7. Implementation of good practices in the production of fresh pineapples for export: Case study of the Huetar Norte region, Costa Rica

7.1 Context of the case study

The Huertar Norte region of Costa Rica borders with Nicaragua to the north along a frontier of approximately 210 km. This region accounts for more than 50 percent of total pineapple cultivation in Costa Rica (National Pineapple Programme, 2005). The high demand of import markets and the price incentive have produced truly surprising growth in pineapple production in this region, displacing rangeland and other cultivation. The January 2005 regional census of tropical fruits and roots conducted by the Ministry of Agriculture and Livestock (MAG) indicated 11 168.4 hectares under pineapple cultivation in the whole region, with 3 566 hectares located in the district of Pital.

The district of Pital de San Carlos (Alajuela province), where the case study was carried out, has a high migratory inflow, especially from Nicaragua. This workforce is generally unskilled, without schooling and predominantly male. It works in pineapple production, cassava harvesting or construction. The area is also a point of transit, with workers moving to other parts of the region or country.

Table 14. Main agricultural activities in the district of Pital, 2005

Activity	Number of producers	Area (Ha)
Pineapple		3.565,60
Plantain	6	4,40
Roots and tubers	252	1.445,21
Total	567	5.015,21

Source: National Pineapple Programme.

7.2 Characteristics of the actors and production systems in the study area

The findings of local surveys and interviews identified five producer categories or groups whose characteristics are listed in Table 15. Producers differ in degree of specialization, size of operation and level of investment. The size of cropped area is determined by individual financial possibilities. Areas range from 1.5 ha (type I producer) to 50 hectares or more (type V producer) for the large-scale producer/packer category. Small producers generally also cultivate other crops besides pineapple.

Yield per hectare is directly related to quality of planting material and level of technology. The average yield per hectare works out at 67 MT, within a range extending from 2.8 MT to 113.4 MT/ha. The average production cycle is 360 days for the first crop and 668 days for the second. The region has plantations with production cycles for both harvests, extending from 330 to 390 days and 330 to 690 days respectively.

As regards the production system, pineapple is largely grown as a monoculture with 50.39 percent of the region's cultivated area dedicated solely to this activity. An average of 75 percent of the workforce have an education level equal to or below incomplete secondary schooling. The average age of producers is 40 years. Their experience in pineapple cultivation is relatively recent, on average 5 years, though some individuals have up to 15 years of experience. This is to some extent explained by the recent expansion of cultivation in the area.

Small producers represent 75 percent of all producers and cultivate between 0.5 and 10 hectares. A significant level of investment, calculated at US$9 900/ha, is required to take up pineapple production. However, many producers began with one hectare, then gradually built investment capacity to expand

Table 15. Types of pineapple producer in the study area in the district of Pital, 2005

	Micro Producer I	Small Producer II	Medium Producer III	Large Producer IV	Large Producer / Packer V
Cultivated area (ha)	< 1,5	1,5 – 3,0	3,1 – 15	15,1 – 50,0	> 50,1 with packing plant
% population in the sample	5	9	25	4	2
Production system	In transition from Champaka and Monte Lirio to MD-2, with other crops such as cassava	Seeking to specialize in MD-2	Seeking to specialize in MD-2, more intense activity	Specialization in MD-2, intense activity with high levels of technology	Specialization in MD-2, intense activity and high technology
Capacity	Household and apprentice	Experienced wage labour	Under technical and financial improvement	Purchase of equipment and machinery, ongoing training	Highly specialized production
Target market	Export, contract with packing house	Export, contract with packing house	Export, contract with packing house	Export, direct contract with clients in USA and Europe	Own export under registered brand to variety of markets
Approach to implementation of good practices	In transition to good practices	In transition to good practices	At advanced stage of adoption and a good percentage inspected	Programmes of good practices already adopted	Implementation of good practices, with 2 or 3 inspections

Table 16. Characteristics of pineapple production units in the Huertar Norte region, Costa Rica. 2004

Range of farm/holding area	Hectares	Proportion (%)
0-10	1.440,70	12,9
10,1-50	551,20	4,9
50,1-100	602,00	4,4
More than 100	8 574,50	76,8
Total	11.160,40	100

Source: Regional Census of Tropical Fruits and Roots. 2005.

to three, five or more hectares. Engaging in investment has been permitted by the export market and by sales prices that have maintained income levels.

-Integration and coordination of the sector

There is little vertical integration in small-scale production as it is difficult for producers to invest in their own packing plants. On the other hand, exporting companies are generally vertically integrated (sowing, packing and marketing) and are supplied from their own crops and/or through contract farming. Although some small companies are involved in export, such as the Association of Agricultural Producers of Legua (APROALE), the market is dominated by very few companies. According to data from the Chamber of Commerce, 60 percent of the domestic market is covered by one company. Table 17 details the companies present in the study area.

With regard to the domestic market, the producers sell their fruit directly to supermarkets or markets or use a wholesale distributor as their outlet. As for the international market, the producers sell their fruit to specialized wholesale distributors or directly to exporting companies on a contract basis. Regarding the study area, 51.7 percent of pineapple output is for the domestic market and 47 percent for exports.

