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The U.S. Government's Global Hunger & Food Security Initiative



TECHNICAL REPORT

ANALYSIS OF THE CHALLENGES AND OPPORTUNITIES OF THE HORTICULTURAL VALUE CHAIN OF THE NORTHERN TRIANGLE COUNTRIES

(HONDURAS, GUATEMALA AND EL SALVADOR)



HORTICULTURE
INNOVATION LAB

UC DAVIS
UNIVERSITY OF CALIFORNIA



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I. EXECUTIVE OVERVIEW

The University of California, Davis, received funding to lead the new *Horticulture Innovation Lab* program. Within the next five years, the Horticulture Innovation Lab will focus their efforts in four regions, including West Africa (Ghana), East Africa (Kenya), Southeast Asia (Nepal) and Central America (Honduras).

Central American countries have a great potential for horticultural and fruit production. The contribution they make in the production of vegetables supplies the food and nutritional demand. The generation of income through the placement of their products in national and international markets is also well known.

To this end, UC Davis proposed that ZAMORANO University organizes a “Central American Regional Workshop” with decision-makers, management staff and leaders; this would be the first step in building an intervention strategy to involve key institutions in the agricultural sector in the area to work on the enhancement and improvement of the horticultural chain. ZAMORANO also proposed the development of focus groups in horticultural production areas with the participation of members that are involved or influence the horticultural chain in the region.

The application of surveys and interviews is envisioned to broaden the range of opinions and positions regarding the sector’s problems and challenges it faces. The information obtained was analyzed to determine the opportunities and levels of involvement of these institutions in the horticultural chain of production, technology, food security, research, youth and gender in Honduras, El Salvador and Guatemala through the months of March to August of 2022.

The *“Regional Workshop to Understand the Context and Establish Challenges and Opportunities for the Horticulture and Fruit Sector in Honduras and Central America”* was held in person at ZAMORANO University from June 15 to 18, 2022. A total of 48 representatives of key institutions and organizations of the horticultural sector in Honduras, El Salvador and Guatemala participated in the workshop. Meanwhile, 8 Focus Groups were developed; six groups in Honduras, with the participation of 110 actors of the chain from the different departments, one in El Salvador with 25 participants and another with actors from Guatemala that for reasons of the pandemic was developed virtually with the participation of 14 institutional representatives.

Through these activities, quantitative and qualitative information was compiled on the constraints, problems, and opportunities, as well as the group agreements found in each component of the vegetable value chain studied, for subsequent analysis and general presentation of the results. These results are intended to provide a clear path for the actions to be programmed by the Horticultural Innovation Lab through UC Davis in conjunction with key institutions, to develop research proposals to improve production processes, food security, nutrition, use and management of technologies, public policies, natural resources, social inclusion of youth and gender approach in the Central American region.

At the level of opportunities, priority has been given to actions aimed at generating and disseminating knowledge, involving all the actors in the fruit and vegetable chain in an integrated manner. In addition to, a deep reflection on the lack of public policies to promote horticultural production and subsequently a design that includes access to financing and technology. Guatemala is one of the most competitive countries in terms of vegetable production, which opens the opportunity for other countries such as Honduras and El Salvador to cooperate and join efforts to benefit the region.

2. INTRODUCTION

Fruit and vegetable production is a very important activity for the local and regional economy, from the point of view of consumers and farmers. It is also a key component to increase food security in the countries of the Central American region.

Fruit and vegetable value chains are complex, regardless of the region and type of production. To be efficient, effective, and beneficial, they require integrated work. The various actors in the chain and their actions, such as input suppliers (services and agricultural), producers, processors, distributors, traders, regulators, and end consumers contribute to the desired benefits. All the actors in the fruit and vegetable chain must be involved in order to offer a product with excellent presentation, quality and, above all, safety.

The actors throughout the chain respond to a series of demands, problems, challenges and limitations in terms of regulations and administrative constraints, as well as the availability of inputs, demand, and quality required by consumers. Many of these actors are vulnerable, they have little bargaining power, lack knowledge, training and technical skills, and have difficulty accessing agricultural financial credits.

The analysis study was carried out in the countries of the Northern Triangle of Central America of Central America (Honduras, Guatemala and El Salvador) and focused on identifying problems, requirements and opportunities in the fruit and vegetable chain. This report is focused on the prioritization of the problems and opportunities, in the fruit and vegetable chain, and an appropriate approach to address the needs and overcome the current challenges. It also identifies key research elements required to achieve sustainable development in the fruit and vegetable sector.

Production and trade context of the Northern Triangle of Central America

Honduras

Honduras is a country well-endowed with agricultural land, forests and marine resources. Its territory has an approximate of 11.2 million hectares mostly covered by forested mountains. Arable land is estimated at 1.8 million hectares, and pastureland at over 2.5 million hectares (*World Bank, 2021*). Honduras is the second country in the region in terms of the ratio of arable land to population (about 0.28 hectares per inhabitant).

Honduras has the potential for significant and continuous growth of its agricultural production; it has a variety of microclimates that allow diversification of production, including, the cultivation of fruits and vegetables that have a very large demand and is located close to the markets of major developed countries. According to the National Investment Council, this strategic location positions Honduras as a major exporter of agricultural products in the world. Likewise, the duty-free access for the entry of fresh fruits and vegetables to different markets due to the FTAs signed with different countries, make the country an ideal place for investment and agribusiness trade.

In January 2021, foreign trade of general merchandise registered a deficit of US\$464.3 million; denoting an increase of 1.9% (US\$8.6 million) compared to January 2020. The observed result is attributed to the 12.9% drop (US\$53.3 million) in the value of exports (particularly coffee, bananas, melons, and watermelons), associated with the contraction in external demand and the negative effects caused by storms Eta and Iota. Meanwhile, imports presented a reduction of 5.2%, mostly explained by lower fuel purchases (*General Merchandise Foreign Trade Report 2021*).

El Salvador

El Salvador, the smallest country in Central America, has experienced a modest economic growth in recent decades, with annual GDP growth exceeding 3 percent only twice between 2000 and 2020

(World Bank 2022). Even so, the country achieved a significant decrease in poverty and inequality.

In 2021, economic growth rebounded to 10.7 percent, supported by remittance-driven consumption and exports. El Salvador's economy is expected to grow by 2.9 percent in 2022 and 1.9 percent in 2023 (World Bank 2022).

In El Salvador, the main economic activities after oil are agriculture and forestry, mainly because of the people it employs. Another important sector is commerce and tourism. The country produces mainly coffee, sugar cane, basic grains, oilseeds, dairy, poultry, and fish products.

In terms of exports, coffee, sugar, textiles, chemicals, and shrimp are key industries of El Salvador, while raw materials such as fuel, food, electricity and vegetables such as tomato, potato, onion, green chili, carrot, cabbage, banana, orange, banana, lemon, pineapple and papaya are a high range of imports.

Guatemala

Guatemala is an eminently agricultural and forestry country. It is mapped that there are 7.3 million hectares for agricultural use, which is equivalent to 67.7% of the national territory. Of this, 12% is dedicated to the production of annual crops such as corn, beans, rice and vegetables, 14% to sugar cane, coffee, rubber, oil palm and cardamom, 23% to pastures and 51% to forests, scrublands and other non-agricultural uses (Grupo Hame, 2021).

For Guatemala, agricultural production is an important pillar of the economy, contributing 21 percent of GDP, employing more than half of the labor force, and providing two-thirds of exports, mainly coffee, sugar, bananas and beef (Grupo Hame 2021). Guatemala's three main staple foods are corn, beans and rice.

In Guatemala, at least three types of agricultural production are identified: subsistence farming, semi-commercial agriculture and export agriculture (Guatemalan Climate Change Science System 2019).

In 2020, the main exported products were cardamom, bananas, coffee, African palm oil, cane sugar, fruits, legumes and vegetables, which together accounted for 36% of Guatemala's total exports.

Guatemala leads the region in sales

In 2021 the main exporter in Central America was Guatemala with \$64.9 million, followed by Honduras with \$25.6 million, Costa Rica with \$11.1 million, Nicaragua with \$4 million, El Salvador with \$2 million and Panama with \$1 million.

If we break down these exports by country, Guatemala is the leading exporter with 28% of agricultural exports, followed by Costa Rica (24%) and Honduras (16%), together accounting for 68.8% of agricultural exports (Central American Agricultural Council 2021). This denotes and highlights the opportunities that exist throughout the region, such as the generation of jobs, investment, and the opportunities generated by trade agreements, all with the goal of generating sustainable and equitable economic growth for the entire Central American region.

Factors of food insecurity in the Northern Triangle of Central America

High prices of basic commodities and fuels are a trigger for food insecurity in the Northern Triangle of Central America countries (Honduras, Guatemala and El Salvador). Up to 4 million people in this region are expected to suffer borderline levels of acute food insecurity and need emergency food aid according to the Famine Early Warning Systems Network.

Prices of fertilizers, fuels, and high-consumption commodities, including basic grains, beans, oil, and sugar, continue to rise steadily in 2022. This price increase is expected to negatively affect low-income households suffering from food insecure conditions by further restricting purchasing power and leading vulnerable populations to adopt negative coping strategies, such as consuming less and lower quality food, according to [\(FEWS NET, 2022\)](#).

3. OBJECTIVES

3.1. Main Objectives

Establish appropriate parameters on the horticultural context of the countries of the Northern Triangle of Central America of Central America and identify challenges, possible opportunities and needs of the sector. As well as, prioritizing research topics and determining innovation and technology needs through the participation of key stakeholders in the Central American region.

3.1.1. SPECIFIC OBJECTIVES

1. Collect qualitative information on the horticultural and fruit value chain in Honduras, El Salvador and Guatemala, through a regional workshop, to identify challenges and set possible opportunities in the sector.
2. Identify challenges, as well as possible opportunities in the horticultural and fruit value chain of the Northern Triangle of Central America of Central America, through work meetings using the focus group methodology for the collection and analysis of quantitative and qualitative data.
3. Conduct surveys and interviews with key personnel in the horticultural and fruit chain in the region to support data collection to understand the context of this sector in Honduras and Central America.
4. Analyze the quantitative and qualitative information gathered through the regional workshop, focus group meetings and surveys of key personnel in the horticultural and fruit chain in the Northern Triangle of Central America of Central America; to obtain a clear route to identify possible opportunities and lines of research to direct the efforts of direct and indirect actors, as well as national and international ones.

4. METHODOLOGIES FOR INFORMATION COLLECTION

The following procedures were established for the collection and analysis of the information:

- Research with literature and document review
- Develop a regional workshop in ZAMORANO
- Assemble national and regional workshops under the focus group methodology
- Set up field surveys and interviews
- Make internet consultations
- Undergo detailed analysis of the collected data

This type of activity encouraged participants to analyze the main problems, needs, requirements, and challenges, as well as the main opportunities for the sector and those involved possibly in solving the problems. In addition to the opportunity to develop research, training and public policies initiatives to counteract these needs and solve the problems.

4.1. Regional Workshop to Understand the Context and Identify Challenges and Opportunities for the Horticultural and Fruit Value Chain of Honduras and Central America

The development of this regional workshop for the horticultural sector in Honduras, Guatemala and El Salvador was supported by an external consulting team, which used a specific methodology focused on obtaining data through participatory dynamics with workshop participants. The workshop was held at the ZAMORANO University facilities and focused on six dimensions; agronomic management, integrated pest management, post-harvest, storage (cold chain and logistics), value added (processing), and markets and commercialization.

The methodology was designed in two phases, which are shown below:



Figure 1. Development of dynamics within the workshop at the University of ZAMORANO.

Preliminary Phase

- **Enrollment Process:** ZAMORANO University extended the invitation to 48 decision makers and key role players in the fruit and vegetable chain in the countries of Honduras, El Salvador and Guatemala. Physical and digital tools (such as the Whova platform) were used to collect the attendance of the stakeholders involved in the Regional Workshop ([Appendix 1 - List of attendees](#)).
- **Development of Methodological Tools:** The consulting team used a methodology for the collection of information based on three interdependent formats to identify challenges and possible opportunities in the value chain of the fruit and vegetable sector in the region ([Appendix 2 - Methodological tools for the development of the workshop](#)).



Figure 2. Participants from Honduras, Guatemala, El Salvador and the United States together with the coordinating team and technicians from the Regional Innovation Center for Vegetables and Fruits at the University of ZAMORANO.

