

To what extent small farmers are affected by their lack of GlobalGAP certification?

Evidence from mango export sector in Peru

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Abstract

A range of the economic development literature focuses on the debate of whether international standards exclude small-scale farmers from high-value food markets. Nonetheless, when exclusion is pointed out, very little is said about the extent of the problems of such forms of exclusion are. In this paper, we examine how small farmers are affected by their lack of certification. Based on primary data collected to examine the effects of GlobalGAP on the mango sector in Peru, we find a significant number of excluded farmers. These farmers face greater price risk while their bargaining power and agricultural income have decreased.

Key words: *GlobalGAP, exclusion, small-scale farmer, sporadic exporters, mango, Peru*

1. Introduction

The last two decades witnessed unprecedented changes in the agrofood sector through the proliferation of standards in international agricultural trade. After a period during which the states of developed countries actively implemented food safety standards (this has been exacerbated by a series of food scandals (Henson et al., 1999), private food standards have rapidly penetrated agrofood markets as well nowadays. Expanding beyond their initial tiny market niche, they respond to rising consumer concerns regarding the conditions of

production and trade of the goods they buy (Jaffee et al., 2004). These voluntary standards combine a mixture of food safety, environmental, and social dimensions, with an implicit emphasis on product traceability. Consequently, standards not only affect the safety of final products, but also the whole organization of the supply chain (Hammoudi et al., 2009). For many farmers in developing countries, investing in agricultural niches for exportation may appear a profitable option. A wide range of literature in development economics focused on whether international standards tend to exclude or not small-scale farmers from high-value food markets. Finally, it is becoming generally recognised that evidence is mixed (Henson et al., 2010). Nonetheless, when exclusion is pointed out, very few studies examine what happens to the farmers who are excluded from a specific certified market and to what extent small farmers are affected by their lack of certification. Our paper is a contribution to the scarce literature analysing the implications that international sustainability standards have on the behaviour of excluded farmers and their impacts in terms of marketing risks and income levels (Chemnitz et al., 2007). The contribution of our paper lies in characterizing the excluded farmers who are generally difficult to track down. Researchers too often focus just on the benefits of the adoption of standards, but our research provides insights into the crucial indirect effects of standards on rural poverty (Gomez et al., 2011).

In this paper, we focus on GlobalGAP adoption by small-scale producers of fresh mangos in Peru. The fresh mango sector in Peru is an interesting case, as the private GlobalGAP standard – the most important standard that applies to the production of fresh mangos – has become mandatory *de facto* for exportation to the European Union (EU) since 2007 (Bain, 2010; Souza et al., 2010; Zoss et al., 2007). Actually, this standard is not mandated by law and thus remains ‘voluntary’, but the reality is that compliance with GlobalGAP has become

an ‘entry ticket’ into EU (Campbell et al., 2006; Fox et al., 2006). Yet two-thirds of Peruvian mangos are exported to the EU.

We first conducted qualitative interviews with experts and supply chain actors before conducting quantitative interviews aimed at identifying the producers’ characteristics. We surveyed 223 small-scale mango producers from October 2010 to May 2011. We collected data in the main mango production area, the Piura region in northern Peru.

Findings show that a significant number of farmers are excluded from the certification process. These farmers sell therefore all their production to small and sporadic exporters, called ‘golondrinos’ (swallows). Finally, with these intermediaries, they face greater price risk while their bargaining power and agricultural income have decreased. These producers are particularly vulnerable since their investment in mango trees impedes to radically change of farm activity.

The paper proceeds as follows: section two provides a background of mango production and trade in Peru and the growing standard requirement on the international trade; section three develops the typology of producers used to formulate hypotheses; and describes the survey and data; section four presents and discusses the empirical findings; and section five concludes the paper and reports some policy implications of the study.

2. Fresh mango sector in Peru

a) Production and Trade

According to the World Bank definition, Peru is a low middle income country with a GDP of USD 152.8 billion and per capita income of USD 9200 in 2010 (Worldfactbook, 2010). In Peru, agriculture is still a source of economic development. It accounts for 8 per cent of the

GDP and provides 23 per cent of direct and indirect employment (INEI, 2008). Fresh mango is one of the major agricultural exports. Since 1985 with the first export towards the US, the sector has grown at remarkable rates. Between 2000 and 2010, the cultivated areas passed from nearly 18700 hectares to around 28400 hectares and the production from 125 thousand tons to 250 thousand tons (MINAG, 2010). Peru exports around 30 per cent of its national production (105.72 tons in 2009/2010) and is the fifth largest mango exporter in the world. Fresh mangos are by far the most important of exported mangos (in 2009, 87 per cent of exported mango volumes, (Gerbaud, 2010)). Exports go to both the EU (65%) and US (35%) markets (Gerbaud, 2010).

Production is concentrated in northern Peru, in the region of Piura (around 70 per cent of the national production and 90 per cent of exported production). The main mango varieties grown for the domestic market are Criollo, the local variety, and Edward, the improved variety. Nevertheless, their productions have declined. Improved varieties for export such as Kent (94.5 per cent of export volumes) have steadily replaced the domestic ones (SENASA, 2010). Piura export-oriented production is harvested between November and March. At this period and for the EU market, Peru – the second largest supplier – competes with Brazil in November and December (Gerbaud, 2010).