7.3 The present status of production systems in relation to good practices for safety and quality improvements

Cultivating pineapples is a complex activity as is illustrated in Figure 3. A certain level of technology is required as Table 18 indicates. Sowing is staggered to ensure continuous production and to reduce the negative price impact of surplus supply. Pineapple that does not make the grade for the export market is sold as fresh fruit on the domestic market at low prices and as raw material for the fruit juice industry.

There are clear differences in the production technologies used by producers in the different categories. For example, small and medium producers make greater use of family labour for cultivation activities while machinery and equipment is used increasingly in correlation with size of operation. Similarly, the effectiveness of phytosanitary control and plant fertilization is greater the higher the producer category because of the technology used in cultivation.

The differences in production systems among producer categories and related economies of scale mean that it costs small producers more to produce a kilogram of pineapple as Table 19 shows.

Table 17. Pineapple exporting companies in the district of Pital

Name of company	Activities	Source of capital	Jobs generated	Linkage with producer groups
INPROTSA	Sowing, packing and marketing	Mexican	1.100	Linkage
FRUTEX		National	986	Linkage
HEL HUERTO		National	1.900	Linkage
FRUVER		Spanish	2.500	Linkage
PROAGROIN		Dutch	2.800	Linkage
BANACOL		Colombian	400	Linkage

