial products: www.pesticideinfo.org/Search_Products.jsp

2. **Registration status with ICA-Colombia:**

- See "**Regulación y Control de Plaguicidas Químicos: Listado de Productos Registrados en Colombia, ICA**": hard and electronic copies can be found in Chemonics Office or in the ICA web site.
- See also "**Regulación y Control de Plaguicidas: Listado de Bio-insumos Registrados en Colombia, ICA**": hard and electronic copies in Chemonics Office and in the ICA web site.
- **ICA web site**: www.ica.gov.co, then go to "Servicios" – "Area Agrícola" – "Plaguicidas" o "Bioinsumos", as per your interest.

3. **Situation regarding its possible RUP status:**

If in doubt about the possible RUP status, consult:

- **See RUP:** www.epa.gov/opprd001/rup/rupjun03.htm (at the moment of writing the PERSUAP, in August 2003, updated to June 2003)
- **PAN Pesticides Database** – Pesticide Registration Status – Colombia – Pesticide Registration, import consent and bans. http://www.pesticideinfo.org/Detail_Country.jsp?Country=Colombia
- **ICA Pesticide Data base** (see 2 above).

4. **Toxicological class:**

If in doubt about the toxicological class, the last word is with World Health Organisation (WHO).

- **Visit WHO**: www.who.int/pcs
- **Or read the document:** "The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification 2000-20002" (with Chemonics Colombia).

5. **Additional toxicological information:**

To write the PERSUAP you need to know the possible hazards the pesticide may pose, not only in acute form (Toxicological Class) but also chronically, to humans and the environment. A good source of information for this is:

- **See PAN:** www.pesticideinfo.org/Search_Ecotoxicity.jsp
- **Extoxnet:** www.ace.ace.orst.edu/info/extoxnet
- **Tolerance in food:** www.epa.gov/pesticides/food/viewtols.htm or www.epa.gov/opprd001/tolerance/tisinfo/

6. International agreements on pesticides:

Among the most important agreements is the Preliminary Informed Consent (PIC) that mandates that governments should be informed ex-ante about the possible introduction of hazardous chemicals and they should give the express approval for the importation of these products. The PIC list, among which there are various pesticides, could be found in:

- **UNEP:** www.irptc.unep.ch
- **EPA:** www.epa.gov/oppfead1/international/picklist.htm
- **Or for more details:** www.pic.int/en/viewpage.asp

Sección 5.5
Anexo 1
Conociendo la situación de registro y toxicología del plaguicida
Chemonics - CAD – PERSUAP - Colombia

1. **Situación de Registro con USA-EPA, incluyendo si es PUR (RUP en inglés), y clase toxicológica:**

Ver específicamente la situación de re-registro de ese plaguicida con EPA.

- **Ver EPA:** www.epa.gov/pesticides
- **Ver bio-plaguicidas:** www.epa.gov/pesticides/biopesticides/ingredients/index.htm
- **Ver situación de re-registro:** http://cfpub.epa.gov/oppref/rereg/status.efm
- **Ver plaguicidas prohibidos:** www.epa.gov/oppfead1/international/picklist.htm
- **Ver plaguicidas en revisión especial:** www.epa.gov/oppsrrd1/specialreview.htm
- **Ver PAN:** www.pesticideinfo.org/Index.html o, más especificamente, para ingredientes activos: www.pesticideinfo.org/Search_Chemicals.jsp, o para productos comerciales: www.pesticideinfo.org/Search_Products.jsp

2. **Situación de registro con ICA- Colombia:**

- **Ver "Regulación y Control de Plaguicidas Químicos: Listado de Productos Registrados en Colombia, ICA"**: copias en Chemonics o en el sitio web de ICA.
- **Ver "Regulación y Control de Plaguicidas: Listado de Bio-insumos Registrados en Colombia, ICA"**: copias en Chemonics y en el sitio web de ICA.
- **Sitio web del ICA**: www.ica.gov.co, después ir a "Servicios" – "Area Agrícola" – "Plaguicidas" o "Bioinsumos", según su interés.

3. **Situación como PUR (RUP) o no:**

Si en duda sobre la situación del plaguicida sobre PUR (RUP) ya sea en Colombia o en USA, consultar:

- **Ver EPA-PUR:** www.epa.gov/opprd001/rup/rupjun03.htm (al momento de hacer el PERSUAP, agosto de 2003, actualizada a junio 2003)
- **PAN Pesticides Database** – Pesticide Registration Status – Colombia – Pesticide Registration, import consent and bans. http://www.pesticideinfo.org/Detail_Country.jsp?Country=Colombia
- **Registro ICA de Insumos Químicos** (ver 2 más arriba)

4. **Clase toxicológica:**

Si en duda sobre la clase toxicológica, la última palabra la tiene la Organización Mundial de la Salud (OMS).

- **Visite el sitio de la OMS:** www.who.int/pcs
- **O vea el documento:** "The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification 2000-20002" (con Chemonics Colombia).

5. **Información toxicológica adicional:**

Para la redacción del PERSUAP es necesario conocer los riesgos toxicológicos que el plaguicida pueda colocar ya sea en forma aguda, clase toxicológica, como en forma crónica sobre los humanos y sobre el ambiente en general. Para esto, buenas fuentes de información son:

- **Ver PAN:** www.pesticideinfo.org/Search_Ecotoxicity.jsp
- **Ver Extoxnet:** www.ace.ace.orst.edu/info/extoxnet
- **Tolerancias en los alimentos:** www.epa.gov/pesticides/food/viewtols.htm or www.epa.gov/opprd001/tolerance/tisinfo/

6. Acuerdos internacionales sobre plaguicidas:

Entre los más importantes está el Informe Consentual Preliminar (**PIC**) que manda que los gobiernos deben ser informados ex-ante sobre la posible importación de productos químicos peligrosos y ellos deben dar anticipadamente la expresa autorización para la importación de estos productos. La lista de productos PIC, entre los cuales hay varios plaguicidas, puede encontrase en:

- **UNEP:** www.irptc.unep.ch
- **EPA:** www.epa.gov/oppfead1/international/picklist.htm
- **O por más detalles:** www.pic.int/en/viewpage.asp

Section 5.5
Annex 2
Searching for options to a pesticide
Chemonics - CAD – PERSUAP - Colombia

The search will centre about the pest or problem

I. Search for other pest control methods for the pest:

- Consult with the technical staff of the UMATA[1]
- Consult with technical staff of Corpoica[2]
- Consult with technical staff of producer organisations, if available; (the equivalents of the Cenicafé, Cenipalma, Fedecacao, etc.).
- Consult with technical staff of the universities
- Visit web sites for the producer organisations and others (see separate page on Web sites).
- Search for literature references (see separate page on bibliography).

II. Search for other pesticides:

- Same reference sources as in I above.
- Review a vademecum for agricultural products, such as the "Diccionario HC Agropecuario". [Remember that, since there is a fee for listing the products here, many products from small firms are not included in this publication because they cannot afford it].
- Consult with pesticide distributors.
- Visit the web sites of the agchemical companies, such as those that you can access through:
  - **ANDI:** www.andi.com.co

III. Decide about the alternative to the pesticide (i.e. complete the last column of Form No.3)

- Analyse the **efficacy** of the various methods of pest control available.
- Search for information about the **availability** of this option in the market and its **cost**
- Avoid **RUP**, those in **toxicological class I** (a and b) and those that could have important **environmental impacts** in the short or medium term; in other words look at toxicology (to humans) and eco-toxicology (environment). If there is a possibility for environmental impacts, search and design how to possible **prevent** and/or **mitigate** these environmental impacts.
- Prefer **non-chemical options,** if available.
- As much as possible choose a set of practices, over single tactics, and assemble these as "**menus**" of offers (list of practices among which growers could possible choose the most

[1] The UMATA is the local agricultural extension agency.
[2] Corpoica is the para-statal agricultural research institution.

desirable ones) as opposed to “packages” (fixed, inflexible and structured programmes): i.e. offer **IPM programmes.**

Sección 5.5
Anexo 2
Buscando opciones a un plaguicida
Chemonics - CAD – PERSUAP - Colombia

La búsqueda se centra en la plaga o problema

II. <u>Buscar otros métodos de control de la plaga</u>:

- Consultar con técnicos de la la UMATA
- Consultar con técnicos de Corpoica
- Consultar con técnicos de la organización de productores de dicho cultivo, si existe (los equivalentes de Cenicafé, Cenipalma, Fedecacao, etc.)
- Consultar con técnicos de las universidades
- Visitar los sitios web de las organizaciones de productores y otros (ver lista de sitios web por separado).
- Hacer búsquedas bibliográficas (ver lista bibliográfica por separado).

II. <u>Buscar otros plaguicidas:</u>

- Las mismas fuentes de referencia que más arriba en I.
- Revisar un vademecum de productos agropecuarios como el Diccionario HC Agropecuario. [Recordar que, debido a que existe un cargo por listar los productos en el vademecum, muchos productos de pequeñas firmas NO están incluídos ya que no están en la capacidad de enfrentar ese gasto].
- Consultar a distribuidores de productos agroquímicos
- Visitar los sitios web de las empresas de agroquímicos, tales como aquellos que se pueden visitar a partir de:
    - **ANDI:** www.andi.com.co

III. <u>Decidir sobre las alternativas al plaguicida (o sea, completar la columna final del Formulario No.3)</u>

- Ver la **eficacia** de los varios métodos de control para la plaga en cuestión
- Conseguir información sobre su **disponibilidad** en el mercado y sus **costos**
- Evitar plaguicidas de uso restringido y de las clases toxicológicas Ia y Ib, así como aquellos que puedan tener **impactos ambientales** importantes sea a corto como a largo plazo; o sea ver toxicología (humano) y ecotoxicología (ambiente). Si hay posibilidad de impacto ambiental conseguir medidas de **prevención** y/o **mitigación** de esos posibles impactos.
- Preferir **opciones no-químicas** cuando disponibles
- Siempre que sea posible elegir un **conjunto de métodos**, en oposición a una o dos tácticas, e integrarlas en "menúes" de oferta (listado de posibles prácticas de entre las cuales los productores pueden elegir una o más) en oposición a "paquetes" (programas fijos, estructurados e inflexibles): **programas MIP.**

Section 5.5
Annex 3
Writing a "PERSUAP-Amendment"
Chemonics - CAD – PERSUAP – Colombia

Integrate all the information about the various pests and pesticides to be proposed for the new crop and proceed to write up a "PERSUAP-Amendment".

A. <u>The introduction describes:</u>

♦ Why a new crop and how this gets integrated into the general context of CAD, as described in the PERSUAP;

♦ How this "PERSUAP-Amendment" was prepared and how it integrates, and it is compatible with, the former CAD-PERSUAP already approved;

♦ If any important deviations from the approved CAD-PERSUAP are foreseen, they have to be clearly presented, justified and discussed.

B. **<u>For the selected and proposed pesticides</u>:**

♦ Clearly explain all the following points, referring to the same 12 points described in the general framework of the CAD-PERSUAP:

1. **<u>Registration status with ICA-Colombia and with USA-EPA:</u>**
   ♦ See Form No. 2: this is information should be found there.

2. **<u>The basis for selecting this pesticide:</u>** availability, cost, efficacy, toxicity, environmental impact, etc,
   ♦ See annex No.2 /III: this information should be found there.

3. **<u>How is the pesticide integrated into an Integrated Pest Management (IPM) programme;</u>**
   ♦ See annex No.2 /III: this information should be there.

4. **<u>Application method, including the availability of proper application and protection equipment</u>:**
   ♦ Refer to the CAD-PERSUAP.
   ♦ If it is a particularly different method of application, describe in detail and discuss the reasons why this method has been chosen, its viability in Colombia, and its potential impacts upon human health and the environment.

5. **<u>Acute or chronic toxicological hazards, either to human or to the environment, associated to the use of the pesticide and the proposed measures to minimise them:</u>**
   ♦ See annex No.2 /III: the information should be there.