The monthly prices at the exporting port, the free in board (FOB) prices for exportation to the EU and to the US are nearly similar for both markets. Nevertheless, there are some monthly or annual variations due to the other competitors for the targeted market (for instance, the EU market price was higher than the US price in November 2010 because of the shortage of Brazilian mangos on the international market, which was not the case in November 2009 (Gerbaud, 2010). Otherwise, Kent variety prices are substantially lower than

those for the Edward or Criollo varieties on the domestic market, as Peruvian consumers do not value the taste of the latter. Kent mangos are not profitable on the domestic market.

For Kent mango producers, the international market is thus the only lucrative market. Nonetheless, Peruvian mango growers face multiple inhibiting factors to export. The first constraint to accessing an outside market is a minimum volume required by the buyer (at least one container of 20 tons). This explains why small-scale producers (on average hardly producing 20 exportable tons) cannot export directly and work with exporters or form producer associations in order to get export market access. The second constraint is that the mango exporters must meet commercial quality requirements (colour, appearance and size). Lastly, export-oriented producers require a phytosanitary certificate from the SENASA (Servicio Nacional de Sanidad Agraria del Peru) – the public agency in charge of eradication of the fruit fly.

b) Non-tariff measures from the EU market and the voluntary food standards

For both the EU and the US markets, exports are required to respect the standard from Codex Alimentarius and maximum residual levels (MRL) for pesticides. Nevertheless, contrary to the US, the EU does not require hydrothermal treatments to kill fruit flies

ⁱ. Mangos exported to Europe are cleaned and then packed in 20 existing packing plants in Peru. Most of them are located in the Piura region. Barriers to trade in the EU are therefore much more relative to private standards: at the plant level, the HACCP is essential; at the production level, organic certification has spread and GlobalGAP has become mandatory de facto since 2007 (Bain, 2010; Souza, et al., 2010; Zoss, et al., 2007). Indeed, while European Retail Produce Good agricultural Practices (EurepGAP) was developed by 13 European retailers, the Global Good agricultural Practices (GlobalGAP) begin to have an expanding role

as one of the major private standards in the international trade (Lee et al., 2010). Nowadays, this standard is still not mandated by law and thus remains ‘voluntary’, but the reality is that compliance with GlobalGAP has become an ‘entry ticket’ into EU (Campbell, et al., 2006; Fox, et al., 2006).

Data on GlobalGAP participation are hard to obtain but certified production should represent the total volume of EU exports since it is required by almost all the European importers (according to interviews with experts, exporters and importers). The GlobalGAP guideline ensures good agricultural practices with a particular focus on food-safety, environment quality (soil, water, and wildlife conservation), worker safety and hygiene, and traceability on the farm. The GlobalGAP certification requires some initial investments (such as toilets, canteens for workers, water taps, safety equipment, and storage facilities for agricultural inputs and outputs, respectively) that require substantial financial capital to upgrade the farm. It also entails annual costs for external inspection by a certification body. Finally, it requires that the producer know how to read, write, and keep records – which means a high level of human capital. Producers have two options to obtain certification under the standard: they can apply individually or apply collectively for a producer group certificate. In Peru, information on the GlobalGAP standard is relayed by government organizations, producer and exporter organizations, and NGOs. Concerning the cost of compliance, our interview results highlight a large variability of the compliance costs, ranging between 150 and 833 US\$/haⁱⁱ. This is influenced by the previous endowments in storage or other infrastructures and the technical level of the farm, but also by its size (since required infrastructure and technical levels are not size proportional). Some added costs are then spending for infrastructure maintenance. According to the producers’ perceptions in Peru, implementation costs remain the major constraint from GlobalGAP standard implementation.

In addition, the fixed cost of annual inspection in Peru is 2000 \$US/year. This is high, all the more so without a premium in the product price. The size of an individual enterprise is thus a major determinant of standard adoption. According to our first qualitative interviews, the minimum profitable size to individually implement GlobalGAP is around 20 ha.

Organic production represents one per cent of the total mango production in Peru (3,000 tons in 2007). 36 per cent of organic mangos are exported to the US and 64 per cent to Europe in 2007 (data collected at the Public PROMPERU agency). Organic certification focuses on food-safety, environment quality, and traceability on the farm through agricultural practices that do not involve chemical inputs. The certificate includes few initial investments, but entails annual costs for external inspection by a certification body – meaning a minimum level of financial capital– and requires that the produce be able to read, write, and keep records – meaning again a minimum level of human capital. Again, producers have two options to obtain certification under the standard: they can apply individually or apply collectively for a producer group certificate. The organic certification generally includes a better price that can recover the cost of certification and a possible lower yield.

GlobalGAP and Organic certifications are not exclusive and depend of the firm strategy. Nonetheless, in the case of farms which invest in organic certification, they not required GlobalGAP certification to find importers in Europe. Therefore, very few combine both certifications.

c) Export-oriented organizations and stakeholders

In Peru, most of the mango producers are smallholders (85 per cent of them have less than 20 ha of total land including 15 per cent who have less than 5 ha). This repartition and the rather small size of mango producers in Peru are due to the agrarian reform of 1969.

