Food and Agriculture Organization
of the United Nations

Linking Small FArmers to the Market while caring for the Environment.

LISFAME
The case of Ecuador

Project Report*

***Over the next two decades**, the world's population is expected to grow on average by more than 100 million people a year. More than 95 percent of that increase will occur in the developing countries, where pressure on land and water is already intense. A key challenge facing the international community is, therefore, to ensure food security for present and future generations, while protecting the natural resource base on which we all depend. The potato will be an important part of efforts to meet those challenges (The international Year of Potato, IPV, 2008).*

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Context

The Agricultural and Development Economic division (ESA) of the Food and Agriculture Organization and the International Potato Center (CIP) in Ecuador have started, in 2006, a collaborative project called *Linking Smallholders Potato farmers to the Market while caring for the Environment.* Purpose of the project is to examine the drivers of the new agricultural economy and their impacts on the functioning of agricultural markets, on household welfare, and on the natural resource base.

The project links two major research efforts undertaken by FAO-ESA: "Using markets to promote the sustainable utilization of crop genetic resources" and "Supermarkets and the poor". The former focuses on the input side of market interactions assessing how policies affect markets for seeds and how changes in markets affect farmers' incentives for sustainable utilization of crop genetic resources. The latter focuses on the output side of the market, assessing possibilities and constraints that smallholders face when supplying to dynamic markets as well as how changes in agricultural output markets affect their production system and choice of market outlets. In this project, co-financed by the FAO Norway Partnership (**FNOP**) and the FAO Netherlands Partnership Program (**FNPP**) both the input and output side of the market for potatoes are taken into consideration.

This report describes: 1) the project objectives; 2) activities undertaken; 3) methodology developed and its implementation; 4) main findings; 5) lessons learned and recommendations. Purpose of the report is to provide policy advice for project expansion as well as a useful tool and recommendations to those wishing to conduct similar research in this area. The intended audience for this report includes practitioners, researchers, technicians and specialists working in the field of rural development.

To meet these objectives, the remainder of the report is divided as follows. The next section provides a description of the study motivation. Section 2 describes the project's objectives and section 3 provides background and description of the study area to set the context under which the methodology was employed. In section 4, the methodology used and activities undertaken are described in detail, including survey instruments, sample selection procedure and value chain analysis. Section 5 briefly discusses field activities, final products and the data base. Section 6 introduces some findings while finally, in section 7 conclusions and recommendations are presented

1. Background and motivation for the study.

The last decades have witnessed profound changes in farming systems and the way in which agricultural production is organized in many developing countries. These changes, in few words defined as "*the new agricultural economy*", have introduced new forms of institutions imposing private grades and standards for food quality and safety, in addition to choices on new organizational arrangements (Dolan and Humphrey, 2004; Reardon and Berdegué, 2002; Kerallah and Kristen, 2001).

The net effect of the new agricultural economy on the welfare of poor people is controversial and depends on how these changes will affect the poor as producers and as consumers and on what are the conditions that determine their market integration. The increased orientation of rural development programs towards expanding agricultural markets through liberalization and deregulation can certainly offer farmers potential benefits, such as better markets access, availability and accessibility to credit and a better management capacity (Winters et al, 2005; Eaton and Shepherd, 2001). However, the fact that many smallholders remain on the periphery of the new agricultural economy indicates benefits to them do not accrue automatically and are by no means guaranteed (Reardon et al., 2003; Berdegué et al., 2003; Little and Watts, 1994).

The increased commercialisation of agricultural produce could have various opposing effects also on the environment. The orientation towards regional and farm-level specialization as well as the intensification of natural resources' use, have raised several concerns related to the loss of biodiversity and to the genetic erosion of local varieties, in addition to the intensification of chemicals used (Pingali, 2001; Barrett et al., 2001; Singh, 2002; Winters et al., 2005). The quality and uniformity requirements of agro processors may, indeed, limit the use of certain varieties, particularly traditional ones in favour of modern varieties with desirable processing characteristics (Dasgupta et al., 2001; Pingali, 2001). Moreover, the requirements of standards may lead, at least initially, to an increase in the use of agricultural chemicals and thus to higher environmental and human health risks (Thrupp, 1990; Crissman et al., 1998; Pingali, 2001, Berdegué et al., 2003).

The challenge is, thus, to identify programs and policies that allow smallholders to actively participate and benefit from the increased food-system dynamics while avoiding negative environmental externalities. Nevertheless, empirical research on farmers' choices to participate to the growing market liberalization is rather intricate, as it is analysing the consequential effects on the environment.

A growing literature indicates how complex and variable socioeconomic factors influence farmers' decisions on contracts or on other forms of market integration (Stiglitz, 1974; Eswaran and Kotwal, 1985; Grossmant and Hart, 1986; Perry and Katz, 1989; Lafontaine, 1992; Laffont and Matoussi, 1995; Barrett et al., 2001;Cotteril, 2001; Pingali, 2001; DeHaen et al., 2003; Reardon et al., 2003, Berdegué et al., 2004; Reardon and Swinnen, 2004; Winters et al, 2005; Kvaloy, 2006; Aggarwal, 2007). Other authors analyse the links between agricultural modernization and environmental impacts examining various interrelated factors, such as the substitution of new technologies for indigenous ones, new forms of land access and tenure security, access to credit, etc (de Janvry and Helfand, 1990; Thiesenhusen, 1991; Yapa, 1993; Coomes and Burt, 1997; Godoy et al., 2000; Perz, 2003). All these studies have analyzed the role of a wide array of factors, including risk sharing, moral hazard, capital constraints, information, social capital, risk perception, uncertainty and transaction costs. However, they all widely recognize that most of the crucial variables are difficult to identify and even more to measure.

Careful empirical work is, thus, critical in understanding the accuracy and generality of theoretical results.

Building on these theoretical studies, a number of attempts have been made in the Andean region to work with market chains and improve the integration of small farmers into markets with the aim of improving their welfare (Devaux, et al., 2006). The present study represents a specific attempt to try to account for the difficulties above mentioned and to identify the types of obstacles and the costs farmers face selling their produce. Various types of market channels, including new ones promoted through development interventions have been taken into account. How the different market channels influence farmers' marketing decisions and what are the consequent environmental impacts is a specific objective of the study. A specially designed primary level survey on smallholder potato producers in Ecuador is used to collect variables to measure the impacts and mechanisms above mentioned. An important added value to this research is the value chain analysis and farmers' focus groups that have preceded the quantitative data collection and that provide a good source of information and of complementary data. In addition, in the same study area, a precedent study on the use of pesticides[2] had been carried out and offers a good source of information.

2. Objectives

The specific objectives of the project are as follows:

1) To understand the structure of dynamic markets for potatoes and the position and role of smallholders in these markets;

2) To identify the circumstances and mechanisms which promote or inhibit small farmers' entry into the new agricultural economy and the actions that can be taken to improve the benefits of such entry;

3) To understand the role of social capital, transactions costs or other institutional norms and/or behaviours that could determine farmers' decision making and influence their choice to participate to the market and in which form;

4) To ascertain conditions under which such participation allows the conservation of the natural resource base with special regard to crop genetic diversity and reduced use of pesticides.

The most appropriate means to reach these objectives is to run an empirical case study in areas where concerns have been raised over the new agricultural economy. One such region is the Andean region whose agriculture relies on a resource base that is somewhat fragile because of its topography. It is also the point of origin and center of genetic diversity for a number of important crops, particularly potatoes. Large indigenous populations and widespread poverty characterize the Andean countries, particularly in rural areas. For this study, two countries, Ecuador and Bolivia, and one commodity, potatoes, have been chosen for detailed analysis. Focus of this report is the case study conducted in Ecuador.

[2] ECOSALUD project. For more information see CIP: www.cipotato.org

3. Setting the scene.

Ecuador and potato have been chosen for this study because:

- Potato is a staple crop, crucial to the food security of many Ecuadorian peoples, but also a crop that is commonly used in the processing of chips, fries and other foods. Moreover the Andes are the centre of origin and diversity for potatoes.

- Ecuador[3] has been chosen because, despite its on going agro-industrialization process, it still has large indigenous populations and widespread poverty, particularly in rural areas. It is a country that presents various degrees of farmers' integration with the market, from the many small farmers who still produce under the rules of traditional farming system to those vertically integrated and oriented towards agro-industrial production.

- There was a relatively large scale integrated market chain intervention with small potato farmers (Fortipapa).

3.1 Potato

2008 has been declared by the UN and FAO the International Year of Potato. One of its main objectives was to draw special attention to the role potatoes can play in food security, poverty alleviation, cultural heritage, adaptation to climate change, environmental protection as well as its potential contribution to achieving the UN Millennium Development Goals (IYP, 2008).

Potato is the fourth most important food crop worldwide, after rice, wheat, and maize, and one of the most diverse crop in the world (Hellin and Higman, 2003; IYP, 2008). Since the early 1960s it has exceeded all other food crops in the developing countries in terms of growth in production area. This trend is on-going and expected to continue. The crop is fundamental in the diets of populations in countries in South America, Africa, Central Asia and Asia.

"*It yields more nutritious food more quickly on less land and in harsher climates than any other major crop*[4]" (IYP, 2008).

Potatoes originated in the Andes and have been cultivated in the region for over 8000 years. It is estimated that more than 4,000 varieties of native potatoes (landraces) are still cultivated in the Andean region of South America. The potato is both a staple food and a cash crop for small Andean farmers. Native potatoes are grown in high areas where they play central roles in production systems and household economies (Devaux et al, 2006). The Andean highlands are, in effect, also home to some of the poorest rural households in South America. Traditionally farmers use a great diversity of potatoes to cope with the range of environmental risks they face, such as drought, floods, frost and hail. To minimize these risks, a wide range of potato varieties

[3] In effect the project has focussed in two regions of the Andes, Bolivia and Ecuador. The idea was to look across countries at different points in the process of agro-industrialization. The two identified Andean countries are ideally suited for such an investigation because they have similar environmental and poverty concerns and the same important staple crop in potatoes. However they are at different stages of agroindustrialization. While Ecuador offers various examples of market integration for small farmers, in Bolivia the process has just started and offers very different characteristics. Because they are at distinct stages of agroindustrialization they also face differing environmental problems. For Ecuador the issues of pesticide use and land use are most important because of the intensification of agriculture that accompanies a shift to processing. Agricultural biodiversity is less of an issue since there is limited diversity in processing areas because there was a shift to modern varieties in the past. In Bolivia, on the other hand, along with pesticide and land use issues, agricultural biodiversity is a key issue because there still remains significant diversity in areas where there is potential for processing. The focus of the present report is Ecuador.

[4] Up to 85 percent of the plant is edible human food, while for cereals the figure is around 50 percent (IYP, 2008).

are planted in small quantities during separate sowing periods, in mixtures or singly over a range of ecological niches (Hellin and Higman, 2003).