6. **<u>The effectiveness of the pesticide for the proposed use:</u>**

- See annex No.2 /III: the information should be there.

7. **<u>The compatibility of the pesticide with the target and no-target ecosystems:</u>**
   - Refer to the CAD-PERSUAP

8. **<u>The conditions under which the pesticide will be used</u>,** including climate, flora, fauna, geography, hydrology and soils;
   - Refer to the CAD-PERSUAP
   - If the proposal is for a new area, under differing conditions from those described in the CAD-PERSUAP, describe it following the same format used in the CAD-PERSUAP.

9. **<u>The disponibility and effectiveness of other pesticides and non-chemical methods:</u>**
   - See annex No.2 /III: this information should be found there.

10. **<u>The capacity of Colombia to regulate and control the distrubution, storage, use and disposal of the pesticide:</u>**
    - Refer to the CAD-PERSUAP

11. **<u>The provisions made to train users and applicators:</u>**
    - Refer to CAD-PERSUAP

12. **<u>The provisions made to monitor use and efficacy of the pesticide:</u>**
    - Refer to CAD-PERSUAP.

Sección 5.5
Anexo 3
Redactando una "Corrección-al-PERSUAP"
Chemonics - CAD – PERSUAP - Colombia

Integrar la información sobre las varias plagas y los plaguicidas a ser propuestos para el nuevo cultivo y proceder a escribir una "Correción-al-PERSUAP".

A. La introducción debe describir:

♦ el porqué de un nuevo cultivo y cómo se integra éste en el contexto del CAD descripto en el CAD-PERSUAP general;

♦ cómo fue preparada esta Correción de PERSUAP y cómo se integra, o nó, con el CAD-PERSUAP General.

♦ Si hay desviaciones importantes del CAD-PERSUAP general estas deben ser claramente definidas, discutidas y justificadas.

B. **Para los plaguicidas seleccionados y propuestos:**

♦ explicar cada uno de los 12 puntos siguientes, haciendo referencia al marco general de estos mismos 12 puntos ya desarrollado en el CAD-PERSUAP:

1. **Situación de registro en Colombia y con la USA-EPA;**

♦ Ver formulario No. 2: allí se encuentra esta información.

2. **Las bases de la selección de ese plaguicida en particular:** disponibilidad, costo, eficacia, toxicidad, impacto ambiental, etc.;

♦ Ver anexo No.2 /III: allí se encuentra esta información.

3. **Cómo se integra ese plaguicida en un programa de Manejo Integrado de la Plaga (MIP);**

♦ Ver anexo No.2 /III: allí se encuentra esta información.

4. **Métodos de aplicación, incluyendo la disponibilidad del equipo adecuado para la aplicación y para la protección de los usuarios;**

♦ Referirse al CAD-PERSUAP general.

♦ Si es un método muy particular o diferente, se deberá describir en detalle y discutir la razón de proponerlo, su viabilidad en Colombia, y sus posibles impactos sobre la salud humana y el ambiente.

5. **Los riesgos toxicológicos agudos o crónicos, ya sea a humanos como ambientales, asociados al uso del plaguicida y las medidas propuestas para minimizarlos;**

♦ Ver anexo No.2 /III: allí se encuentra esta información.

6. **<u>La efectividad del plaguicida para el uso propuesto;</u>**

- Ver anexo No.2 /III: allí se encuentra esta información.

7. **<u>La compatibilidad del plaguicida con los ecosistemas objetivo y no-objetivo;</u>**

- Referirse al CAD-PERSUAP general

8. **<u>Las condiciones bajo las cuales se usará el plaguicida</u>**, incluyendo clima, flora, fauna, geografía, hidrología y suelos;

- Referirse al CAD-PERSUAP general
- Si es un área nueva, con condiciones diferentes a las descritas en el CAD-PERSUAP, decribirla siguiendo el formato de CAD-PERSUAP general.

9. **<u>La disponibililidad y efectividad de otros plaguicidas o métodos no químicos;</u>**

- Ver anexo No.2 /III: allí se encuentra esta información.

10. **<u>La capacidad de Colombia para regular y controlar la distribución, almacenamiento, uso y eliminación del plaguicida;</u>**

- Referirse al CAD-PERSUAP general

11. **<u>Las previsiones hechas para capacitar a los usuarios y aplicadores;</u>**

- Referirse al CAD-PERSUAP general

12. **<u>Las previsiones hechas para monitorear el uso y la eficacia del plaguicida.</u>**

- Referirse al CAD-PERSUAP general

Section 5.5
Form No.1
Pest diagnostic, pest control & pesticides being used in the alternative crop
Chemonics - CAD – PERSUAP - Colombia

1. Which ones are the main "**pests**"[1] of the new crops being promoted by CAD?

2. Which ones are the main *"**control methods**'*[2] being used / recommended / promoted by farmers, GO extension institutions, NGOs and the private sector, and/or the CAD project, for the pests mentioned in 1 above?

3. Which ones are the "***pesticides***"[3] being used / recommended / promoted by farmers, GO extension institutions, NGOs and the private sector, and/or the CAD project, for the pests mentioned in 1 above and part of the methods mentioned in 2 above?

4. Are you aware of:

   (a) Abuse and/or misuse of pesticides in this crop? What type of problems?
   (b) Efficacious non-chemical methods of control for the main pests mentioned above? If, yes … please, explain in the table below. If not, which ones are the "recalcitrant" pests, those more difficult to control? How are they being controlled?

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[1] By '**pests**' we understand all living organisms that can negatively affect the quality or decrease the amount of agricultural harvests, before or after the harvest (during storage). Pests may cause their actions through competition for resources (**weeds**), as well as acting directly upon de crop during its vegetative or reproductive stages, or after harvest, such as it is the case of vertebrates (**mice, rats and birds**), and invertebrates, incuding **insects**, **mites**, **spiders, ants**, **moluscs** (**slugs and snails**), **nematodes** and other pathogens, such as **fungi, bacteries**, **viruses**, **ricketsias, phytomones, phytoplams**.

[2] Such as **chemical**, **biological**, **cultural**, **mechanical**, **genetic**, **ethological**, and others.

[3] As per the above footnote, we consider as '**pesticides**' the **herbicides**, **algicides**, **rodenticides**, **avicidas**, **insecticides**, **acaricides**, **aracnicides**, **formicides**, **moluscicides**, **nematicides**, **fungicides**, **bactericides**, and even some **antibiotics**, and other products that without really being 'cides', i.e. without killing the pest, they repel it, **repelents**.

Pests problems and their management, including pesticides, in the alteative crop

Crop: ……..

Pest/s	Method/s of control	Pesticides[1]	Efficacy[2]	Problems

Sección 5.5
Formulario No.1
Diagnostico de las plagas, su control y el uso de plaguicidas en el cultivo alternativo
Chemonics - CAD – PERSUAP - Colombia

1. ¿Cuáles son las principales **'*plagas*'**[1] de los cultivos alternativos que están siendo promovidos por el CAD?

2. Cuáles son los principales '***métodos de control***'[2] que están siendo utilizados / recomendados / promovidos, por los agricultores, las instituciones de extensión del GOC o las ONG y el sector privado, y/o el proyecto CAD, respectivamente, para las plagas mencionadas en 1?

3. ¿Cuáles son los '***plaguicidas***'[3] utilizados / recomendados / promovidos, por los agricultores, las instituciones de extensión del GOC o las ONG y el sector privado, y/o el proyecto CAD, respectivamente, para las plagas mencionadas en 1 y como parte de los métodos mencionados en 2?

4. A su mejor saber y entender:

   (a) ¿Hay problemas de mal uso o abuso de plaguicidas en esos cultivos? ¿Qué problemas?
   (b) ¿Hay métodos no químicos eficaces para el manejo de las plagas mencionadas? Si, sí … por favor, explique en la tabla. Si no, ¿cuáles son las plagas más 'recalcitrantes', más difíciles de controlar? ¿Y cómo se controlan?

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[1] Por '**plagas**' entendemos aquí a todos los organismos vivos que pueden perjudicar la calidad y/o disminuir la cantidad de las cosechas agrícolas, tanto en antes, pre-, como después, post-, de la cosecha (durante el almacenado). Las plagas pueden causar sus efectos a través de competencia por recursos (**malezas**), como por acción directa sobre el cultivo en sus estados vegetativos, reproductivos, o ya en post-cosecha, tales y como los vertebrados (**ratones, ratas, pájaros**), y los invertebrados, como los **insectos**, **ácaros**, **arácnidos, hormigas**, y los **moluscos** (**babosas, caracoles**), **nemátodos** y otros patógenos, tales como los **hongos**, las **bacterias**, los **virus**, **ricketsias, fitomonas, fitoplasmas**.
[2] Tales como **químico**, **biológico**, **cultural**, **mecánico**, **genético**, **etológico**, y otros.
[3] Siguiendo la nota de más arriba, consideramos como '**plaguicidas**' a los **herbicidas**, **alguicidas**, **rodenticidas**, **avicidas**, **insecticidas**, **acaricidas**, **aracnicidas**, **formícidas**, **moluscicidas**, **nematicidas**, **funguicidas**, **bactericidas**, hasta algunos **antibióticos**, y otros productos que sin ser, propiamente, 'cidas', quiere decir que sin matar a la plaga, la repelen, **repelentes**.

Problemas de plagas y su manejo, incluyendo a los plaguicidas, en el cultivo alternativo

Cultivo: ……..

Plaga/s	Métodos de Control	Plaguicidas[1]	Eficacia[2]	Problemas

Section 5.5
Form No.2
Summary of the Pesticides Used in the Alternative Crop
Chemonics - CAD – PERSUAP – Colombia

Crop: _____

Name of the Pesticide		Pest against which it is used	Toxicological Class[1]	Registration[2]		Commentary re USAID Reg. 216[3]
Commercial[4]	Technical[5]			Colombia	USA	

[1] Of World Health Organisation (WHO), as per acute toxicity into Classes Ia, Ib, II y III.
[2] Yes or No and if there is any restriction.
[3] Missing registration in 1 or 2 countries; is it a Restricted Use Pesticide (RUP); is it toxicological class Ia or Ib?
[4] Name under which is being sold in Colombia
[5] Technical or generic name, or the active ingredient of the product.

Sección 5.5
Formulario No.2
Resumen de los Plaguicidas Utilizados en el Cultivo Alternativo
Chemonics - CAD – PERSUAP - Colombia

Cultivo: _____

Nombre del Plaguicida		Plaga contra la cuál se usa	Clase Toxicológica[1]	Registro[2]		Comentario re la Reg 216 de USAID[3]
Comercial[4]	Técnico[5]			Colombia	USA	

[1] De la Organisación Mundial de la Salud (OMS), en función de la toxicidad aguda; clases Ia, Ib, II y III.
[2] Si o No y si tiene alguna restricción.
[3] Falta registro en uno o ambos países; es un Plaguicida de Uso Restringido (PUR); es clase toxicológica Ia o Ib?
[4] Nombre bajo el cuál es vendido en Colombia
[5] Nombre técnico o genérico, o sea del ingrediente activo del plaguicida.

Section 5.5
Form No.3
Problem Pesticides in the Alternative Crop
Chemonics - CAD – PERSUAP - Colombia

Pesticide			Pest/s	Type of Problem[1]	Alternatives to the pesticide
Technical Name[2]	Commercial Name[3]	Type[4]			

[1] Toxicological class I (a o b), RUP, registration with USA-EPA, registration with ICA- Colombia, other.
[2] Technical or generic name, or the active ingredient of the product.
[3] Name under which is being sold in Colombia.
[4] Action against … type of pest: fungicide, insecticide, herbicide, etc.