In 2009, 1,627 producers exported their mangos. Among these producers, 75 per cent are smallholders (less than 20 ha of total land), 20 per cent are medium farmers (from 20 to 50 ha), and 5 per cent are large-scale farmers (more than 50 ha). They account for 30 per cent, 30 per cent, and 40 per cent of exported produce, respectively. Larger farmers are generally vertically integrated into exporter enterprises and export their own mango production. However, there is large variability in mango production from year to yearⁱⁱⁱ. Thus, they generally complete their own production by purchasing from smaller farmers. For that, small-scale producers may have annual procurement contracts (written or oral contracts, but hardly enforceable). Through these contracts, they steadily delegate harvests to the exporter (or a third party assigned to harvest on behalf of the packing plant), since it becomes very difficult to gather daily workers. In addition, in many cases, producers hardly have any access to credit to pay workers. A disadvantage of that service is the high level of mangos discarded during the harvest – the discarded mango rate is on average 20 per cent. Exporters are also in charge of carrying out transportation to the processing plant. Prices are rarely fixed and pay is often delayed. Nonetheless, for a monthly adjustment strategy, exporters do not implement farming contracts with smallholders.

In 2009-2010, Peru had 106 fresh mango-exporting companies (SENASA, 2010). The top 10 companies represent 46 per cent of the total export volume. However, when compared to the figures from 2005-2006 (Fulponi, 2007), this concentration in the mango-exporting sector has decreased these last five years, revealing a still very attractive and expandable market: in

2005 there were around 70 mango exporters in Peru and the top six represented 54 per cent; Moreover the top one accounted in 2006 for 22.1 per cent of the total fresh mango export and in 2010 only for 10.2 per cent. Otherwise, there are still few foreign exporter enterprises (it seems there are only two for the moment) but since the sector has been attractive for foreign investments few years ago, we found Peruvian enterprises with a part of foreign capital (from the US, Colombia, Costa Rica, and so forth,).

Large exporters mostly rely on their own production (from 50 to 250 ha) and still tend towards increased vertical integration, even though land has become very expensive recently. They have easily enforced quality, traceability, and certified production – in particular GlobalGAP. They own packing or treatment plants. Nonetheless, the sector shows a relatively low entry barrier since the concentration in the mango-exporting sector has decreased these last five years and the sector actors complain about the high number of small and sporadic exporter firms (60 per cent treat less than 500 tons per year) that enter the market for short run market opportunities. These sporadic exporters are called ‘golondrinos’ (meaning ‘swallows’). These firms are subjected to the most border rejections.

The mango-producing sector is little organized in Peru. According to an expert, this could be explained by the fact that there are lots of small producers and the mango season is very short, around 3 months.

3. Hypotheses, data and method

a) Producers’ typology

In our paper, we question the effects of the restructuring of the mango supply chain by the expansion of private standard requirements, GlobalGAP in particular, on small-scale producers. The farmers we surveyed are export-oriented (they grow the Kent variety, which is

not valued locally), but normally should not be certified because of the low economy of scale of their small farm (they own less than 20 ha).

Given the scarcity of an adequate amount of literature to analyse the effects that international sustainability standards have on the behaviour of farmers –included and excluded, we first propose to construct a simple typology of producers according of the standard introduction.

In the specific case of mango sector in Peru, we identify 4 potential types of small-scale farmers since the introduction of GlobalGAP:

(i) GlobalGAP certified farmers: Some farmers may adopt the GlobalGAP certification. As we mentioned above, producers have two options to obtain certification under the standard: either by applying individually or by applying collectively for a producer group certificate. In the case of small farmers who hold less than 20 ha, the GlobalGAP certified strategy seems difficult at the individual level due to the fixed costs of compliance. Thus the alternative option is that farmers organize themselves within producer organizations so as to comply collectively with standards.

(ii) Organic certified farmers: Some producers will continue to export to the EU and the US equally since they adopt the European organic certification. Organic certification substitutes for the GlobalGAP requirement in the EU market. We must mention, however, that this second category is not totally exclusive from the first one.

(iii) Excluded farmers: Some farmers will no longer export to the EU and will target the US or domestic market instead. They were used to working with large exporters specialized on European market, and will be excluded from this channel by their usual

exporter since they don't adopt any certification. This implies therefore that the farmers replace their usual exporter by a new trader targeting US or domestic market. In extreme cases, we may expect that some farmers uproot their Kent mango trees (intended for export) and replant new orchards with Edward or Criollo mango trees for the domestic market (targeting the higher segment of the domestic market).

(iv) Non-certified farmers: Actually, non-certified producers do not yet face total exclusion from the EU market as a whole since EU importers can buy non-certified products when no GlobalGAP produce is available. This means that the 'auspicious' export window is reduced for these producers. In spite of the tremendous demand for GlobalGAP certification, these small-scale producers still have not been affected by the GlobalGAP introduction. We presume, however, that this last category is probably infrequent.

As Henson and Jaffee (2008) and Chemnitz et al. (2007) have already highlighted, the ability to implement a profitable option will depend on several factors at the country, market structure, and farm levels, as well as the specific food standards. Besides, the above typology does not give any idea of the benefits or disadvantages for small farmers to adopt one type of marketing behavior. We will thus additionally formulate a research hypothesis on the impacts of these options on income and marketing risk for farmers.

b) Research hypotheses

We hypothesize that the introduction of GlobalGAP may have ambiguous impacts on non-certified smallholders.

First, when some small-scale producers comply with the GlobalGAP standard, one could expect positive results on income and marketing stability:

(i) Price and Stability: GlobalGAP certification does not involve a price premium, but since it can increase market access when the EU export market is favourable, we expect prices to increase. Besides, since GlobalGAP compliance often leads to stronger vertical coordination through farming contracts, we expect producer-exporter relationship stability to increase.