The Andean potato region comprises three broad zones: a) the 'Green' Andes of Ecuador and northern Peru; b) the 'Yellow' Andes of central Peru and eastern Bolivia; and c) the 'high climatic risk' Andes of southern Peru and the Bolivian Altiplano (Hellin and Higman, 2002). The Andean potato region of Ecuador is the object of the present study.

3.2 Ecuador

Ecuador is crossed by the equator, from which it takes its name, and has an area of 256,371 square kilometers. It has three main geographic regions, in addition to an insular region in the Pacific Ocean:

- *La Costa* (the coast), comprises the low land in the western part of the country, including the Pacific coastline.

- *La Sierra* ("the highlands") is the high-altitude belt spanning north to south along the center of the country. Its mountainous terrain is dominated by the Andes.

- *El Oriente* ("the east") comprises the Amazon rainforest areas in the eastern part of the country, accounting for just under half of the country's total surface area. Only 5 percent of the population lives in this area.

- The *Región Insular,* comprises the Galápagos Islands, some 1,000 kilometers west of the mainland in the Pacific Ocean (Wikipedia, 2008).

Although the country is not particularly large, there is great variety in the climate, largely determined by altitude. The Pacific coastal area has a tropical climate, with a severe rainy season. The climate in the Andean highlands is temperate and relatively dry; and the Amazon basin on the eastern side of the mountains shares the climate of other rain forest zones.

Because of its location at the equator, Ecuador experiences little variation in daylight hours during the course of a year and it is one of 17 megadiverse countries in the world according to Conservation International. It accounts for over 1600 bird species (15 percent of the world's known bird species) in the continental area, in addition to 25,000 species of plants and crops, among which one of the most important is potato (IYP, 2008; Wikipedia, 2008).

3.3 Poverty in Ecuador

Ecuador experienced low GDP growth rates and no expansion in real GDP per capita over the last two decades. The country, mainly exports primary products (oil, bananas, flowers and shrimp) for which fluctuations in world market prices can have a substantial domestic impact. Industry is largely oriented to supplying the national market, with some exports to the Andean Common market in addition to Columbia and Venezuela (World Bank, 2004).

Declining economic performance in 1997-98 culminated in a severe crisis in 1999, which was worsened by a number of external shocks, including the El Niño weather phenomenon in 1997, a sharp drop in global oil prices in 1997-98, and international emerging market instability in 1997-98. These factors mixed with a large fiscal deficits and expansionary money policy resulted in a 7.3 percent contraction of GDP, annual inflation of 52.2 percent, and a 65 percent devaluation of

the national currency, the Sucre, in 1999, which led Ecuador to adopt the US dollar as the national currency in 2000 (An, 2004; WB, 2004; Wikipedia, 2008).

Thanks to high oil prices, the Ecuadorean economy experienced a modest recovery in 2000, with GDP rising 1.9 percent. Nevertheless, 70 percent of the population was estimated to live below the poverty line that year, more than double the rate in 1995. The national consumption-based poverty rate stood at 45 percent in 2001, compared with 40 percent in 1990, while the number of poor people increased from 3.5 to 5.2 million during the same period. Increases in poverty were not uniformly distributed across the country. The increase in poverty rates were largest in urban areas in the Costa and the Sierra, where the poverty rate climbed by more than 80 percent between 1990 and 2001. On the contrary, poverty remained constant in the rural Costa and increased by 15 percent in the rural Sierra (World Bank, 2004).

3.4 Potato in Ecuador

Ecuador's Andean region lies within the potato's area of genetic diversity, and particularly rich diversity of wild potato is found in central Ecuador. The potato is one of the main traditional crops cultivated in Ecuador. Potato production takes place throughout the *sierra* region of Ecuador, and is differentiated by the use of technology, chemical inputs, production efficiency, types of varieties farmed, and the degree to which the farmer is immersed in the market economy (An, 2004). Cultivation is generally undertaken by small-scale farmers[5] with an average of 2 hectares of land, part of which typically devoted to potato. There are more than 82,000 producers in 90 cantons (Mancero, 2007).

Almost all potato production is for internal consumption, with per capita consumption of around 32 kg per year (OFIAGRO, 2009). Potato planting and harvesting are done year round, and Ecuador could potentially produce enough to satisfy its domestic demand (Mancero, 2007). Nevertheless, input costs and the higher profitability of other crops, in addition to a production that is becoming more and more commercially oriented in response to demand from growing urban sector, has led to marked fluctuations in the country's potato output. Over the past decade, total production has fallen from more than 450 000 tonnes to 350 000, while the cultivated area has shrunk from 65 000 ha to around 50 000 (table 1). Average yields (6.8 t/ha) (INEC, 2007) are still far below the international average not only when compared to Europe (17.27 t/ha) and North America (36.79 t/ha), but also when compared to nearby countries: 12.6 t/ha in Peru, 17.3 t/ha in Colombia, and 18.6 t/ha in Venezuela (FAOSTAT, 2007). In contrast, potato imports increased almost six-fold between 2000 and 2006 in response to the dynamic of the fast food restaurants which requires determined varieties as well as the respect of a certain degree of grades and standards (international franchises) (OFIAGRO, 2009; IYP, 2008; Mancero, 2007). However, this still represent less than 2% of total consumption (Cavatassi et al., 2009).

[5] Small-scale producers represent 50% of the total number of Agriculture Production Units (APUs) they own just 19% of the land dedicated to potatoes (Mancero, 2007).

Table 1	
Production, 2007	
Harvested area	52 000 ha
Quantity	355 000 t
Yield	6.8 t/ha
Consumption, 2005	
Population	13 228 000
Food consumption	331 000
Consumption/capita	25.185 kg
Source: FAOSTAT	

According to the III National Agricultural Census[6] there are 82,759 production units growing potato (INEC, 2000). The majority of producers are located in the provinces of Carchi, Chimborazo, Cotopaxi, Tungurahua and Pichincha, which account for 76% of the land dedicated to potato production and 81% of the production volume. As Table 2 shows the provinces of Chimborazo and Tungurahua, focus of the present study, represent respectively the first and the fourth most important provinces in terms of area harvested, and the second and third in terms of production volume, accounting for about 33% of total production although with some differences in yields (Cavatassi et al., 2009; Mancero, 2007; INEC, 2007). Carchi is the most productive potato province in Ecuador, while Chimborazo and Tungurahua have historically had the greatest number of potato farmers and among the top four in terms of total area harvested. Farmers in Chimborazo and Tungurahua tend to be smallholders and poverty is widespread.

Table 2

Province	Production (Metric tonnes)	Area Harvested ('000 Hectares)	Production/ hectare (tonnes)
Carchi	101,715	7640	13.31
Chimborazo	44,233	5980	7.40
Imbabura	1,900	500	3.80
Pichincha	45,000	3430	13.12
Cotopaxi	55,694	5100	10.92
Tungurahua	49,373	6940	7.11
Boliva	9,555	2450	3.90
Cañar	11,270	2250	5.01
Azuay	12,248	1270	9.64
Loja	2,500	370	6.76
Others	3,520	260	13.54
Total (Ecuador)	**305,438**	**36,190**	8.44

Source: INEC, 2004 (estimated data)

[6] The III Agricultural Census was undertaken between October 1, 1999 and September 30, 2000. It gathered information from a sample of 162,818 production units selected from among all of the country's provinces.

3.5 The case study

A series of activities and pieces of information provided a good starting point for project and site selection. Firstly, a workshop was held with various farmers, village representatives, stakeholders and NGOs in July 2006 in Riobamba, a town located in a poor potato producing area of the country. Farmers' focus groups and key informants interviews were also completed. In addition, CIP provided very useful information, particularly in relationship to the Papa Andina Partnership project and, more specifically, on this area of Ecuador where poverty is a concern and potato represents the main crop. In this area, the multistakholders platforms represented a perfect case to analyse and became the focus of the study.

A summary of the main findings from workshop and key informants' interviews is reported in Annex II while workshop's details are available in Annex I.

Papa Andina is a regional initiative that promotes technological, commercial, and institutional innovation in the potato sector in Bolivia, Ecuador and Peru. It began activities in 1998 with financial support from the Swiss Agency for Development and Cooperation (SDC) and is coordinated by the International Potato Center (CIP). This initiative seeks to help reduce poverty among small-scale farmers by improving the competitiveness of potatoes in the market and by allowing small farmers to participate more effectively in markets for potatoes and potato-based products. Papa Andina pays special attention to improving the participation of low-income farmers in productive chains by linking their demands more effectively with sources of new technology, by promoting farmer organization, and by involving small farmers in participatory market chain exercises that develop innovations beneficial to the poor (Devaux et al., 2009).

Papa Andina works with a Strategic Partner in each country to promote capacity development, information exchange and collaborative learning. The project has put special emphasis on fostering technological innovation within the context of productive chains. It also takes into account the needs and interests of all the actors along the chain by using a Participatory Market Chain Approach (PMCA) to identify and exploit business opportunities that can benefit the poor. Within the Papa Andina project, CIP has implemented in collaboration with INIAP[7] the FORTIPAPA[8] project, a project that supports the establishment and the performance of **multi-stakeholders' platforms.** These are alliances which bring farmers together with a range of agricultural support service providers, including INIAP, local NGOs, researchers, universities, and local governments.

A primary objective of INIAP's FORTIPAPA[9] project is to: "*reduce poverty and increase food security, through increasing yields and profits of potato-producing smallholders*" (Pico, 2008) in the central regions of Ecuador. Two of these regions, Tungurahua and Chimborazo, are the focus of the present study and are regions where the intervention first started in 2003.

The *Plataforma* is part of a larger program which involves a series of activities and interventions that pays special attention to improving the participation of low-income farmers in high-value producer chains by providing them with new technologies, by promoting their organization and

[7] Instituto Nacional Autónomo de Investigaciones Agropecuarias
[8] Fortalecimiento de la Investigación y Producción de Semilla de Papa
[9] The FORTIPAPA project is funded by COSUDE and CIP (through the Papa Andina project) and is part of a larger INIAP program of work called the National Program of Tubers and Roots which aims to fight poverty and promote production of traditional tuber and root crops.

social capital accumulation, and by involving them in a "value chain vision" of production and commercialization that directly links them with the market (Cavatassi et al., 2009; Devaux, 2009).

The plataformas were created with the purpose of contributing to the organizational and commercial improvement of small-scale potato producers and provide them with services to link them directly with the market. In particular, the mission of the platform is to: "*Strengthen the organization through alliances and agreements with institutions with the purpose of coordinating efforts and providing the services required by the producers so that they can achieve quality products, using a technological package friendly to the environment, acting with gender equality, and facilitating the access to formal markets to satisfy in quantity, quality and stability, promoting a change in attitude of the associates so that they work in function of a common interest and in coordination with the management team*" (Mancero, 2007). The main objectives achieved are reflected by producers' organizations and by their improved capacities, as well as by their links to the market through a stable production, good quality produce and pre-identified clients.