The three tools were:

- 1. Matrix for the identification of challenges - Brainstorming:** This is the introductory tool where the working groups list the challenges that they considered relevant to be addressed according to their assigned area of work.
- 2. Matrix for the prioritization of challenges:** In this tool, the participants listed the challenges found with the support of the first tool and then assigned them a rating on a scale of priority to be addressed.
- 3. Tree matrix:** Based on the challenges identified with the highest urgency rating in tool 2, participants were able to identify possible actors, solution proposals and inputs needed to address the identified challenges.

Development Phase

- 1. Formation of Working Groups and socialization of instructions:** A study of the profile of the participants in the First Regional Workshop was carried out, and the consultant team proceeded to form groups according to their experience and area of action, then the objective of the workshop and the instructions for the use of the matrices were presented to the participants.
- 2. Group work:** The information of the tools was filled in gradually in the time allotted according to the workshop agenda.
- 3. Presentation of Results:** At the end of the day's work, each group had a space to present its results, which served to socialize the challenges encountered and proposed solutions so that the other participants could contribute their opinions and generate a time for the appropriation of ideas and concepts.

4.2. Working Meetings through Focus Group Workshops

In Honduras, Guatemala and El Salvador, 8 workshops were held under the focus group methodology. In Honduras, a mapping was carried out, and according to the country's representative productive zones, 6 workshops were held, one in El Salvador and one in Guatemala. The following table shows the distribution:

Table 1. Distribution of focus groups at the national, regional levels, and dates of fulfillment.

No	Focus Group	Modality	Place	Date
1	Honduras	On site	Comayagua, Comayagua	March 30th, 2022
2	Honduras	On site	Danlí, El Paraíso	March 31st, 2022
3	Honduras	On site	La Esperanza, Intibucá	July 12th, 2022
4	Honduras	On site	Santa Cruz de Yojoa, Cortes	July 13th, 2022
5	Honduras	On site	Choluteca, Choluteca	July 28th, 2022
6	Honduras	On site	Tegucigalpa, Francisco Morazán	July 29th, 2022
7	El Salvador	On site	San Salvador, El Salvador	July 19th, 2022
8	Guatemala	Online	Guatemala, Guatemala	August 11th, 2022

The people invited to participate were selected according to their sector, their action in the fruit and vegetable value chain, their professional trajectory, and their leadership. All components of the fruit and vegetable value chain were present, from input suppliers of agricultural services, raw materials and professional services, production, post-harvest, processing, transportation, commercialization and distribution. Other participants included international cooperation actors, civil society and government regulators, as well as experts in the areas of gender, climate change, food security, nutrition, research, education and training ([Appendix 3- List of participants](#)).



Each workshop was divided in two sessions:

Session 1. Working groups:

They were assigned a matrix for group discussion and debate, in addition to completing a matrix for future actions and involvement in the program (*Appendix 4 - Matrix for identifying problems and opportunities by chain components*).

The following questions were asked in this session:

1. What are the needs and requirements in each component of the fruit and vegetable value chain?
2. What opportunities are envisaged to address the needs identified in the fruit and vegetable value chain?
3. How could actions be implemented and who should be involved in their implementation and how would they be involved?
4. How can we prepare the fruit and vegetable chain for the challenges that will be faced in the short, medium, and long term?
5. What topics are priorities in research, education, and training?
6. How do you consider the locality is doing in terms of requirements, nutritional demand, and market?

Session 2: Analysis and summary of the day.

A representative from each group reported to the plenary for a general open discussion on the issues identified, main challenges and challenges, as well as the opportunities identified, their conclusions and recommendations.

4.3. Field Surveys - Interviews

A printed survey was prepared and applied to (horticultural producers, academic researchers, government regulators, company managers, traders, distributors, representatives of private enterprise, government, and civil society organizations); as well as several open interviews to obtain a broader perspective and analysis of the fruit and vegetable sector in Central America, with emphasis on Guatemala, Honduras and El Salvador. Fifty-five key actors in the fruit and vegetable chain participated in the surveys (*Appendix 5 - List of participants in the surveys and interviews*).

The survey included eight sections:

1. Horticultural Production
 2. Natural Resources
 3. Socioeconomic Context
 4. Market
 5. Consumption
 6. Technology
 7. Research-Education-Training
 8. Policies in Horticultural Production
- (*Appendix 6- Survey-field interview*).

It included questions that helped identify the main constraints and problems of the horticultural chain, as well as the main needs for research, education, training, and capacity building.



Figure 3. Actors of the fruit and vegetable chain during the implementation of surveys.

5. DEVELOPMENT OF ACTIVITIES

5.1. Geographic Area Covered

The three main activities for information gathering, the regional workshop, focus groups and interview-surveys, involved the participation of key actors and decision-makers in the horticultural and fruit chain in Honduras, El Salvador and Guatemala. The workshop also included the participation of staff representing the agreement between UC Davis, the *Feed the Future Program*, USAID and ZAMORANO University.

The *Regional Workshop to learn about the context of the horticultural and fruit value chain in Honduras, El Salvador and Guatemala* was held at ZAMORANO University in Honduras. The workshop was attended by 48 people, including 39 from Honduras, 3 from Guatemala, 4 from El Salvador and 2 from the United States of America, all from different key sectors in the development and study of the horticultural and fruit value chain.



Figure 5: Location of focus groups in the Northern Triangle (Honduras, Guatemala and El Salvador).



Figure 4: Representation of the country of origin of the workshop participants in ZAMORANO.

Regarding to the work meetings, under the Focus Group methodology, 8 meetings were held as follows: 6 groups in Honduras in representative departments by productive zones; northwestern zone (Cortés), central western (Intibucá and Comayagua), central eastern (Francisco Morazán and El paraíso) and southern region (Choluteca), 1 in San Salvador, El Salvador and 1 in Guatemala.

5.2. Description of the Participants in the Activities (Workshop, Focus Group and Interviews)

Participants were chosen according to their role in the value chain of the horticultural and fruit sector in the region. Some participants include representatives of public education in the food sector, producers, agricultural exporters, government, private entities, international cooperation agencies, research, supermarkets, NGOs, experts in gender, nutrition, food safety and experts in food safety regulations and standards from the three countries of the Northern Triangle of Central America.

6. RESULTS

6.1. Elements Prioritized at the Regional Workshop

The analysis conducted with key stakeholders in the fruit and vegetable chain revealed a series of problems and opportunities, which are summarized below:

Table 2. Summary and elements prioritized in the regional workshop by dimension of the fruit and vegetable chain

PRIORITIZED ELEMENTS IN THE REGIONAL WORKSHOP IN EACH DIMENSION OF THE HORTICULTURAL CHAIN			
Dimension	Prioritized problem	Prioritized opportunities	Group agreements
Production systems and integrated pest management (IPM)	<ol style="list-style-type: none"> 1. Failure to disclose information. 	<ol style="list-style-type: none"> 1. Taking advantage of the development of new technologies for biological controls. 2. Creating alliances for the resolution of problems in the agricultural educational area. 	<ol style="list-style-type: none"> a. Developing an effective and equitable outreach program. b. Strengthening the education of vulnerable groups, youth, and women. c. Updating educational models through new communication technologies. d. Expert training for knowledge management.
Natural resources, environment, and socio-economic context	<ol style="list-style-type: none"> 1. Access to water. 2. Soil degradation. 3. Unconsolidated producer organizations. 4. Little access to financing / soft loans. 5. Lack of regulation on imported products in local competition. 	<ol style="list-style-type: none"> 1. Implement the use of efficient irrigation technologies. 2. Better crop yields and increased production areas. 3. Donor support. 4. Identify the portfolio of financing projects for the agricultural sector in local and regional private banks. 5. Reduction of imports through production for self-consumption. 6. Reduce costs through the implementation of Good Agricultural, Manufacturing and Business Practices to stabilize the prices of products used in the value chain of horticultural production, as part of the strategy to face the global crisis. 	<ol style="list-style-type: none"> a. Regulations of areas suitable for cultivation. b. Have an environmental and sustainable production adapted to climate change. c. Establish an urban development plan and investment in infrastructures for water harvesting. d. Soil conservation practices. e. Integrated crop management. f. Design of financial products adapted to the characteristics of the sector. g. Create, review and update public policies regarding imports and exports. h. Treaties between countries that can regulate policies regarding imports to give the local market an opportunity.

Dimension	Prioritized problem	Prioritized opportunities	Group agreements
Technologies and production	<ol style="list-style-type: none"> 1. Lack of producer empowerment in relation to infrastructure and shared technology; there is no adoption of this. 2. Poor infrastructure for value addition (roads, water access and others). 	<ol style="list-style-type: none"> 1. Development of installed capacities in the producers / return on investment / support of organizations for showcase or model companies. 2. Within the framework of SICA, create programs to integrate and share technology. 3. Declaration of emergency oriented to the productive sector. 	<ol style="list-style-type: none"> a. Adopt the technologies transmitted through practices in the field / location of the infrastructure in a strategic way. b. Training of skills for managing technology. c. Design of a financial product to strengthen the infrastructure. d. Integrate the academy, government, and productive sector.
Post-harvest and processing	<ol style="list-style-type: none"> 1. High losses due to food waste. 2. Low quality and safety of products. 	<ol style="list-style-type: none"> 1. Interest of international cooperation in strengthening agrifood chains to guarantee Food Security. 2. Define quality standards to open new markets. 3. Establish an inter-institutional work agenda for the regulation of food quality. 	<ol style="list-style-type: none"> a. Organization and implementation of staggered planting plans that meet quality requirements.
Commercialization and distribution	<ol style="list-style-type: none"> 1. Lack of cultural identity focused on local consumption. (Local vs/International, Food Safety, Nutritional Advantages). 2. Lack of organization among producers. 	<ol style="list-style-type: none"> 1. Determine the characteristics of local demand to respond by expanding the productive sector. 2. Satisfy the demand for healthy food by promoting greater consumption of local horticultural products. 3. Improve the quality of life of the population through the consumption of new products rich in vitamins and minerals. 4. Access to permanent buyers. 5. Support from international donors. 6. Improvement in product quality. 7. Local development. 	<ol style="list-style-type: none"> a. Local Consumption Campaigns. b. Gastronomic fairs around the promotion of local consumption and food safety. c. Create new cultural patterns of local consumption. d. Diversification of the basic basket to add local products to it. e. Staggered planting. f. Promote the organization of producers. g. Generation of commercial components.

Dimension	Prioritized problem	Prioritized opportunities	Group agreements
<p>Research, education, and training</p>	<ol style="list-style-type: none"> 1. Poor agricultural research. 2. Lack of knowledge or fear in commercialization in small producers. 	<ol style="list-style-type: none"> 1. Creation of national and regional research centers. 2. Establish agricultural research in study centers. 3. Development of tropicalized genetic materials to increase productivity levels. 4. Establish the foundations for intelligent agricultural production in the context of developed technologies. 5. Reactivation of the high-level agricultural extension programs. 6. Formalization as companies. 7. Access to value chains, exports, and transformation of products. 8. Create and support of programs with a gender approach. 9. Digital transformation and use of new technologies in the horticultural sector. 	<ol style="list-style-type: none"> a. Development of prioritized research based on diagnosis by zones and production chains. b. Clear public policies in promoting research and budget for implementation. c. Coordination with the private company. d. Carry out a study and documentation of the best post-harvest practices in vegetables. e. Incentives for researchers. f. Make alliances with external research centers. g. Encourage the participation of young people in research. h. Involve producers so that they are participants in the research. i. Training programs for negotiation, administration, personal finance, leadership, agribusiness, incoterms, entrepreneurship, among others. j. Round of business. k. Form cultivation chains to improve local and international commercialization.

6.2. Elements Prioritized in the Focus Groups in Honduras, Guatemala and El Salvador

Through the analysis carried out with the actors of the fruit and vegetable chain in the workshops and meetings, different problems and opportunities were identified, and these are prioritized below:

The complete list of prioritized elements in greater detail for each region of Honduras is presented in *(Appendix 6 - Elements prioritized by focus group in Honduras)*.

Table 3. Summary and elements prioritized by components of the fruit and vegetable chain in six focus groups in Honduras.