(ii) Second, the organic certified option may have positive results on the income and marketing stability for small-scale producers:

(iii) Price and Stability: Organic certification involves a price premium, which can balance the costs of compliance. It can also increase the security of market access due to product diversification. Consequently, we expect price and market stability to increase.

(iv) Third, the excluded farmers may have negative results on the income and marketing stability of non-certified smallholders:

(v) Price: excluded producers switch to supplying the domestic market, where the price for Kent mangos is substantially lower than on the international market.

(vi) Risk: excluded producers switch to supplying ‘golondrinos’(sporadic and thus unfamiliar buyer). This is likely to increase their marketing risk (unstable relationships, insecure markets, low prices, and so forth,).

(vii) However, the demand for certified products may have indirect positive results on the income of excluded farmers:

(viii) Price: Conventional product demand from the US may mostly be satisfied by the supply chain responses of excluded producers. In addition, the bargaining power of these producers compared to small-scale exporters, such as ‘golondrinos’, may increase. Consequently, we could expect excluded producer prices to increase.

(ix) **Hired labour:** The increase in certified exporters' own production increases the need for hired labour. Consequently, we could expect a higher labour demand for excluded producers at the village level.

(x) **Income:** The increase of price for conventional mangos and the increase of hired labour may increase the total income of excluded producers.

The fourth category of producers, non-certified producers will constitute a kind of control group in the following development since we presume that these producers still have not been affected by the GlobalGAP introduction.

c) Survey and data

Between October 2010 and May 2011, we surveyed 223 mango producers in the main mango region of Piura, where over 90 per cent of exported mangos originate. We focused our analysis on small farmers with less than 20 ha. These producers represent 20-30 per cent of mango exports and 70-80 per cent of all mango producers. We randomly selected 19 villages located in Piura region where exporters' plants are found. Within these villages, we randomly selected producers to survey, who grew Kent mangos (which are export-oriented) with holdings of less than 20 ha (which correspond to small farmers for whom individual GlobalGAP certification might be unprofitable). We conducted face-to-face interviews. The data collected through the questionnaire included: household and farm general characteristics, household assets, mango production and marketing behaviour, mango standard certifications (organic and GlobalGAP), other activities, changes and perceptions since GlobalGAP has been required by exporters (that is 2007).

In addition to the farmer surveys, we conducted additional semi-structured interviews with 10 exporters and other supply chain actors (promoting agencies, state actors, leaders of producer organizations, importers and so forth,) to collect supplemental contextual data allowing better understanding of various aspects of the mango supply chain in Peru. Finally, this primary data was supplemented with price information.

d) Data analysis

To describe factors that may have influenced the farmers' marketing behaviours and determined perceived impacts of standard requirements, an analysis is performed using t-test and χ^2 -test^{iv}. In this paper, we do not show a causal effect of GlobalGAP certification on producers, but rather we depict the characteristics and perceptions that characterize the different types of producers in the alternative options. Finally, estimating a regression model tests the hypothesis concerning the impact of these options on the price received for mangos. In addition, we also control for other factors considered to be relevant, such as the variables of farm and household characteristics and relationships with buyers. The dependent variable of the regression is the logarithm of the highest price received by the farmer. We do not know the volume sold at this price, but since farmers generally harvest once or twice per season and that the discarded mangos could not have received the highest price, we can assume that it was a sizeable amount of the farmer's production. We think that it could be a good proxy of the producer's bargaining power and final income (given the volume of mangos).

4. Results and discussion

a) Characteristics of farmers and marketing behaviours: non-certified farmers are still predominant

Within our sample of 223 producers, the average farm size is 8 ha, 3.3 ha of which are dedicated to mango production (of which 85 per cent is Kent mangos). All producers grow varieties for the domestic market and personal consumption (an average of 15 per cent of their total mango crop surface). Some small-scale producers also grow lemons (39%), cereals (21%), and cocoa (6%). 80 per cent of respondents say that mangos are the most important product grown in terms of cash flow. Some small-scale producers are also day labourers at other farms (13%) or have off-farm income (14%). On average, they have grown mangos since 1997, but most of them started after 2000, when exportation raised dramatically. Their distance from the nearest exporter plant (treatment or packing plant) is around 14 km. 70 per cent of producers are used to having informal contract with only one and usual exporter, every year the same.

(i) GlobalGAP certified farmers: only 8 per cent (18 cases) are GlobalGAP certified and only 31 per cent of farmers surveyed have heard about GlobalGAP certification. GlobalGAP certified producers are scarce, as we expected for smallholder farmers. The average certification date is 2009 (from 2007 to 2010). The compliance cost is US\$ 2,000 per year (without any variability among respondents). If the farmer is under contract, the exporter mostly pays for the certificate; otherwise, if farmer belongs to a producer's organization, the organization pays for the certificate (half of GlobalGAP producers are members of an organization, 22 per cent of the total sample). Initial investments (such as toilets, canteens for workers, water taps) are more often paid for by the producers thanks to a rural credit bank.

(ii) Organic certified farmers: 12.5 per cent of producers are certified organic (28 observations). The average certification date is 2007 (from 2004 to 2010). The annual cost of certification is around US\$ 2,000/year and is mostly paid for by the producer or a producer organization (in few cases by the exporters).