The project, thus, incorporates various activities starting from market analysis to clients' identification, from quantity and quality standards to achieve, to identification of the potato variety more requested, more suitable for processing and more resistant to the main pests/diseases.

On the basis of market analysis and clients' demand and on the productive capacity of farmers, the area of land to be sowed is determined, the production plan developed and strategy for input procurement elaborated. The platforms make sure that seeds are of good quality, and that farmers renew them often or learn how to manage tuber born pathogens. At harvest, the platforms take care of the *quality control* of potato production. If the potatoes meet the standards required, they are sold to the clients. Otherwise the platforms look for second-best alternatives[10]. In the commercialization phase, the platforms identify clients, represented by restaurants, pollerias[11] and more recently by supermarkets. Sales are generally done through pre-established verbal agreements.

The platforms have been developed using concepts, instruments and tools coming from other initiatives. One such initiatives is the Farmers Field Schools (FFS), which gave special emphasis on production technologies and Integrated Pest Management (IPM) techniques. Aim of FFS was to improve quality and quantity of production to reach the standards required while at the same time reducing the use of pesticides and thus protecting the environment and farmers' health. Techniques taught were adapted to resource-poor farmers and focused on soil and seed management, insects, diseases and pesticides training (Cavatassi et al., 2009; Cáceres et al., 2007). Farmers were taught the importance of renewing seed of good quality but also techniques to select their own stocks, considering size, shape and particularly the health status of the tubers in order to recognize and avoid born disease pathogens. Special emphasis was also given to the use of synthetic and organic fertilizers, including sources, methods and periods of application, and dosages. Insects' life cycle were also taught to manage Andean potato weevil and tuber moths (*Phthorimaea operculella*, *Symmestrischema tangolias* and *Tecia solanivora*), in addition to techniques to reduce the population and damage of the pests. Traps using low-toxicity

10 Generally, if the potatoes are too small or have some physical damage, they are sold in the local market at reduced prices. If the quality is not enough for the local market, potatoes are used for household consumption if not to feed livestock.
11Small restaurants that sell chicken cooked in a rotisserie style and usually accompanied with French fries.

insecticides were introduced and widely used to catch and kill Andean weevil adults. To manage late blight, farmers learned to recognize the symptoms of the disease, the life cycle of the pathogen, the use of resistant potato varieties, and the use of fungicides. Last but not least, special care was also given to teaching farmers how to recognize the toxicity level of pesticides (by the color of the label), the main symptoms of intoxication, and how to protect the environment and themselves from risks associated with using pesticides (Cavatassi et al., 2009).

Within the Plataforma, INIAP implemented also a seed multiplication program through training a group of small farmer seed multipliers who were given registered seed to produce good quality seed for *Plataforma* participants. Seed is graded through an internal quality control system (Cavatassi et al., 2009; Narvaez, 2005; Montesdeoca and Narvaez, 2005). Through seed selection and seed management techniques farmers tend to maintain their own seed or source them from the plataforma thus reducing their dependency on registered seeds, which are expensive and not always available. A special important achievement of the plataforma has thus been that of implementing a seed system which successfully combines formal and informal elements (Cavatassi et a.l, 2009; Thiele, 1999), a subject, this, open to very intense debate (Lipper et al., forthcoming).

Qualitative analysis conducted as well as secondary information gathered show that the results obtained by means of the platforms to date are encouraging. Historically smallholders have worked on the basis of a traditional, individualist model in which producers work independently on their own potato plots. This remains the primary production method despite it is claimed to be inefficient due to the long intermediary chain, the inability to manage market information, the difficulty in accessing certified seeds, and the lack of technical know-how. On the contrary, the association of farmers together with researchers, NGOs and other institutions[12] through the platforms shows the ability to improve efficiency by lowering transaction costs through the coordination of their actions in line with a model that manages to optimize the chain and increase gross margins[13] obtained by farmers and otherwise lost in the many links of traditional chains (Mancero, 2007). One key element to select farmers and communities for participating to the plataforma is the existence of associations in the area of interest or of other types of organizations and social ties. In other words, social capital, represents an entry point to the plataforma.

The project started in 2003 with 10 hectares of land and 420 MT of potato produced. In 2007 (when the study was conducted) the land for production was 260 hectares and the quantity marketed amounted to 1,483 MT (CONPAPA 2008).Through the plataformas, selected fresh potatoes have been marketed to 29 restaurants, fast food outlets and processors in Ambato and Riobamba The price received by members has been calculated to be approximately 30% above that received by non-members during the same period (Deveaux et al., 2006). This suggests the platforms represent a good approach to linking smallholders to market and represents a very solid case to study and verify what are the conditions and mechanisms that allow such results. To verify this was the case, the remaining of the report describe the specific sites as well as the methodology employed and project implementation.

3.6 Selecting the study site

Initially it was thought to work in the two main potato producing regions of Ecuador, i.e. Carchi and Chimborazo. The idea was to study two different sets of cases, where in one region (Carchi)

12 NGOs, the Ministry of Agriculture, the Agricultural Research Centre (INIAP), Universities, etc.
13 Gross margins refer to the return to the fixed factors of production; namely, family owned land, labor and animal traction (or tractor). It is calculated by subtracting variable costs from revenue.

farmers supply the processing plant for potato chips (FritoLay[14]), and another region supplying restaurants and pollerias (Chimborazo).

During FAO's first mission, thanks to CIP and other relevant stakeholders' support (INIAP, FAO-office in Ecuador, and some selected NGOs), it was found that a large variety of market channels are being supplied from Chimborazo. Moreover, the highest number of small potato farmers in Ecuador resides in the area. Therefore it was decided to focus on this region only, comparing a group of farmers involved in selling to these dynamic markets, versus farmers that do not. This would allow for a more thorough analysis in one region and would also economise on logistical costs. Later the area of Tungurahua has been added as it faces very similar market connections and is very close geographically.

Small and large farmers in both areas are entering new market arrangements with various degrees of success. This provides a good "with" and "without" intervention case to compare outcomes, along with the possibility of comparing small and large farmers. Hence, the selection of this area would enable to answer questions on how small farmers have been affected by the new agricultural economy, as well as questions on what can be done to help small farmers engage the new agricultural economy through organization and the reduction of transaction costs.

An interesting aspect in this process is that an INIAP released variety, *Fripapa*, has been quite successful in supplying agro-processors and Restaurants. This variety, which originated from CIP clone 388790.25 (CIP, 2009), was developed as part of a collaborative program between the National Agricultural Research Institute (INIAP) and industry. It is a variety particularly suitable for resource scarce small producers because it has a good degree of resistance to potato late blight and its use, therefore, reduces the need for frequent fungicide applications. Additionally, it is also a highly demanded variety because it matures earlier than other competitor varieties, such as Diacol-Capiro.

A reconnaissance of the study areas was implemented during the first and second FAO visits.

3.6.1 Chimborazo

Chimborazo is located in central part of Ecuador and has more area allocated to potatoes than any other province in the country. In 2001, approximately 10,000 Ha of potato land was harvested, which represented roughly 19 percent of the total arable land in Chimborazo. While a large proportion of land is set aside for potato farming, yields in Chimborazo have been historically lower than the national average. In 1997, Chimborazo's potato yield was 5.0 MT/Ha, while the national average was 7.9 MT/Ha. More recently Chimborazo's productivity has increased to later decline again (8.8 MT/Ha Vs a national average of 8.1 MT/ha in 2002; to 7.4 MT in 2004 Vs a national average of 8.4 and 4.01 MT/ha in 2007 Vs a national average of 6.8 Mt/ha) (INEC, 2007).

The three major potato-growing zones are Guamote (with 47 percent of the provincial area), Riobamba (32 percent) and Alausi-Chunchi (21 percent) (Herrera *et al*, 1998). The breakdown of farm sizes is as follows: 76 percent of farms are 0-5 Ha, 19 percent are 5-50 Ha and 5 percent of farms are over 50 Ha. In general, potato plots are smaller in Chimborazo than in Carchi. The major varieties of potatoes grown are Gabriela, Esperanza, Maria and Uvilla (Herrera *et al*.,

[14] Frito-Lay has a potato chip factory in Ecuador that procures about 10,000 tons of potatoes annually from local farmers. Supply contracts tend to favor large farmers, with smaller farmers serving as residual suppliers. However, some public-sector policy initiatives, such as the multistakeholders platforms, are trying to increase access to the processing market by small farmers.

1998). Up-to-day Fripapa is the most cultivated variety. In Chimborazo, potatoes are often planted in a rotation that also includes corn, barley and pasture (del Rocio, 2001).

Potatoes and milk are the two most important income-earners for farmers in Chimborazo. Of the potatoes produced, del Rocio (2001) found that 9 percent is for personal consumption (human and animal), 12 percent is saved as seed, and 79 percent is sold at the various local and provincial markets. Of the milk that is produced, the same study found that 10 percent is for personal consumption, 14 percent is for animal consumption and 76 percent is sold.

In Chimborazo women are involved in nearly all facets of potato production - from planting seeds to applying pesticides to selecting potatoes to be sold. Chimborazan women are also involved in the other farming activities and work alongside men for the most part.

One interesting risk-aspect to take into account for the area of Chimborazo is the presence of the Tungurahua volcano. It erupted in 1999, 2003 and, in fact, again in 2007 just prior to starting survey pilot phase[15]. The eruption results in the expulsion of ash and toxic gases and these elements may have both negative and positive impacts on potato production, depending on the stage of the plant at the time of the explosion[16].

3.6.2 Tungurahua

Tungurahua is located at the very centre of Ecuador. It is one of the most densely populated provinces of the country with 140.9 inhab/km^2 over a total surface of 3,369.4 km^2. Of its 441,389 inhabitants, 57.3%, (252.788) live in the rural area. The province is divided in 9 cantons, which are in turn divided into 63 parroquias: 19 urbans and 44 rurals (INEC; VI Censo de vivienda).

The land cultivated is about 14,863 ha, with potato and maize the main crops produced (table 3).

Table 3: Main crops in Tungurahua

Crops	**UPAs**	**Surface/ha**	**%**
Potato	19,414	7,380	46.65
Maíz	11,572	2,944	19.81
dry maize	7,974	2,665	17.93
Tree tomato	5,407	1,470	9.89
Peas	386	181	1.22
Canes	27	115	0.77
Beans	235	108	0.73
TOTAL	**45,045**	**14,863**	**100**

In Tungurahua, two are the main potato producing areas where the platform has operated: Pilahuin and Pillaro.
In the former the main crops produced in addition to potato are fava bean, pasture and garlic. The main problems with potato production are related to late blight, white worm, frost and a plant pathogen called erwinia.

15 And which led to changing some of the communities selected.
16 If the volcano erupts and emits ash on the soil prior to the emergence of the plant, the minerals from the ash may be beneficial. However, if the eruption occurs after the seedling has broken through the ground then the ash may interfere with the process of photosynthesis.