Sección 5.5
Formulario No.3
Plaguicidas Problemáticos en el Cultivo Alternativo
Chemonics - CAD – PERSUAP - Colombia

Plaguicida			Plaga/s	Tipo de Problema[1]	Alternativas a ese plaguicida
Nombre Técnico[2]	Nombre Comercial[3]	Tipo[4]			

[1] Clase toxicológica I (a o b), PUR, registro con la EPA-USA, registro con ICA-Colombia, otros.
[2] Nombre técnico o genérico or el ingrediente activo del producto.
[3] Nombre bajo el cual es vendido en Colombia.
[4] Acción contra …qué tipo de plaga: funguicida, insecticida, herbicida, etc.

Section 5.5
Form No.4
Check up List for the Pesticides in the Alternative Crop
Chemonics - CAD – PERSUAP - Colombia

N°	Item	Yes / OK	No / Problem	Commentary
1a	Registration with ICA - Colombia			
1b	Registration with US – EPA			
2	Reasons to select this pesticide			
3	Part of an IPM programme			
4	Application method & equipment			
5	Toxicological hazards			
6	Effectiveness for the proposed use			
7	Compatibility with ecosystems			
8	Conditions under which will be used			
9	Availability of other controls			
10	Colombia's capacity to control it			
11	Training of users in general			
12	Monitoring of use & efficacy			

Sección 5.5
Formulario No.4
Lista de Chequeo de los Plaguicidas en el Cultivo Alternativo
Chemonics - CAD – PERSUAP - Colombia

N°	Item	Sí / OK	No / Problema	Comentario
1a	Registro con ICA - colombia			
1b	Registro con US – EPA			
2	Porqué se eligió ese plaguicida			
3	Parte de un programa MIP			
4	Aplicación y equipo			
5	Riesgos toxicológicos			
6	Efectividad para el control buscado			
7	Compatibilidad con los ecosistemas			
8	Condiciones en las que se usará			
9	Disponibilidad de otros controles			
10	Capacidad de Colombia para controlarlo			
11	Capacitación de usuarios en general			
12	Monitoreo de uso y eficacia			

Sección 5.5
FICHA DE REVISION AMBIENTAL PARA EL USO DE PESTICIDAS (USAID-Colombia)
Proyectos productivos agrícolas o pecuarios

FECHA_____

1) Descripción del Proyecto:

Nombre y Código del Proyecto:
Participantes en el proyecto:
Ubicación del Proyecto: Municipio: Departamento:
Tipo de proyecto: (Ver listado ficha PNDA) ( ) Vial ( ) Actividades productivas ( ) Eléctrico ( ) Educación ( ) Saneamiento básico ( ) Salud ( ) Otro. Especifique:
Alcance del proyecto: ( ) Construcción ( ) Adecuación ( ) Mejoramiento ( ) Rehabilitación ( ) Ampliación
Costo estimado:
Numero de personas que se beneficiaran:
Fecha de inicio del proyecto: Fecha de terminación:
Personas responsables de la supervisión y desarrollo del proyecto
Objetivos del proyecto
Actividades a realizar, en las cuales se utilizaran pesticidas:

2) **Descripción y Análisis del sitio:**

Localización del proyecto: ( ) Parque Nacional o área protegida ( ) Zona de amortiguación ( ) Zona indígena ( ) Zona de Producción ((Reserva campesina ( ) Zona semi urbana ( ) Zona urbana ( ) Otra. Indique De acuerdo a las zonas definidas por el POT el proyecto se localiza en un área: ( ) Productiva ( ) De Protección ( ) De Conservación ( ) De uso mixto ( ) Restringida por amenaza de riesgos ( ) Otra. Indique Veredas: Anotaciones:
Uso actual del suelo: ( ) Agricultura ( ) Área degradada, erosionada ( ) Ganadería ( ) Humedal, pantano, manglar ( ) Bosque nativo ( ) Plantación forestal
Descripción de la localidad: (Tamaño, topografía, usos, edificios, vías de acceso, servicios públicos)
Describa brevemente el estado del medioambiente del lugar donde se realizara el proyecto: inventario de los cuerpos de agua, factores que afecten cualquiera de los recursos, suelo, hídricos, aire, biodiversidad, salud humana y contexto socio-cultural.
Receptores sensitivos cercanos: (describa) ( ) Áreas residenciales ( ) Colegios ( ) Escuelas ( ) Otros ( ) Hospitales
Anexo plano
Anexo fotografías
Existen fuentes de polución? (describa) ( ) Salidas de agua ( ) Desechos sólidos ( ) Trafico ( ) Otras
Áreas de recursos naturales (describa) ( ) Ojos de agua ( ) Montes o bosques ( ) Arroyos ( ) Otros ( ) Humedales (tierras húmedas)

3) Información básica sobre Pesticidas

Ver: **Presentación Uso de Pesticidas – esp**
Procedimientos sobre pesticidas
Decreto 1843 de 1991 sobre plaguicidas

a) Pestes que se van a controlar, etapa del proyecvto en el cual se va a utilizar y programa de aplicación propuesto
b) Pesticida y dosis propuestas
c) Estado del registro USEPA del pesticida solicitado
d) Bases para la selección del pesticida solicitado
e) Hasta que punto el pesticida propuesto es parte de un programa de manejo integrado de plagas
f) Métodos propuestos para la aplicación, incluyendo la disponibilidad de equipos apropiados para la aplicación y la seguridad. (herramientas de buena calidad, tales como guantes, bombas, mezcladores, y canecas para el manejo del pesticida)
g) Riesgos agudos y de largo plazo, tanto humanos como medioambientales, asociados con el uso propuesto y medidas disponibles para minimizar tales peligros
h) Efectividad del pesticida para el uso propuesto
i) Compatibilidad del pesticida propuesto con los ecosistemas naturales bien sean o no el objetivo principal
j) Condiciones bajo las cuales se va a usar el pesticida, incluyendo clima, flora, fauna, geografía, hidrología, y suelos
k) Disponibilidad y efectividad de otros pesticidas o métodos no químicos de control
l) Programa de aplicación: personal, sitios, dosis, horarios, etc.:

Aplicar solo bajo condiciones favorables de viento y lluvia, uso de boquillas de baja descarga, disponer de materiales para limpieza, asegurar el lavado de los trabajadores al terminar la aplicación, asegurar la buena disposición de los empaques, requerir el uso de guantes y protectores para los ojos, evitar la fumigación a plantas que no son objeto del programa.
m) Previsiones sobre aislamiento de zonas de reserva (por ejemplo Distancia a los cuerpos de agua)
n) Previsiones para entrenamiento de usuarios y aplicadores: manejo, preparación y aplicación, uso del equipo de aplicación, calibración de los equipos, uso de boquillas, uso de ropa y otros elementos de protección, características del producto, síntomas de envenenamiento y precauciones de seguridad, procedimientos de emergencia, manejo de informes, uso de los equipos de emergencia
o) Plan y equipos de seguridad disponibles: Proveer y verificar el uso de elementos de protección para aplicadores y preparadores, uso de pantalón y camisa de manga larga, zapatos, medias, protección para los ojos, guantes impermeables
p) Disponibilidad de Kits de emergencia en los sitios de almacenamiento y aplicación (Contenido)
q) Plan para el transporte y almacenamiento: evitando contacto con alimentos, áreas separadas de almacenamiento, control de acceso, buena ventilación, avisos de emergencia, lejos de comida para animales y de materiales inflamables, buena marcación, almacenamiento en las cajas originales cerradas.
r) Previsiones para monitorear el uso y efectividad del pesticida

6) Decisión ambiental recomendada:

	Los impactos ambientales pueden ser eliminados o reducidos a niveles aceptables a través de las medidas de mitigación de impacto previstas y convenidas en esta evaluación; el proyecto puede continuar
	Los impactos ambientales significativos son probables y requieren un estudio ambiental adicional; se preparara una Evaluación Ambiental del Proyecto
	Los impactos ambientales son probables y requieren revisiones en la localidad del proyecto o en el diseño o el desarrollo de nuevas alternativas

	Los impactos ambientales son probables y la mitigación y las nuevas alternativas no son factibles; el proyecto será abandonado

7) Documentación anexada

Ejemplo: licencia ambiental, etiquetas, manuales de aplicación, estudios ambientales existentes, etc.

Revisión realizada por:

CAD PERSUAP

Sub-Section 5.6:

Photos

(CAD Project areas & PERSUAP process)

Section 5.6: Photos

Photo 1. Pests and pesticides consultation workshop with CAD operators in Cúcuta, Norte de Santander, July 2003.

Photo 2. Pests and pesticides consultation workshop with CAD operators in Puerto Asís, Putumayo, August 2003.

Photo 3. A CAD-El Semillero-Conif tree nursery in Putumayo.

Photo 4. 'Agroamazonía's heart of palm field in Putumayo.

Photo 5. Composting at 'Agroamazonía', a heart of palm enterprise in Putumayo.

Photo 6. Entrance to one of the pesticides stores in Puerto Asís, Putumayo.

Photo 7. The pesticide store attendant and her daughter. Puerto Asís, Putumayo.

Photo 8. The young mother and her daughter would spend the day inside the pesticide store, in Puerto Asís, Putumayo.

CAD PERSUAP

Sub-Section 5.7:

Literature References and Useful Web Sites

Section 5.7
Colombia Alternative Development Project (CAD)
Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP)

REFERENCIAS BIBLIOGRÁFICAS

Algodón:

Lobatón G., V. 2000. El control etológico en el manejo integrado de plagas del algodonero en Colombia. Boletín de Sanidad Vegetal No.29: 49-54.

Arroz:

Pantoja, A. et al. 1997. MIP en Arroz: Artrópodos, Enfermedades y Malezas. CIAT, Fedearroz, Fundación Polar, y FLAR.

Meneses C, R. et al. 2001. Guía para el Trabajo de Campo en el Manejo Integrado de Plagas del Arroz. CIAT.

Cacao:

Consultoría SA. 2003. EIA para el Proyecto Cacao.

Frison, E.A. and E. Feliu. (eds). 1989. FAO/IBPGR Technical Guidelines for the Safe Movement of Cocoa Germplasm. FAO / IBPGR, Rome.

Café:

Bustillo P., A.E. 2000. Utilización del control biológico clásico en un programa de manejo integrado: el caso de la broca del café, *Hypothenemus hampei*, en Colombia. Boletín de Sanidad Vegetal No.29: 37-48.

MA / SAC / FEDEPALMA. 2002. Guía Ambiental para el subsector de Cafetero. Ministerio del Medio Ambiente, Sociedad de Agricultores de Colombia y Federación Nacional de Cafeteros de Colombia.

Valenzuela, G., A. Gómez, C.J. Ramírez, y R.G. Ruíz. 1985. Manejo y control integrado de malezas en cafetales y potreros de la zona cafetera. FNCC, CNIC, CENICAFE.

Caucho:

CAEMA. 2003. EIA para el Proyecto Caucho.

Ramírez C., L.A. 1998. Algunas enfermedades del caucho (*Hevea*). Boletín de Protección Vegetal No.3. CONIF

Villegas G., C. 1998. Reconocimiento de enfermedades en el cultivo del caucho en la zona Central cefetera. Páginas 38-38: Boletín de Protección Vegetal No.3. CONIF

Forestal y Agroforestal:

Amaya N. M. 1999. Aspectos biológicos, ecológicos y potencialidades de *Trichogramma* spp. Como agente de control biológico en forestales. Páginas 30-33: Boletín de Protección Vegetal No.5. CONIF.

Arguedas, M. 2000. Problemas fitosanitarios en semillas forestales. Páginas 3-18: Boletín de Protección Vegetal No.6. CONIF.

Arguedas, M. 2000. Problemas fitosanitarios en viveros forestales. Páginas 19-29: Boletín de Protección Vegetal No.6. CONIF.

CONIF. 2002. Manual de Viveros Forestales. Serie de Divulgación No.45, Mayo 2002.

CONIF. 1999. Boletín de Protección Vegetal. Diciembre 1999.

CONIF. 1998. Boletín de Protección Vegetal. Diciembre 1998.

CONIF. 1997. Guía de Insectos Dañinos en Plantaciones Forestales.