Figure 3. Pineapple production chain, District of Pital

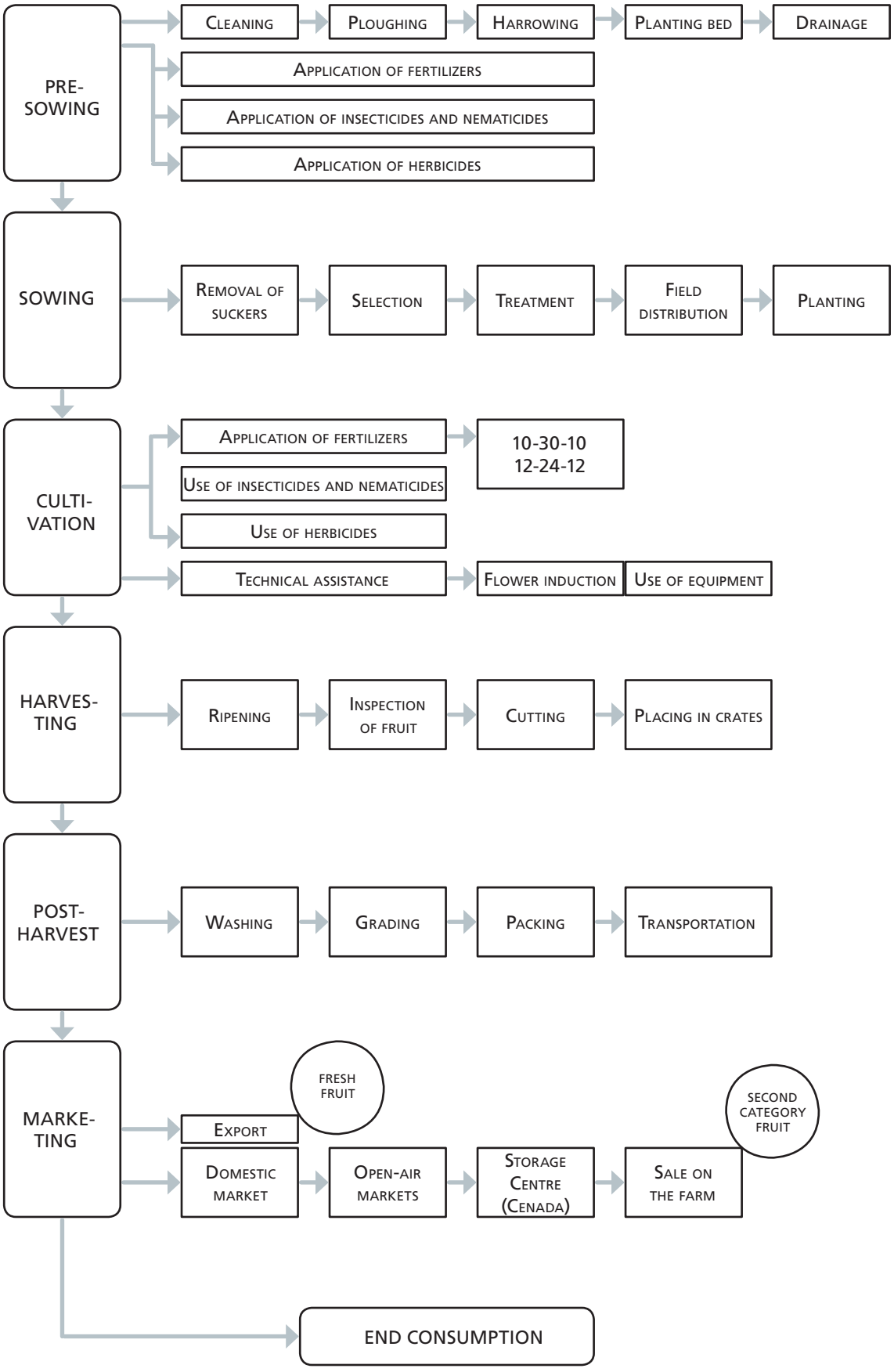


Table 18. Activities relating to pineapple production in the study area

Preparation of soil	Preparation of the soil includes the stages of cleaning, levelling, preparation of planting beds, designing drainage systems and laying out pathways. These are all labour-intensive phases. However, machinery is used to simplify these activities and make them more efficient. A total of 71.1 percent of producers use hired machinery. The average cost of hiring a wheeled tractor per hour varies between US$18.36 and $24.49. Social relations between producers are relevant to this phase as good relations determine the shared use of machinery. Some 36.7 percent of producers hire this service from a neighbouring producer; in second place, two persons in the area provide the service to 36.7 percent of producers; and there is only one cooperative providing the service to 6.7 percent of producers.
Pre-sowing and sowing	Most producers use herbicides and pesticides when preparing the soil. The seeds are usually bought from other producers or home grown. A producer opting to buy a "sucker" or seed has to pay between US$ 0.07 and $ 0.09, but if he grows and extracts it from his own plantation the cost varies between US$ 0.04 and $ 0.06. Most producers in the area choose to produce their own seed to save on costs, given that it takes an average of 54 000 seeds to cultivate one hectare. Otherwise, seed is provided by small and medium producers through sale or barter. The main activities for the sowing phase require 110 hour per hectare. A plot coding system is used to indicate number of plants, date of sowing, plot number and number of blocks. The most important detail is the number of plants sown, according to 31.1 percent of the production units.
Crop maintenance	This includes the application of granular and liquid fertilizer, liquid or dry pesticide and herbicide. Fertilizers are applied in granular or liquid form at monthly intervals, with at least 12 applications during the growing period. The fertilizers most commonly used are compounds. There is intermediate use of pesticides, with 3 to 4 applications per sowing period. Pesticides are used to a lesser extent. Machinery and equipment is used during the growing period to conduct many of these activities more efficiently. Calibration is a key element of good practices and needs to be done every month, according to 31.1 percent of producers. Others view calibration as needed every two or even 3+ months. Producers may accelerate flowering to advance the cultivation process. The key action here is assessing the stage of growth; the next step is to apply the inducer and then seek technical consultation to evaluate the result. Technical assistance is essentially provided by private entities; to a lesser extent by public agencies. Twenty-five percent of producers reported no advice received.
Harvesting	This is after 12 to 13 months. Producers use different indicators to determine when the fruit is ripe and ready for cutting. The main criteria are size of plant, colour of fruit and Brix content. Harvesting requires protective equipment, including gloves, overalls and protective goggles. Twenty-eight percent of respondents wear no protection during crop maintenance; only 2.2 percent use goggles and gloves. Producers generally hire machinery for the harvesting work.

Post-harvest*	This phase prepares the pineapple for market and includes washing, grading, packing, packaging and transport. On delivery to the packing house, the fruit is washed in chlorinated water for sanitary protection. It is then graded, packed and packaged, cooled and stored before transportation in containers. The criteria used by packing houses to grade fruit are colour, size and frequency and extent of external damage. With such selection criteria, an average of 18 percent of the fruit is rejected. Most of packing houses have refrigeration equipment, although 30 percent are not properly equipped. All the workers in the packing houses visited have the required materials and clothing. It is important to note that the workers in these establishments are the actors in the production chain that have received the least training and technical assistance. The fruit is stored for 3 days before being transported 250 km to the port, which takes 4 hours on average.

* The information regarding post-harvest activities was provided by four of the eight companies operating in the area.

Table 19. Production cost of one kilogram of pineapple according to producer category (US$)

Cost of producing 1 kilogram of fresh fruit US$				
Micro-Producer I	**Small Producer II**	**Medium Producer III**	**Large Producer IV**	**Large Producer/ Packer V**
0,081	0,036	0,013	0,010	0,003

Source: the authors.

-Safety and quality requirements

In Costa Rica, although the issue of "safety" in agriculture has been topical for some 15 years, actual implementation took some time to materialize. As regards the minimization of hazards (e.g. microbiological hazards), relatively limited progress was made because the basic measures were voluntary and not time-bound, besides focusing primarily on leafy vegetables. On the other hand, EurepGap established time frames for adherence to safety and quality requirements and to aspects of environmental protection and worker health and welfare.

The safety and quality assurance systems were generally well received by institutions and producers when first introduced, as pineapple cultivation was under full expansion. The institutional players developed training activities and provided a good range of services, while agrochemical companies developed activities in support of good practices, for example arranging for the collection and handling of pesticide containers.