In Pillaro the main crops after potato are maize, pasture and vegetables. The main potato production problems are late blight, white worm and bookworm.

4. Methodology and activities

This section describes the methodology developed and the main activities undertaken to reach the project objectives.

As already mentioned, the first step undertaken after a careful evaluation and selection of potential case studies through CIP information and review of relevant literature was to held a

A. Stakeholders' Workshop

with farmers, NGOs, platform representatives, seed multipliers and representatives from various institutions (including the Ministry of Agriculture). This was held in Riobamba on Friday July the 21nd 2006. The workshop report as well as the list of participants is available in Annex I.

The main aims of the workshop were to:

- Present and discuss project's motivation, objectives and expected activities and outcomes;
- Identify, with the help of workshop participants, the barriers that impede and the elements that facilitate or help small-farmers' participation to the new agricultural economy;
- Analyse the impact of agro-processing or platform activities on natural resources as well as on farmers' welfare.

Participants were first asked to discuss what their expectations from the workshop were. A presentation with discussion and feedback followed. Participants were then split into 4 working groups to discuss impacts on farmers' welfare and on the use of natural resources of market participation. Barriers and possibilities for effective market participation were also discussed.

The workshop helped in identifying case and areas to study as well as in defining the most relevant issues to take care of when developing the survey instrument.

B) The second crucial step deemed necessary to understand the structure of the potato dynamic market but also the mechanisms and determinants to help or impede small farmers' participation, was twofold:

B1. Focus group and key informant interviews. Focus group exercises have been carried out with various separate groups selected to represent the different types of actors and farmers operating in the study site. In addition interviews were undertaken with a number of selected key informants. Information gathered through these activities have integrated and complemented the literature review and the information gathered through workshop. This, in combination with the value chain analysis, has helped to select a representative sample of farmers and to provide a clear picture of what are the possible drivers for market participation. Typical farming system and main environmental issues have also been identified (see annex II).

B2. Potato Value chain analysis[17]

The value chain analysis, provided a very insightful instrument to the final analysis and survey development, and was carried out by Lorena Mancero using the methodology developed by FAO under the project "Using market to promote the sustainable utilization of crop genetic resources[18]" and which is concisely reported in the Box 1 below. The approach used has been the participatory market chain analysis which has helped to identify the different market chain actors and to assess the impact of these formal linkages on the choice of seeds made by farmer on one side and of market outlets to sell produce on the other side. Data and information gathered through the value chain analysis has complemented the economic analysis to be conducted by means of questionnaires to households and communities, and has helped their design.

The analysis focused on three specific experiences where small producers have been linked to productive chains. The study emphasizes the role of platforms and client relationships with restaurants, chicken restaurants, industries and supermarkets; the barriers which farmers encounter when they attempt to link up to markets or become part of or gain access to the chain; and the process of integrating into the chain.

The analysis has a general description of the potato productive chain in Ecuador, analyzing the traditional market channels. The description is then followed by a detailed analysis of the various links in the chain of this new model. This analysis contemplates three experiences of associative businesses created by small-scale producers from Chimborazo, Cotopaxi and Tungurahua Provinces all three originally selected as study sites. For more information see Potato chain study.

[17] The potato chain analysis can be found at ftp://ftp.fao.org/es/esa/lisfame/PotatoValueChainEcuador.pdf
[18] See ftp://ftp.fao.org/es/esa/lisfame/guidel_valueChain.pdf for more details

Box 1: Value chain Analysis Methodology[19]

The flow of potato from farmers to the market occurs along chains. These can be referred to as value chains because as the product moves from chain actor to chain actor e.g. from producer to intermediary it gains value. A useful definition is as follows: "*the value chain describes the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final customers, and final disposal after use" (Kaplinsky & Morris, 2000).*

Value chains analysis (VCA) can include qualitative and quantitative tools. The analogy is one of painting a house: the first coat (the undercoat) adds a little color but several coats of paint are needed in order to appreciate the final effect. With VCA, it is possible to get an idea of the different actors in the input chains and output chains by talking to key informants e.g. going into a village and talking to farmers, then driving to the nearby town and talking to the seed companies and the grain purchasers. The qualitative approach is very much an 'anthropological' one. Very quickly you can build up a picture of the chain or more likely chains. A simplified version is as follows:

Seed suppliers → Farmers → Traders → Processors → Exporters/importers → Retailers → Consumers

To understand more about the rationale behind farmers' decisions vis-à-vis the types of seeds they purchase and how they decide where and to whom to sell their produce it is important to know about the extraneous factors that influence the way that the chain works. This is where the market map comes in useful. The market map is a conceptual and practical tool that helps identify policy issues that may be hindering or enhancing the functioning of the chain and also the institutions and organizations providing the services (e.g. market information, quality standards) that the different chain actors e.g. farmers need in order to make better informed decisions about what varieties to grow.

Value chains do not always work efficiently and effectively (either in terms of income generation for small-holder producers and/or the maintenance of crop diversity). The VCA can help researchers identify where there are bottlenecks.

In summary, a value chain analysis that takes into account the policy environment and provision of business (livelihood) services (basically the Market Map) is a very powerful tool for analysing:

- How existing chains are structured and operate
- The impact that the chains have on farm level decisions on utilizing crop genetic resources
- The leverage points in the chain that would maintain or enhance crop diversity as opposed to its reduction

There are no fixed rules as to how the analysis should be carried out. A range of qualitative and/or quantitative research tools are available.

From Hellin and Meijer: Guidelines for Value chain Analysis (2006)

All the qualitative analysis thus far conducted has provided a strong and indispensable basis to develop a sampling frame and the survey instruments to be administered to households and communities.

C. Sample selection

CIP provided the FAO-team with census data at parish and community level for the household and community survey. The agro-census data were impossible to gather if not at provincial level.

[19] From J. Hellin and M. Meijer, 2006: ftp://ftp.fao.org/es/esa/lisfame/guidel_valueChain.pdf

Initially the sample frame was decided to be limited to Chimborazo, Tungurahua and Quero. These are the areas where the platforms are active. Within these zones, variability was planned to be sought in terms of farm size. After two volcano eruptions the area of Quero was dropped off as it was highly affected and could convey misleading data. In addition, the area of Cotopaxi was included and later dropped for analysis as better explained below.

One key issue discussed with the representatives of the platforms, as well as with farmers' facilitators and CIP's representative, was the selection of a representative sample that would also allow for a control group (farmers in comparable communities, but who do not participate to the platforms) in order to allow for a proper impact analysis. In fact, as with any impact evaluation *"the main problem is that it is not possible to observe the outcomes for participants if they had not participated*" (Ravallion, 2006). Therefore a "*comparison group*" had to be used to identify the counter-factual of what would have happened without the program. The comparison group is designed to be representative of the "*treatment group*" of participants with the key difference that it did not participate to the platform. The data set had to be constructed and collected in such a way to allow for a sound comparison of the two groups and for different approached to apply in order to corroborate the results.

The initial breakdown of surveys to be conducted was as follows: 150 in Cotopaxi; 400 in Tungurahua; and 450 in Chimborazo. This totaled 1,000 surveys. One NGO was identified in each of these regions, to conduct the surveys and to serve as a guide for FAO and CIP for the proper identification of participating (those belonging to the platform) and non-participating communities (those not part of the platform and henceforth referred to as *counterfactual communities*). This was a good strategic decision since each of these organizations had a certain degree of contact with the platform, its beneficiaries, and in most cases, with counterfactual communities. These organizations were *Maquita Cushunchic* in Cotopaxi, *IEDECA*[20] in Tungurahua, and *Fundacion Marco* in Chimborazo (henceforth referred to as FM). These three regions had a total of 49 communities participating to the platform: 9 in Cotopaxi, 14 in Tungurahua, and 26 in Chimborazo.

After a series of meetings with the directors of each of these organizations, it became clear that it was advisable to focus in two regions only – Tungurahua and Chimbrazo. Cotopaxi reported a total of 58 participant farmers. It was thus decided to drop this area from the selected study sites because the number of participants was too small to allow for a proper evaluation. The final breakdown of surveys to be implemented by region was 500 for Tungurahua and 500 for Chimborazo, for a total of 1,000. The breakdown of farmers to be interviewed, in terms of participants and non-participants was as follows: 334 participating farmers; 333 non-participants from participating communities (in order to identify spill over effects); and 333 non-participants from non-participating communities (counterfactual communities).

The selection of the two types of communities, participants and counterfactuals, to be interviewed was done, in general terms, in two steps: 1) a Propensity Score Matching[21] process was used to find a proper counterfactual for each of the participating communities; 2) corroboration of these

[20] Instituto de Ecología y Desarrollo de las Comunidades Andinas.

[21] In PSM, the treatment group (platform participants) is matched to a control group based on observable characteristics using a propensity score which is calculated using a probit on the probability of participation in platform. The benefit of this procedure over the other methods is that the PSM procedure confines attention to a matched sub-sample where there is common support and unmatched observations are dropped if appropriate (Ravallion 2005). See also Smith and Todd (2005) for a recent discussion of this technique.

"matches" during various meetings with key staff (director, agronomists/"tecnicos", "promotores") from each of the interested areas[22].

The selection of counterfactual communities was done on the basis of some key variables available from the population census[23]. Various meetings with platform coordinators and with farmers and agronomists working in the areas were carried out in order to corroborate whether the counterfactual communities selected through this method were good and solid comparable communities.

An additional filtering was applied in order to account for other important factors such as the length of time in the *Plataformas*, whether communities had received other similar interventions, or whether interviews could be conducted in the selected communities. For example, some treatment communities were not included in the sample; likewise treatment communities were excluded from the analysis when a reasonable counterfactual could not be identified, because of additional intervention received, or because they were not willing to participate in the surveys. The final list of participant communities and counterfactual is reported in Annex III, table 1 and 2 and it is comprised of 5 participant and 5 counterfactual communities in Tungurahua, in addition to 13 participant and 12 counterfactual communities selected in the province of Chimborazo. Within each treated community, there are community members who participate in the program and others that do not. Thus once selected control and treatment communities three groups of household farmers had to be randomly selected: i) beneficiaries of the program, ii) non-beneficiaries in the treatment communities (referred to as non-participants), and iii) non-beneficiary households in the control communities (referred to as non-eligible).

Lists of households from each of these categories were provided by *Plataforma* coordinators and community leaders. Households from the lists were randomly selected to be included in the survey. More specifically related to *Plataforma* participants, in the case of Tungurahua, 157 out of 227 participants were randomly selected to be interviewed, while for Chimborazo 167 out of 232 participants were also randomly selected to be interviewed. This represents 70% and 71% of participants interviewed, respectively. The final sample includes a total of 1007 households of which 683 reside in beneficiary communities (324 participants and 359 non-participants) and 325 in control communities (non-eligible). The sampling process within the selected communities is explained in detail in box 2 below.