PRIORITIZED ELEMENTS BY COMPONENTS OF THE HORTICULTURAL VALUE CHAIN IN HONDURAS			
Components of the fruit and vegetable chain			
Dimension	Prioritized problem	Prioritized opportunities	Group agreements
Input Suppliers	<ol style="list-style-type: none"> 1. Inadequate registration procedures and import of inputs. 2. Variability and high costs of raw materials and inputs. 3. Lack of technical assistance. 4. Environmental contamination by pesticides and poor handling of containers and packaging . 5. Inadequate information to customers. 6. Lack of approved product regulations. 7. Low product availability. 	<ol style="list-style-type: none"> 1. Create online program for records. 2. Search for local alternatives. 3. Prioritize research topics. 4. Subsidy program. 5. Development of technical assistance program for suppliers and producers. 6. Expand and diversify the supply of products and development of local products. 7. Training and capacity building in biopesticides and pesticide use. 8. Establish a management, education and training program for chemical and pesticide waste. 9. Conduct an agricultural census. 	<ol style="list-style-type: none"> a. Broaden the involvement of all the actors in the supply chain. b. Strengthen those involved in the fruit and vegetable chain through training and capacity building. c. Support an effective communication program. d. Support the search for strategic financial partners. e. Create youth and women's enterprises in local inputs and promote local products.

Components of the fruit and vegetable chain

Dimension	Prioritized problem	Prioritized opportunities	Group agreements
Production	<ol style="list-style-type: none"> 1. Poor agricultural practices, poor management of resources (soil and water) and climatic conditions. 2. Lack of access to agricultural credit and financing. 3. Lack of production technology. 4. Lack of technical advice and assistance 5. High production and seed import costs. 6. Inadequate pest and disease management. 7. Scarce generational inclusion and land tenure. 8. Food safety. 	<ol style="list-style-type: none"> 1. Access to and implementation of environmentally friendly technologies, training, and agricultural practices to mitigate and adapt to climate change. 2. Reactivation of value chains considering success stories and access to agricultural credit. 3. Certifications of agricultural production and land legality. 	<ol style="list-style-type: none"> a. Organize and implement field school training programs (ECA's), implementation of technologies and research for producers and their families. b. Support in the review of credit policies at the central level with the different stakeholders. c. Support the identification of entities that have certified material and support the establishment of alliances and agreements with marketers. d. Seek business alternatives and youth entrepreneurship. e. Involve key stakeholders in research, training, education, and technology transfer processes.
Post-harvest and processing	<ol style="list-style-type: none"> 1. Waste of products, high rejection of vegetables and lack of added value. 2. Lack of infrastructure, equipment, and packaging for adequate post-harvesting. 3. Lack of skilled and available labor. 4. Lack of post-harvest knowledge. 5. Residuality of chemical products. 6. High refrigeration and energy costs. 	<ol style="list-style-type: none"> 1. To provide added value to products through youth and women's entrepreneurship. 2. Training in post-harvest issues, value added and technologies. 3. Traceability and search for financing for technical assistance process. 	<ol style="list-style-type: none"> a. Formalize strategic alliances with government agencies, international cooperation agencies, civil society and NGOs and stimulate entrepreneurship among young people and women. b. Identify market niches for Commercialization the product with added value.

Components of the fruit and vegetable chain

Dimension	Prioritized problem	Prioritized opportunities	Group agreements
Comercialization and Distribution	<ol style="list-style-type: none"> 1. Lack of equipment and infrastructure to maintain the cold chain. 2. Lack of understanding of market needs, market windows and price stability. 3. Road infrastructure in poor condition. 4. High costs of customs clearance, transportation, land, sea and air customs and fuel costs. 	<ol style="list-style-type: none"> 1. Implementation of new technologies to maintain the cold chain (mobile cold rooms). 2. Conduct market studies and make better decisions at the trade level. 3. Standardize quality standards at local and international level. 	<ol style="list-style-type: none"> a. Seek funding for innovation in cold chain maintenance technology. b. Establish strategic alliances and linkage of technical training entities for the manufacture of materials for export at the local level. c. Maintain updated quality parameters and standards in accordance with the market. d. Diversify crops and establish contracts with buyers. e. Linking the relevant authorities to improve access roads.
Dimension	Prioritized problem	Prioritized opportunities	Group agreements
Research, training and education	<ol style="list-style-type: none"> 1. Lack of education in agricultural practices, pest management, manufacturing, post-harvest, financial and Commercialization. 2. Lack of funding for agricultural research, Integrated pest management (IPM), technology, nutrition, laboratories for soil and water analysis. 	<ol style="list-style-type: none"> 1. Creation of a program and technical training for: integrated crop management, technology, good agricultural practices, Integrated pest management (IPM), biological controllers, financial education, production costs, good manufacturing practices and post-harvest handling. 2. Make a connection between research, practice, and publications. 3. Establish laboratories at the local level for analysis of water, soil and vegetative material. 4. Research according to the needs of the basic food basket with a nutritional approach. 	<ol style="list-style-type: none"> a. Locate strategic allies to strengthen investigation, analysis, and education.
Dimension	Prioritized problem	Prioritized opportunities	Group agreements
Nutrition	<ol style="list-style-type: none"> 1. Lack of laboratories to analyze pesticide residues in vegetables. 2. Lack of nutritional information and little consumption of what is produced locally. 3. Over-demand and few production areas. 	<ol style="list-style-type: none"> 1. Obtaining timely and reliable data for each pillar of Food and Nutrition Security with emphasis on components related to consumption and biological utilization of food. 2. Advertise horticultural products through awareness, food education, safety and nutrition campaigns. 	<ol style="list-style-type: none"> a. Involve specialized actors to implement laboratories at the regional level and government involvement for the implementation of local food safety policies. b. Implement family gardens to diversify the diet at the household level.

Dimension	Prioritized problem	Prioritized opportunities	Group agreements
<p>Political, socioeconomic and climate change context</p>	<ol style="list-style-type: none"> 1. Lack of opportunities for women, low skilled labor force and deficient government agricultural policies. 2. Bureaucratic processes for registration, exports and import monopolies. 3. Water scarcity, deforestation and crop losses due to excessive rainfall and poor management of agricultural waste. 	<ol style="list-style-type: none"> 1. Involve women and young people in chain activities, mainly in value-added activities. 2. Produce more environmentally friendly, sustainable products and generate new markets. 	<ol style="list-style-type: none"> a. Encourage the creation of training programs for capacity building, search for support programs for gender equity, efficient and sustainable production, and regulation of imports.

Table 4. Summary and elements prioritized by dimension of the fruit and vegetable chain by focus group in El Salvador, El Salvador

ELEMENTS PRIORITIZED BY COMPONENTS OF THE FRUIT AND VEGETABLE CHAIN IN EL SALVADOR			
Components of the fruit and vegetable chain			
Dimension	Prioritized problem	Prioritized opportunities	Group agreements
Input Suppliers	<ol style="list-style-type: none"> 1. Little offer of alternative products 2. Shelf life of biological and chemical products. 3. Logistics for imports of agricultural inputs. 4. Seed availability. 	<ol style="list-style-type: none"> 1. Strengthening national banking with financial products adapted to producers. 	<ol style="list-style-type: none"> a. Search for new technologies, and promotion of new sustainable emerging technologies.
Production	<ol style="list-style-type: none"> 1. Limited access to technology. 2. Misuse of resources. 3. Poor availability of labour and lack of generational inclusion. 	<ol style="list-style-type: none"> 1. Technification of production processes and compliance with environmental regulations. 2. Provision of labor services. 3. Association between producers. 4. Empowerment of women in the productive sector. 	<ol style="list-style-type: none"> a. Promote the change of project vision to a business-commercial vision.
Post-harvest and processing	<ol style="list-style-type: none"> 1. Lack of experience and technology in post-harvest and processing. 2. Lack of requirement for traceability of products. 	<ol style="list-style-type: none"> 1. Implementation of registration and certification processes. 2. Implement export crops and agro-industrial processes. 	<ol style="list-style-type: none"> a. Opportunity to generate jobs for the community through local enterprises.
Commercialization and distribution	<ol style="list-style-type: none"> 1. Little knowledge of the cold chain. 2. Geographical location accessible to ports and roads for marketing and distribution. 	<ol style="list-style-type: none"> 1. Market research and analysis for development processes. 	<ol style="list-style-type: none"> a. Search for strategic allies to define marketing channels for linking to the formal market.

Dimensions	Prioritized Problem	Prioritized Opportunities	Group Agreements
Research, training and education	<ol style="list-style-type: none"> 1. Little knowledge of the cold and post-harvest chain. 	<ol style="list-style-type: none"> 1. Cold chain and post-harvest training processes. 2. Creation of post-harvest management guides. 	<ol style="list-style-type: none"> a. Capacity building and strengthening of new technologies.
Dimensions	Prioritized Problem	Prioritized Opportunities	Group Agreements
Nutrition	<ol style="list-style-type: none"> 1. Lack or deficiency of technical knowledge 2. Lack of food insurance laws. 	<ol style="list-style-type: none"> 1. Organization of products to ensure continuous substitution. 2. Food sovereignty. 	<ol style="list-style-type: none"> a. Involvement of government actors to promote population development and comply with agreements.
Dimensions	Prioritized Problem	Prioritized Opportunities	Group Agreements
Political, socioeconomic and climate change context	<ol style="list-style-type: none"> 1. Lack of public policies to regulate imports and phytosanitary controls. 2. High population migration. 	<ol style="list-style-type: none"> 1. Diversification of crops, creation of processed products and generation of employment for the population. 	<ol style="list-style-type: none"> a. Involve key actors in the chain for regulations and controls.

Table 5. Summary and elements prioritized by dimension of the fruit and vegetable chain by focus groups in Guatemala

ELEMENTS PRIORITIZED BY COMPONENTS OF THE FRUIT AND VEGETABLE CHAIN IN GUATEMALA			
Components of the fruit and vegetable chain			
Dimension	Prioritized problem	Prioritized opportunities	Group agreements
Input Suppliers	<ol style="list-style-type: none"> 1. New pesticide molecule alternatives and complex records. 	<ol style="list-style-type: none"> 1. Updating of records of new molecules and maximum limit allowed in vegetables and fruits. 	<ol style="list-style-type: none"> a. Involvement of government entities and actors in the chain for production with quality and safety.
Production	<ol style="list-style-type: none"> 1. Lack of productive infrastructure and irrigation technology. 2. Aspects of incipient plant nutrition. 3. Land tenure. 4. Producers' model. 5. Lack of safety. 	<ol style="list-style-type: none"> 1. Use of non-renewable resources. 2. Reduction of pesticide use, reduction of pests in crops and analysis of pesticide residues. 3. Opportunities for sustainable irrigation technology and water harvesting. 4. Gender equity in the fields of production 5. Mapping of producers and distribution of crops. 5. Implement geographic information systems (GIS). 6. Preparation of manuals for the safety of fresh agricultural products. 	<ol style="list-style-type: none"> a. Search for strategic alloys as educational entities for the analysis of vegetative samples and residues through laboratories, in response to current challenges and reduction of pesticides.
Post-harvest and processing	<ol style="list-style-type: none"> 1. Cold chain and quality maintenance. 2. Fruit and vegetable processing. 	<ol style="list-style-type: none"> 1. New markets. 2. Reduction of food waste and Circular Economy. 3. Added Value. 	<ol style="list-style-type: none"> a. Search for strategic alloys for support and new markets.
Commercialization and distribution	<ol style="list-style-type: none"> 1. Have the quality requirements for export. 2. logistics and intermediaries. 3. Market saturation . 	<ol style="list-style-type: none"> 1. Improving the economic conditions of farmers. 	<ol style="list-style-type: none"> a. Look for new market alternatives and work under a cost structure.

Components of the fruit and vegetable chain			
Dimension	Prioritized problem	Prioritized opportunities	Group agreements
Commercialization and distribution	4. Packaging.	2. Communication and transparency between intermediaries and data of available prices. 3. Organization of sowing 4. Decreased use of plastic packaging.	
Dimensions	Prioritized Problem	Prioritized Opportunities	Group Agreements
Research, training and education	1. Incipient and transparent research capacity. 2. Lack of information and professionalization of trainers. 3. Development of new improved varieties.	1. Linking academia and the private sector. 2. Publications of research and creation of guides for training and education. 3. Development of a training program for professionals (Training of trainers).	a. Search for funds from international cooperation for the development of a specific research center that components producers, agro-exporters and above all that is sustainable over time. b. Establish them permanently in response to needs. Getting on track for the "Green Deal".
Dimensions	Prioritized problem	Prioritized opportunities	Group agreements
Nutrition	1. Need for research.	1. Conduct a study on production and nutrition education at the household level .	a. Search for strategic government alloys for statistical data and search for research centers that have specialized laboratories for nutritional analysis.
Dimensions	Prioritized Problem	Prioritized Opportunities	Group Agreements
Political, socioeconomic and climate change context	1. Low participation of agricultural economists. 2. Entrepreneurial approach. 3. Protect intellectual property.	1. Establish production costs and crop profitability. 2. Protection of new and improved varieties.	a. Resource management to operate properly.