CONIF. 1996. Boletín de Protección Vegetal. Diciembre 1996.

Diekmann, M., J.R. Sutherland, D.C. Nowell, F.J. Morales and G. Allard. 2002. *Pinus* spp. FAO/IPGRI Technical Guidelines for the Safe Movement of Germplasm, No.21. FAO / IPGRI, Rome.

Estudios y Asesorías. 2002. EIA para el Proyecto Agropastoral de Anamichú.
INDERENA. S/f. Recomendaciones Preliminares para el Control de Afidos en Ciprés (*Cupressus lusitanica*).

Laranjeiro, A.J. 2000. Manejo de hormigas cortadoras en bosques plantados. Páginas 34-43: Boletín de Protección Vegetal No.6. CONIF.

Madrigal, A. 1996. Plagas de importancia potencial para la reforestación con pinos. Página 11-18: Boletín de Protección Vegetal No.1. CONIF.

Majía, A.E. 1999. Experiencia en manejo integrado de plagas (Caso: Refocosta S.A.). Páginas 41-48: Boletín de Protección Vegetal No.5. CONIF.

Moreno B., H. 1998. Publicaciones y tesis recientes sobre enfermedades forestales. Páginas 53-55: Boletín de Protección Vegetal No.3. CONIF.

Moreno B., H. 1999. Publicaciones recientes sobre sanidad forestal. Páginas 50-51: Boletín de Protección Vegetal No.4. CONIF.

Moreno B., H. 1999. Publicaciones y tesis recientes sobre sanidad forestal. Páginas 49-51: Boletín de Protección Vegetal No.5. CONIF.

Moreno B., H. 2000. Publicaciones y tesis recientes sobre sanidad forestal. Páginas 50-51: Boletín de Protección Vegetal No.6. CONIF.

Moreno B., H. 2002. Publicaciones y tesis recientes sobre sanidad forestal. Páginas 37-39: Boletín de Protección Vegetal No.7. CONIF.

Moreno B., H. 2000. Red de diagnóstico y control de plagas y enfermedades. Páginas 44-47: Boletín de Protección Vegetal No.6. CONIF.

Moreno B., H. y E. Blandón T. 2002. Insectos dañinos asociados a plantaciones de roble y alisio en los departamentos de Magdalena, Córdoba y Cladas. Páginas 28-32: Boletín de Protección Vegetal No.7. CONIF.

Ortíz B., R., L.A. Sánchez Guillen, y J.A. Morales. 2000. Base de datos PPF-Biblio en Internet. Páginas 48-49: Boletín de Protección Vegetal No.6. CONIF.

Orozco, J.C. 1986. Determinación y Contról de las Principales Enfermedades que Afectan Viveros y Plantaciones Generales en Colombia. INDERENA.

Pinzón F., O.P. 1997. Guía de Insectos Dañinos en Plantaciones Forestales. Prograna de Protección Forestal, CONIF.

Pinzón F., O.P. 1996. Plagas forestales en Colombia. Paginas 5-10: Boletín de Protección Vegetal No.1. CONIF.

Pinzón F., O.P. 1996. Diagnóstico de plagas y enfermedades forestales; recomendaciones para la toma de muestras. Paginas 39-48: Boletín de Protección Vegetal No.1. CONIF.

Pinzón F., O.P. 2002. Efectividad de hongos entomopatógenos sobre primeros instares ninfales de *Planudes cortex* Herbard. Páginas 3-14: Boletín de Protección Vegetal No.7. CONIF.

Pinzón F., O.P. y H. Moreno B. 1998. Entomofauna asociada a plantaciones forestales en Colombia. Paginas 3-29: Boletín de Protección Vegetal No.3. CONIF.

Pinzón F., O.P. y H. Moreno B. 2000. Daños e insectos asociados a plantaciones de Teca en el Municipio de Canalete, Córdoba. Páginas 30-33: Boletín de Protección Vegetal No.6. CONIF.

Pinzón F., O.P., H. Moreno B., y E. Blandón T. 1999. Observaciones biológicas sobre *Planudes cortex* (Plasmida: Pseudoplasmatidae). Paginas 3-10: Boletín de Protección Vegetal No.4. CONIF.

Pinzón, O.P. y H. Moreno B. 1999. Problemas fitosanitarios de *Tectona grandis* y *Gmelina arborea*: Una revisión. Paginas 11-16: Boletín de Protección Vegetal No.4. CONIF.

Pinzón, O.P., H. Moreno B., y M. Avila Z. 1999. Entomofauna dañina en *Tectona grandis* y *Gmelina arborea* en la región del Caribe. Paginas 3-22: Boletín de Protección Vegetal No.5. CONIF.

Quevedo, T. 2002. Nueva enfermedad para Coníferas en Colmbia. Páginas 33-36: Boletín de Protección Vegetal No.7. CONIF.

Ramírez C., L. A. 1997. Guía de Enfermedades en Plantaciones Forestales. Prograna de Protección Forestal, CONIF.

Rodríguez M., M.A. 1996. Estrategias y métodos para el control de plagas; caso Monterrey Forestal Ltda. Páginas 19-38: Boletín de Protección Vegetal No.1. CONIF.

Rodríguez S., D.A. 2002. Los entomopatógenos, posibles auxiliares en el manejo de poblaciones de insectos plagas en forestales. Páginas 3-14: Boletín de Protección Vegetal No.7. CONIF.

Sousa, N.J. 1999. Depredadores como agentes de control biológico: aspectos biológicos y ecológicos. Páginas 23-26: Boletín de Protección Vegetal No.5. CONIF.

Sousa, N.J. 1999. Parasitoides como agentes de control biológico: aspectos biológicos y ecológicos. Páginas 27-29: Boletín de Protección Vegetal No.5. CONIF.

Sousa, N.J. 1999. Aspectos biológicos y ecológicos de microorganismos. Páginas 34-40: Boletín de Protección Vegetal No.5. CONIF.

Suárez A., A. 2002. Cuarentenas y estrategias de prevención de entrada de enfermedades y plagas al país. Páginas 23-27: Boletín de Protección Vegetal No.7. CONIF.

Trujillo-Navarrete, Enrique. S/f. Manejo de Semillas, Viveros y Plantación Inicial. ACE Printer, Bogotá, Colombia.

Hortalizas:

Cancelado S., R.E. 2000. Manejo integrado de plagas de tomate. Boletín de Sanidad Vegetal No.29: 14-21.

Méndez A., J. 2003. Guía para la Instalación y Manejo de la Huerta. Páginas 37-46: Control Biológico en la Huerta.

Leguminosas (fríjol, soya):

Frison, E.A., L. Bos, R.I. Hamilton, S.B. Mathur, and J.D. Taylor. (eds). 1990. FAO/IBPGR Technical Guidelines for the Safe Movement of Legume Germplasm. FAO / IBPGR, Rome.

Maracuyá:

Estudios y Asesorías. 2002. EIA para el Proyecto Maracuyá.

Ruggiero, C. 1991. A Cultura do Maracujá No Brasil. Fotocopia en Chemonics.

Ruggiero, C. et al. 1998. Simpósio Brasileiro sobre a Cultura do Maracujazeiro. Anais do 5o. Simpósio. FAPESP. (Fotocopia en Chemonics).

SIESA. S/f. Based dedatos en computador central de Chemonics, Bogotá.

Medio Ambiental en General:

Bingham, C., W. Knausenberger, and W. Fisher. 1999. Environmental Documentation Manual. For PL 480 Title II Co-operating Sponsors Implementing Food-Aided Development Programs. USAID/BFA/OSD and BHR/FFP. FAM/EWG, Second Edition, February 1999.

Burpee, G., P. Harrigan, and T. Remington. 2000. A Co-operating Sponsor's Field Guide to USAID Environmental Compliance Procedures. Second Edition. February 2000. CRS and FAM.

MIP en General:

Forero, R. 2002. Desarrollo Económico y Social de Colombia, Educación, Agricultura Ecológica Ecuatorial y Seguridad Alimenticia. Mimeo, 22 páginas.

ICA. 1999. Bases Tecnológicas del MIP. Boletín de Sanidad Vegetal 25.

ICA. 2000. Manejo de Plagas con Tecnología MIP. Boletín de Sanidad Vegetal 29.

IICA. 2003. Guías de Agricultura Ecológica, Vol. 1 y 2.

IICA. 2003. Video sobre Agricultura Ecológica.

Moreno B. y R. Ortíz B. 1998. Las bases de datos como herramienta en la protección vegetal. Páginas 30-34: Boletín de Protección Vegetal No.3. CONIF

Mowbray, D. 1996. Manejo Integrado de Plagas al Servicio de los Pequeños Campesinos Colombianos.

Stoll, G. 2000. Natural Crop Protection in the Tropics: Letting Information come to Life. Margraf Verlag.

Musaceas:

Frison, E.A. and C.A.J. Putter. (eds). 1989. FAO/IBPGR Technical Guidelines for the Safe Movement of *Musa* Germplasm. FAO / IBPGR, Rome.

Palma de Aceite:

CAEMA. 2002. EIA para el Proyecto de Palma Africana.

Cenipalma. 2002. Plagas de la plama de aceite en Colombia. Cenipalma, Fedepalma, Fondo de Fomento Palmero.

Cenipalma. 2002. Manejo integrado de plagas en palma de aceite. Curso Nacional, Cenipalma, Fonade, Marzo 2002.

Cenipalma. 2002. Biología, hábitos y manejo de *Cyparissius (Castnia) aedalus* Cramer. Barrenador gigante de la palma. Cenipalma, Fonade, Sena, Boletín Técnico No. 15. Septiembre 2002.

Cenipalma. 2002. Manejo de *Leptopharsa gibbicarina* Froeschner, insecto inductor de la Pestalotiopsis. Cenipalma, Fonade, Sena, Boletín Técnico No. 16. Septiembre 2002.

MA / SAC / FEDEPALMA. 2002. Guía Ambiental para el subsector de la Agroindustria de la Palma de Aceite. Ministerio del Medio Ambiente, Sociedad de Agricultores de Colombia y Federación Nacional de Cultivadores de Palma de Aceite.

Palmito:

Moreno B., H. 1998. Plagas y enfermedades más frecuentes del chontaduro. Páginas 40-52: Boletín de Protección Vegetal No.3. CONIF.

Trés Elementos. 2002. EIA del Proyecto Palmito.

SIESA. S/f. Based dedatos en computador central de Chemonics, Bogotá.

Papa:

Castaño Z., J. 2000. Epidemiología como base de programas MIP en tizón tardío de la papa . Boletín de Sanidad Vegetal No.29: 30-36.

Jeffries, C.J. 1998. Potato. FAO/IPGRI Technical Guidelines for the Safe Movement of Germplasm, No. 19. FAO / IPGRI, Rome.

Mora M., J.C. 2000. El control etológico en el cultivo de la papa. Boletín de Sanidad Vegetal No.29: 55-58.

Palacios, M., J. Alcázar, O. Ortíz. 2000. Manejo integrado de plagas con énfasis en el control del gusano blanco. Boletín de Sanidad Vegetal No.29: 22-29.

Torres W., F. 2000. Manejo integrado de la polilla de la papa *Tecia solanivora* en Venezuela. Boletín de Sanidad Vegetal No.29: 5- 13.

Plaguicidas:

Embajada de los EE.UU. y Clínica de Toxicología "Uribe Cualla". 2001. Supuestos efectos del glifosato en la salud humana. Bogotá, Colombia, Diciembre de 2001.

FUNDAFLOR y CORNARE. 1995. Saneamiento Básico en Cultivos de Flores: Módulo 3: Plaguicidas y Salúd Ocupacional: Guía Práctica. Fundación de Productores de Flores de Corte bajo Invernadero y Corporación Autónoma Regional Río Negro-Naré.

Guarín M., J.V. 1999. Diagnóstico de las Condiciones de Trabajo y Salud en las Empresas que Comercializan y Utulizan Plaguicidas en el Área de Competencia del Hospital Engativa. Fondo Financiero Distrital de Salud, Bogotá.