Nine producers are both GlobalGAP and organic certified.

(iii) Excluded Farmers: 24 per cent of producers are assumed as excluded farmers according to our definition. Actually, 33 per cent say that they have increased their volumes sold to unfamiliar brokers ‘in passing’ since 2007 (29 per cent have decreased and 35 per cent have experienced no change). These brokers are the ‘golondrinos’, with a very sporadic existence, taking advantage of a particular market opportunity. When most producers (85%) work partly with these traders each year- particularly to sell any Kent mangos rejected by their usual exporters- 34 per cent of producers declare selling low volumes to these traders and 42 per cent of producers declare selling a high volume to these traders each year. 56 per cent of producers who declare huge volumes to ‘golondrinos’ say that these volumes have increased since 2007 – the latter (24 per cent of the total sample) are considered among the excluded farmer below because they no longer know to whom they are selling their mangos. Otherwise, 9 per cent of producers declare to have increased their volumes sold to the domestic market since 2007 (33 per cent have decreased and 54 per cent have experienced no change), but they have not increased areas dedicated to domestic varieties for the domestic market nor decreased the Kent variety areas.

(iv) Non-certified farmers: unexpectedly they still represent 55,5 per cent of small-scale producers. This high number of non-certified farmers may be due to two reasons: first, the production of small-scale farmers that account for 30 per cent of the export produce are mainly oriented towards the 35 per cent of US market-share; second this could be due to the lack of GlobalGAP enforcement, since it is known that some exporters mix certified production with uncertified production and sell it under the same brand (Fulponi, 2007).

Unfortunately, it is difficult to get GlobalGAP figures to compare the surface certified and the volume sold with the global standard.

b) Mean comparison analysis: ‘swallow doesn’t make a spring...for small scale farmers’

At the producer level, we compare the fourth categories of farmers proposed above: GlobalGAP adopters, organic adopters, excluded farmers (selling mangos to ‘golondrinos’) and, as a control group since we assume they didn’t change since 2007, non-certified farmers, according to some selected variables.

As presented in Table 1, the average size of total land of excluded farmers is a little lower than their counterparts (non-certified farmers) and these producers have a little less mango production. Nonetheless, these excluded farmers are significantly less specialized in mango production (ratio of land) than standard adopters. Regarding yield in 2009, there are no significant differences among the groups – even the lower yield expected for organic farming is not significant.

Household characteristics do not show any important results in terms of our comparison, except that excluded farmers but also GlobalGAP adopters are more likely to have income from an agricultural off-farm activity. This could be explained in different ways: while it is proof of GlobalGAP adopters’ access to financial capital that could be reinvested in their farms, conversely in this case of excluded farmers this could suggest that their farm is not profitable enough to bring sufficient income. Excluded farmers are also less likely to own a car.

Table 1: Mean comparison of producer characteristics according to categories

	Non- certified farmers (n=137)	GlobalGAP - certified farmers (n= 18)	Organic- certified farmers (n=28)	Excluded farmers (n=49)
Farm characteristics				
Total land size	8.81	4.2***	6.8	7.18*
Ratio of land size under mangos	0.52	0.82***	0.65**	0.53
Ratio of mango area under Kent	0.84	0.88	0.87	0.84
Volume of mangos 2009	25.49	17.42*	17.85*	19.92*
Yield 2009	8.00	8.34	6.69	7.47
Household characteristics				
Age	55.6	51.4*	51.3**	57.7
Education	1.49	1.61	1.46	1.48
Experience	15.77	14.4	12.96**	15.57
Children (<15 years)	1.67	1.50	1.70	1.43
Mobile phone	0.64	0.77	0.64	0.65
Car	0.27	0.16	0.18	0.12**
Date of car	1995	2004*	2002*	1991
Agri. off farm Income	0.08	0.33***	0.14	0.20**
Market access and relation w/ buyer				
Distance to plant	14.9	7.8***	11.5**	14.4
Packing plant	0.68	0.94**	0.68	0.84**
Works only w/ one exporter	0.71	0.88*	0.73	0.37
Used to have written	0.15	0.66***	0.43***	0.02**

contract				
Used to have no contract	0.57	0.27***	0.39**	0.77***
Technical advices	0.50	0.77***	0.5	0.02***
Advance payment	0.18	0.44***	0.28*	0.04**
Month is important for	0.10	0.22	0.14	0.09
buyer				
Color is important for buyer	0.49	1***	0.90***	0.44*
Weight is important for	0.51	1***	0.85***	0.51
buyer				

*Statistical significance at the 0.01 (***), 0.05 (**) and 0.1 (*) level of probability*

Among variables related to market access, distance to plant is significantly lower for both standard adopters (GlobalGAP and organic adopters). This could suggest that standard compliance may be more the result of an exporter's decision rather than that of the farmer (Lemeilleur, 2012). This could be supported by the fact that it is the exporters who manage the harvest inside the mango farms. Other variables related to relationships with buyers, such as contracts (used to having written contracts or not) and advance payments, differ significantly. Written contracts and advance payments attest to close relationships with the buyers. In the case of GlobalGAP adopters, farmers are also more likely to receive technical advice from the buyer and the presence of nearby packing plant (namely exclusively EU-oriented) is significantly higher compared to the control group. The results lead to the same conclusion as Kleinwechter and Grethe, who have shown that vertical integration or some forms of closed vertical coordination, such as contract farming, can be seen as the most important factor influencing GlobalGAP compliance (Kleinwechter et al., 2006). Moreover, standard adopters' buyers are significantly more demanding in terms of commercial quality (colour and weight) than those of their counterparts. Conversely, it is clear that excluded farmers have significantly less contracts with buyers; they do not benefit from technical

advice or advance payments, even if a packing plant is generally and significantly more accessible for them than for the control group.