6.3. Elements Prioritized in Surveys-Interviews

Fifty-five surveys were administered in printed format. Within the group surveyed, in terms of the level of response, most of the respondents represented Honduras (48), followed by El Salvador (4) and Guatemala (3). Of the total number of participants of the survey, 19 were women (34.5%) and 36 were men (65.4%). In addition, according to participation, they were grouped by profession, organization and involvement in the fruit and vegetable chain.

According to the type of sector represented, the highest participation was obtained at the level of: Government with 25.5%, followed by producers' organizations with 20%, NGOs with 16.4%, the private sector with 16.4%, academia with 7.3%, cooperatives, research foundations and international development agencies with 1.8% respectively, and others with 3.8%.

According to participation by components of the chain, 16.36% represents the agricultural input and raw material suppliers link, 45.5% the production link, 23.6% post-harvest and processing, 29.12% Commercialization and distribution, and 5.45% agricultural research and development, among others.

The following are the main limitations expressed by the participants in the survey-interviews:

Table 6. Main limitations of the fruit and vegetable chain in Honduras

Main limitations	Averages
Availability of agricultural extension programs	5
Availability of technical advice	5
Agricultural input costs	4
Extended periods of drought	4
Presence of new pests and diseases in production fields	4
Landslides and/or landslides in production fields	4
Distribution of goods and wealth	4
Generational change	4
Youth migration	4
Land tenure	4
Price fluctuation and variation	4
Product with added value	4
Accessible technologies for production (mesh houses, macro tunnel, greenhouses (etc.))	4
Accessible technologies for processing and added value	4
Lack of government programs to support smallholder agriculture	4

Main limitations	Averages
Access to credit for smallholder farmers	5
Availability of agricultural insurance	5
Cost of agricultural insurance	4
Associativity of farmers	4
Access to market information	4

Table 7. Main limitations of the fruit and vegetable chain in Guatemala and El Salvador.

Main limitations	Average
Access to credit for smallholder farmers	3.4
Prices of fruits and vegetables for the consumer	3.4
Lack of government programs to support smallholder agriculture	3.2
Availability of agricultural insurance	3.2
Availability of appropriate technologies for irrigation	3
Extended periods of drought	3
Access to agricultural credit	3
Place of purchase of vegetables	3
Availability of agricultural extension programs	3
Availability of technical advice	3
Accessible technologies for processing and added value	3
Agricultural input costs	2.8
Lack of working capital	2.8
Access to credit	2.8
Accessible technologies for proper storage	2.8
Lack of support programa	2.6
Market requirements	2.6
Market quality policies and parameters	2.6
Increase in pests and diseases in production fields	2.4
Presence of new pests and diseases in production fields	2.4

7. ANALYSIS

7.1. Analysis of the Aspects Prioritized by the Participants in the First Regional Workshop held in ZAMORANO

According to the analysis of the working groups in the workshop, they prioritized the problems in the following 5 elements in the different components of the horticultural chain.

- **Knowledge Management:** such as poor adaptation and appropriation of technologies, little or no technical assistance, little or no training and knowledge transfer, little or no business development, little or no communication of information.
- **Natural Resources, Environment and Socioeconomic Context:** poor access and management of water, soil degradation and poor soil management. Poor access to financing. Little or no action to regulate product imports.
- **Technologies and Production:** limited infrastructure and equipment for value addition, lack of technology adoption.
- **Post-harvest and Processing:** high volumes of harvest waste, low product quality and safety.
- **Product Commercialization and Distribution:** lack of enforcement of regulations, existence of an informal market, little access to high-value markets, low cultural identity in consumption.

In relation to opportunities in the different components of the horticultural chain, the same groups prioritized the following activities;

- Develop a program to generate and disseminate knowledge.
- Develop an education and training program at all levels.
- Establish a program to provide training and technical assistance services.

7.2. Analysis of the Aspects Prioritized by Focus Group Participants

Based on the analysis of the focus groups, the chain actors prioritized the problems in the following elements for the components the horticultural chain.

7.2.1. HORTICULTURAL PRODUCTION

i) Plagues and diseases

- a) High handling costs and high volumes of product rejection.
- b) Development of high levels of resistance due to misuse of pesticides.
- c) Little resistant genetic material
- d) Misuse of chemicals increases levels of contamination of water, soil and people.
- e) Little knowledge and training in pest management

7.2.2. NATURAL RESOURCES AND CLIMATE CHANGE

i. Water

The availability of water for consumption and irrigation is a problem in the dry months in Honduras, Guatemala, and El Salvador. The dry months are normally from November to March-April. Irrigation technology and equipment are essential to be able to produce and increase productivity. On the other hand, there are viable and feasible alternatives that could be implemented, such as the use of irrigation equipment and systems using solar energy and low-pressure technology. These technologies can help protect the environment.

Water quality is essential, not only for human consumption but also for irrigation in production fields, which is why analysis through certified laboratories is necessary.

ii. Soil

In the production fields, soil weakening is generated day by day. This is caused by bad agricultural practices. Many farmers do not carry out soil analysis before proceeding with fertilization plans, and they continue to burn production plots and deforest to extend their production, which causes accelerated erosion and soil erosion.

iii. Environmental contamination

Bad practices throughout the fruit and vegetable chain generate environmental contamination, due to the indiscriminate and inappropriate use of pesticides in the production fields, as well as the generation of chemical waste, containers, and packaging, which are not biodegradable, and the processing of this waste is expensive and follows a complex process.

iv. Weather

At the regional level, climatic conditions are strongly affected. In many areas, excess rainfall, or droughts (El Niño or La Niña effect) are very prolonged, which has a negative effect on agricultural production and productivity and soil fertility, as well as causing an increase in pests and diseases.

7.2.3. SOCIOECONOMIC CONTEXT

The challenges in the socioeconomic context are quite marked. Today, the *COVID 19* pandemic and the international wars have caused a decrease in imports, which has increased the costs of raw materials, communication, energy, fuel and refrigeration services. Farmers are limited and lacking information to qualify for agricultural credit that would allow them to increase their businesses and thus be able to generate sources of employment in their enterprises. The lack of jobs has increased migration, reduced generational inclusion in the chain and reduced opportunities for both men and women. At the chain level, this has had a strong impact because there is currently a lack of skilled and trained labor.

On the other hand, small farmers are the most prone and vulnerable to climate change events, as are those involved in exports. The cost of agricultural insurance is a major constraint because they are deficient and there is no adequate, timely and timely response to the problems described.

7.2.4. WOMEN IN HORTICULTURE

Women play an important role in agricultural activities, however, they lack the resources to be able to work in them. Women have little power in decision-making, and administrative positions are not evenly represented in farmers' organizations or agricultural cooperatives.

On the other hand, land tenure is a limiting factor in terms of access to agricultural credit and market access. However, women are involved in other areas that have or are more related to industry and value added. On the other hand, according to the Food and Agriculture Organization of the United Nations, women play an important role in household food security and are involved in the production of subsistence crops through the implementation of home gardens.

7.2.5. MARKET

i. Economic Problems

The lack of inventory and high costs of horticultural inputs such as fertilizers, equipment, technologies, chemical and biological inputs, packaging, refrigeration equipment, transportation, storage, and export materials negatively affect the sector, making it look like an unprofitable business. Due to the lack of these resources the product can be lost or sold at uncompetitive prices. This is also affected by production costs exceeding the selling prices of the products, reflecting not a profit margin, but a loss or a liability. There is great variation and fluctuation in the prices of inputs at the country level, which causes farmers near the borders to purchase their agricultural inputs abroad, affecting the local economy.

ii. Access to markets

At the commercialization and distribution level, the actors in the fruit and vegetable chain face many challenges. Poor organization in the production fields at the time of planting leads to an excess of product in the market or over-demand, resulting in poor organization when it comes to the commercialization of the products. On the other hand, there is a lack of understanding of market needs; the supply does not go in hand with the market's demand. It is important to aspire to reach other targets and explore new market niches, such as school snacks, restaurant chains, and others.

Another major problem is the road infrastructure and access to the sales centers. In order to deliver products on time, they have to leave very early in the morning, additionally, due to political issues, there are often road blockades that cause delays in deliveries, break the cold chain, and cause products to decay reflecting in an economic loss.

In some cases, producers are consistent with their schedules, but in many cases they are not. These structures are sometimes weak because there is a lack of agreements and contracts between producers and the market, and many of the prices are unfair, leading to non-compliance with purchase and sale commitments.

7.2.6. CONSUMPTION

According to data from the *World Health Organization (WHO)*, people should consume about five servings of fruits and vegetables per day as part of the guidelines or recommendations for maintaining a healthy diet. In terms of vegetable consumption, the region is below the WHO recommendations in terms of quantity, variety and frequency. communities where vegetables and fruits are produced. Often what happens is that in the communities and places where most vegetables are produced, they are not consumed.

The Central American region has a great diversity of fruits and vegetables. Exploring new products or new recipes can be the key to incorporate vegetables into our diet. It is also important to provide added value to the products. In addition, it is important to analyze that many times there is availability, but little access due to high prices. In the group discussion, the alternative of being

able to carry out awareness campaigns for the consumption of vegetables was mentioned. The campaigns should focus on the nutrients they provide, as well as the promotion of access at points of sale.

7.2.7. STRUCTURE AND TECHNOLOGY

Access to structures and technological innovation are key to the functioning of the components in the fruit and vegetable chain. In addition, the horticultural sector needs technologies that improve the quality of its products, are adapted, and minimize environmental impact.

i. Technology for the Production

Agricultural production under protected structure has proven to be effective and is in great demand as it is a great alternative for better management and control of pests and diseases. This helps farmers to increase productivity, produce with quality and safety and above all make a rational use of non-renewable resources.

There is currently a need to opt for this type of technology; however, due to high costs and little or no access to agricultural credit, support is required for the implementation of these technologies in the fields. In addition to this, for it to work it is important to make a correct and adequate transfer of technology, as well as adequate training and training processes on this.

ii. Post-harvest Technology

Adequate handling and preservation of various agricultural products, to maintain their quality and subsequent commercialization or consumption, requires specialized equipment and infrastructure. However, equipment availability and costs are high in the region. On the other hand, it is difficult to maintain the cold chain. As a result, there are large losses and there is a high rejection of vegetables.

There is also little research and innovation in the development of new products and added value. The promotion and development of new products and innovation in new packaging that is biodegradable and thus avoids the use of plastics is considered appropriate, with the intention of maintaining the value of the chain and sustainability.

iii. Transportation and Cold Chain

Agriculture is one of the most important industries in the region. However, the region does not have adequate means of transportation to move crops to the various markets; air, land, and sea freight costs are high and there is no appropriate transportation equipment, which causes the cold chain to be interrupted. At present, there is a shortage of transportation services such as containers used mainly for export.

iv. Laboratories

Integrated soil and water management, as the main factors of production and productivity, helps to make the use of resources such as fertilizers and agrochemicals more efficient. At the regional level, the development of laboratories at the local level is considered necessary and opportune.

On the other hand, pesticides are the main product used to handle plagues and disease control. In the region, some pesticides and molecules are still being used despite that they have been forbidden in other countries. That is why the evaluation and analysis of pesticide residues in horticultural products is also essential. There is a lack of laboratories in the region that could perform this type of analysis. It is considered that not only the product for the export market should be tested, but also the product for local consumption.

7.2.8. NUTRITION

Sustainable food, fruit and vegetable production allows the land and water to be resilient and harbor the diversity needed to provide a nutritious and healthy diet. By producing more sustainably, we would be contributing greatly to the reduction of pesticide residues in vegetables and fruits. The lack of product safety is evident. This makes it impossible to open gaps to other markets, since there is also a lack of laboratories in the region that perform this type of analysis. Mitigation strategies are required, and production must be demand-driven. Today, much of what is produced lacks the required nutrients and, in addition, there is often an over-demand.

7.2.9. RESEARCH, EDUCATION, AND TRAINING

The lack of specialized technical advice is a cross-cutting issue in all the components of the fruit and vegetable chain. At the level of input suppliers, the intervention of trained personnel is necessary because in many cases input sellers are not able to advise farmers, which leads to misinformation. Technical assistance and training are key elements; not having assistance in time and form causes the actors to carry out some bad practices during the processes, have problems with plague and disease management, market, post-harvest, processing, and value added, among others.

There are research and education institutions that have all the installed capacity to carry out research, however, sometimes they lack funds to do so and results of research are not published. It is important to mention that a coordination between research entities, government and the private sector should exist to create an institution with the intention of strengthening technology, and knowledge management.