Gobierno de Colombia. 1979. Ley 09 de 1979, "por la cual se … colocar texto…"

Gobierno de Colombia. 1993. Ley 99 de 1993, "por la cual se crea el Ministerio del Medio Ambiente …""

Gobierno de Colombia. 2002. Decreto 1728 de 2002, "por la cual se reglamenta el Título VIII de la Ley 99 de 1993 sobre la Licencia Ambiental."

HC Ediciones. 2003. Diccionario HC Agropecuario: Vademecum de Productos Agropecuarios. Edición 14, 2003-2004.

ICA. 2003. Productos Registrados. Sitio Web del Instituto Colombiano Agropecuario, Regulación y Control de Plaguicidas Químicos.

Ramos A., A. 2002. Uso Seguro y Eficáz de Productos Fitosanitarios. Agrovida / Bayer CropScience

Sanchez S., J.E. 2000. Uso de agroquímicos en la producción de flores bajo invernadero en Colombia: Impactos ambientales y en la salud de los trabajadores. Aconteceres Entomológicos 2000.

SENA y ANDI. 2001. Manual de Instructores para Entrenamiento de Agricultores y Extensionistas en el Uso Seguro y Eficás de Plaguicidas. Convenio ANDI-SENA. Mayo 2001.

SENA y ANDI. 2002. Memorias: Uso Adecuado y Eficáz de Productos para la Producción de Cultivos. Convenio ANDI-SENA. Tercera Edición, octubre 2002.

SENA y ANDI. 2002. ¿Cómo transportar de manera segura los productos para la protección de cultivos a la finca? Convenio ANDI-SENA, Tercera Edición, octubre de 2002.

SENA y ANDI. 2002. ¿Cómo hacer el mantenimiento, limpieza y calibración de su bomba de espalda? Convenio ANDI-SENA, Tercera Edición, octubre de 2002.

SENA y ANDI. 2002. ¿Cómo hacer de manera segura la aplicación de productos para la protección de cultivos con bomba de espalda? Convenio ANDI-SENA, Tercera Edición, octubre de 2002.

Roedores:
Valencia G., D. 2000. Manejo integrado de roedores en cultivos agrícolas. Boletín de Sanidad Vegetal No.29: 59-64.

Vainilla:
El Cultivo Orgánico de la Vainilla. Mimeo S/f y sin autor.

Pearson, M.N., G.V.H. Jackson, F.W. Zettler, E.A. Frison. (eds). 1991. FAO/IBPGR Technical Guidelines for the Safe Movement of Vanilla Germplasm. FAO / IBPGR, Rome.

Yuca:
Arias, B., C.J. Herrera, A.C. Bellotti, y G.L. Hernandez. 2001. Plegable Técnico: Control biológico y microbiológico del gusano cachón de la yuca (*Erinnys ello*). MAyDR-Colombia / CIAT / BioCaribe S.A.

Bellotti, A.C., L.Smith, and S.L. Lapinte. 1999. Recent advances in cassava pest management. Annu. Rev. Entomolo. 44:343-70.

Bellotti, A. C. 2001. Arthropod Pests and IPM. IN: Cassava: Biology, Production and Utilization, R.J. Hillocks and J.M. Thresh (eds). CABI Publishing.

CIAT, UMATA, FIDAR, Universidad Nacional. 1998. Plegable Técnico: Pudrición Radical y Marchitez de la Yuca.

Corpoica, MAyDR, CIAT. 2002. Plegable Técnico: NATAIMA-31: Variedad de yuca (*Manihot esculenta* Crantz) resistente a lamosca blanca (*Aleurotrachelus socialis* Bondar) para el Valle Cálido del Alto Magdalena.

Estudios y Asesorías. 2002. EIA para el Proyecto Yuca.

Frison, E.A. and E. Feliu. (eds.) 1991. FAO/IBPGR Technical Guidelines for the Safe Movement of Cassava Germplasm. FAO and IBPGR, Rome.

Hillocks, R.J. and K. Wydra. 2001. Bacterial, Fungal and Nematode Diseases. IN: Cassava: Biology, Production and Utilization, R.J. Hillocks and J.M. Thresh (eds). CABI Publishing.

Ospina, B. y H. Ceballos. (eds) 2002. La Yuca en el Tercer Milenio: Sistemas Modernos de Producción, Procesamiento, Utilización y Comercialización. CIAT / CLAYUCA / MAyDR-Colombia / FENAVI. Páginas 131-268: Parte C: Manejo de Enfermedades y Plagas.

Ospina, B. y H. Ceballos. (eds) 2002. Guía Práctica para el Manejo de las Enfermedades, las Plagas y las Deficiencias Nutricionales de la Yuca. Varios autores. CIAT / CLAYUCA / MAyDR-Colombia / FENAVI.

Section 5.7
Colombia Alternative Development Project (CAD) - Chemonics
Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP)
SITIOS WEB DE UTILIDAD

Plaguicidas

Asociación Nacional de Industriales (ANDI): www.andi.com.co:

- *Cámaras Sectoriales* /
  - *Industrias para la Protección de Cultivos*
    - Documentos de la industria de agro-químicos y nexos a las compañías miembros de la ANDI.

Environmental Protection Agency (EPA): Toda la información sobre el registro de los plaguicidas en los EE.UU. www.epa.gov/pesticides

- Bio-plaguicidas: www.epa.gov/pesticides/biopesticides/ingredients/index.htm
- Situación de re-registro: http://cfpub.epa.gov/oppref/rereg/status.efm
- Plaguicidas prohibidos: www.epa.gov/oppfead1/international/picklist.htm
- Plaguicidas en revisión especial: www.epa.gov/oppsrrd1/specialreview.htm
- Plaguciidas de use restringido: www.epa.gov/opprd001/rup/rupjun03.htm (al momento de hacer el PERSUAP, en agosto del 2003, actualizada a junio 2003)

Gobierno de Colombia. Ministerio de Justicia: http://bib/minijusticia.gov.co/biblioteca/consulta.htm. Decretos, leyes y reglamentos sobre plaguicidas.

Instituto Colombiano Agropecuario (ICA): Información de registro de plaguicidas químicos, bioinsumos, y empresas: www.ica.gov.co, "Servicios" – "Area Agrícola" – "Plaguicidas" o "Bioinsumos".

Organización Mundial de la Salud (OMS): Las clases toxicológicas y la lista de todos los plaguicidas clasificados por clase: www.who.int/pcs

Pesticide Action Network (PAN): Bases de datos con información toxicológica, ecotoxicológica, de registro y otros sobre los plaguicidas en los EE.UU. y en otros países: www.pesticideinfo.org/Index.html. Más especificamente,

- para ingredientes activos: www.pesticideinfo.org/Search_Chemicals.jsp, o
- para productos comerciales: www.pesticideinfo.org/Search_Products.jsp
- para los plaguicidas colombianos: www.pesticideinfo.org/Detail_Country.jsp?Country=Colombia
- para ecotoxicología: www.pesticideinfo.org/Search_Ecotoxicity.jsp

Programa de Naciones Unidas para el Medio Ambiente (PNUMA): Lista y descripción de los convenios internacionales relacionados a los plaguicidas: www.irptc.unep.ch

Consultoras en Medio Ambiente

Centro Andino para la Economía en el Medio Ambiente (CAEMA): www.andeancenter.com

Asistencia Técnica por Cultivos

Café:

ICA: Fichas Técnicas sobre Plagas de Café: www.ica.gov.co, luego ir a "Publicaciones" – "Fichas Técnicas: Plagas de Café" (en pdf).

Flores:

ICA: Manual Técnico: Plagas Exóticas a la Floricultura Colombiana (en pdf): www.ica.gov.co/publicaciones/plagas/index.htm, aunque también incluye plagas endémicas.

Forestal:

CONIF: www.conif.org.co. En Servicios / Biblioteca en linea / se entra a las bases de documento y referencias forestales de CATIE.

Yuca:

International Institute of Tropical Agriculture (IITA): MIP para yuca (insectos, enfermedades, malezas): www.iita.org/info/ipm/ipm.htm

Section 6:

Annexes

Sub-Section 6.1:

Acknowledgements

Annex 6.1
Acknowledgements

This PERSUAP was possible by the collaboration of many Colombians. They were a representative sample of a hard working nation that, in spite of their suffering during the past 50 years, continue to be, in many respects, at the forefront of Latin America. My hope is that this work, contributing to improve the health of a small group of Colombians and of a small piece of the Colombia environment, also helps them achieve improved and sustained living conditions.

My appreciation to the staff of Chemonics Colombia, mainly my counterparts, Juan Manuel Soto, William Ardila and Ruth Marcela Avendaño, for their kind support throughout the preparation of the PERSUAP. My recognition also goes to USAID staff, Gabriel Escobar, in Colombia, and Walter Kanusenberger and Brian Hirsch, in the Africa Bureau, for their support in various forms.

My thanks to many Colombian professionals, some of them friends for long time, for their support with information about pests, pesticides and IPM.

Mario Pareja
Consultant

CAD PERSUAP

Sub-Section 6.2:

Terms of Reference for the PERSUAP

Annex 6.2
Chemonics International Inc.
Colombia Alternative Development (CAD) Program
Terms of Reference for the Preparation of a Pesticide Evaluation Report and Safe Use Action Plan (PERSUAP)
June 6, 2003
Clin 4

Background

The Colombian Alternative Development (CAD) project assists USAID and the Government of Colombia to achieve the goal of improving licit opportunities for small producers in coca and poppy growing areas, which will result, over time, in abandonment of illicit crop cultivation and refusal by small farmers to plant new areas in coca and poppy. To this end, the CAD project operates in four thematic areas: (a) Strengthened National and Local Institutions, (b) Expanded Rural Social Infrastructure, (c) Expanded Licit Economic Opportunities, and (d) Improved Natural Resources/Environmental Management.

All USAID activities are subject to an environmental evaluation via, at minimum, an Initial Environmental Examination (IEE), and because of risk concerns presented by pesticides, the USAID environmental regulations require that at least the 12 factors outlined in the Pesticide Procedures (22CFR 216.3(b)(1)(i)(a-l)), including USEPA registration status, anticipated conditions of use, and other considerations, be addressed in the IEE for any program that includes assistance for the procurement or use of pesticides. For an evaluation of programs that have used, currently use or may use agrochemicals in the future, the preparation of what is termed a "Pesticide Evaluation Report and Safe Use Action Plan" (PERSUAP), must be produced. The PERSUAP is a document that covers the 12 Pesticide Procedures factors and focuses on the development of local-level risk mitigation actions. Further details about what to include in a PERSUAP are given below.

Local-level assessment in the form of a PERSUAP is needed for all USAID financed projects, where pesticides may be used. When the USEPA registers pesticides for use in the United States, it specifies the manner in which the product can be "safely" used (i.e., with an acceptably small risk), including safety equipment needed when applying the pesticide, how to apply it, the allowed uses, etc. But the context in which EPA makes these registration decisions is important to note. An extensive system of capabilities and resources exist in the United States that help give EPA confidence that these specifications will be followed and the product will be used appropriately. These include a 97% literacy rate meaning most of the population can read labels; close control by EPA over the content of the label; training requirements and programs for those pesticide products that require applicator certification; worker protection requirements; occupational safety regulations; and relatively effective federal, state and local enforcement mechanisms.

In allowing the use of certain pesticides in its Latin American programs, USAID cannot rely on the same societal capabilities and resources that the USEPA does to assure appropriate use of the product. The preparation of a PERSUAP gives a program manager

the opportunity to consider practical actions by which to reduce the risks of using pesticide products in a program, taking into consideration the context in which the products will be used, the particular elements of the program, and the different capacities of the partners involved.