Producers, especially large producers, have gradually adjusted their operations to market requirements. However, a significant proportion of producers responded differently and frequently redirected their activity (market) to avoid having to comply with such requirements because they lacked technological or financial capacity and did not produce on a sufficient scale. For example, in the Huertar Norte region, some 50 percent of producers have not adjusted their production systems to produce under a good practices approach. A significant number of producers, mainly small producers, initiated the process but failed to achieve certification, which has been a mandatory requisite of European buyers since 2006. The results of surveys conducted in the study area among producers who initiated the process of applying good practices to obtain certification are given in Table 20.

Table 20. Status of certification for producers in the district of Pital

	Status of certification		
Size of holding (Ha)	**Yes (%)**	**No (%)**	**In progress (%)**
0,5 – 2,0	0	86	14
2,1 – 10	3	30	47
10,1 – 25	28	0	72
> than 25	67	0	33

Source: Field survey team. October 2005.

7.4 Analysis of the constraints and drawbacks facing small and medium producers as they apply good practices programmes to achieve safety and quality objectives

a. Internal factors

-With regard to the support documentation for good practices programmes, small producers have difficulty maintaining records and using basic technology, including the computer and accounting and record-keeping software. The computer has been one of the main assets acquired but producers have had to recruit extra staff to help them maintain their records and accounts.

-With regard to cultivation, there have been clear inadequacies in the management of technical equipment. For example, 34 percent of producers failed to calibrate their cultivation equipment. Those who calibrate their equipment do so with the help of a technician or adviser and only 11 percent see to it themselves. Inappropriate calibration of equipment results in incorrect dosages against pests and diseases with concomitant risks of residues in products, either because more applications are needed when very low dosages are applied or because the dosages are too high. Likewise, with regard to equipment to determine fruit maturity, 57 percent of the time this is done directly by the fruit buyers or contracted advisers, while 28 percent of producers have their own equipment (refractometer) and 14 percent have neither the equipment nor an advisor to help them, which results in loss of quality when the fruit is cut at the wrong time.

-With regard to market information, 34 percent of producers use local meetings with counterparts as their source of information, 16 percent use the Internet, 17 percent acquire information from discussions with their clients, 16 percent combine the Internet with conversations with clients, while the remaining 17 percent lack the wherewithal to track market trends. This lack of information makes it difficult to understand the changes and adjustments required to improve safety and quality.

-The small and medium producers generally lack experience in pineapple growing. This translates into poor entrepreneurial management because of their ignorance of basic aspects such as production costs. There is little organizational tradition and limited integration between the links driving the production chain. For example, better coordination in seed provision is needed to achieve significant reductions in production costs.

-With regard to downstream linkages, i.e. the marketing phase, the study revealed that the producers had no understanding of the process, which rendered them vulnerable to decisions taken by managers of packing and exporting houses. Packing plants often arrange the certification of their suppliers to EurepGap standards. Payment for certification is not always one-off, but can be in the form of a percentage of fruit supplied to the packing house. Such terms of payment are not always clearly understood

by producers which expose them to agreements that are not always in their best interest.

-Producers have limited financial resources for the investment needed to provide proper facilities for the storage of agrochemicals, sanitary infrastructure and other requirements to meet the safety requisites of the EurepGap protocol, and banks do not offer lines of credit. Twenty-five percent of producers interviewed stated that high costs made it difficult to initiate or accelerate the application of good practices to achieve certification.

-In addition, the fact that efforts to apply safety standards are not reflected in a higher commodity prices discourages small producers from applying good practices programmes.

b. External factors

The external factors that discourage producers from applying good practices programmes are those factors that are outside their control: logistic services, infrastructure (roads, wharves, airports), price of fuel, macroeconomic policy and so forth.

-One disincentive mentioned was the poor quality of roads to freight the fruit from farm to packing or export plant.

-Lack of information, time and the cost and quality of training. Twenty-five percent of producers criticized the dissemination of information concerning requisites for the certification of their farms. Dissemination and quality of information were mentioned as major obstacles to implementation of the programmes.

-While 25 percent stated that high costs made it difficult to initiate or accelerate the process of certification, such costs were identified as applying not only to infrastructure but also to the advisory services needed from the private sector.

-Thirteen percent of producers identified time as a major constraint to completing the process and thus being able to export their fruit after January 2006.

-The institutional structure has not been sufficiently robust to provide producers with adequate support, in contrast to the support that was given to preparing for the food export requirements of the US Bioterrorism Act.

As a result of these critical factors, 32 percent of respondents in all categories have not yet initiated procedures to obtain certification. A further 45 percent are in the process of doing so; in other words, there are producers who have been in the process for an average of eight months while others have invested some 18 months in change, without having achieved their final objective. The remaining 23 percent now operate certified holdings.