In order to mitigate the lack of research on important topics such as Integrated Pest Management (IPM), nutrition, soil, water, and others, there is an opportunity to create and establish a specific regional research center that would link specific regional research center that links producers, agroexporters and, above all, is sustainable over time and, above all sustainable over time and in accordance with the needs of the sector.

7.2.10. HORTICULTURAL PRODUCTION AND POLICIES

Central America is a region in which the countries have similar characteristics. The horticultural sector plays a very important role in economic and social development as a traditional source of employment, food for the rural and urban population, production, and exports.

According to stakeholders in the chain, many of the processes such as import and export registration in the countries of the region are quite bureaucratic. They consider that there is a huge deficiency in government agricultural policies, a strong monopoly on imports and a lack of compliance with laws, all of which leads to ungovernability.

7.3. Analysis of Surveys and Interviews

For the analysis, to understand the horticultural context, the surveys applied to participants were presented with a set of questions classified in eight prioritized sections based on horticultural production, natural resources, socioeconomic context, market, consumption, technology, research, education, training, and policies in horticultural production. For each of the sections, participants were asked to rate the items according to a scale.

The results coincide with those of the interviews and workshops since technical advisory services are considered cross-cutting in all components of the fruit and vegetable chain. On the other hand, there are also productive constraints, such as the rise and cost of agricultural inputs, an excess of plagues and diseases, and the presence of new pests in the production fields. There are also socioeconomic constraints such as inequality in the distribution of goods and wealth, land tenure, and the lack of involvement of young people in agricultural activities. Women lack representation and many young people do not see agricultural activities as a business, since they lack information, come from homes where subsistence agriculture is practiced and are unaware of the benefits and opportunities that this sector can provide, causing them to look for other options to generate income and make the decision to migrate from the country.

In the production fields, there is a shortage of labor at harvest time, which causes some crops to be lost. On the other hand, many of the farmers do not have access to credit. This reduces the possibilities of diversifying their crop plantations, opting to improve or acquire technologies for new production systems, post-harvest technologies, and processing and thus offer the final consumer a value-added product. There is also wide fluctuation and variation in the prices of horticultural products and producers do not have first-hand information on markets.

Due to climate change, many of the production fields have suffered landslides and extended periods of drought and rainfall, causing crop losses. Many farmers have the initiative to opt for agricultural insurance, but the high costs and low availability of these possibilities are reduced, which is a constraint for the chain. There is also a lack of government support programs for agricultural extension. Participation is considered opportune since farmers need support in the activities of the entire fruit and vegetable chain.

The limitations at the regional level are quite similar. The results obtained in Guatemala and El Salvador are somewhat similar to the constraints in Honduras. Access to credit for small farmers, the lack of support programs from the government and other entities that support farmers, the limited availability of appropriate technologies for production, processing and value added, the increase and presence of new pests and diseases in the production fields because they also face high input costs. There is also limited availability of technical advisory services to support processes throughout the chain. The three countries are also experiencing a lack of availability and high costs of agricultural insurance, which prevents them from insuring their production and protecting it from the effects of climate change. In addition, there is a lack of working capital, which limits farmers' ability to carry out their work, implement new technologies for production, post-harvest, processing, and storage, adapt to market demands, policies and parameters, and qualify for agricultural credit to increase their production fields.

For consumers, one of the limitations to acquiring vegetables and fruits are the places where they can buy them, as well as the prices.

7.4. Research Needs in the Fruit and Vegetable Sector

The survey contained a section on research of the overall needs in the fruit and vegetable sector. As well as plague and crop management and postharvest. Among the main topics for research in the sector we have:

- Genetic improvement and resistant varieties
- In-vitro production
- Water management in horticultural production
- Crop adaptation and management under protected structures
- Soil management and nutrition
- Post-harvest management
- Sociology and rural development
- Agricultural economics
- Business development
- Market access

Specifically for pest and disease management, the most important topic was IPM, followed by the development and use of biological controllers. Most expressed that the use of biological controllers for pest and disease control in production fields should be a priority to have a more sustainable agriculture.

Under the category of integrated crop management, the topics for research were sustainable agriculture, development of plague and disease resistant crops, soil nutrition and development of early warning systems for pest management in crops.

Post-harvest research topics were related to proper handling, education and training, technology, safety, packaging, food waste reduction, pesticide residue analysis in vegetables, and cold chain.

8. GENERAL APPROACHES TO RESULTS

8.1. Approaches at the National Level (Honduras)

The chain approach makes it possible to identify the different actors involved in the process to establish their relationships and functions. It is in this construction process that problems can be mainstreamed and systematized to address them in an established timeline.

The Central Government is of utmost importance for the design of public policies that favor the horticultural and fruit sector, since its duty is to promote and regulate economic activities related to the production, processing, and commercialization of agricultural products, as well as the environment in which they are developed.

Undoubtedly, the lack of public policies to promote horticultural production requires a deep reflection and later a design that includes access to financing and technology. Likewise, the State Modernization Law needs to be revised to improve government services to producers.

Most technical assistance is being provided to producers by non-governmental organizations, but these do not necessarily respond to a comprehensive vision of improving the competitiveness of the horticultural sector.

Although there are four agricultural universities in the country that carry out research, these are not socialized with producers, so productive competitiveness has been stagnant and outdated. Private agricultural companies (national and transnational) carry out and finance their research to improve their production and have access to phylogenetic material that allows them to be competitive in the export market.

Producers are frustrated by the lack of direct support from the State, in addition to the poor management of their crops due to soil impoverishment, lack of renewal of phylogenetic material, phytosanitary problems in their crops, no opportunities to access low-interest loans to finance working capital, the onslaught of extreme conditions resulting from the effects of climate change and, currently, the increase in agricultural inputs as a result of the international crisis.

All these factors considerably reduce the consolidation of adult horticulturists, and in view of these scenarios, the young people called to be their parents' successors do not find motivation to continue their parents' work; on the contrary, they decide to migrate to other countries.

On the other hand, the vegetable processing and packaging industry is very small, first because the product they receive from the producers does not meet the quality standards and the volume they deliver is reduced because the grower has many losses in production and post-harvest. Likewise, the industry is incipient in process technology and value addition.

A good part of the production is marketed in markets and supermarkets; however, there are a small number of agricultural exporters that market their products in different countries.

8.2. Approaches at the Regional Level

Central America, being in a biodiversity corridor, has several ecosystems, where each of the countries that comprise it produces a significant number of vegetables, Guatemala being one of the most competitive countries in the region. This situation opens the opportunity for other countries such as Honduras and El Salvador to establish technical cooperation through existing platforms that could be generated within the region.

The need for technical assistance in all components of the fruit and vegetable chain is an important issue throughout the region, in addition to research processes in integrated pest management, technologies and nutrition. On the other hand, it is essential to be able to carry out nutrition feasibility studies according to the geographical areas where each family is located.

Also, at the chain level, priority should be given to the integration of young people and women, with the aim of generating opportunities through rural enterprises for the vegetable market and generating added value to horticultural products.

On the other hand, at the regional level, the different stakeholders expressed the need for technification at all levels. This opens an excellent opportunities to develop a mapping and diagnosis of the level of technification and equipment available in the region.

9. GENERAL CONCLUSIONS AND RECOMMENDATIONS

- a) In order to determine the appropriate parameters for the current situation of the horticultural and fruit chain in the Central American region, it was necessary to gather information through specific methodologies used in the first regional workshop, focus group meetings and interviews with key personnel in the value chain in the countries of Honduras, El Salvador and Guatemala.
- b) The analysis of the matrix of results and prioritized actions shows that the most recurrent problems in all components of the chain correspond to knowledge management, financing, public policies and socioeconomic context, natural resources and environment, and use of technology.
- c) In the opportunities and group agreements, priority has been given to actions aimed at generating and disseminating knowledge with the participation of the actors involved in training, which are the producers and facilitators, the latter within an institutional system or individually as consultants/providers of training and technical assistance services.
- d) Government involvement and the lack of public policies to promote horticultural production require a thorough reflection and later the design of a structure that includes access to financing and technology. In addition, the State Modernization Law needs to be revised to improve government services to producers.
- e) In relation to the regional context and the fact that Guatemala is one of the most competitive countries in terms of vegetable production, there is an opportunity for other countries such as Honduras and El Salvador to establish technical cooperation through existing platforms that could be generated in the region.
- f) In Honduras, Guatemala, and El Salvador there is a clear need to generate training processes that involve all the actors in the fruit and vegetable chain in an integrated manner.
- g) At the regional level, there is a lack of recent data and studies on the nutritional value of vegetables and fruits for the final consumer.

10. SUGGESTIONS AND PROPOSALS FOR NEXT STEPS

- a) The continuity of research efforts and compilation of information obtained at the first regional workshop to keep the information up to date, with special emphasis on public policies, climate change, food and nutrition insecurity, and the use of natural resources. Food and nutritional insecurity and the use of natural resources.
- b) Develop workshops for the transfer of knowledge and/or disseminate the findings of scientific research developed by the academic institutions involved in the region, with the objective of improving crop productivity levels and increasing economic yields.
- c) Implement workshops or educational strategies, and empowerment programs with emphasis on vulnerable groups such as youth, ethnic groups, and women. These implementations are meant to accelerate the potential in terms of product transformation, business, administrative and financial skills, as well as promote business rounds and the formation of crop chains to improve local and international commercialization.
- d) Strengthen and enrich the knowledge of chain actors regarding good agricultural practices with emphasis on the protection of non-renewable resources and the promotion of technologies for mitigating and adapting to climate change.

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12. APPENDIX

Appendix 1 – Attendees at the First Regional Workshop to Understand the Context of the Horticultural and Fruit Chain in Honduras



Participants Workshop UCDAVIS -ZAMORANO, from June 15 to 17, 2022

No	Name	Institution	Position	Place of Origin	Contact	Email	Their role in the Horticulture Chain
HONDURAS							
1	Rosario Lagos	Del Campo Soluciones Agrícolas	Coordinadora de mercadeo	Tegucigalpa	9909-8914	mlagos@delcamposoluciones.com	Proveedores de insumos agrícolas y de servicios
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3	Roger Montoya	CONAGROH	Gerente	Tegucigalpa	31482215/94	gerenciaconagroh@gmail.com	Grupo de productores organizados
4	Adrian Torres	Banco de Alimentos	Oficial de programa Rescate Verde	Tegucigalpa	761228	oficialrv@bahonduras.org	Reducción de desperdicios de alimentos
5	Victor Gonzalez	FHIA	Director de Investigación	Tegucigalpa	96415657	victor.gonzalez@fhia-hn.org	Investigación
6	César Noé Pino	SDNASA	Jefe de Oficina de admisibilidad	Tegucigalpa	94993506	cnopino@senssa.gob.hn	Entidad Regulatoria
7	Zaira Colindres	Rikolto	Asesora de programas y proyectos en Sistemas Agroalimentarios	Tegucigalpa	33910595	zaira.colindres@rikolto.org	Sistemas agroalimentarios - ONG
8	Mathias Martínez	La Colonia	Asesor Técnico de campo	Tegucigalpa	98971123	mmartinez@lacolonia.hn	Comercialización- compras
9	Lourdes Medina	IICA	Representante IICA Honduras	Tegucigalpa	99780254	lourdes.medina@iica.int	Instituto Interamericano de colaboración para la Agricultura
10	Miguel Flores	CRS	Representante	Tegucigalpa	NA	Miguel.Flores@crs.org	ONG
11	Cesar Zelaya	Vision Mundial	Coordinación de programas y proyectos	Tegucigalpa	32098179	Cesar_zelaya@vwi.org	ONG
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13	Ricardo Bulnes	PYFLOR	Gerente propietario	Tegucigalpa	99583362	rbulnes@yahoo.com.mx	Empresa Privada- Innovación- Tecnología- producción- Comercialización
14	Edna Santos	Productora/Privado	Representante cadena de chile jalapeño	Danlí	95804636	inversionesvalentina1983@gmail.com	Productora- Procesadora
15	Jose Luis Rodas	IDEAL Tecnologías	Coordinador de proyectos	Tegucigalpa	94593105	slara@ideglobal.org	Tecnologías
16	Julio Lopez Montes	SINEFAH	Representante	Tegucigalpa	99240007	jlopez@zamorano.edu	Sistema nacional de Extensión Agrícola y forestal de Honduras
17	Juan Pablo Mena	DINANT	Gerente de Mercadeo y Empaque	Comayagua	33910095	juanpablo.mena@dinant.com	Empresa Privada- Producción- Exportación- Procesamiento
18	Victor Barahona	COHORSIL	Presidente de Junta Directiva	Siguatepeque	33919678	vbarahona@cohorsil.hn	Proveedores de insumos agrícolas y Viveros
19	Guillermo Guierrez	Rikolto	Asesor de programas y proyectos en Sistemas Agroalimentarios	Tegucigalpa	0505 8422	guillermo.gutierrez@rikolto.org	Sistemas Agroalimentarios - ONG
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21	Jose Lino Pacheco	UTSAN	Director	Tegucigalpa	99689673	joselinopacheco@yahoo.es	Seguridad Alimentaria y Nutricional
22	Medardo Galindo	FPX	Presidente de Asociación de Agroexportadores de HN	Tegucigalpa	99911327	mgalindo@fpxhn.net	Exportación
23	Harold García Betancourth	INFOP	Jefe del CEFEDH	Nacaome	9931 5518	harcoldgarcia@infoh.hn	Formación
24	Elizabeth Gonzales	Proyecto USAID/TMS	Facilitadora de campo - Cumplimiento Ambiental	Tegucigalpa	96500212	egonzales@zamorano.edu	Ambiente
25	Elsa Victoria López	5 al día Honduras	Miembro	Tegucigalpa	99724026	elavictoria.lopez@gmail.com	Nutrición
GUATEMALA							
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EL SALVADOR							
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USA							
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ZAMORANO							
35	Arie Sanders	Zamorano	Decano de posgrado	Nueva Zelanda	99141579	asanders@zamorano.edu	Educación
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Appendix 2 – Methodological tools for the development of the First Regional Workshop