It is the Environmental Management's responsibility, in each country, to guarantee that all productive projects minimize potentially negative impacts due to pesticide use, both on the people and their environment. Hence, a PERSUAP is required for the Colombian Alternative Development Program, to determine the possible impacts and prepare for preventive and corrective measures that need to be applied.

Purpose

The purpose of this assignment is to produce documentation and action plans that result in safe and economic agrochemical use for activities supported by CAD. Achieving this purpose requires the consultant to produce PERSUAPs for crop production, including but not limited to, cocoa, natural rubber, hearts of palm, African palm, cassava, maize, passion fruit, cut flowers, and vanilla. Additionally, the resulting PERSUAPs need to be of the quality necessary to receive approvals when submitted by CAD to USAID.

Tasks

The consultant shall undertake the following principal tasks:

1. Review relevant PERSUAP information in Washington, D.C.at AID, Chemonics International headquarters, and other international organizations, as necessary, where similar pesticide use information can be obtained, to gather examples and insight on the subject, prior to travel to Colombia. The Environmental Manager for CAD/Colombia and the Washington D.C. based CAD PMU will assist the consultant to acquire the necessary information and documentation to facilitate preparation of PERSUAPs that meet the required standards. As a minimum, the consultant will review the PERSUAP case studies previously approved by USAID, that refer to activities in Mozambique, Kenya, Nicaragua and Bolivia.
2. Schedule the production of PERSUAPS according to a work plan developed with and approved by CAD.
3. Follow the "Guidance for the development of a PERSUAP for ITM programs", contained in Appendix 1 of this TOR.
4. On an on-going basis as necessary, meet and travel with CAD staff (particularly the Natural Resource Management and the technical team members), and the USAID environment official to vet elements and issues of the PERSUAPs being developed; to obtain useful information regarding Colombian conditions, institutional framework, viable procedures and related national legal requirements; and to strategize regarding optimum mechanisms, necessary activities, and the best procedures to ensure the PERSUAPs meet environmental and human health standards while allowing the use of pesticides when essential.
5. Prepare and present PERSUAPs that meet USAID and project requirements.

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Deliverables

1. Prepare and submit a work plan within three work days after arrival in Colombia. CAD will review and discuss for approval within two days of submission.

2. Submit a brief (two page) weekly report that summarizes meetings held, information gathered and analyzed, advances made, and obstacles regarding the tasks to be carried out.

3. Provide at least three oral briefings, organized by CAD, regarding progress and challenges during the consultancy.

4. Submit draft PERSUAPS to CAD for review and comments no later than two weeks prior to departure from Colombia. CAD personnel will provide comments for possible revisions no later than one week after each draft PERSUAP has been received.

5. Approximately one week prior to departure, orally present findings and action plans to CAD and USAID.

6. Prior to departure from Colombia, submit written PERSUAPs in final form (electronically and in hard copy) to satisfy USAID and Chemonics approval requirements for the assigned projects/commodities.

Timing/Duration

The estimated LOE for this assignment is 48 work days (8 weeks) beginning on/about June 23 and finishing the assignment no later than August 30, 2003. Two to three work days shall be conducted in Washington, D.C. to complete task #1 prior to arrival in Colombia. It is estimated that a total of four travel days will be required. Six day work weeks (Saturdays) are permissible when in Colombia.

Locations

Washington, D.C., CAD project office in Bogotá, and occasional brief visits to regional cities and/or project sites. Upon approval of the work plan, CAD will request travel clearances for in-country travel.

Reporting

Under the overall guidance of the CAD Chief of Party, the consultant will report to the CAD Environmental Manager, Juan Manuel Soto, who will support and supervise the consultant's work.

Appendix 1

February 22, 2002

USAID/AFR guidance: preparing PERSUAPs for pesticide programs in Africa

Overview of review requirements

All USAID activities are subject to evaluation via, at minimum, an Initial Environmental Examination (IEE). And because of risk concerns presented by pesticides, the USAID environmental regulations require that at least the 12 factors outlined in the Pesticide Procedures described in 22 CFR 216.3 (b)(1)(i) (a through l) be addressed in the IEE for any program that includes assistance for the procurement or use of pesticides. The Africa Bureau asks that these factors be examined in a particular type of document, termed a "Pesticide Evaluation Report and Safer Use Action Plan" (PERSUAP), which is submitted as an attachment to the IEE. (Note: the IEE itself can be very brief, with the analytical work contained in the attached PERSUAP.) The PERSUAP focuses on the particular circumstances of the program in question, the risk management choices available, and how a risk management plan would be implemented in the field. Further details about what to include in a PERSUAP are given below.

Why is a local-level assessment such as a PERSUAP needed for USAID pesticide programs? To help in understanding the utility, consider the U.S. system for promoting pesticide safety. When the USEPA registers pesticides for use in the United States, it specifies the manner in which the product can be "safely" used (i.e., with an acceptably small risk), including safety equipment needed when applying the pesticide, how to apply it, the allowed uses, etc. But the context in which EPA makes these registration decisions is important to note. An extensive system of capabilities and resources exist in this country that help give EPA confidence these specifications will be followed and the product will be used appropriately. These include a 97% literacy rate meaning most of the population can read labels; close control by EPA over the content of the label; training requirements and programs for those pesticide products that require applicator certification; worker protection requirements; occupational safety regulations; and relatively effective federal, state and local enforcement mechanisms. In allowing the use of certain pesticides in its African programs, USAID cannot rely on the same societal capabilities and resources that the USEPA does to assure appropriate use of the product. The preparation of a PERSUAP gives a program manager the opportunity to consider practical actions by which to reduce the risks of using pesticide products in a program, taking into consideration the context in which the products will be used, the particular elements of the program, and the different capacities of the partners involved.

Who prepares a PERSUAP?

Program managers are generally responsible for assuring that environmental review requirements for their programs are met, including PERSUAPs. As for all environmental reviews, guidance and assistance for PERSUAPs is available from the the appropriate Mission Environmental Officer (MEO), Regional Environmental Officer (REO), the Africa Bureau Environmental Officer (BEO), or the BEO/DCHA if Title II (PL 480) funds are involved.. Considerable reference materials, as well as examples of other PERSUAPs, are available through these contacts, or directly from the Africa Bureau's ENCAP program website, www.encapafrica.org.

Components of an activity-level PERSUAP

A PERSUAP basically consists of two parts, a "PER" and a "SUAP." The Pesticide Evaluation Report (PER) section addresses the 12 informational elements required in the Agency's Pesticide Procedures. The Safer Use Action Plan (SUAP) puts the conclusions reached in the PER into a plan of action, including assignment of responsibility to appropriate parties connected with the pesticide program.

Below are three annexes which further elaborate the content needed in a PERSUAP:

*1. **Detailed guidance for developing a Pesticide Evaluation Report**:* provides detailed guidance on the information that should be provided in the Pesticide Evaluation Report, following the 12 informational elements required by the Pesticide Procedures section of USAID's environmental regulations.

2. ***Representative Elements for a Safer Use Action Plan***: Describes the elements needed in a plan that takes action to assure issues resolved in the Pesticide Evaluation Report are resolved in the implementation of the development program being reviewed.

*3. "**A Practical Guide To Reducing Pesticide Risks in Development Projects**":* This brief guide was prepared by staff of the UNFAO, and provides a useful list of problems to watch for as well as practical responses. USAID programs using pesticides would do well to use this guide as a checklist to look for problems and as a source of inspiration for ways to deal with those problems.

Annex 1: Detailed guidance for the development of a Pesticide Evaluation Report

USAID "Pesticide Procedures" Element and Description (from USAID Pest Management Guidelines, 1991)	Specific Guidance for Pesticide PERSUAP
a. **USEPA registration status of the proposed pesticide.** Pesticides are registered in the U.S. by active ingredient and by formulation. "Registration status" possibilities of the active ingredients and the formulated products include registered, never registered, and cancelled.	In the PERSUAP: *Identify the registration status in the U.S. and in the host country. Identify the formulated pesticide product to be used.* USAID is effectively limited to using pesticide active ingredients registered in the U.S. by the U.S. Environmental Protection Agency for the same or similar uses. Other pesticides not registered in the U.S. may be authorized, but only if the USAID program can show that no alternatives are not available, as required under USAID Pest Management Guidelines for the use on non-U.S. registered pesticides. Host country pesticide registration procedures must also be identified and followed.
b. **Basis for selection of the pesticide**: This refers to the economic and environmental rationale for choosing a particular pesticide. In general, the least toxic pesticide that is effective is selected.	In the PERSUAP: *Explain the basis for selection of the pesticide product to be used, including active ingredient and formulation.* Pesticide product selection may be driven by a number of factors, including efficacy, price, availability, safety, etc. All things being equal, a program should choose the pesticide active ingredient and formulation that presents the least overall risk. Formulation is a key determinant of toxicity, and should be considered in selecting a particular pesticide product. Formulation can also have an impact on exposure; for example, solid formulations can eliminate the potential for poisoning through accidental exposure to concentrated liquid product. Packaging can have a significant impact on exposure potential. Large containers necessarily introduce hazardous product transfer steps, as well as the possibility that the product will end up in a smaller, poorly labeled container. Smaller

	containers are generally better for use in USAID programs.
c. **Extent to which the proposed pesticide use is, or could be, part of an IPM program**: USAID policy promotes the development and use of integrated approaches to pest management whenever possible. This section discusses the extent to which the proposed pesticide use is incorporated into an overall IPM strategy.	In the PERSUAP: *Describe the extent to which the proposed product(s) is/are or could be a part of an IPM program. Describe the connection between the USAID activity and regional, national and local control programs (as appropriate).* Integrated pest management, and its public health counterpart, integrated vector management, is USAID policy because it is the most effective, economical, and safest approach to pest control. "Integrated pest management attempts to control pests in an economically and environmentally rational manner; it emphasizes non-chemical tactics which cause minimal disruption to the ecosystem."[88] USAID programs should assure that the choice of pesticides was made after consideration of other pest management options available, and that this is the most effective and environmentally sound option available.
d. **Proposed method or methods of application, including the availability of application and safety equipment**: This section examines in detail how the pesticide is to be applied and the measures to be taken to ensure its safe use.	In the PERSUAP: *As stated, describe in detail how the pesticide is to be applied and the measures to be taken to ensure its safe use.*
e. **Any acute and long-term toxicological hazards, either human or environmental, associated with the proposed use, and measures available to minimize such hazards**: This section of the IEE examines the acute and chronic toxicological data	In the PERSUAP: *Describe measures the program will take to reduce the potential for exposing humans or nontarget organisms to selected pesticides. Also describe monitoring measures that will allow the program to identify problems with users applying other pesticides.* **It is recommended that this be the key section of the PERSUAP, in which the**

[88] USAID. 1990. Integrated Pest Management: A.I.D Policy and Implementation.

associated with the proposed pesticide. In addition to hazards, this section of the IEE also discusses measures designed to mitigate any identified toxicological hazards, such as training of applicators, use of protective clothing, and proper storage.	**majority, or perhaps all, of the planned mitigation measures are described.** To address this element, the PERSUAP should summarize the toxicity to humans and other non-target organisms of the pesticide products chosen for the program in question, the potential exposure opportunities presented by those products, and the risk reduction actions the program will take to minimize such exposure opportunities. The risk reduction actions should be described in sufficient detail to show that they are indeed workable solutions. If protective clothing is recommended, for example, assurance should be provided that a sustainable source of such protective clothing has been identified, a schedule for its replacement, training in its use, etc.
f. **Effectiveness of the requested pesticide for the proposed use**: This section of the PERSUAP requires information similar to that provided in item b, but more specific to the actual conditions of application. This section also considers the potential for the development of pest resistance to the proposed insecticide.	In the PERSUAP: *Explain what recommendations or evidence suggests that the ITM products proposed are effective in the program area.*
g. **Compatibility of the proposed pesticide use with target and non-target ecosystems**: This section examines the potential effect of the pesticide on organisms other than the target pest (for example, the effect on bee colonies kept in the area). Non-target species of concern also include birds and fish. The potential for negative impact on non-target species should be assessed and appropriate steps	In the PERSUAP: *Describe efforts that are being made to minimize environmental exposure to pesticide products.* This section should address the toxicity of the products and the environmental risk mitigation measures that the program will take. The key options for environmental risk mitigation are product choice and exposure reduction. In this section, therefore, describe the relative environmental risk of the product chosen versus the other options. Also describe efforts the program will make to reduce exposure of the environment, through choice of pesticide product and packaging, preparation of educational materials, training, etc.