This sampling approach allows for different possible comparison groups, each offering interesting insights. In addition indirect or spillover effects could also be determined.

[22] IEDECA served as the 'administrative liaison' for the platform for half the number of participating communities in Tungurahua. The remaining participating communities worked under CESA, and this is why we needed to contact CESA to help us with the communities that they worked with.

[23] Share of households that burn garbage (indication of no garbage collection); share of households with access to water distribution inside household; share of households with access to electricity; share of households that use electricity for cooking; percentage of families that cook with gas; percentage of families that have their own toilet; the percentage of families that have access to a telephone; percentage of indigenous population in the community; percentage of people working in the third sector (services); percentage of population with respect to total province's population; and percentage of people that work in the industrial sector

Box 2: sample selection

Selecting producers from participating communities: Tungurahua

Within each of the 5 final participating communities to be interviewed, the potato producers that belonged to the platform were organized in groups or associations. In 3 out of 5 of these communities, there was more than 1 association that belonged to the platform and these associations were of different sizes, in terms of the number of their members. In total, in Tungurahua, there were 12 associations for the 5 participating communities.

The approach taken to select participating producers was as follows: for any association with less than 15 members, it was chosen to interview all the members; for any association with more than 15 members 2/3 of their total number of members was to be interviewed– this was done on a random basis, by interviewing all members, except each third member from the list provided. Those members that were not selected were then assigned the "alterno" status, in case one of the selected members was not available or willing to do the interview.

It is important to note that the members of the associations typically live close to each other in areas that can be considered 'barrios'. When looking for non-participants, the approach taken was to find non-participant farmers within these same 'barrios' in these communities, when this was not possible or when there were not enough farmers, the enumerators went to nearby 'barrios' within the same community.

Selecting producers from non-participating communities: Tungurahua

IEDECA maintains a directory of all the farmers in all the communities – participating and counterfactual ones. From these lists, a random selection of possible counterfactual farmers was carried out. The random selection was done depending on the number of farmers living in each community and the number of farmers that were needed for interviews in that particular community. For instance, if there were needed 10 farmers from a community of 100 farmers; the 1st, 10th, 20th (and so forth) producer was chosen to be interviewed. Those producers that were not selected were considered to be "alternos" in case some of the chosen ones did not, or were not able to participate in the surveys.

Selecting producers from participating communities: Chimborazo

In contrast to Tungurahua, each participant community in Chimborazo only had one association of producers that belonged to the platform. The number of members in each of these associations also varied, with the smallest association consisting of 6 members and the largest one consisting of 32 members. The approach taken to select participating producers was as follows: for any participating community with less than 10 platform members, all the members were to be interviewed; for all other participating communities with more than 10 members, 85% of their members were to be interviewed– this was done on a random basis depending on the number of members in an association and the number of producers needed for the survey (85% of them). The random selection in these cases was done skipping each 5th from the list. For instance, in the community of Calerita Santa Rosa, the list contained 20 platform members. 85% of these had to be interviewed which yielded 17 members. Thus, all members but the 5th, 10th, and 15th were interviewed. The ones that were skipped were then labeled as "alternos" and were to be interviewed if the ones that had initially been selected did not want to do the interview or if they were not available.

Selecting producers from non-participating communities: Chimborazo

FM in Chimborazo provided the lists of the producers that were members of the platform. Prior to the pilot phase of the study FM made contacts with all the communities, the leaders of the communities were told that it was necessary to have a list of all the members of the community in order to randomly select households to be interviewed. The leaders agreed to have these lists ready for FM, so a random selection of farmers similar to the one explained above could de carried out.[24]

[24] A more thorough explanation of all details can be found in the report: Field implementation by Mario Gonzales.

D. Household and community surveys[25]

The questionnaire was to be administered to approximately 1000 households half of which participate to the platform the other half representing a counterfactual group having similar socio-economic as well as geographic characteristics but not participating to the platform. This would represent an indispensable group to analyze the data and understand the key variables. Data related to the communities which these households belong to were also planned to be collected by means of survey instruments. The data would then be analyzed using appropriate econometric techniques.

The initial survey questionnaire was developed by Paul Winters and Romina Cavatassi, from DC and Rome, respectively. During the pilot phase in Ecuador, led by Mario González with the support of P. Espinosa from CIP, various revisions and finalizations were made also in collaboration with P. Winters and R. Cavatassi. The first revisions were made after two meetings with 'tecnicos' from FM. The tecnicos gave valuable input into the survey, which was reviewed thoroughly to make the necessary modifications so to have an instrument more relevant to the context of Chimborazo and Tungurahua.

Prior to the training, there were two survey tests done in two different communities (which were not going to be visited for interviews to prevent 'contamination'). After these tests, additional modifications were made to the survey in the areas and questions that needed more clarity and better wording. The final versions of the household survey, which ca be found in http://www.fao.org/es/ESA/lisfame/en/ecuador.htm#outputs , contain the following sections:

1. Land tenure and characteristics
2. Agricultural production
3. Potato production
4. Potato sale and agro-biodiversity (with a focus on transaction costs and on varieties)
5. Knowledge and treatment of pests, disease and chemicals
6. Household demographics
7. Household characteristics (socio-economic)
8. Social capital (participation to platforms or other organizations/associations)
9. Access to credit and loans

For each community selected a survey regarding the elements common for each household residing in the community was also prepared and contained the following sections:

1. Population characteristics
2. Infrastructures
3. Access to public services
4. Distance from main cities
5. Soil and land characteristics
6. Organizations at community or provincial level
7. Institutions linked to multi-stakeholders' platforms (Fundación Marco/IEDECA)
8. Other institutions

[25] For more info see: ftp://ftp.fao.org/es/esa/lisfame/HHsurvey_Ec.pdf

5. Survey Implementation

5.1 Pilot phase

The training in Chimborazo lasted for 5 days. The team of enumerators included 7 agronomists, one "zoo-tecnista" and a student of agronomy with a specialization in forestry[26]. The extensive experience of the trainers[27] gave valuable input to the training. Likewise, the experience and knowledge of the team of enumerators was also of great value, since, not only were they knowledgeable about agriculture, but they were also very familiar with the nuances of the region.

The training was structured as follows: during the morning, the entire team went over each section and each question of the survey in order to get familiar with the instrument and to clarify any areas of confusion; during the afternoon the entire team went to the field for testing (to a different community each day); and in the evening, the survey tests were verified and corrected. The corrected surveys were then handed out to each enumerator for their review on the following day. On the next day, training began by going over the mistakes that enumerators had made in their survey tests.

During each day of training, including the field tests, various issues with the survey came up and these issues were addressed in the evening by the survey coordinator and the survey manager[28] and the necessary corrections were made. Each following day of training, the activities would start with an updated version of the survey.

The training (of 4 days) and survey tests from Tungurahua were also of help in making the final changes to the survey.

In each of the organizations – FM and IEDECA – there were two teams of enumerators with one leader heading each team. The leaders were responsible for monitoring the quality of the surveys for their own teams.

Mr. Patricio Toro was hired to monitor the quality of the surveys in Tungurahua. A series of documents, reported in box n 3 below, were prepared to make sure of the data quality and that the field activities and survey management were carried our properly.

[26] For the list of enumerators and background, see field report.
[27] An INIAP representative, Patricio Espinosa , Paul Winters and Mario González
[28] Paul Winters and Mario González with consultation when needed and possible of R. Cavatassi from Rome.

Box 3: documents for quality control and survey management

Documents used for quality control

In order for all enumerators, leaders, and quality control coordinators to do the exact same kind of quality control of the surveys, a document that explained, section by section and question by question, how each of these was to be answered/completed/filled out was prepared. This document ("Control de Calidad") was handed out to each of the enumerators, to each of the leaders and to each of the coordinators for quality control.

Documents used for the management and organization of the surveys:

Due to the array of things that the leaders needed to keep in mind for the implementation, management, and organization of the surveys, it was necessary to create a document that listed all the things that needed to be in place prior to the beginning of the surveys in both regions. This document ("*Manejo Y Organizacion Para Encuestas*") was given to each of the two leaders (and to the quality control coordinator in Tungurahua) in each region so to have a good level of consistency and organization prior to the surveys.

Documents used for lists of farmers to be interviewed in each community

A document was used to keep track of all the farmers – platform members and non-members, including the alternatives[29] (*alternos*) - that were going to be interviewed in each community (*Lista de Hogares por comunidad*). This document included information about the community and the farmers: province, canton, parroquia, number of household in the community, number of participants and how they had been selected, number of non participants and how they had been selected.

Documents used for the tracking of surveys

A document was prepared to keep track of all the surveys done every day and for each community[30] (*Documento de Control Diario*), which was handed over to the leaders. Once these were completed, the leaders handed these documents over to the quality control coordinator as soon as the surveys were reviewed and accepted by each of the leaders. The quality control coordinator would sign for the receipt of the surveys but would only sign the acceptance of the quality of the surveys once these were verified.

5.2 Data collection

The implementation of the surveys in Tungurahua and Chimborazo were carried out in a somewhat distinct manner. In the former, things worked pretty smoothly as planned and with only a few minor problems, while in the latter, there were quite a lot of issues that came up in various communities.

The surveys were carried out as planned in Tungurahua: the lists of farmers (participants and non-participants) were compiled in advance; the farmers were randomly selected; surveys were done simultaneously, with one team going to a participating community and the second team going to a non-participating community whenever this was practical. The teams alternated in each field visit, one day one team would go to a participating community and the following day

[29] in case the selected ones were not available

[30] It is important to note that most of these documents were prepared by Mario González and following up to the methodology used for a previous project run in Ethiopia under the first phase of the FNPP. For more info see: http://www.fao.org/docrep/008/af843e/af843e00.htm

the same team would go to a non-participating community[31]. Likewise the enumerators alternated in interviewing participants and non-participants to the platform.

In Chimborazo things were slightly more complicated, mainly because the number of households to interview was much larger and required few additional days than planned to sort things out, organize and carry out activities as planned[32]. Nevertheless, with some re-arrangements, the survey implementation followed the same organizational structure described in box 3 above.

The quality control for the surveys was done using the approach described in the document "Control de Calidad".

5.3 Data set

A data base developer, Fabian Muñoz, was in charge of designing the program to enter households (HH) and community surveys[33]. Once data were entered, a consistency check program was used to double check for mistakes and for consistency. Once the program was executed, each table was saved into Stata format.

The program, in particular would:

- Avoid duplicate entry of surveys;
- Set appropriate range limits for variables (e.g. refusing responses higher or lower than allowed on survey);
- Set missing values and "don't know" answers as agreed;
- Check consistent values for same questions coming from different sections of the questionnaire.