HORTICULTURE
INNOVATION LAB

UC DAVIS
UNIVERSITY OF CALIFORNIA



First Regional Workshop to Know the Context and Establish Challenges and Opportunities of the Horticultural and Fruit Value Chain of Honduras and Central America

DYNAMICS: TREE DIAGRAM

CHALLENGES
CAUSES
EFFECTS / CONSEQUENCES
SOLUTION PROPOSAL
OPPORTUNITIES
NEEDS OR REQUIREMENTS TO OVERCOME THE CHALLENGE/CHALLENGE
ACTORS THAT CAN CONTRIBUTE TO OVERCOMING THEM
TYPE OF CONTRIBUTION

First Regional Workshop to Know the Context and Establish Challenges and Opportunities of the Horticultural and Fruit Value Chain of Honduras and Central America

DYNAMICS: MATRIX FOR PRIORITIZING CHALLENGES AND CHALLENGES

GROUP NAME: _____ DATE: _____

DIMENSION:					
CHALLENGES	LEVEL OF PRIORITIZATION TO CONSIDER THE CHALLENGE/CHALLENGE				
	NO PRIORITY	LOW PRIORITY	TO CONSIDER	HIGH PRIORITY	EXTREMELY PRIORITY

First Regional Workshop to Know the Context and Establish Challenges and Opportunities of the Horticultural and Fruit Value Chain of Honduras and Central America

DYNAMICS: BRAINSTORMING - IDENTIFICATION OF CHALLENGES AND CHALLENGES

GROUP NAME: _____ DATE: _____

DIMENSION	CHALLENGES

Appendix 3 – Attendees at the focus groups for the analysis of the Context of the Horticultural and Fruit Chain in Honduras, Guatemala and El Salvador



Database of chain actors in focus groups

NO.	Name	Institution	Focal Group Location	Position	Phone Number	Email
1	Gabriela Hernandez	UNAG	Edén, Comayagua	Docente/Coordinador de Producción vegetal	9463-2923	ghernandez@unag.edu.hn
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27	Rafael Reyes	ORAGROH	Dani, El Paraiso	Producción	9867-3922	reygon_84@yahoo.com
28	Edwin Gonzalez	ECARAI	La Esperanza, Intibucá	Asesor comercial	9555-8713	venisagroc.comercial.ecarai@gmail.com
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35	Dilcia Bautista	Flóres de café	La Esperanza, Intibucá	P.I.V	9996-2786	dilciabautista94@gmail.com
36	Sonia Vasquez	CHFP	La Esperanza, Intibucá	Coordinador de proyectos	9522-6729	sonia.vasquez@gmail.com
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48	Juan Meza	ACAPPY	La Esperanza, Intibucá	Presidente	9947-0483	NA
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56	Felina Euceda	Avoproxy	Santa Cruz de Yojoa, Cortes	Secretaria juntas	9871-1504	NA
57	Alejandro Catillo	Rica la Caridad	Santa Cruz de Yojoa, Cortes	Administrador op	9605-2412	atejandroz02@gmail.com
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62	Carlos Valle	Productor Independiente	Santa Cruz de Yojoa, Cortes	NA	9743-4848	NA
63	Manuel Galdamez	Productor Independiente	Santa Cruz de Yojoa, Cortes	NA	9770-5886	NA
64	Osmar Quiroz	Productor Independiente	Santa Cruz de Yojoa, Cortes	NA	9538-9282	NA
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74	Wilber Campos	ENA	San Salvador, El Salvador	GT	2363-4865	wilbercampos@ena.edu.sv
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84	Pedro Arreaga	ACOPO DE RL	San Salvador, El Salvador	Socio	7787-6558	NA
85	Adelmo Arreaga	ACOPO DE RL	San Salvador, El Salvador	Presidente	7211-3341	NA
86	Olga Diaz	Zamorano, Mireducyt	San Salvador, El Salvador	Especialista en tecnologías agroecológicas	7227-1240	olgadiaz61@gmail.com
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63	Manuel Galdamez	Productor Independiente	Sanja Cruz de yojoja, Cortes	NA	9770-5886	NA
64	Osmar Quiroz	Productor Independiente	Sanja Cruz de yojoja, Cortes	NA	9538-9282	NA
65	Jonathan Orellana	CDE VS	Sanja Cruz de yojoja, Cortes	Coordinador regional	9630-3430	janaco02@gmail.com
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137	Luis Andres Arevalo	Universidad del Valle de Guatemala	Guatemala, Guatemala	Coordinador del laboratorio de entomologia aplicada	NA	laareval@uvg.edu.gt
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151	Santos Saloj Poz	CORCL Asociación Coordinación Regional	Guatemala, Guatemala	Director ejecutivo	02) 5767-1421 / 4919-4052	direcc@corcl.org.gt
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Appendix 4 – Matrix used by focus group to identify problems, needs, opportunities, challenges and challenges by components of the chain

Chain components	Problems	Needs and requirements	Opportunities	Challenge
Input suppliers				
Production				
Postharvest and processing				
Transport and cold chain				
Marketing and distribution				

Appendix 5 – Participants of the surveys-interviews for the analysis of the Context of the Horticultural and Fruit Chain in Honduras, Guatemala and El Salvador



Database of respondents for the analysis of the fruit and vegetable chain

No	Name	Gender	Department	City / Community	Contact	Email	Profession	Entity to which participants belong	Components of the Horticulture Chain
1	Sully Pacheco	Femenino	Francisco Morazan	Tegucigalpa	33 733937	spacheco@voicetvaleshonduras.com	Lic. En comunicación y Publicidad	ONG	Comercialización y Distribución
2	Elizabeth Zúñiga	Femenino	El Paraíso	San Lucas		egonzalez@zamorano.edu	Ing. Ambiente y Desarrollo	Agencia de Desarrollo Interno	Proveedores de insumos
3	Miyra Cruz	Femenino	Francisco Morazan	Tegucigalpa	96 773181		Ingeniera Agrónoma	Gobierno	Seguridad alimentaria y Nutricional
4	Luis Jaco	Masculino	Comayagua	Comayagua	94569751	Luisjaco@Mentifaras.com		Compañía Agrícola	Producción, Postcosecha y Procesamiento, Comercialización y distribución
5	Héctor Urbina	Masculino	San Salvador, El Salvador	San Salvador	72 063775	he.turbina@gmail.com	Especialista en desarrollo sembrío	Academia	Producción
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8	Edna Santos	Femenino	El Paraíso	Teupasenti	95804636	inverdosnuevatenitina1983@gmail.com	Productora de Hortalizas	Independiente	Producción
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10	Raimario	Masculino	Guatemala	Guatemala		raimerio.lec@rikoira.org	Ingeniero agrónomo	ONG	Producción, Comercialización y distribución
11	Ricardo Bulnes	Masculino	Francisco Morazan	Valle de Angeles	99 583362	ribulnes@yahoo.com.mx	Ingeniero agrónomo	Independiente	Proveedor de insumos, producción, postcosechas y procesamiento, comercialización y distribución
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15	Louredes Medina	Femenino	Francisco Morazan	Tegucigalpa	99 780254	louredesmedina@rikoira.org	Médico veterinario	Otro	Producción, Postcosecha y procesamiento, Comercialización y distribución
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17	Adrian Torres	Masculino	Francisco Morazan	Tegucigalpa	95 653621	oficialiv@gmail.com	Licenciado en Tecnología de Alimentos	ONG	Postcosecha y Procesamiento
18	Victor Gonzalez	Masculino	Cortés	La Lima	94615657		Agrónomo	Fundación	Investigación y Desarrollo
19	Miguel Flores	Masculino	Intibuca	esús de Oro	31 650652	Miguel.Flores@rs.org	Ingeniero Civil, Maestría en Desarrollo Rural y Producción	ONG	Proveedores de insumos, Producción
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21	Stanley Perdomo	Masculino	San Salvador	San Salvador	503 71401555	stanly_perdomo@mag.gob.sv	Administrador de empresas	Gobierno	Producción, Postcosecha y Procesamiento
22	Carolina Mejía	Femenino	San Salvador	San Salvador	503 70714046	carolina.mejia@mined.gob.sv	Licenciada en Administración de Empresas	Gobierno	Comercialización y Distribución
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27	José Rodas	Masculino	Comayagua	Comayagua	94593105	jrodas@deglobal.org	Ingeniero Agrónomo	ONG	Proveedor de insumos, Producción, comercialización y Distribución

Appendix 6 – Field survey-interview for the analysis of the horticultural and fruit and vegetable context



SURVEY

ANALYSIS OF THE CENTRAL AMERICAN FRUIT AND VEGETABLE CONTEXT

Objective: To characterize the current situation of the fruit and vegetable sector in Central America and prioritize the opportunities, needs, requirements, challenges existing in the sector; in order to establish a participatory manner, models, approaches and appropriate solution strategies in accordance with local contexts.

BASIC INFORMATION OF THE RESPONDENT

Full name	
Gender	
Department	
City and/or community	
Contact (email, landline or cell phone)	
Profession	
Name of the organization/company/entity it represents	
Type or sector to which the entity it represents belongs (enclose in a circle)	<ul style="list-style-type: none"> a. NGO b. Foundation c. Government d. Academy e. Producer organization f. Consultant g. International Development Agency h. Independent i. Other, please specify: _____
Participation in the chain	<ul style="list-style-type: none"> j. Suppliers of inputs or raw materials k. Production l. Post-harvest and/or Processing m. Transport and/or cold chain n. Marketing and distribution o. Other _____

II. Characterization of the horticultural sector

Instructions: Below you will find a series of questions with multiple answer options, please consider your geographical area of influence and use the following rating scale and assign a value at your discretion. In some cases, several options may receive the same rating.



Qualification

Value	Description
1	It is not limiting
2	Little limiting
3	Moderately limiting
4	Very limiting
5	Extremely limiting
6	I do not know

1. HORTICULTURE – BIOPHYSICS

1.1. Rate the following limitations related to fruit and vegetable production, based on your experience or knowledge.

Limiting	Qualification
a. Agricultural input costs	
b. Lack of access to pest-resistant varieties and diseases	
c. Availability of appropriate technologies for irrigation	
d. Availability of appropriate and environmentally friendly agronomic technologies	
e. Availability of products for phytosanitary control	
f. Technical and managerial capacity of farmers	
g. Technical assistance and advice offered by experts	
h. Availability of certified and treated seeds	
i. Other, specify	

2. NATURAL RESOURCES

2.1. Rate according to the scale, the limitations related to climate change in fruit and vegetable production in your geographical area of influence.