Many producers are clearly uninterested in initiating the process because they see no greater benefit in terms of price. This makes it increasingly necessary to emphasize that this is an indispensable requirement to remain in the export sector, especially considering that 97 percent of producers are currently operating for the export market. One critical external factor in the production chain is the impact of fluctuating international prices. Although Costa Rica's pineapples are classified as among the best in the world, surplus global supply makes domestic production vulnerable.

c. The costs of applying safety and quality assurance programmes

Producers are incurring high costs in applying new forms of cultivation that will enable them to adjust to market requirements. Such costs increase producer vulnerability to low prices that might not be sufficiently high to cover the costs of changing the production process. The findings of the cost analysis conducted in the study area indicate the impact of such costs on profitability, especially for small producers. Figure 4 reports the analysis of 55 aspects (Annex 7) of the EurepGap protocol, grouped into 13 components (variables).

Significant differences were noted in the cost of each of these components of good practices[1], determined by the level of specialization (scale) of production and related activities. For example, in the category of producers carrying out packing activities and preparing the product for export (large producer/packer, type V), practices relating to post-harvest safety and quality assurance, environmental management, worker health and safety, and water management account for 86.8 percent of the cost structure (36.18; 20.21;15.66 and 14.82 percent, respectively).

For the small producers in category I, the activities with the highest impact on cost are harvesting, management of soil and growth medium and initiatives to ensure traceability and plant protection, with percentages of 27.28; 13.27; 12.69 and 12.37 respectively.

With regard to transportation, emphasis is on the hygiene of vehicles and holding baskets. This is relatively easy for most producers as they contract this service, with cleaning and maintenance of vehicles and baskets included. Plant protection contributes significantly to the cost structure of category I, II and III producers, with percentages of 12.39; 16.39; and 28.63 respectively. Fertilization is critical for categories II, III and IV, with 19.5; 12.76; 20.20 respectively. These aspects include activities relating to the building of infrastructure for storage of pesticides, fertilizers and other agrochemicals; the procurement of application equipment; the calibration and maintenance of equipment; constructions for the preparation of phytosanitary mixtures; the application of integrated pest and disease management programmes; the conduct of soil analysis, and so forth. Although investment in infrastructure is a major component of the cost of programme implementation, the small producers adapt solutions to their economic capacities, as Figure 5 shows.

The greater the technology, the fewer the resources needed for agricultural activities (e.g. soil management and plant protection). A producer with low technology will need to invest more in adjusting his production systems.

Investment in traceability is relatively higher for type I and II producers who have to counter entrenched cropping traditions and have to bear administrative costs out of proportion to their production.

Given the complexity of comparing producer categories because of differences in technology and scale of production, the study focused on estimating the total costs of applying good practices and their percentage of net earnings. The results are given in Table 21.

The differences in production costs resulting from economies of scale, integration of activities (production, packing) and production systems determine differences in the cost of producing one kilogram of the commodity, as illustrated in Table 19. The impact on net earnings of investment in the EurepGap protocol is therefore more drastic for small and medium producers. Category I and II producers have to invest a higher percentage of earnings to meet the requisites.

-Costs of meeting safety objectives

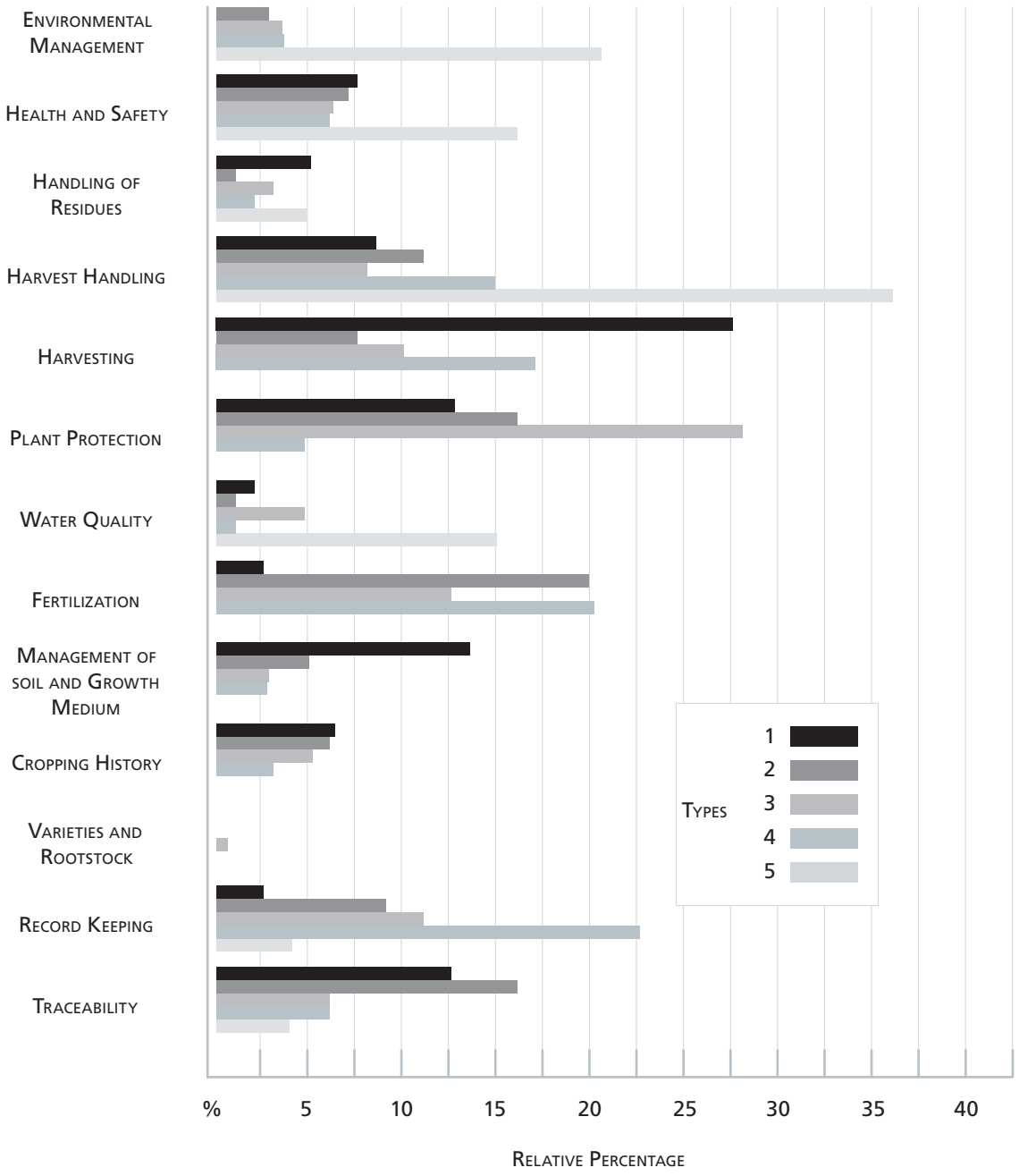
An independent exercise was conducted to estimate the impact of the safety variables on the total cost of the good practices programme. The regulatory components that targeted safety were selected and a cost estimate was made for each. Out of 55 variables studied, 28 were identified as directly related to safety. Disaggregating the variables is not easy as some activities target more than safety objectives. The results are given in Table 22, which shows that safety components account for a high proportion of the total cost of applying good practices (36 to 55 percent).