The data base has been cleaned and documented. A journal article and two working papers have been prepared using the data set. A policy brief has been drafted and other analysis planned. The present report summarizes some main findings below. Some of these findings have also been presented to the National Potato Conference hold in Quito in July 2008 as well as during the stakeholders' workshops.

5.4 Two final stakeholder workshops to present results

Two workshops have been held to present results in Ecuador: one in February 2008 with farmers, NGOs and village representatives in Riobamba. The second one was held in June 2008 in Quito with relevant policy makers to discuss policy implications and potentials for scaling the project up. Project proposals have been prepared by the FAO-Office and INIAP in Ecuador with intense e-mail exchange that has involved also the FAO team in Rome.

The data set and the case study contains a wealth of information to be further exploited for other analysis and publication.

6. Some results

The challenge of evaluating the impact of participation of any program is that it is not possible to observe what would have happened to participants in the absence of the program. The key to

[31] There were exceptions to this process when there was a need to send both teams to the same community with a large number of farmers to be interviewed.
[32] For more info: see Mario Gonzales' field report
[33] For community surveys see: ftp://ftp.fao.org/es/esa/lisfame/CommSurvey_Ecuador.pdf

identifying and measuring the impact is, thus, to have a proper counterfactual—that is, a comparison (control) group that is similar to the intervention (treatment) group except that they did not receive the intervention.

As previously described, in selecting such communities a series of steps were taken to make sure that treatment and control communities as well as treatment and control households were appropriately selected. In addition, appropriate econometric techniques were applied to make sure the treatment and control communities were comparable and that impact analysis was conducted properly[34].

Table 4 presents data on the household characteristics of the sample.

The sample is composed by smallholders that own, on average, 2.56 hectares of land divided into about 3 different plots and are located at 3450 meters above the sea level. Of the total land owned 1.24 hectares are on average cultivated with potato. A good percentage of the land is characterized by black soil (about 80% of their land) but usually steep (less than 40% of households land is flat or slightly steep). A good percentage of the land is also irrigated (slightly more than 50%:).

Socio-demographic indicators: the average family size is about 4.7 members with an average education level of 5.16 years. The average age of the head of household is 42.22 years, while the percentage of female headed households is 12%. The dependency ratio, the ratio between kids+ people above 60 years old Vs. labour force is 0.30 in each family. A good share (63%) of the households' heads is represented by indigenous people.

Welfare indicators show that we are largely focusing on poor households. On average they own 0.29 pieces of hi-fi, and 0.17 refrigerators/fridges but only 5% of the households own some valuable agricultural equipment. 20% of the households are also credit constrained, meaning that 20% of them have no access or very difficult access to credit. The number of oxen owned per family is 0.19 on average, 1.79 is the number of cows and 0.75 the number of bulls. Nevertheless, the majority of the households (86%) live in a house, made of concrete or brick *walls (*87%*)* and 96% have access to private or public *water.* More than half households (56%) use electricity or gas to prepare food, but only 6% have access to a sewage system.

A good presence of social capital is reported in the households sampled with 37% participating to organizations and 23% taking part to agricultural associations. The nr of years people belong to non agricultural associations is on average comprised between 1 and 10 years, (*year_assnoa*=1.74)[35]. Last but not least the average distance to the closest city is almost 30 km.

[34] For further imformation see: Cavatassi et al., (2009), Linking Smallholders to the New Agricultural Economy:An Evaluation of the *Plataformas* Program in Ecuador, ESA Working paper.

[35] The variable takes value 1 for nr of years between 1 and 5, 2 for nr of years between 6 and 10, and 3 for more than 10 years. 0 if households do not participate to any non agricultural associations.

Table 4: Descriptive statistics

Variable	*Mean value*
Altitud	3458.78
Total land Owned	2.56
Total potato land	1.24
Total plots owned	2.93
Share of black soil	0.80
Share of flat plots	0.38
Share of irrigated land	0.57
Average family size	4.69
Average years of education	5.16
Percentage of indigenous households head	0.63
Percentage of female headed households	0.12
Average age of head of Household	42.22
Dependency ratio	0.30
nr_hi_fi	0.29
nr_refrigerators	0.17
High value equipment	0.05
Nr cows	1.79
Nr bulls	0.75
Nr oxen	0.19
Own house	0.86
Brick Walls	0.87
Access to Water	0.94
Sewage facilities	0.06
Cooking_facilities	0.56
Credit constraints	0.20
Organizations	0.37
Agricultural Associations	0.23
Nr of years in non agricultural associations	1.74
Minimum distance to closest city	29.16

One of the main objectives of the project was to analyze the impact of platform participation on participant farmers' welfare and on the environment. In addition the mechanisms trough which these objectives are met are also a key objective. To this purpose a detailed impact analysis was run are results are described in Cavatassi et al. (2009).

On average sampled farmers harvest about 7 tons of potato per hectare, quite below the average harvest in Latin America (16 T/ha) but slightly more than the average Ecuadorian havervest (6.88 T/ha) and than the average in this area of Ecuador (5.68 in 2007, INEC). The average gross margin obtained is slightly less than 113 $ per hectare overall. When looking at the impact of the project comparing participant farmers to non beneficiaries, results show that yields are indeed about 33.3 % percent higher as a result of the program with a range that goes from 6.3 metric tons (MT) per hectare for non-participants to 8.4 MT for beneficiaries. Input output ratios are about 20% higher when comparing beneficiaries to the all group of non participants, and gross margins differ of a large amount (259.52 per beneficiaries vs 63.15 for non participants).

The mechanisms working to achieve these results are mainly related to the role played by social capital in the area and within associations and organizations existing as well as through reduction

of transaction costs. For example, knowing the price and contractual arrangements ex-ante plays a significant role in market integration within the selected farmers. In addition beneficiaries sell more of their harvest as compared to non-beneficiaries both in terms of percentage sold as well as quantity per hectare harvested at a price about 30% higher than those who were not in the program.

With regard to the environmental impacts, while the level of on-farm potato diversity does not present significant differences among the groups, the type and number of varieties found can raise some concerns with regard to potential genetic erosion, although this cannot be attributed to the role played by the plataforma. Last but not least, there are not significant differences between participant and non participant farmers on the level of chemicals used, although participants know better their toxicity[36].

7. Conclusions, recommendations and lessons learned

Some important lessons have emerged from this experience on how to approach the analysis of farmers' integration with dynamic market and consequent impact on the environment.

One key question is the balance and timing of quantitative vs. qualitative data.

In this effort, the community focus groups proved to be very rich sources of information that have been very useful in designing the household survey and sample in addition to the value chain analysis. This was a fruitful application of lessons learned from a previous project carried out in Ethiopia[37] .

However, if this experience has, overall, proven to be very successful and its implementation has been very efficient it is also thanks to the good collaboration with the International Potato Centre and to the help and coordination of the FAO-Office in Ecuador and of its Representative Ivan Angulo Chacon. Logistics, information flow, access to data and statistics have all been made available when needed and required. Likewise communication, exchanges and feedback have always been efficient and punctual. The results achieved reiterate the importance of selecting good counterparts in running projects.

Other lessons have been drawn from direct experience in the field, some of which that could be improved. Theses lessons can be summarized as follows: it is important to spend enough time in the target regions for a better understanding of the environments, contexts, and dynamics. More staff and resources are needed to organize, manage, and implement the surveys, including staff that makes indispensable contacts in the community for sample selection and information gathering. It is important to have a bilingual 'bridge'/interpreter and/or bilingual enumerator when the local language is different than the national one, as in this case was Quechua Vs Spanish. It is advisable to include a gender component in the team, and if possible also in the questionnaire. It is important and advisable to budget resources and schedule the time to allow a good analytical analysis and output production.

With regard to the analytical conclusions, while we invite the readers to look at the papers and policy brief, we can summarise here the main findings. Platform participants are certainly well linked to the market and seem to achieve higher yield and larger gross margins. This is due to a mix of effective production techniques and commercialization processes. The platform, indeed,

[36] For further details see:
[37] For more info see http://www.fao.org/docrep/008/af843e/af843e00.htm

helps in reducing transaction costs not only with regard to selling produce and, thus with having pre identified clients and higher selling price, but also with regard to the input side of the market. Results show, in effect, that a large share of positive effects is due to the investment participant farmers make in inputs and good quality seeds. These results emphasise the importance of access and availability of good quality seeds.

Only two out of the seven varieties most commonly used are native varieties. This could lead to the total genetic erosion of local native varieties, a process already started when the new market opportunities arose and exacerbated by the El niño weather phenomenon and that could be counteracted only if a demand for native varieties existed. Policies and actions to encourage the use of native varieties, like the Papa Andina project, are thus desirable. As a matter of fact it is important both for breeders and farmers and for the world at large to have access to genetic resources that contain a diversity of genes, genotype and traits, not only to sustain crop productivity but also for the potential future benefits that one could derive.

Even though participants show a better knowledge of pesticides used and of their toxicity level, not necessarily they use less and take more precaution in their application. Provided that participants tend to prefer less toxic products and tend to use more precautions, still the percentage of farmers taking care of their health is very little and the amount of pesticides used very high. This suggest the importance of emphasising and persisting in capacity building with regard to the use of agro-chemicals taking care of human as well as environmental health.

The results show also the importance of information flow and social capital to facilitate farmers' associativism and smallhoders effective participation in the new agricultural economy.

Although this experience demonstrates to be effective, it would be crucial to scale the project up as these positive results only applies to 1.4% of Ecuadorian farmers.

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Annex I: first workshop report (presentations in power point are available upon request)

In Riobamba on Friday, July 21 2006, 43 people participated in the first workshop of the Project "Facilitating the entry of small producers into the new agricultural economy conserving the natural resources base: A case study in the Andes". Eighteen of the participants were farmers belonging to the Consortium of Small Potato Producers (CONPAPA) and the Chimborazo, Quero, and Tungurahua Coordination Platforms, as well as NGOs and public institutions dedicated to rural development, such as CIP, FAO, MAG, and INIAP.

The **purposes** of the workshop were to:

- Present the motivation, concepts, and aims of the project.
- Better understand the relationships between the actors involved in the potato value chain (platforms for shared projects).
- Identify barriers that prevent small farmers from linking to the value chain, as well as the business that has developed around the platforms of the shared project and CONPAPA.
- Analyze the impact of the platforms (value chains) on the environment (agro-diversity, natural resources, etc.) and on human health.

With regard to the methodology, a series of activities were designed to ensure that the workshop's objectives were achieved:

Introduction:

The introduction sought to create an environment appropriate for group work, which facilitated the presentation of the participating individuals and institutions, and which made it possible to record the various actors' expectations about the workshop.

Socialization:

The purpose of the second phase was to share the justification, concepts, objectives, and strategy of the CIP-FAO Project with the participants. This was done via a PowerPoint presentation followed by a dialogue between the participants aimed at clarifying the project's purpose and providing feedback.