Limiting	Qualification
a. Increased and excessive rainfall	
b. Extended periods of drought	
c. Flooding in production fields	
d. Cloudiness	
e. Low temperatures	
f. High temperatures	
g. Soil compaction	
h. Soil erosion	
i. Increase in pests and diseases in production fields	
j. Presence of new pests and diseases in production fields	
k. Landslides and/or landslides in production fields	
l. Other, specify	

3. SOCIO-ECONOMIC CONTEXT

3.1. Rate socio-economic constraints for production/processing/value added in the fruit and vegetable sector

Limiting	Qualification
a. Distribution of goods and wealth	
b. Access to education	
c. Lack of support programmes	
d. Market access	
e. Access to agricultural credit	
f. Lack of working capital	
g. Access to agricultural insurance	
h. Generational change	

i. Gender equity	
j. Youth migration	
k. Land tenure	
l. Other, specify	

4. MARKET

4.1. Rate the following limitations related to the market and marketing of fruit and vegetable products:

Limiting	Qualification
a. Access to credit	
b. Price fluctuation and variation	
c. Demand for fruit and vegetable products	
d. Offer of fruit and vegetable products	
e. Access to export markets	
f. Market requirements	
g. Market quality policies and parameters	
h. Access to informal markets	
i. Access to formal markets	
j. Formal market payment policies	
k. Payment time and periods	
l. Access to market and square information	
m. Access to pricing information	
n. Product Superabundance	
o. ñ. Other, specify	

4.2. If the entity you represent is engaged in marketing and/or distribution, please answer the following question:

Mark with an x the market channels you use to sell your fruit and vegetable product.

Canals	Qualification
a. Sales to the intermediary directly, because it treats me fairly	

b. Sales to the intermediary directly, because I have no other marketing channel	
c. All the fruit and vegetable product is put together and sold to the one who offers to buy	
d. Farmer's Fairs	
e. Wholesale market	
f. Contract with recognized supermarket chains	
g. I sell to other farmers who have contacts with marketers	
h. Grocery stores and convenience stores	
i. Other, specify	

4.3. Marking with an X the mechanisms you consider would result in a fairer and more stable price for farmers in the *informal market*.

- a. Establish staggered plantings to avoid overabundance of products ___
- b. Establish plantings of products according to geographical areas ___
- c. Organize into consortia, cooperatives or farmers' associations ___
- d. Establish contracts with wholesale market sellers ___
- e. Other, specify

5. CONSUMPTION

5.1. Rate the following limitations related to the consumption of fruit and vegetable products, based on your experience or knowledge.

Limiting	Qualification
a. Demand for nutritious product	
b. Product with added value	
c. Place of purchase of fruits	
d. Place of purchase of vegetables	
e. Prices	
f. Time required for food preparation	
g. Other, specify	

6. STRUCTURES AND TECHNOLOGY

6.1. Rate the following technology-related limitations in the fruit and vegetable chain:

Limiting	Qualification
a. Accessible technologies for production under protected structures (mesh houses, macrotunnel, greenhouses (etc.))	
b. Accessible technologies for post-harvest	
c. Accessible technologies for proper storage	
d. Accessible technologies for processing and added value	
e. Production supplies	
f. Technology suitable for transport and cold chain	
g. Other, specify	

7. RESEARCH, EDUCATION AND TRAINING

7.1. Rate the following limitations related to education, research and training:

Limiting	Qualification
a. Operational capacity of farmers	
b. Availability of training programs	
c. Availability of training programs	
d. Availability of agricultural extension programs	
e. Availability of technical advice	
f. Other, specify	

7.2. Mark with an X the *research needs* in the fruit and vegetable sector:

- a. Genetic improvement (resistant varieties) _____
- b. Invitro production- Biotechnology _____
- c. Integrated crop management _____
- d. Water management in hortícola _____ production
- e. Adaptation and management of crops under protected structures _____
- f. Integrated pest and enfermedades _____
- g. Optimization of production systems _____
- h. Soil management and nutrition _____
- i. Post-harvest management _____
- j. Sociology and rural development _____
- k. Agricultural economy _____
- l. Business Development/Market Access _____
- m. Other (specify): _____

7.3. In his opinion and experience, the research priorities in Integrated Pest Management (IPM) and Diseases in fruit and vegetable crops should be in:

Specify:

7.4. In your opinion and experience, research on Integrated Crop Production and Management (MIC) issues should include:

Specify:

7.5. In your opinion and experience, in the area of post-harvest research, the priority topics should be:

Specify:

8. HORTICULTURAL POLICY AND PRODUCTION

8.1. Rate the following limitations related to political factors and fruit and vegetable production, based on your experience or knowledge.

Limiting	Qualification
a. Lack of government programs to support smallholder agriculture	
b. Access to credit for smallholder farmers	
c. Availability of agricultural insurance	
d. Cost of agricultural insurance	
e. Associativity of farmers	
f. Confidence in the fruit and vegetable value chain	
g. Access to market information	
h. Availability of land suitable for agriculture	

a. Security of land tenure (invasions, expropriations)	
b. Other, specify	

8.2. Mark with an X the options you consider necessary. To improve business relations between farmers and fruit and vegetable marketers, you believe that the *Government* could:

- a. Implement policies to support the agricultural sector. _____
- b. Establish stricter price control laws. _____
- c. Establish more collection centers. _____
- d. Establish a business center that allows farmers and marketers to meet. _____
- e. Provide agribusiness training to farmers and marketers. _____
- f. Create places for the marketing of horticultural products such as fairs _____
- g. Other (specify) _____

8.3. Mark with an X the options you consider appropriate. You believe that *non-governmental organizations* (NGOs) could support as follows:

- a. Agribusiness training services to various segments of the value chain _____
- b. Provide market intelligence services to farmers _____
- c. Offer marketing services to farmers _____
- d. Promote spaces between farmers and marketers through fairs, business roundtables, etc. _____
- e. Create interinstitucionales _____ spaces
- f. Other (specify) _____

Appendix 7 – Problems and opportunities prioritized by focus group in Honduras

Table 1. Summary and elements prioritized by components of the fruit and vegetable chain in the focus group in Comayagua, Comayagua, Honduras.

ELEMENTS PRIORITIZED BY COMPONENTS OF THE FRUIT AND VEGETABLE CHAIN COMAYAGUA, COMAYAGUA			
Components of the Fruit and Vegetable Chain			
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Input Suppliers	<ol style="list-style-type: none"> 1. Bureaucratic procedures for registration and import of inputs. 2. High raw material costs. 3. Lack of technical assistance. 	<ol style="list-style-type: none"> 1. Create online program for records. 2. Search for local alternatives. 3. Lines of research at the regional level . 4. Rregulation of subsidies. 5. Creation of a technical assistance programme and research programme. 	<ol style="list-style-type: none"> a. Greater involvement of actors. b. Decentralization of procedures. c. Facilitate registration processes. d. Strengthen support programs for SMEs and rational agriculture. e. Create program in BPA´s.
Production	<ol style="list-style-type: none"> 1. Poor agricultural practices and mismanagement of resources. 2. Inappropriate use of agricultural inputs. 3. Lack of access to agricultural credit. 4. Lack of technology for production. 	<ol style="list-style-type: none"> 1. Access to irrigation systems and creation of reservoirs or wells in a sustainable manner. 2. Characterization of soils and water sources in the region. 3. Promote crop rotation, soil analysis, use of green manures, use of fungi and bacteria. 4. Training processes for the proper use of agricultural inputs. 5. Reactivation of value chains considering Success Stories. 6. Implementation and transfer of technology. 	<ol style="list-style-type: none"> a. Organization and implementation of Field Schools (ECA's) for producers and their families. In addition to the generation of information at the regional level. b. Encourage the creation of certification programs for Agrochemical applicators. c. Review of credit policies at the central level with the different actors. d. Create new production opportunities involving the entire chain.

Components of the Fruit and Vegetable Chain

Components of the Fruit and Vegetable Chain			
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Post-harvest and processing	<ol style="list-style-type: none"> 1. Waste of products and high rejection of vegetables. 	<ol style="list-style-type: none"> 1. Provide added value to discard and rejection products. 2. Entrepreneurship at the level of young people and women of the locality. 	<ol style="list-style-type: none"> a. Stimulate entrepreneurship at the local level. In addition to resource management at the level of international cooperation for post-harvest projects.
Comercialization and Distribution	<ol style="list-style-type: none"> 1. Maintain the cold chain. 2. Lack of organization in marketing. 3. Lack of inputs and materials for export. 	<ol style="list-style-type: none"> 1. Implementation of Mobile Cold Rooms. 2. Improve prices, better windows for marketing and better decisions at the union level. 3. Local pallet manufacturing and exploration of new materials. 	<ol style="list-style-type: none"> a. Search for funds for innovation technology in cold rooms. b. Encourage the creation of market intelligence offices. c. Establish strategic alloys and link technical training entities for manufacturing.
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Research, training and education	<ol style="list-style-type: none"> 1. Poor Agricultural and Manufacturing Practices . 	<ol style="list-style-type: none"> 1. Creation of a technical training program for specialists in post-harvest management. 	<ol style="list-style-type: none"> a. Strengthening of educational institutions at the local level.
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Nutrition	<ol style="list-style-type: none"> 1. Lack of laboratories for the analysis of pesticide residues in vegetables. 	<ol style="list-style-type: none"> 1. Safety and certification processes. 	<ol style="list-style-type: none"> a. Involve specialized actors to implement laboratories at the regional level.
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Political, socio-economic and climate change context	<ol style="list-style-type: none"> 1. Lack of skilled and skilled labor. 	<ol style="list-style-type: none"> 1. Job creation through production, post-harvest and processing. 	<ol style="list-style-type: none"> a. Encourage the creation of training programs for the provision of skills.

Table 2. Summary and elements prioritized by components of the fruit and vegetable chain in the focus group in La Esperanza, Intibucá, Honduras.

ELEMENTS PRIORITIZED BY COMPONENTS OF THE FRUIT AND VEGETABLE CHAIN LA ESPERANZA, INTIBUCÁ			
Components of the Fruit and Vegetable Chain			
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Input Suppliers	<ol style="list-style-type: none"> 1. Input costs. 2. Environmental pollution from the use of pesticides. 3. Poor management of chemical waste, packaging. 	<ol style="list-style-type: none"> 1. Expand and diversify the product offering. 2. Training in biological controllers, organic products and biopesticides. 3. Promote at the level of all producers the use of biological controllers. 4. Formalize a program for the management of chemical and pesticide products and wastes. 	<ol style="list-style-type: none"> a. Keep all members of the chain informed and trained. b. Develop demonstration plots and model farms on management, pest control, Good Agricultural Practices, biological controllers and organic plots. c. Look for alternatives for incentive program.
Production	<ol style="list-style-type: none"> 1. Lack of advice and technical assistance. 2. Lack of technology transfer. 3. High costs of production and import of seeds. 	<ol style="list-style-type: none"> 1. Create a program of assistance and technical advice for the fruit and vegetable chain. 2. Training and knowledge in new technologies. 3. Diversify crops and rescue of native and native seeds. 	<ol style="list-style-type: none"> a. Involve all actors. b. Create a platform for technology access. c. Improve and establish agreements with marketers.
Post-Harvest and Processing	<ol style="list-style-type: none"> 1. Lack of infrastructure for an adequate post-harvest. 2. Lack of specialized and available labor. 	<ol style="list-style-type: none"> 1. Innovate in new technologies. 2. Training in post-harvest and value-added issues. 	<ol style="list-style-type: none"> a. Search for sources of investment for technological options. b. Formalize strategic alliances with government, civil and NGO agencies.

Components of the Fruit and Vegetable Chain			
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Commercialization and distribution	<ol style="list-style-type: none"> 1. Lack of understanding of market needs. 2. Weak organizational structures. 	<ol style="list-style-type: none"> 1. Standardize quality parameters. 2. Market training. 3. Organization of the production chain. 	<ol style="list-style-type: none"> a. Update on parameters and product presentation in optimal conditions. b. Diversify crops, improve and establish contracts with buyers.
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Research, training and education	<ol style="list-style-type: none"> 1. Lack of nutrition research. 2. Lack of financial and market education. 	<ol style="list-style-type: none"> 1. Research according to the needs of the basic food basket with a nutritional approach. 2. Investment plans. 3. Evaluation of production costs. 4. Mandatory training programs to access markets. 	<ol style="list-style-type: none"> a. Dissemination of technical guidelines for food education. b. Create sustainable business and investment models.
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Nutrition	<ol style="list-style-type: none"> 1. Little consumption of what is produced. 2. Pesticide residues in vegetables and fruits. 	<ol style="list-style-type: none"> 1. Awareness campaigns to motivate consumption through nutrition education. 2. Perform analysis of horticultural products to determine residuality. 	<ol style="list-style-type: none"> a. Implementation of family gardens for the diversification of the family diet. b. Improve the quality and safety of horticultural products.
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Political, socio-economic and climate change context	<ol style="list-style-type: none"> 1. Lack of opportunities for women. 2. Deficiency in agricultural government policies. 	<ol style="list-style-type: none"> 1. Involvement of women in activities of the chain mainly in added value. 2. Impact by the government on aspects of imports. 	<ol style="list-style-type: none"> a. Search for support and gender equity programs. b. Promote efficient agricultural programs and policies.