The results of these studies were presented by the survey team at a workshop attended by 34 producers. The intention of the workshop was to gauge their general perception of the benefits and drawbacks of applying good practices programmes.

The producers failed to fully understand the reason for so many practices, which they only implemented to meet requisites and remain in the market. There were differing opinions on the cost of applying the

[1] The analysis does not include the costs of certification as such.

Figure 4. Cost structure for application of EurepGap protocol by producer category



Source: Field Survey Team. October 2005.

system per holding, although all participants agreed that the larger the holding, the lower per hectare cost. With regard to the funding of activities, the larger the scale of operation, the greater the likelihood of self-financing, and the smaller the scale, the greater the need for loans or membership of support programmes.

As regards the impact on family incomes of applying good practices, 72.22 percent of the participants reported a clear and sometimes significant reduction in income, especially in a context of falling prices. Only 5.56 percent mentioned higher income from facilitated sale.

All the workshop participants had received training. However, 32.3 percent indicated that there was

still much to be done in this regard, while 53 percent considered that the training had been appropriate. The training had been provided by a variety of public and private entities, with the government producing the greatest share, accounting for 73.5 percent. Some participants reported significant change in workforce performance due to the implementation process and the training.

A total of 70.6 percent of participants considered that the implementation of safety and quality systems had a positive impact on environmental management, through aspects relating to conservation and protection, the safeguarding of landscapes and recovery. Widely differing features of fruit quality were reported but only four individuals saw clear changes in safety.

7.5 Conclusions

-There is an urgent need for measures to consolidate partnerships and policies aimed at improving the provision of financial, educational, organizational and other support services at a reasonable price.

-An interdisciplinary perspective is fundamental. Training, for example, has focused solely on the need for producers to meet the minimum requirements for certification; but not all producers have taken on board the implications for sustainability, for the conservation and safeguarding of production resources, for safety and quality.

-There needs to be a stronger entrepreneurial focus on the application of safety and quality assurance programmes. Producers need to be made aware of the importance of such programmes for accessing international markets, while trainers need to understand the commercial, social, environmental and agricultural context and the specific characteristics of local producers. This will mean reshaping the training process.

-An ongoing and sustainable strategic partnership between the public and private sectors must exist for the implementation of safety and quality assurance programmes by producers.

-The study confirms that the process of safety assurance is in the interest of producers and public institutions alike, as demonstrated by the many different efforts that are taking place in agricultural areas. The difficulties relate mainly to achieving an integrated assimilation of the process, because of disparities in actor population (contrasting categories) and the failure to reflect investment in the commodity price.

-This is also evident in interest rates on bank loans which are usually for traditional agricultural production. Investment in safety and quality assurance must therefore be found elsewhere, with short-term repercussions on net earnings, family income and the ability of producers to continue operating.

-A significant proportion of producers are unable to continue implementing safety and quality assurance systems because of the instability of commodity prices.