Analysis:

This stage of the workshop analyzed the barriers and other factors that facilitate the entrance of small farmers into the market, and the effects of these value chain information processes on the environment and human health. This analysis was conducted through working groups comprised of the various types of participants (farmers linked to the platforms, policy makers, development organizations, and actors from other levels within the potato value chain). These groups were asked to address three thought-provoking questions:

(i) What barriers prevent farmers from linking with value chains and with platforms?
(ii) What are the elements that facilitate this type of process?
(iii) What impact do these market-oriented production processes (platforms) have on the environment and human health?

This stage of the workshop culminated with a discussion during which the various groups shared their work, and the entire conference reached conclusions about the similarities and differences in the visions of the various actors.

Closing:

The workshop organizers took advantage of the closure of the event to inform the participants about the next steps in the process.

The results of the workshop are presented below.

Expectations of the workshop participants

By means of the ***"What do I expect?"*** group-work technique, the workshop organizers facilitated the participation of the various actors and realized what their expectations were. These are summarized below:

1. Become familiar with the production and commercialization chain; identify opportunities, strengths, weaknesses, and threats to small agricultural producers while conserving the environment and improving the economy.
2. Learn the various points of view regarding the entrance of small producers in the new economy.
3. Acquire more knowledge to strengthen the agricultural practices of small producers with improved technologies.
4. Generate concrete actions to benefit the small potato producers.
5. Learn new strategies regarding rural development interventions.
6. Learn to produce better in order to improve the household's wellbeing.
7. Seek mechanisms to improve coordination between the various actors.

Recommendations made by the farmers in the workshop to the project

Recommendations regarding the results

- The seasonal nature of potato production means that there are periods of boom and periods of difficulty; the results of the project should advise the country on establishing norms that allow dealing with this type of situation.
- The project should reflect on the limitations faced by the producers in the different stages of the productive chain.

Recommendations regarding the methodology

- It is interesting to have information and knowledge to elaborate policies that benefit small producers.
- To work successfully with the farmers that comprise CONPAPA and to earn the support of the platforms, one must work in three phases that guarantee the participation of the farmers and which allow the farmers to capitalize the results of the research project. These three phases are:
  - Phase I: Socialization among the farmers that belong to CONPAPA and the coordination platforms. During this phase, the farmers must receive information about the project and the project should establish operational agreements for the execution of the activities.
  - Phase II: Research and the definition of objectives and production of results and lessons learned
  - Phase III: Dissemination of the research results to the farmers who can capitalize on the knowledge and information generated.

- CONPAPA's and the platforms' monthly meetings should be utilized to inform their members about the project's progress and to establish agreements.
- Technicians should not be the only ones to participate in the visits, but farmer leaders, who are familiar with the area and who can express farmers' doubts, should also participate.
- It is important to work with all of the actors who participate in the chain and/or who are involved at the institutional level to obtain all of the different visions.

Linking small farmers to the market and its environmental and social impact. The answers to three questions addressed to the workshop participants

Four groups worked on these topics. Two of the groups included small farmers linked to CONPAPA, the third included representatives from public institutions, and the fourth consisted of various actors involved in the potato production chain. The reflections of these four groups were guided by three thought-provoking questions:

- What barriers impede the entrance of small farmers to the market (value chains, platforms)?
- What elements facilitate the inclusion process?
- What impact do these agro-business processes have on the environment and people?

The conclusions of each group are reported below.

Group 1: FARMERS

Barriers that impede the entrance of farmers into the market:

- Lack of organization
- Lack of knowledge of other markets (traditional)
- Lack of knowledge about production costs
- Lack of knowledge about production quality
- Intermediaries (abuse of prices)
- Lack of information about market prices
- Lack of planning with respect to planting crops

Difficulties in the Coordination Platforms:

- There is insufficient collaboration among farmers that belong to the platform
- Agreements are not fulfilled
- Lack of knowledge
- Lack of planning
- Unplanned and disorganized production

Factors that facilitate the insertion of farmers into the market:

- Strengthened organizations
- Better prices
- Secure market
- Planned and organized production
- Cleaner potatoes (safer, as not contaminated)
- Institutional support
- Added value (classification)
- Identification of new markets and sales support
- Training specific to potato production

Impacts on the environment and people:

Negative impacts

Environment	**People**
- Use of just one variety - Abandonment of native varieties - Pollution due to chemical use - Stopped producing other crops (corn, barley, wheat, beans, etc.) - Introduction of potatoes areas inappropriate for their production	- Opportunistic - Disinterested - Critical, especially of women - Human contamination by chemicals

Positive impacts

Environment	People
- Soil conservation - Decontaminated soil - Plague control - Efficient use of water for irrigation - Proper management of fertilizers	- Seed selection - Improved standard of living (income, health, nutrition) - Stable work - Women's access to training

Contribution made during the discussion:

- Not many community members are part of it; only those that have access to irrigation participate.
- There are approximately 1,500 people participating in the platform.
- Within the platform, there has been a favorable impact on women; the training is more directed at them. Likewise, children have increased access to the formal training.

Group 2: FARMERS

Barriers that impede the entrance of farmers into the market:

- Lack of organization among the producers (egoism) due to the fact that they cannot face the market alone.
- They cannot produce because they do not have water for irrigation (access to productive resources).
- Lack of access to technology to produce quality products.
- Intermediaries control the market and there is no capacity to convince businessmen.
- Municipalities do not allow producers to sell in street markets.
- It is difficult to enter the market because they take away your stand.
- Intermediaries manipulate the market.
- Producers cannot sell directly because there is a lack of transportation.
- No access to technology.
- Due to a lack of technology and unstable production, small producers cannot satisfy market demands.
- Lack of product selection
- Producers do not use certified seed.

Factors that facilitate the entrance of farmers into the market:

- Producers are organized to compete in the market, they plan production (planting and harvest) according to market demand.
- Prohibiting business people from fixing prices and intervene so that producers can define market prices.
- Obtain support from the institutions that comprise the platforms by going to the meetings and informing other producers.
- Be prepared to improve productivity and quality to achieve better market access.
- Acquire good seed to produce quality products.

Impacts on the environment and people:

- Farmers' field schools have trained producers to reduce their use of chemicals and to switch to organic products.
- Farmers' health has improved now that they are not using red label chemicals.
- Emigration has decreased.
- Family incomes have increased.
- Potato sector more organized.
- Better access to technology thanks to the platforms.
- Awareness has been raised among farmers to achieve better production.

Contributions made during the discussion:

- The process should be oriented towards the market.
- It requires an integral vision of the chain and knowledge of each of its links.

Group 3: VARIOUS ACTORS IN THE CHAIN

Barriers that impede the entrance of farmers into the market:

- Variable prices
- Agro-industry with little social consciousness
- Lack of commitment on the part of farmers – they have their good moments and their bad.
- Lack of compensation mechanisms during critical periods.
- Smuggling of contraband potatoes
- Lack of formal agreements, legalized contracts
- Lack of public market policies
- Lack of alternative markets
- Lack of information systems that provide daily prices at the national level.
- Limited support; it is limited to specific intervention areas.

Factors that facilitate the insertion of farmers into the market:

- Support institutions (focus on the agro-food chain).
- Mechanisms and platforms
- Willingness to work with institutions
- Improved income
- Current level of organization favors future action
- Technical knowledge of crops
- Favorable agro-ecological conditions

Impacts on the environment and people:

- Social
  - Income
    - Organization
    - Health
- Environmental
    - Monoculture
    - Decreased varieties
    - Marginal areas: paramos
    - Better use of pesticides

Contributions to the discussion:

- Lack of strong leadership that can push the project.
- There should be a training event about quality control.
- The production process should be improved.
- The majority of production is above 3,000 meters above sea level.
- Including more people in the platforms depends on the potato market
- Implementing more farmer field schools and training more producers creates expectations.
- People need to see the potato chain from a market perspective.
- There are people organized and others that are not; somebody should undertake a deeper analysis of market access.
- Products should be stored to negotiate at more appropriate times.

Group 4: PUBLIC INSTITUTIONS

Barriers that impede the insertion of farmers into the market:

- Lack of organization, collaboration and cooperation

- Lack of information
- Lack of production planning
- Crop zoning, which depends on farmers.
- Poor post-harvest management; the majority of farmers have poor quality.
- There are no local agricultural policies
- Standardization of weights, sizes, and packaging at the national level.
- Lack of commercialization/business norms
- Absence of varieties in demand by industry
- Bureaucracy in financial processes to assure agreements and projects.
- Lack of other products to enter into markets
- No value added to potatoes
- Lack of systematic focus
- Lack of empowerment of the process by public institutions

Factors that facilitate the insertion of farmers into the market:

- There are organized and legalized groups: CONPAPA and the coordination platforms.
- Planting and harvesting plans
- Better prices
- Farmer training
- Inter-institutional cooperation
- Use of public information

Impacts on the environment and people:

On the environment:

- Decreased pesticide use
- Decrease in potato biodiversity: farmers only work with the Fripapa variety
- Overuse and desertification of the soil: monoculture

On people:

- Improved income for the participating farmers
- Farmer participation – as owners – in the potato business
- Training of local farmer promoters

Contributions to the discussion:

- Concrete experience looking at the results that allow farmers to learn and improve their production processes.

People should focus on the generation of knowledge, which will strengthen these processes.

Annex II: Summary of main findings from Workshop, focus groups and key informant interviews

1 Multistakholders' platforms -Plataformas de concertación

INIAP supported by Papa Andina worked with a number of other local organizations to develop and implement the multistakeholder platform concept as part of the SDC funded Fortipapa project. Various institutions, such as local NGOs, the Ministry of Agriculture, the National Agricultural Research Center (INIAP), universities, and producers participate in the platforms, which, as described above, represent alliances among researchers, NGOs and institutions[38] with farmers to facilitate potato production and its marketing. These experiences, in the two areas selected, directly link 1.4% of all the small potato producers across the country.

Each platform has two components:

1. Farmers
2. Institutions (Fortipapa, Municipalities, INIAP, Universities, etc.)

Essentially, a platform is a system where different agro-food actors interact with the purpose of improving market chain governance whilst facilitating a more equitable access to markets for small producers. Platforms can also be a means of looking for financial help or other types of support.

Currently, there are three operating platforms, facilitated either by a local NGO or the municipality:

- Tunguragua (19 communities involved)
- Quero-Guano (16 communities involved over a total of 45 communities in the area)
- Chimborazo (23 communities involved)

Two other platforms are in the process of being set up:

- Bolivar
- Cotopaxi

The platforms have been working directly with producers for over two years to improve potato quality. At the beginning, they had problems with quality, particularly for damage caused by the 'gusano blanco' (*Premnotrypes vorax*) and other pests or diseases. The interest in improving quality is, above all, due to stricter requirements of new and/or potential customers, as compared to the wholesalers.