should be identified to mitigate adverse impacts.	This question might also be covered in response to question (e), and if so, simply reference that section without repeating it.
h. **Conditions under which the pesticide is to be used, including climate, flora, fauna, geography, hydrology, and soils**: This section examines issues such as the potential for contamination of surface and groundwater sources.	In the PERSUAP: *Describe the environmental conditions under which the pesticide is to be used, identifying any environmental factors that might be particularly sensitive or subject to contamination from re-treatment operations.* This item refers to particular environmental factors that might accentuate the effects of exposure to pesticides, and the potential need for measures to reduce those risks. Examples of special conditions that need to be noted here include sensitive ecosystems in the project area and superficial groundwater tables.

i. **Availability of other pesticides or non-chemical control methods**: This section identifies other options for control of pests and their relative advantages and disadvantages.	In the PERSUAP*: Describe other pest management options being pursued in the geographic area of the activity, either as part of the USAID activity or otherwise, and explain why this particular vector control method was chosen over other available options.*
j. **Host country's ability to regulate or control the distribution, storage, use, and disposal of the requested pesticide**: This section examines the host country's existing infrastructure and human resources for managing the use of the proposed pesticide. If the host country's ability to regulate pesticides is inadequate, the proposed action could result in greater harm to the environment.	In the PERSUAP: *Summarize the host country's capacity and structure for the regulation of public health and agricultural pesticides. Identify the approval/registration status of the pesticide product in the host country.* The host country's capacity and structure for the regulation of public health and agricultural pesticides should be summarized. A critical issue for a pesticide activity supported by the Agency is the extent to which the host country's regulatory oversight will help to control distribution, storage, use and disposal of the pesticide products in question. USAID activities should always be in compliance with local environmental and public laws and regulations, but that is not necessarily enough. If host country regulatory systems and institutions are not sufficient to give a reasonable expectation that environmentally sound practices will be enforced, USAID still bears responsibility for assuring environmental protection at each of these steps in the pesticide life cycle. Government oversight over pesticides is important for controlling the quality of products as well as their environmentally-sound use and disposal. USAID programs of substantial size should generally include an element of capacity-building work with host country institutions that govern public health pesticide use. These measures should be identified in this chapter of the PERSUAP.
k. **Provision for training of users and applicators**: USAID recognizes that safety training is an essential component in programs involving the use of pesticides.	In the PERSUAP: *Describe the provisions made to train and educate those who will be using the pesticides.*

The need for thorough training is particularly acute in developing countries, where the level of education of applicators may typically be lower than in developed countries.	
l. **Provision made for monitoring the use and effectiveness of this pesticide**: Evaluating the risks and benefits of pesticide use should be an ongoing, dynamic process.	In the PERSUAP: *Describe monitoring and evaluation programs for pesticide use activities, and the health and environmental safety-related information that is collected via this M and E capacity.* Monitoring programs should actively investigate, to the extent possible, the following issues: • Effectiveness of Information, Education and Communication materials and activities in promoting safe handling, use and disposal of pesticide products. • Adverse health and environmental effects and the frequency and severity with which they occur. • Quality control of pesticide products. • Effectiveness of the chosen products and their alternatives, including whether or not resistance is developing. • Safe and effective pesticide use and handling practices by program staff and end users.

Annex 2: Representative Elements for Pesticide Safer Use Action Plan

A pesticide safe use action plan should:

- **Be programmatically linked to national pesticide registration and pest management programs**

- **Ensure formal national registration of pesticides**
  - Establish pesticide quality standards and control procedures
  - Provide for enforcement
  - Require good packaging and clear and adequate labeling

- **Define and assure safe use practices**
  - Identify pesticides appropriate for use, selecting the least toxic insecticides and formulations possible, and considering non-pesticide alternatives.
  - Define appropriate methods of pesticide handling, storage, transport, use and disposal.

- Assure accessibility of protective clothing and equipment needed.
  - Training, development and distribution of appropriate information, education and communication
  - Specific IEC messages, along with sale and treatment, regarding the proper handling, use, disposal of pesticides, and related waste, at the distribution, storage, handling, use, disposal stages, at all levels, but especially at the village and household levels.

- **Emphasize operational research & monitoring & evaluation**: Roles of key actors
  - Quality control of insecticide(s)
  - Research on alternative insecticides and effectiveness under local conditions
  - Mosquito susceptibility to insecticide(s) of choice
  - Safe and effective use of insecticide by parties at all levels

- **Identify Roles and Responsibilities**:
  - Public Sector: coordination, regulatory oversight and management, defining environmental responsibilities, and others
  - Commercial Private Sector
  - Non-profit private sector, PVOs, NGOs

- **Integrate Mitigation Measures**, for example:
  - Choice of USEPA-recommended pesticides
  - Avoid disposal of treatment solution in bodies of water
  - Avoid washing application equipment where the residues would impinge on bodies of water
  - For bulk pesticides, provisions for spill prevention and clean-up

- **Disposal provisions for used pesticide containers**

Annex 3: A Practical Guide To Reducing Pesticide Risks in Development Projects[89]

Basic principle of risk reduction: risk must be evaluated in the local conditions of the project or activity.

1) Some common errors

- Pesticide not registered in the host country
- Pesticide not evaluated/registered in the country of origin (OECD)
- Pesticide not efficacious for the planned use
- Formulation is not stable in tropical conditions
- Formulation not adapted for the available application equipment
- Quantities exceed the real need
- Pesticide is too dangerous for the users
- No label / in a foreign language
- Packaging of an inappropriate volume
- Packaging not strong enough

2) Basic principles

- Promote IPM as the preferred approach for pest control
- Reinforce the management of pesticides by the host country
- Use good practices in the provision of pesticides

3) Constraints to IPM -- pesticides

- Aggressive marketing of pesticides
- Policies of government/donors
- Governmental policies / donors promote the use of pesticides
- Economic/financial
- Institutional
- Centralized decision-making in favor of pesticides

4) Possible responses

- Put in place a project/program for plant protection/vector control
- Put in place IPM/IVM projects/programs
- Donation/purchase of pesticides

[89] Translated from Oct. 2000 presentation at IPM workshop by H. van der Walk, UNFAO Sahel Regional Program, Bamako, Mali.

5) **Use of pesticides in development projects -- some recommendations if one is obliged to use pesticides.**

<u>Stage 1 – phytosanitary problem analysis</u>

- Is the pest biology known?
- Is the environment and are the farmer practices known?
- Is the pest impact known (financial loss)?

Stage 2 – analysis of management options.

- Has the pesticide efficacy been evaluated for the crop/pest and locality in question?
- Are agronomic/cultural measures known and applied?
- Is biological control possible?
- Has an IPM system been developed?

<u>Stage 3 – risk reduction</u>

- Risk = toxicity x exposure
- Minimize the risk of the pesticides used by:
- Reducing toxicity of choices
- Reducing the duration of exposure
- Reducing the degree of exposure

6) **Risk reduction measures:**

Avoid use

- Avoid pesticide use, if possible.
- Avoid pesticide use as the only control option, if possible.
- Integrate pesticide use into an IPM system -- minimize the frequency and dose of applications
- Use pesticides as a last resort

Toxicity reduction

- Use the least toxic commercial products available – basic principles:
- Products authorized? -- regulation.
- Products efficacious? -- regulation / research
- Products acceptables to users? -- extension / farmers' groups
- WHO acute toxicity classes:
  - Ia Extremely hazardous
  - Ib Highly hazardous
  - II Moderately hazardous
  - III Slightly hazardous
  - U Unlikely to present any acute hazard in normal use
- Lists of concern :
  - Products in WHO toxicity classes Ia, Ib (and II)
  - Products not registered in OECD countries
  - « PIC » or « POP » chemicals

(FAO: will not use Ia/Ib in development projects. World Bank / OECD: will not finance Ia/Ib/(II) if use is directly by or accessible to small farmers or in countries without good regulatory programs.)

Exposure reduction

- Prior to use
  - Transport, Packaging, Storage
- During use (« safer use »)
  - Training
  - Formulation
  - Equipment
  - Protective material
  - Buffer zones
- After use
  - Waiting period
  - Cleaning / bathing
  - Storage
  - Disposal
  - Monitoring

Sub-Section 6.3:

Work Plan Followed for the Completion of the PERSUAP

Annex 6.3
Plan de Trabajo para el PERSUAP
30 de junio al 22 de julio y 4 de agosto al 11 de septiembre
Mario Pareja
Consultor

Domingo	Lunes	Martes	Miércoles	Jueves	Viernes	Sábado
29Junio	**30** Día de viaje Ginebra-DC	**1 Julio** Washington, DC, Chemonics 'brief'	**2** Washington, DC USAID 'briefs'	**3** Día de viaje: DC-Bogotá	**4** Bogotá: Chemonics 'brief'	**5** Lecturas sobre CAD
6	**7** Reuniones c/ CAD Chemonics	**8** Reuniones con USAID-Col	**9** Reuniones con IICA	**10** Reuniones con CAEMA y El Semillero	**11** Visitas distribuidores de plaguicidas	**12** Reuniones c/Bayer y Univ. Nacional
13	**14** Reuniones c/ICA y Tres Elementos	**15** Reuniones c/Corpoica y CONIF	**16** Reuniones c/LANIA, CEF y CAEMA	**17** Reuniones c/Corpoica y ANDI	**18** Reuniones c/USAID	**19** Procesar info.
20	**21** Día de campo: Cúcuta	**22** Día de campo: Cúcuta	**23** Días personales	**24** Días personales	**25** Días personales	**26** Días personales
27 Días personales	**28** Días personales	**29** Días personales	**30** Días personales	**31** Días personales	**1** Días personales	**2** Días personales
3	**4** Reuniones c/SGS y Chemonics	**5** Reuniones c/FEDECACAO	**6** Reuniones c/Fundaset, ICA y SGS	**7 FERIADO** Procesar info	**8** Reuniones c/Corpoica y U. Nac. Visita a Agroexpo	**9** Procesar info
10 Agosto	**11** Procesar info. Escribir. Teleconferencia c/Escobar y Bullen	**12** Procesar info. Reuniones. Teleconferencia c/P Des Rosier	**13** Procesar info. Reuniones.	**14 AM** Calvachi (Cenipalma) **14 PM** Procesar info. Escribir.	**15** Día de campo: CIAT, Cali	**16** Día de campo: CIAT, Cali (1/2 día)
17 Regreso Cali – Bogotá	**18 FERIADO** Procesar info. Escribir.	**19** Procesar info. Escribir	**20** Día de campo: Pto. Asís	**21** Día de campo: Pto Asís	**22** Procesar info. Escribir.	**23** Procesar info. Escribir.