-Finally, this exercise has shown that local and international, public and private bodies need to promote integrated development strategies that include technical, commercial and social criteria in the evaluation of the applicability of safety and quality assurance systems, if these are to be implemented in a sustainable manner.

Figure 5. Solutions devised by different producer categories to meet market requirements

Above, area for the field preparation of phytosanitary mixtures and toilets;
centre, two sources of information: plot and regulated entry;
below, storage facilities of type II producer (left) and type IV producer (right).

Table 21. Cost of implementation of good practices as a percentage of net earnings

Cost of implementation of good practices (as % of earnings)				
Micro-Producer I	**Small Producer II**	**Medium Producer III**	**Large Producer IV**	**Large Producer/ Packer V**
47,63 %	21,54 %	7,40 %	5,92 %	0,56 %

Source: Survey team. October 2005.

Table 22. Safety variables as a proportion of the total cost of implementing good practices (%)

Safety variables				
Micro-Producer I	**Small Producer II**	**Medium Producer III**	**Large Producer IV**	**Large Producer/ Packer V**
49,9 %	54,3 %	36,2 %	38,1 %	49,5 %

Source: Survey team. October 2005.

8.

Overview of the case study findings

The case studies presented in the previous sections illustrate the impact that safety and quality developments in food importing markets have had on sectoral structure and organization in the exporting countries. The producers of each sector clearly face enormous challenges in making the adjustments needed to participate in the export market. This section provides a general analysis of the common characteristics and differentiating elements of the sectors studied in relation to their ability to rise to the challenges of meeting the safety and quality requirements of markets and existing standards, with a special focus on small producers.

8.1 The analytical approach to safety and quality aspects in each case study

The exercise proposed by FAO consisted in fostering coordination between national institutions responsible for food safety and quality, in order to analyse the problems of a specific horticultural sector in meeting the safety and quality requirements of markets and prevailing standards, and in order to determine actions to resolve the identified problems or constraints.

Although the three studies considered the general environment for each sector, the analysis was conducted in a local context (municipality, district) for pineapple and cape gooseberry and in an entrepreneurial context (Huertos Gatazo Zambrano consortium), for broccoli. This resulted in differences in analytical approach employed by the survey teams and in the detail of information presented.

The three case studies generally followed the methodology proposed by FAO, as described in Section 3. The analysis focused on a general description **of the external and internal environment of production systems and product management** in relation to difficulties in meeting the quality and safety requirements of target markets, principally in the context of small producers. The next stage was to identify the changes that were needed to improve safety and quality, identifying and estimating the advantages and disadvantages from a perspective of the costs and benefits of implementing the recommended changes.

The three case studies showed substantial differences in approach to estimated costs. In the case of cape gooseberry, the analysis was based on the impact of applying the recommended practices for improving safety and quality on total production costs. In the case of broccoli, the cost analysis included a detailed estimate of the costs of implementing the recommendations, including the costs of training and other support needed to improve quality and safety – this is one of the strengths of the study. In the case of pineapple, the cost estimate related to the implementation of practices recommended in the EurepGap protocol, supplemented by a detailed analysis of the costs of specific practices relating to safety. The analysis compared the impact of such practices on the production cost of different producer categories (type I - V); this comparative analysis is the greatest strength of the study.

The analysis of benefits in the case studies was based on an economic assessment of the "tangible" (quantifiable) benefits resulting from the positive impact of recommended practices on product quality, yields per hectare, reduced production costs, efficient use of production resources, and so forth. In the case of pineapple, the analysis centred on the assessment of costs, without dwelling on expected benefits from applying good practices in compliance with the EurepGap protocol, as detailed below.

The final stage of the methodology proposed by FAO was to draw up a plan to implement the suggested recommendations. This aspect was included in the case studies in Colombia and Ecuador. The following sections detail the results of the case studies conducted by the respective survey teams.

8.2 The general framework of the sectors studied from the perspective of improving safety and quality

The case studies focused on "emblematic" horticultural sectors within the non-traditional exports of each country, sectors that varied significantly in terms of size and scale. In Colombia, the cape gooseberry, the second (fresh) horticultural export after banana, represented a cultivated area of 360 hectares throughout the country and a total export value of US$14 million in 2004[1]. In Ecuador, an estimated 3 423 hectares were sown with broccoli in 2004 (an effective area of 9 000 hectares, given the three cycles each year), with an export value calculated at US$32 million for the same year. For pineapple, Costa Rica's sixth export commodity and the second horticultural product after banana, total exports amounted to US$365 million in 2005, from an estimated 23 000 hectares. The development of pineapple production for export was mirrored by other fresh horticultural produce, with Costa Rica featuring prominently in global exports of melon, papaya and cassava. The importance of the fresh horticultural exports sector (excluding banana) is less in Ecuador and Colombia, though growing. As they consolidate, these fresh product export chains will face greater challenges in securing the services and infrastructure needed to support the export process and the public and private capacity to promote improvements in safety and quality.