From Table 2, which analyses the farmers' perceptions of changes since 2007 (corresponding to when GlobalGAP has become mandatory de facto in the EU market), the perception of farmers regarding price risk and the stability of buyer relationships show stark differences: while a significant number of organic producers declare that price risk has decreased or at least not increased, GlobalGAP producers insist on the heightened stability of their buyer relationships. For the excluded farmers group, both indicators of price risk and stability have deteriorated since 2007.

According to the categories, 11 per cent to 21 per cent of producers have increased the amount of land dedicated to mangos, particularly the Kent variety^v. Nonetheless, there is no significant difference between the categories. In addition, none of the producers have decreased their land allotments for mangos (which correspond to uprooting mango trees). These results suggest that, for the moment, none of the producers tend to exit from the mango production activity. Since mango trees represent an investment, we could easily understand why producers do not react promptly to the market signals. Switching costs are high.

In addition, both standard adopters are more likely to increase their land allotments for cocoa than the control group, and inversely the land for cereals. Cocoa trees represent an investment for farmers and the production is sold exclusively on the international market, generally allowing for better prices, but also higher marketing risks. Therefore, the result suggests that standard adopters are less risk-averse than the non-adopters. With regards to the excluded farmers' category, farmers have been more likely to grow cereals since 2007. Conversely to cocoa, cereals are annual crops for the national market. Their prices vary, but

farmers can switch a crop yearly, which illustrates a defensive strategy by these farmers since 2007.

Table 2: Mean comparison analysis of producer perceptions according to categories

	Non- certified farmers (n=137)	GlobalGAP- certified farmers (n= 18)	Organic- certified farmers (n=28)	Excluded farmers (n=49)
Risks and stability in market access				
Price risk has increased	0.66	0.66	0.50**	0.82**
Price risk has decreased	0.15	0.11	0.28*	0.14
Stability of relation w/ buyer has increased	0.32	0.50**	0.43*	0.14**
Stability of relation w/ buyer has decreased	0.25	0.05**	0.25	0.37
Increased land under Kent	0.21	0.11	0.14	0.20
Increased land under cereals	0.22	0***	0***	0.35*
Increased land under fruit trees	0.36	0.61*	0.39	0.47
Increased land under cocoa	0.02	0.44***	0.21***	0
Income and bargaining power				
Off farm labor has increased	0.07	0.16*	0.21***	0**
Off farm labor has decreased	0.18	0.05	0.18	0.12
Mango prices have increased	0.37	0.55	0.57*	0.40
Mango prices have decreased	0.32	0.22	0.21	0.34

Earlier payment	0.24	0.38	0.14	0.24
Later payment	0.33	0.05**	0.28	0.24
Bargaining power has increased	0.26	0.33	0.32	0.08***
Bargaining power has decreased	0.31	0***	0.17**	0.53***
Income has increased	0.34	0.55**	0.43	0.22
Income has decreased	0.30	0.16	0.32	0.48**

*Statistical significance at the 0.01 (***), 0.05 (**) and 0.1 (*) level of probability*

Among the variables related to income and bargaining power, standard adopters are more likely to declare that off-farm labour has increased. When looking at the qualitative answers for the kind of job they have adopted, they generally declare to have small shops. Increasing off-farm labour may thus reflect a better financial situation for these farmers, as they were able to invest in the shop, rather than a pessimistic one (looking for extra income outside of an unprofitable farm). For the excluded farmers' group, off-farm labour has not increased, which is a rejection of our initial hypothesis; labour hired by certified producers does not concern the excluded farmers' group. Indeed, labour contracts are for the only three months of the mango season's peak, the seasonal workers are thus generally not mango producers themselves.

Organic farmers are more likely to declare that mango prices have increased (57 per cent of them) since GlobalGAP farmers a large number of them declare that their income has increased and that they do not receive later payment for that. Conversely, the excluded farmers dramatically perceive a decrease of their bargaining power with a significant lower global income.

c) Regression estimation results: '...nor does one worst purchase price'

To further investigate how the bargaining power of farmers is affected by the certification, we estimate a simple regression on the level of the highest price received by farmers in 2009 for Kent mangos (Table 3). According to the results of our model, the GlobalGAP adopters group is positively and strongly related to receiving a better price for mangos, corroborating our hypothesis. We cannot conclude that the causality of certification on the price level^{vi}, but the result corroborate that GlobalGAP compliance has become an ‘entry ticket’ to EU market in particular when the price is high and the supply is highly competitive. In the same way, the coefficient for the organic-certified producers shows that these producers received significantly a better price; corroborating the fact that organic certification generally includes a price premium from the buyer. However, regarding excluded farmers group, none of the initial hypotheses (positive or negative impacts on the price) are actually verified: the bargaining power of these producers compared to smaller exporters, such as ‘golondrinos’, does not increase.