Once potato produce is harvested, it goes to the quality control (organized by the platform). If the potatoes meet the standards required, they are sold to the clients. Otherwise the platforms look for second best utilizations. Generally, if the potatoes are too small or have some physical damage, they are sold to the common or local market at reduced prices. The third alternative is to use potatoes for household consumption or for seeds, keeping in mind that a good selection is crucial for a good production. Fourth-quality potatoes are used to feed livestock.

Commercialization. Prior to the platforms, farmers used to sell their produce to the wholesalers. The platforms are now trying to facilitate selling directly to bigger clients, avoiding intermediaries. Currently, the main clients are restaurants and "pollerias", but they are also trying to negotiate contracts with supermarkets and with Frito-Lay. Each platform has one promoter, who manages the flows of potato harvest during the year for the purpose of providing clients when required. The promoter negotiates prices as well as standards with clients (diameter, color, etc). All the platforms are coordinated for commercialization through the *"sistema de negocio campesinos*" (farmers' business system), which interacts directly with clients.

To take part to the platform farmers are required to:

- Participate in the Farmers Field School (FFS) and to any meeting or activity organized by the platform;

38 NGOs, the Ministry of Agriculture, the Agricultural Research Centre (INIAP), Universities,

- Marketing potatoes through the platform;
- Attain a good quality potato product to meet standards required by clients.

The main focus of the platform so far has been on: **capacity building of farmers' organizations** (through FFS); **potato-based bussines** of small potato farmers of the consortium (CONPAPA).

With regard to capacity building, the platforms have focussed on (mainly through FFS):

- Production techniques;
- Pesticides application (reduced and using precautions, in colaboration with the Ecosalud project);
- Fertilizers (when, which ones, how much to use);
- Organization (with a strong focus on women groups).

The platforms were created with the purpose of contributing to the organizational and commercial improvement of small-scale potato producers and provide them with services to link them directly with the market. In particular the mission of the platform is to: "*Strengthen the organization through alliances and agreements with institutions with the purpose of coordinating efforts and providing the services required by the producers so that they can produce quality products, using a technological package friendly to the environment, acting with gender equality, and facilitating the access to formal markets to satisfy in quantity, quality and stability, promoting a change in attitude of our associates so that they work in function with a common interest and in coordination with the management team*" (Mancero, 2007).

The platform requires participation to farmer field school and a contribution of 5 USD. It began a training process on integrated management techniques for main pests and fungus control, and on new varieties. Further, some groups of farmers (multipliers) were created with the purpose of cultivating the varieties provided. The platforms are recognized to generate many advantages[39] which supposedly facilitate the market integration of small potato producers. Table 3 describes the main reasons why farmers choose to participate to the platform, as results from the first round of data analysis.

Table 3 main reasons for participation:

Reason	% of HH that report this as the main reason
Participate with friends	6%
High quality seeds	11%
Predetermined client	15%
Technical Assistance	40%
Higher yield	22%
Other reasons	6%

2 Environmental Issues

were identified through interviews with key informants, as well as through information provided by CIP and through the workshop in Riobamba (July 2006).

In general, environmental concerns can be distinguished into:

a. Pesticides

Particular attention has been devoted to the application of pesticides, as a result of previous extensive studies in the area, as well as the Ecosalud project. For this purpose, the platform teaches how to avoid pests and

[39] Farmers achieve: 1) a better understanding of diseases, white worm, production cost reduction, and implementation of IPM in their crops, 2) Improved seeds that are more resistant to disease, 3) Direct sales of their potatoes, instead of selling to intermediaries, 4) Improved sales price and earnings ($2-3 USD over market price); 5) Advances on payment of 50% the moment they deliver the potatoes to the commercialization center and complete payment 8 days after the total sale.

disease by the use of traps and by early recognition of pests and diseases' signs. If pesticides are required, their application is to be controlled and precautions used. The platform provides equipment (plastic jacket, gloves, mask and filter) for pesticide application, whose cost is about US$ 31.00 (less than what would cost in the market). They are trying to find funds to reduce the price.

Through a baseline study carried out in Chimborazo and Quero, the Ecosalud Project determined that:

i) Farmers are not aware of the toxicity levels of the pesticides indicated by the colors of the labels;
ii) If farmers knew how to avoid severe intoxication (bathing immediately; removing wet clothing) they would have some means of reducing risks when using pesticides;
iii) The utilization of protecting equipment is very important for reducing the exposure to pesticides, but in the area there is minimum use of it.
iv) In potato producing communities, the use of pesticides is high.
v) IB, II, U pesticides are widely used in this area;
vi) Carbofuran is a highly dangerous pesticide that is mostly used in communities that are worse off.

b. Agrobiodiversity

The platforms have been a key entry point for the distribution of the Fripapa variety, which is very well received by the market and which farmers did not grow before participating with the platforms.

The following varieties are either falling out of production or being produced in smaller quantities since Fripapa has been adopted:

- Rosita
- Clonada (white and big)
- Nativa (Uvilla)
- Superchola
- Catalina
- Gabriela
- Santa Rosa
- Pan
- Suprema
- Uvilla (Domesticated var.)
- Coneja (Native cultivar)
- Cecilia
- Esperanza

Each variety has a different level of resistance to certain pests and diseases and has different characteristics in terms of diameter, colour, shape and flavour, etc. Apparently, there is no distinction between what farmers grow for sale and what they grow for domestic consumption.

Presently, the platforms are attempting to wide their sellings to supermarkets, most of which are in Quito and Guayaquil. They are trying with three supermarkets, although these supermarkets require very high standards even compared to Frito-Lay. To meet the supermarkets' requests, platforms are starting to work with three other varieties (Catalina, Chola and Superchola), which are more suitable to reach higher standards and to processing. These varieties have a stronger skin and are more resistant to the processing, while the skin of Fripapa is fragile and it does not resist washing or other treatments. The platforms are, in fact, not neglecting the importance of the added value of processing, washing and packaging potatoes. They are starting a strategic plan to achieve targeted objectives (supermarkets) within the next five to ten years. With respect to diameter, supermarkets require from five to a maximum of ten centimetres. Moreover, there cannot be a single potato with physical damages of any sort; otherwise the whole produce is sent back to the seller.

c. Other aspects:

Natural resource management, including the soil management and land conservation as well as erosion prevention, is also part of the platforms and their FFS.

Additional issues identified by farmers and other stakeholders during the workshop included overuse, loss of soil nutrients and desertification due to monoculture (see Annex I for more details).

3 Barriers, Inputs, Production

a. Identification of Barriers

In addition to the standard factors, such as distance, size of land, production barriers etc., workshop participants and people interviewed drew their attention to the role that information limitation play and to understanding the information flows with regard to:

1) Selling to agro-processors,
2) Potato varieties,
3) Type and quantity of pesticides to use, etc

b. Inputs

Most of the tuber seed is bought from INIAP, although a large part is recycled from previous production. Input provision has sometimes constituted a problem because platforms (and therefore farmers) have not had continuity in seed provision, particularly with respect to quality. They do not buy seed every year. Originally they get certified seed, later they re-utilize seeds selected from their own production.

The seed purchased from INIAP is not certified, but guaranteed. The guarantee could be considered as a step before certification.

The price of seed is about:

- 12-13 US$ for guaranteed seeds per bag of 50 kilos.
- 18-20 US$ for certified seeds.

The platforms are now thinking of creating a group of seed producers in the area. In the zone of Pungala (Parish of Licto[40]), a group of ten potato-seed producers is already operating. They start from registered seed and produce other seed from these. This seed producers' group started because, in the past, platforms and farmers had problems getting good quality seed. Last year they planted 300 Q (about 15 tons) of first quality seed. Farmers realized that good quality is extremely important for a good harvest and recognized that selecting potatoes from harvest is not sufficient (apparently the productivity increased by up to 20% in terms of standards met, as well as more quantity). At the moment they are also multiplying seed through a group of seed multipliers and are trying to produce another variety (Capiro) that is more requested by the agro-industry.

The platforms utilize a planting plan on the basis of demand. Each week, they sell about 600–650 Q (about 30–33 tons) of potatoes. Obviously, the platforms' coordinators influence farmers on what and when to grow, depending on the demand they receive. They push farmers to plant the varieties required by clients. Obviously, they plant seeds of certain varieties on the most adequate soil and land (right altitude, latitude etc). At the moment, they are trying to encourage farmers to produce *Superchola* and *Catalina*, which are varieties more requested by restaurants and supermarkets. The latter are quite demanding on standards for quality (size, color and sugar content), but not with respect to the application of pesticides.

[40] Licto is the community in which an irrigation system is in place. It is the community most linked to the market. The irrigation system started as a watershed management project. Erosion prevention activities are also done dividing plots under different crops and using stones or grass to separate each plot. There is also an irrigation committee that meets once a month to manage and decide upon irrigation rules and water utilization. More information available upon request.

Annex III: Sample selection

Table 1: Communities to be interviewed in Tungurahua

Comunidades Participantes a la Plataforma			Comunidades Comparables (counterfactuals)		
Comunidad	**Canton**	**Parroquia**	**Comunidad**	**Canton**	**Parroquia**
Llangahua/El Salado	Ambato	Pilahuin	**Escalera**	Ambato	Pilahuin
Tamboloma	Ambato	Pilahuin	**Pallaloma**	Ambato	Pilahuin
Mulanleo	Ambato	Pilahuin	**Pucara**	Ambato	Pilahuin
Yatzaputzan	Ambato	Pilahuin	**San Antonio**	Ambato	Pilahuin
San Luis	Ambato	Juan Benigno Vela	**Chilco**	Tisaleo	Juan Benigno Vela

Table 2: Communities to be interviewed in Chimborazo

Comunidades Participantes a la Plataforma			Comunidades Comparables (counterfactuals)		
Comunidad	**Canton**	**Parroquia**	**Comunidad**	**Canton**	**Parroquia**
Ballagan	Riobamba	San Juan	**Pucullpala**	Riobamba	Quimiag
Calerita-Santa Rosa	Riobamba	San Juan	**Puruhuay San Gerardo**	Riobamba	Licto
Capilla Urco	Guamote	Palmira	**Pomachaca**	Guamote	Palmira
Curiquinga	Alausí	Tixan	**Santa Lucia**	Alausí	Achupallas
El Cortijo	Riobamba	Quimiag	**Bayo Grande**	Riobamba	Quimiag
Guntuz	Riobamba	Quimiag	**Bayo Chico**	Riobamba	Quimiag
San Vicente de Tiazo	Riobamba	San Luis/Licto	**Tunshi San Javier**	Riobamba	Licto
Shilpalá	Riobamba	Cacha	**La Delicia**	Riobamba	San Juan
Shobol	Riobamba	San Juan	**Guabug**	Riobamba	San Juan
Sumak-Yura	Riobamba	Punin	**Chulcunag**	Riobamba	Punin
Totoras	Alausí	Achupallas	**Guluagayco**	Alausí	Tixan
Tunsalao	Guano	San Andrés	**Pulingui**	Guano	San Andrés