Table 3. Summary and elements prioritized by components of the fruit and vegetable chain in the focus group in Tegucigalpa, Francisco Morazán, Honduras.

ELEMENTS PRIORITIZED BY COMPONENTS OF THE FRUIT AND VEGETABLE CHAIN TEGUCIGALPA, FRANCISCO MORAZÁN			
Components of the Fruit and Vegetable Chain			
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Input Suppliers	<ol style="list-style-type: none"> 1. Price fluctuations of agricultural inputs. 2. Institutional weakening in technology transfer and advice. 	<ol style="list-style-type: none"> 1. Development of alternative products. 2. Application of subsidies. 3. Production management plan. 4. Investment plans by farmers. 5. Technical advice under controls and protocols. 6. Chain-wide technology transfer. 	<ol style="list-style-type: none"> a. Search for strategic allies for policies and regulations in accordance with consumer law. b. Associated producers by category. c. Government involvement in the creation of a program for specialized technical assistance.
Production	<ol style="list-style-type: none"> 1. Resistance and new pests. 2. Soil erosion and weakening. 3. Low generational inclusion. 	<ol style="list-style-type: none"> 1. Implementation and use of environmentally friendly technology. 2. Creation of organic communities hand in hand with food education. 3. Implementation of practices for proper soil management. 4. Perform soil analysis according to production items. 5. Involvement of young people in agricultural activities from the business point of view. 6. Job creation at the rural sector level. 	<ol style="list-style-type: none"> a. Implementation of new technologies to make productivity more efficient. b. Search for business alternatives and youth enterprises.

Components of the Fruit and Vegetable Chain

Components of the Fruit and Vegetable Chain			
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Post-Harvest and Processing	<ol style="list-style-type: none"> 1. Low availability of equipment and machinery for post-harvest and processing. 2. High equipment and machinery costs. 3. Lack of proper packaging. 	<ol style="list-style-type: none"> 1. New technologies adapted to climate change. 	<ol style="list-style-type: none"> a. Identify market niches for the commercialization of the product with added value and management of funds for an adequate post-harvest.
Commercialization and distribution	<ol style="list-style-type: none"> 1. Poor road infrastructure. 2. Improper transport- Cold chain. 3. Poor infrastructure of formal and informal markets. 	<ol style="list-style-type: none"> 1. Knowledge of packaging and handling during transport. 2. New markets; Schools, Hospitals and Supply Centers. 	<ol style="list-style-type: none"> a. Link the government to improve access roads and manage funds for technology suitable for the old chain.
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Research, training and education	<ol style="list-style-type: none"> 1. Lack of nutrition research. 2. Lack of financial and market education. 	<ol style="list-style-type: none"> 1. Research according to the needs of the basic food basket with a nutritional approach. 2. Investment plans. 3. Evaluation of production costs. 4. Mandatory training programs to access markets. 	<ol style="list-style-type: none"> a. Dissemination of technical guidelines for food education. b. Create sustainable business and investment models.
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Nutrition	<ol style="list-style-type: none"> 1. Lack of mitigation strategies. 	<ol style="list-style-type: none"> 1. Obtaining timely and reliable data for each pillar of Nutritional Food Security with emphasis on components related to the consumption and biological use of food. 2. Publicize horticultural products through awareness campaigns and large-scale food and nutrition education. 	<ol style="list-style-type: none"> a. Involve key actors for research in a disaggregated manner and based on reliable results perform a correct and adequate intervention and follow-up.

Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Political, socio-economic and climate change context	1. Import monopoly.	1. New policies and regulations to favour producers, such as trade corridors.	a. Search for strategic allies for new policies and regulation of imports.

Table 4. Summary and prioritized elements by components of the fruit and vegetable chain in the focus group in Danlí, El Paraíso, Honduras.

ELEMENTS PRIORITIZED BY COMPONENTS OF THE HORTICULTURAL CHAIN DANLÍ, EL PARAÍSO			
Components of the Fruit and Vegetable Chain			
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Input Suppliers	<ol style="list-style-type: none"> 1. Misinformation on the part of the supplier towards customers. 2. Lack of quality regulations towards inputs. 	<ol style="list-style-type: none"> 1. Education and training on the appropriate use of agricultural inputs specifically pesticides. 2. Conduct of the Agricultural Census. 	<ol style="list-style-type: none"> a. Search for strategic funding allies. b. Incorporation by the government for law enforcement and regulation.
Production	<ol style="list-style-type: none"> 1. Pests and diseases. 2. Lack of funding. 	<ol style="list-style-type: none"> 1. Specialized technical advice. 2. Organize and coordinate plantings. 3. Upgrade production systems. 4. Agricultural loans at low interest rates. 5. Certifications of agricultural production. 	<ol style="list-style-type: none"> a. Need for certification in local and international production.
Post-harvest and processing	<ol style="list-style-type: none"> 1. Lack of added value. 	<ol style="list-style-type: none"> 1. Increased employment at the local level. 	<ol style="list-style-type: none"> a. Involve key stakeholders for the search and management of funds for the implementation of processing plants by vegetable category.
Commercialization and distribution	<ol style="list-style-type: none"> 1. Lack of new market windows. 2. Lack of price stability in the market. 	<ol style="list-style-type: none"> 1. Contribute to food security. 2. Certifications in production farms. 3. Reduce intermediaries. 	<ol style="list-style-type: none"> a. Conduct emerging market research and market research. b. Involvement of the government and local private entities for certification processes.

Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Research, training and education	<ol style="list-style-type: none"> 1. Little research on pests and diseases. 2. Little training in new agricultural production technologies. 	<ol style="list-style-type: none"> 1. Training in pest and disease management by crop category. 2. Technology transfer and capacity building. 	<ol style="list-style-type: none"> a. Involvement of the academy training and research entities.
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Nutrition	<ol style="list-style-type: none"> 1. Lack of product safety . 	<ol style="list-style-type: none"> 1. Provide security and safety in the market. 	<ol style="list-style-type: none"> a. Government involvement in the implementation of local safety policies.
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Political, socio-economic and climate change context	<ol style="list-style-type: none"> 1. Mismanagement of agricultural waste. 2. Lack of manpower. 	<ol style="list-style-type: none"> 1. Formalize a program for the collection of waste. 2. Inclusion and gender equity in chain activities. 	<ol style="list-style-type: none"> a. Involvement of government entities for the process. b. Seek the generation of jobs in the productive sector to avoid migration.

Table 5. Summary and prioritized elements by components of the fruit and vegetable chain in the focus group in Santa Cruz de Yojoa, Cortés, Honduras.

ELEMENTS PRIORITIZED BY COMPONENTS OF THE HORTICULTURAL CHAIN SANTA CRUZ DE YOJOA, CORTES			
Components of the Fruit and Vegetable Chain			
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Input Suppliers	<ol style="list-style-type: none"> 1. Input cost elevator. 	<ol style="list-style-type: none"> 1. Search for alternatives for production such as botanicals and biological controllers. 	<ol style="list-style-type: none"> a. Implementation of organic farming.
Production	<ol style="list-style-type: none"> 1. Lack of adapted and accessible genetic material. 2. Environmental conditions. 	<ol style="list-style-type: none"> 1. Alternative Agriculture and application of mitigation practices. 	<ol style="list-style-type: none"> a. Implementation of new technologies, such as precision equipment.
Post-harvest and processing	<ol style="list-style-type: none"> 1. Lack of post-harvest knowledge. 2. Migration. 	<ol style="list-style-type: none"> 1. Seeking funding for technical assistance processes. 2. Increase the processing of raw materials. 	<ol style="list-style-type: none"> a. Make product deliveries while maintaining quality. b. Job creation for young people and women.
Commercialization and distribution	<ol style="list-style-type: none"> 1. High fuel and energy costs. 2. No cold chain. 3. Lack of knowledge of the claim. 	<ol style="list-style-type: none"> 1. Search for alternatives for storage - cold rooms. 2. Do market research. 	<ol style="list-style-type: none"> a. Establish contracts to ensure fair prices for farmers under quality standards.

Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Research, training and education	<ol style="list-style-type: none"> 1. Lack of post-harvest knowledge. 2. Lack of marketing. 	<ol style="list-style-type: none"> 1. Management training and good manufacturing practices. 2. Conducting market research. 	<ol style="list-style-type: none"> a. Reach new markets with quality standards and export options.
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Nutricion	<ol style="list-style-type: none"> 1. Deamnd overclaim. 	<ol style="list-style-type: none"> 1. Avoid intermediation. 	<ol style="list-style-type: none"> a. Produce with the highest standards of quality, safety and nutrition.
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Political, socio-economic and climate change context	<ol style="list-style-type: none"> 1. Deforestation. 2. Water resource shortages. 3. Excess rainfall. 4. Unfair selling prices. 	<ol style="list-style-type: none"> 1. Produce more environmentally friendly. 2. New markets for marketing. 	<ol style="list-style-type: none"> a. Generating Sustainable Agriculture. b. Government intervention for price regulation.

Table 6. Summary and prioritized elements by components of the fruit and vegetable chain in the focus group in Choloteca, Choloteca, Honduras.

ELEMENTS PRIORITIZED BY COMPONENTS OF THE HORTICULTURAL CHAIN CHOLUTECA, CHOLUTECA			
Components of the Fruit and Vegetable Chain			
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Input Suppliers	<ol style="list-style-type: none"> 1. Low product availability. 2. Untrained vendors. 	<ol style="list-style-type: none"> 1. Development of new products at the local level. 2. Training for agricultural personnel . 	<ol style="list-style-type: none"> a. Creation of youth and women's enterprises in local inputs and promote local product . b. Strengthen the technical staff of agro-services.
Production	<ol style="list-style-type: none"> 1. Food safety. 2. Poor Planting Planning. 3. Land tenure. 4. Inadequate pest management and control. 5. Citizen Insecurity. 	<ol style="list-style-type: none"> 1. Technical assistance for producers. 2. Make use of pesticide application registration. 3. Update statistical data (Agricultural Census). 4. Support for land legalization. 5. Training and technology for good control and management. 	<ol style="list-style-type: none"> a. Involvement of government entities to perform traceability to production batches. b. Bring together actors (government, academia, private enterprise willing to act to improve production conditions).
Post-harvest and processing	<ol style="list-style-type: none"> 1. Residuality of chemicals. 2. High cooling and energy costs. 3. Lack of added value. 	<ol style="list-style-type: none"> 1. Traceability and records of production batches. 2. Create spaces for consultation. 3. Knowledge transfer. 	<ol style="list-style-type: none"> a. Involvement of the government and its main actors. b. Strengthening of technical capacities. Management for equipment acquisition.

Components of the Fruit and Vegetable Chain

Components of the Fruit and Vegetable Chain			
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Commercialization and distribution	<ol style="list-style-type: none"> 1. High costs of customs procedures. 2. Limited internet access and communication. 3. Shortage of transport services. 4. Lack of agreements and fulfillment of contracts. 	<ol style="list-style-type: none"> 1. Spaces for consultation between the government, transport leaders and producers. 2. Immediate market access. 	<ol style="list-style-type: none"> a. Supporting international cooperation through multi-stakeholder platforms.
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Research, training and education	<ol style="list-style-type: none"> 1. Pest and disease management problems. Poor handling of stubble. 	<ol style="list-style-type: none"> 1. Training through demonstration plots. 2. IPM Training. 3. Research to solve new problems and low use of inputs. 	<ol style="list-style-type: none"> a. Search for strategic alloys for learning new methods, techniques and technologies. Knowledge transfer.
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Nutrition	<ol style="list-style-type: none"> 1. Little area for existing demand. 	<ol style="list-style-type: none"> 1. Produce according to demand. 	<ol style="list-style-type: none"> a. It is considered that you can enter a food crisis.
Dimensions	Prioritized problems	Prioritized opportunities	Group Agreements
Political, socio-economic and climate change context	<ol style="list-style-type: none"> 1. Ungovernability. 2. Failure to comply with laws on stubble destruction and agricultural bans. 3. Bureaucratic processes for registrations and exports. 	<ol style="list-style-type: none"> 1. State policies for road improvement. 2. Find resources to enforce bans. 3. Create exclusivity windows for exports. 	<ol style="list-style-type: none"> a. Involvement of the state and competent actors.