Among the statistically significant variables in our model explaining a higher price, the total volume of mangos sold in 2009 is positively correlated to a higher price, as we could expect since the volume also determined the bargaining power of farmers with traders. The month of the mango harvest is also important in determining the price received. Consequently, producers for whom harvests mostly take place in January are more likely to receive a lower price. Otherwise, we find no evidence that having more experience, getting a car or a mobile phone – this could increase farmer access to information —improves the prices received by farmers. And finally, to be paid earlier does not damage the bargaining power of farmers.

Table 3: Regression estimation results

<i>Dependant variable: log. of highest price for mango in</i>	Coeff.	Std. dev.
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2009

Alternative options

GlobalGAP-certified farmers	0.205***	0.080
Organic-certified farmers	0.123**	0.064
Excluded farmers	- 0.156	0.049

Farm characteristics

Volume of mangos 2009	0.002**	0.001
Production peak in December	- 0.005	0.042
Production peak in January	- 0.119***	0.049

Household characteristics

Experience	-0.002	0.002
Mobile phone	0.045	0.044
Car	0.067	0.050

Market access and relation w/ buyer

Packing plant	0.042	0.049
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Risks and stability in market access

Earlier payment	-0.057	0.047
Constant	2.382***	0.141

Pseudo-R² **0.17**

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*Statistical significance at the 0.01 (***), 0.05 (**) and 0.1 (*) level of probability*

5. Conclusion

This paper addresses the gap in the literature regarding the effects that international sustainability standards have on the behaviour of excluded farmers and their impacts in terms of marketing risks and income levels. The main contribution of the paper is that we were able to characterize the excluded farmers (thanks to variety of mangos specific for export) who are generally difficult to track down.

Drawing on a simple typology of producers, we have compared the effects of alternative options that mango producers in Peru have been progressively following since GlobalGAP exporter requirements are growing. Data collected through a representative and large number of surveys with small-scale export-oriented producers (223 surveys) allows us to construct four main alternatives. First, we find evidence that the GlobalGAP-certified option exists since some small-scale producers are currently complying with GlobalGAP (8 per cent of our sample). This certification seems to allow small-scale producers to be included in the lucrative international market (these farmers received a significantly better price for mangos). Second, we found farmers who adopt another option to bypass the difficulties of complying with GlobalGAP certification by implementing organic certification. Organic certification, which required less initial investment from farmers, substitutes for the GlobalGAP requirement in the EU market. Third, we found a steady number of excluded farmers who declare that they sell all their production to ‘golondrinos’. The existence of ‘golondrinos’ is quite well-known in Peru (Fulponi, 2007) and data from the custom allow us to estimate that they represent 30 per cent to 50 per cent of the exporter companies.

To conclude, excluded farmers seem to be very affected to no longer export to EU and to be obliged to replace their usual exporter by ‘golondrinos’: a large majority (82%) declares that price risk has increased, that stability with farmers has rather not increased (compared to their counterparts), and their bargaining power and their agricultural income have decreased.

They are particularly vulnerable because their level of investment (mango trees) impedes radically change of the farm activity. Switching costs are high. These farmers have rather low total land size, low mango volume, and never used to getting any contract farming, technical advice, or advance payments and they represent 24 per cent of our total sample.

Finally, our research aimed to contribute to the analysis of various effect of the GlobalGAP introduction on small-scale producers with a particular purpose to understand the extent to which small-scale farmers are affected by non-certification and thus how problematic such forms of exclusion are. The latter is of interest to policymakers since Peruvian agriculture is still source of economic development and represents a large source of employment. In this case study we show a significant number of excluded farmers (exclusion is more an exit of the stable usual supply chain than a definite activity exit). Consequences of growing international standards in different agricultural sectors are thus very important to analyse in order to develop adapted policy recommendations. Furthermore, fresh fruit sector is sensitive to collective reputation (Jouanjean, 2011) and therefore the whole country's export sector may suffered by import refusals of 'golondrinos' shipments and the lack of standard compliance at the producer level. Once the image of a national product has been affected, it becomes difficult to recover its reputation.

Finally, to pursue this analysis it would be interesting to better understand why some farmers (control group) are still not affected by the international standard requirements, without any changes to their way of supplying exporters. It would thus be necessary to examine more indepth the mechanism of GlobalGAP enforcement at the exporter level.

Appendixes

Appendix 1. Descriptive statistics of variable used in the paper

Variables		Mean	St.err	Min	Max
Total land size	<i>The number of hectares of total land in their farm (ha)</i>	7.92	6.94	1	37
Ratio of land size under mangos	<i>Percentage of land under mangos in the farm (%)</i>	55.88	33.89	5	100
Ratio of mango area under Kent	<i>Percentage of land under mango Kent variety in the farm (%)</i>	84.73	28.67	16	100
Volume of mangos 2009	<i>The volume of mangos sold in 2009 (tons)</i>	24.80	25.73	0.4	120
Yield 2009	<i>The volume of mangos harvested per hectare in 2009 (tons/ha)</i>	7.84	6.17	0.20	30
Age	<i>Age of the respondent (years)</i>	55.59	12.18	30	86
Education	<i>Level of education of the respondent (0,1,2,3)</i>	1.50	0.70	0	3
Experience	<i>The number of year the farmer is working on the farm (years)</i>	15.35	7.30	5	49
Children (<15 years)	<i>The number of children who have less than 15 year old in the family</i>	1.61	1.09	0	6
Mobile phone	<i>If the farmer has a mobile phone</i>	0.65	0.47	0	1
Car	<i>If the farmer has a car</i>	0.22	0.41	0	1
Date of car	<i>Date of the farmer get the car</i>	1996	9.96	1973	2009
Agri. off farm	<i>If the farmer have an agricultural off</i>	0.13	0.34	0	1