Domingo	Lunes	Martes	Miércoles	Jueves	Viernes	Sábado
24	**25** Procesar info. Escribir.	**26** Procesar info y escribir.	**27** Procesar info y escribir.	**28** Procesar info y escribir	**29** Procesar info y escribir	**30** Escribir PERSUAP.
31	**1 Septiembre** Escribir PERSUAP	**2** Escribir PERSUAP.	3 Presentar PERSUAP al CAD.	4 Presentar PERSUAP a USAID-Col	5 **Enviar borrador PERSUAP a revisores.**	**6** Cartagena (personal)
7 Cartagena (personal)	**8** Día de Viaje: Colombia-USA	**9** **Presentar PERSUAP a Chemonics-Washington**	**10** **Presentar PERSUAP a USAID-Washington** Día de Viaje: USA – Francia	**11** Día de viaje (1/2): llegada a Francia	**12**	**13**
14	**15** Día disponible para posibles correciones al PERSUAP 52.5	**16** Día disponible (1/2) para posibles correciones al PERSUAP 53	**17**	**18**	**19**	**20**

CAD PERSUAP

Sub-Section 6.4:

List of Individuals & Institutions Contacted

Annex 6.4
Colombia Alternative Development Project (CAD)
Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP)
INDIVIDUALS INTERVIEWED

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PRIVATE SECTOR

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CAD PERSUAP

Sub-Section 6.5:

Acronyms & Abbreviations

Annex 6.5

Colombia Alternative Development Project (CAD)
Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP)
ACRONYMS & ABBREVIATIONS

ANDI:	Asociación Nacional de Industriales, de Colombia
Masl:	Meters above sea level
ASPROME:	Asociación de Producción y Mercadeo
BEO:	Bureau Environmental Officer
CAD:	Colombia Alternative Development Program
CAEMA:	Centro Andino para la Economía en el Medio Ambiente
CEF:	Centro de Excelencia en Fitoprotección, ICA/USAID/APHIS/IICA
CONIF:	Corporación Nacional de Investigación y Fomento Forestal
Corpoica:	Corporación Colombiana de Investigación Agropecuaria
COSURCA:	Cooperativa de Caficultores del Sur de Cauca
EC:	European Community
EIA:	Environmental Impact Assessment
EU:	European Union
EUREPGAP:	Euro-retailers Produce Working Group Good Agricultural Practice
FEDECACAO:	Federación Nacional de Cacaoteros
FRA:	Ficha de Revisión Ambiental
FUNDASET:	Fundación para el Desarrollo Agrícola, Social y Tecnológico.
GO:	Government/s
GoC:	Government of Colombia
GTZ:	German Development Agency
ICA:	Instituto Colombiano Agropecuario
IICA:	Instituto Inter-Americano de Co-operación para la Agricultura
IEE:	Initial Environmental Examination
IFOAM:	International Federation of Organic Agriculture Movements
IPM:	Integrated Pest Management
IRED:	Interim Re-registration Eligibility Decision, de US-EPA
ITM:	Insecticide Treated Materials
KLM:	Knowledge, Attitude & Practices
LAC:	Latin America and the Caribbean
LANIA:	Laboratorio Nacional de Insumos Agrícolas
MEO:	Mission Environmental Officer
MofH:	Ministry of Health
M&E:	Monitor & Evaluation
NGO:	Non Governmental Organisation
NRE:	Natural Resources and Environment

PEA:	Programmatic Environmental Assessment
PERSUAP:	Pesticide Evaluation Report and Safer Use Action Plan
PPF:	Programa de Protección Forestal, de CONIF
PRA:	Pesticide Risk Analysis
RED:	Re-registration Eligibility Decision, de US-EPA
REO:	Regional Environmental Officer
RUP:	Restricted Use Pesticides
SA:	South America
SENA:	Servicio Nacional de Aprendizaje
SGS:	Société Général de Surveillance
SIMONE:	Sistema de Monitoreo …
SUP:	Safe Use of Pesticides
TA:	Technical Assistance
TOR:	Terms of Reference
UMATA:	Unidad Municipal de Asistencia Técnica Agropecuaria
UMSP:	Uso Más Seguro de Plaguicidas
US:	United States
USAID:	United States Agency for International Development
USG:	United States Government
USP:	Uso Seguro de Plaguidas
WHO:	World Health Organisation

Section 7:

Summary of Recommendations

Fundación Chemonics : Colombia Alternative Development (CAD) Project
Pesticide Evaluation Report and Safer Use Action Plan (PERSUAP)

Section 7
Summary of Recommendations & Monitoring Plan

<u>Recommendation No.1</u>: CAD should continue with this eco- friendly approach to the promotion of alternative crops, leading into sustainable development, to the benefit of the Colombian environment and the health of participant farmers and their families, as well as of the consumers.

<u>Recommendation No.2:</u> In order to prevent the dissemination of contaminated crop seed with pathogens, insect pests, and weed propagules, CAD should establish a strict plant sanitation-quarantine system that follows ICA certification procedures and quarantines for the movement of plant materials into the country as well as from one region to another within Colombia.

<u>Recommendation No.3</u>: CAD should follow a strategy that (a) supports project operators to make farmers, and their families, fully aware of the health hazards of pesticides; (b) supports project operators, civil society and GO authorities to make farmers, their families, and the larger Colombian community aware of the environmental hazards, and societal costs, of pesticide abuse and misuse; and (c) provides the technical assistance to project operators for SUP and IPM, based on the principles of economic injury and action levels and thresholds[90].

<u>Recommendation No.4</u>: Some of the pesticides being presently requested and or purchased by CAD operators are to be *phased out* following the following timeline. (a) In order to allow time for the search of alternative products, preferably non-chemical, while still protecting the crops, the insecticides: carbofuran, chlorpyrifos, and profenofos, and the fungicides: chlorothalonil and copper oxychloride should be phased out in the medium term (1-1.5 years). (b) Due to higher than accepted health and environmental risks, and the availability of pest management alternatives to these molecules, the fungicides: benzimidazole, captafol, hexaconazole, kasugamicine and ofurace, and the insecticides: methomyl, cyfluthrin, cyalothrine (lambda) and cypermethrine should be phased out in the short term (0.5-1 year). (c) The highly toxic and easily replaceable insecticides: monocrotophos, metamidophos, aldicarb, isazophos, and methyl parathion and the herbicide: paraquat should be phase out immediately. (d) And finally, and additionally to this, no product listed in the prohibited pesticides category in the US or Colombia, should ever be used in this project (see section 5.1.4).

<u>Recommendation No.5:</u> Considering the traditional attitudes and practices of the participant farmers with respect to pesticides, as well as the limited CoG presence in the isolated, and conflictive, areas where CAD is operating, it is recommended that a strong SUP programme be implemented. The programme should (a) be based on the pre-existing training offer already available in Colombia; (b) attempt to raise 'awareness' of the health and environmental hazards of pesticides as well as to teach 'good practices' on SUP; and (c) go hand in hand with training in 'ecological agriculture' and IPM, so SUP does not become a false panacea.

<u>Recommendation No. 6:</u> CAD is encouraged to disseminate, among project operators, both of the above lists of bio-pesticides and enterprises producing bio-products in an effort to promote their use in substitution of the more toxic and environmentally hazardous chemical pesticides.

<u>Recommendation No.7</u>: In spite of the good technical level of the field technicians working within CAD and the CAD project operators, technical support in IPM should be strengthened. This may take the form of (a) crop specific field demonstrations on the use of non-chemical pest control methods; and (b) provision of support to the technical staff of the operators for training-of-trainers as well as for direct farmers training in crop-specific IPM programmes.

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[90] IPM programmes may use economic injury thresholds, e.g. when the population of a pest is such that the damage it causes is economically 'significant', and/or action thresholds, e.g. the population density or the damage level when the control should be applied to prevent the pest to reach its economic injury level.

<u>Recommendation No. 8</u>: The list of pesticides to be purchased by CAD operators should be screened by the CAD Natural Resources and Environment (NRE) team, based on the pesticide lists included in this PERSUAP. Pesticides not mentioned in this PERSUAP should be subjected to a screening process, based on the guidelines described in section 5.5, and funding conditioned to their clearance. Products not registered with Colombia-ICA and with US-EPA should not, in principle, be approved (see exceptions discussed below).

<u>Recommendation No.9:</u> The summary of the pesticide analysis with the associated recommendation is:

- **<u>Products not registered in the US and Colombia or in PIC[91] list</u>. NOT TO BE USED UNDER ANY CIRCUMSTANCE: captafol, isazofol, methyl parathion and methamidophos.**
- **<u>Products not yet registered in the US or Colombia</u>. Although a microbial product, the first, and a plant extract, the second, they are NOT TO BE USED UNTIL REGISTERED in at least Colombia: *Baculovirus spodopterae* and *Swingla* (extracts).**
- **<u>Products not registered in Colombia.</u> NOT TO BE USED UNDER ANY CIRCUMSTANCE: endosulfan.**
- **<u>Products not registered with USEPA</u>. NOT TO BE USED UNDER ANY CIRCUMSTANCE: benzimidazole, hexaconazole, kasugamicine, monocrotophos, and ofurace.**
- **<u>Products not registered w/USEPA.</u> But registered in Colombia. APPROVED TO BE USED: extracts of *Glyricidia sepium*, because the resource (*Glyricidia*), the crop (vanilla) and the pest (*Cylsia*), are not present in the US; *Paecilomices liacinus*, because the crop (heart of palm) and the pest (*Leptopharsa*) are not present in the US and the pesticide is a microbial insecticide with unlikely environmental or health impact; and *Trichogramma pretiosum* and *Verticillium lecanii*, are both microbial insecticides with unlikely environmental or health impact.**
- **<u>Products are RUP with USEPA.</u> NOT TO BE USED: aldicarb, cyalothrine (lambda) cyfluthrin, chlorothalonil, chlorpyrifos, copper oxychloride, cypermethrine, methomyl, paraquat, profenofos**
- **<u>Products are RUP[92] with USEPA.</u> USE ONLY CERTAIN FORMULATIONS to reduce health or environmental risk: carbofuran (pellets/tablet), and picloram (Tordon 101R).**

<u>Recommendation No. 10</u>: CAD should implement training and capacity development in SUP for the technical staff of the operators including the theme of pesticide selection. Variables such as product toxicity (using the colour-coded labels), potential environmental impact, and the formulation are to be used among the criteria for selecting pesticides, additionally to efficacy, availability and cost.

<u>Recommendation No.11:</u> No crop should be promoted without first establishing an IPM programme. CAD should install at least one crop specific IPM demonstration field in each of the intervention areas. To this effect CAD should work with the local UMATAS and request the technical support of the institutions and individuals listed in the pest management offers in section 5.2.

<u>Recommendation No.12:</u> CAD SUP programme must include support for three essential components: (a) a comprehensive training programme on "best practices" in SUP (see 3.11); (b) locally, climatically and technologically appropriate[93] protective clothing and equipment (gloves, masks, boots, etc.); and (c) maintenance and repair of spray equipment.

<u>Recommendation No. 13</u>: CAD should socialise and share with project operators the results of the risk analysis of the pesticides and assure the full implementation of the mitigation measures recommended.

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[91] 'PIC List' is the Prior Informed Consent List of the Rotterdam Convention, led by UNEP and FAO, that applies to the international shipment of the most hazardous chemicals.

[92] RUP: Restricted Use Pesticide.

[93] This means adequate for the local climate (temperature and humidity) and possibly adapted from local materials (plastic bottle masks, plastic bags-gloves, etc.) instead of imported clothing materials.

<u>Recommendation No.14:</u> Training on SUP should (a) focus on risk reduction; (b) reach the various important audiences: pesticide dealers, farmers, farmer families (women and children), staff of CAD project operators (trainers); (c) use the already available training offer in Colombia, such as the 'Agrovida' programme, by Bayer CropScience, for farmers and their families (women and children), and/or that of SENA-ANDI joint training programme for farmers and trainers.

<u>Recommendation No.15</u>: CAD should promote a holistic agro-ecological approach, not only to pest management but also to crop production. Training, as well as technical support, offers in topics such as IPM, organic or ecological agriculture, are available in Colombia from various institutions. A list of the possible technical partners that CAD could resort to in the search for technical support follows.

<u>Recommendation No.16</u>: CAD is encouraged to seek a sustainable mechanism for pesticide environmental compliance. This could take the form of (a) a third party independent auditor for the use and management of pests and pesticides by project operators; and/or (b) a market lead environmental (vis-à-vis pesticides) compliance mechanism through a third party, independent, certification agency that assures 'organic', 'EurepGap', 'low-intensity pesticide usage', 'IPM-based', or Regulation 216-based … agricultural production.