Income	<i>farm income</i>				
Distance to plant	<i>The distance from the farm to the plant (km)</i>	14.04	6.56	0.5	32
Packing plant	<i>If there is a packing plant in the near area</i>	0.72	0.44	0	1
Works only w/ one exporter	<i>If the farmer work with only one exporter</i>	0.70	0.45	0	1
Used to having written contract	<i>If the farmer is used to having written contract</i>	0.17	0.38	0	1
Used to having no contract	<i>If the farmer is used to not having contract</i>	0.58	0.49	0	1
Technical advices	<i>If farmer is used to receiving technical advices by exporter</i>	0.39	0.49	0	1
Advance payment	<i>If farmer is used to receiving advance payment by exporter</i>	0.16	0.37	0	1
Month is important for buyer	<i>If the month of delivery is important for buyer</i>	0.11	0.31	0	1
Colour is important for buyer	<i>If the colour of product is important for buyer</i>	0.64	0.48	0	1
Weight is important for buyer	<i>If the weight of mangos is important for buyer</i>	0.55	0.49	0	1
Price risk has increased	<i>They declare that price risk has increase after 2007</i>	0.68	0.46	0	1
Price risk has decreased	<i>They declare that price risk has decrease after 2007</i>	0.16	0.37	0	1
Stability of relation w/ buyer has increased	<i>They declare that stability of relation w/ buyer has increased after 2007</i>	0.30	0.46	0	1
Stability of relation	<i>They declare stability of relation w/</i>	0.27	0.44	0	1

w/ buyer has decreased	<i>buyer has decreased after 2007</i>				
Increased land under Kent	<i>They declare that they have increase land under Kent after 2007</i>	0.19	0.39	0	1
Increased land under cereals	<i>They declare that they have increase land under cereals after 2007</i>	0.21	0.40	0	1
Increased land under fruit trees	<i>They declare that they have increased land under fruit trees after 2007</i>	0.39	0.49	0	1
Increased land under cocoa	<i>They declare that they have increased land under cocoa after 2007</i>	0.06	0.24	0	1
Off farm labour has increased	<i>They declare that off farm labour has increase after 2007</i>	0.07	0.25	0	1
Off farm labour has decreased	<i>They declare that off farm labour has decrease after 2007</i>	0.16	0.37	0	1
Mango prices have increased	<i>They declare that mango prices have increase after 2007</i>	0.41	0.49	0	1
Mango prices have decreased	<i>They declare that mango prices have decrease after 2007</i>	0.31	0.46	0	1
Earlier payment	<i>They declare that they receive earlier payment after 2007</i>	0.24	0.43	0	1
Later payment	<i>They declare that they receive later payment after 2007</i>	0.29	0.45	0	1
Bargaining power has increased	<i>They declare that their bargaining power has increase after 2007</i>	0.22	0.41	0	1
Bargaining power has decreased	<i>They declare that their bargaining power has decrease after 2007</i>	0.33	0.47	0	1
Income has increased	<i>They declare that their global income has increase after 2007</i>	0.34	0.47	0	1
Income has	<i>They declare that their global income</i>	0.33	0.47	0	1

decreased	<i>has decrease after 2007</i>				
Log of highest price for mango in 2009	<i>Log of highest price received by farmer for mango in 2009(\$US)</i>	2.66	0.30	1.60	3.55
GlobalGAP-certified farmers	<i>The percentage of Globalgap adopters in the sample (%)</i>	0.08	2.27	0	1
Organic-certified farmers	<i>The percentage of Organic standard adopters in the sample (%)</i>	0.12	0.33	0	1
Excluded farmers	<i>The percentage of excluded farmers in the sample (%)</i>	0.23	0.42	0	1
Production peak in December	<i>If there is a production peak of mango in the farm is in December</i>	0.48	0.50	0	1
Production peak in January	<i>If there is a production peak of mango in the farm is in January</i>	0.72	0.44	0	1

ⁱ The most demanding norm for exportation to the US relates to a public norm that requires a hydrothermal treatment to kill fruit flies; the mangos undergo a hot water treatment in a certified processing plant. Because of the high costs of the initial investment in certified plants and the treatment supervision are charged to the exporters, few treatment plants exist in Peru. Currently, the Piura region has six certified plants.

ⁱⁱ In spite of a large variability in their results in 2005, Kleinwechter and Grethe (2006) calculate a compliance cost for Peruvian mango growers of 145 US\$/ha/year on average and 9.51 US\$/ton/year, that corresponds to 3.8 per cent of the mango farm gate price.

ⁱⁱⁱ For example, the 2008-2009 season was disastrous in terms of production (due to agronomic reasons). Numerous producers mention a reduction of around 50 per cent of their production level.

^{iv} We cannot use a multivariate logistic regression model because alternative options are not totally exclusive.

^v While producers have increased land allotments for mangos since 2007, it is always with the Kent variety and never with other domestic market varieties (Criollo or Edward).

^{vi} We have no latent variables to control whether the price is due to the new certification or to the fact that this group of producers may have been initially more efficient.

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