The sectors studied have important economic and social impacts. It is important to note the significance of fruits and vegetables as high-value products, although a distinction needs to be made between high-value products and products with high value added. Cape gooseberry, for example, is exported as a fresh commodity to niche markets and is a product with high value in terms of its price (6 421 MT generate an export value of US$23.8 million). In the case of fresh pineapple, the product is gradually entering the dietary habits of average consumers in its terminal markets and as its consumption broadens so its high value in terms of price gradually declines. The value added for the three commodities studied occurs in the processing, packing and distribution stages. In the case of broccoli, value is also added through freezing, which extends shelf life and minimizes marketing risk. The stages of production and value addition have strong social and economic impacts on the generation of employment and the development of allied industries, which is brought to light in the case studies.

The very nature of the product and production chains determines the challenge that producers and exporters face in meeting the safety and quality requirements of terminal markets. Fruits and vegetables that are consumed fresh, such as pineapple and cape gooseberry, face more stringent requirements in this regard than do products that are cooked, such as frozen broccoli.

Similarly, the level of global competition acts as an incentive or disincentive in promoting safety and quality improvements among producers. Broccoli and pineapple face strong international competition. In the case of pineapple, domestic and international competition has lowered producer prices per kilo and discouraged the application of safety and quality improvements, notably among small producers.

The existence of fierce international competition and the need to meet increasingly stringent safety and quality market requirements have caused production chains to regroup, with a higher concentration of production and closer linkages between actors, as described below.

[1] The sown areas probably increased significantly between 2004 and 2005 to reflect the surprising increase in exports during this period (the value of exports rose from US$14 million in 2004 to US$23 million in 2005).

8.3 Application of programmes to improve safety and quality. What is the present state of production technology, institutional support and organization of the sector?

The key export markets in the three case studies are USA and Europe, in particular; the latter accounts for 98 percent of cape gooseberry exports, 42% of pineapple exports and 86.6 percent of broccoli exports. The principal concern of exporters in the three case studies is to meet the safety and quality requirements of the European authorities and the certification requisites of importers as a means of ensuring the safety and quality of the fresh produce they import.

The challenge facing producers and exporters in meeting such requirements largely depends on point of departure in terms of production technology, institutional infrastructure for service provision, technical and administrative capacities and level of organization and interaction among actors. While the smaller producers in each case study share the same technical, administrative and financial inadequacies, these are compounded in the case of cape gooseberry by problems of structure and technology that cause added constraints for the implementation of safety and quality improvements, as detailed below.

8.3.1 Critical factors for the successful implementation of safety and quality programmes for the cape gooseberry. Technological problems and lack of coordination between actors

In theory, the consolidation of quality and safety improvements for cape gooseberry should be relatively easy given that only 360 hectares are involved nationally. Yet, the case study highlights a number of impediments, as described below:

-Available production systems and technologies

In contrast to broccoli and pineapple, the cape gooseberry is relatively unknown on the international market and is only produced on a small scale in the tropical countries. There has therefore been no major development of technology that can be transferred to other producer countries. Although institutions and cape gooseberry producers have made obvious efforts to resolve the technological problems, there are still critical production difficulties that need to be resolved before safety and quality assurance programmes can be successfully implemented. These include poor quality of seed and limited understanding of the cycles of pests and diseases affecting the crop and thus of the most appropriate methods of prevention and control.

-Low level of interlinkage and coordination between actors

The cape gooseberry sector is highly fragmented in production and purchase. With regard to production, there is a large number of producers, who generally work less than 10 hectares. With regard to marketing, a large number of companies are involved in the export trade which is relatively small (58 companies exporting a total of 6421.66 MT in 2005). There is inadequate coordination between producers to build the volumes needed to weaken the role of intermediary wholesalers. Although there is evidence of verbal or written agreements between suppliers and purchasing companies, these are more common between intermediaries and producers with larger volumes. Intermediation remains a significant sectoral feature that has restricted effective communication on safety and quality requirements between actors. Meanwhile, competition from so many buyers could reduce the need for producers/suppliers to secure forward sales for their produce and to observe the terms of agreements.

The relatively limited competition that the product faces internationally probably partly explains the limited coordination and organization that exists in the sector and the scarce linkage between actors. The larger exporting companies had previously started to grow their own crops but, because of the high labour requirements and the need for farmer experience, they subsequently opted to secure their supply of fruit by coordinating with suppliers (FAO, 2005b). However, the new need to meet safety and quality requirements could trigger significant changes in the organizational structure of the sector. Exporting companies are again beginning to grow their own crops on a large scale, mainly on leased

land, in order to ensure a reliable supply of fruit in sufficient quantities and produced to the safety and quality standards of purchasers. Given the pressure to meet the requisites of EurepGap certification, vertical integration (establishment of own crops) is likely to become more prominent as a supply strategy of exporting companies. The speed of such integration is difficult to predict and will be largely determined by the capacity of companies to minimize cultivation risks and by the suppliers' ability to ensure the safety and quality of their produce. The extent to which the establishment of own crops becomes viable and gains favour among exporting companies will largely determine the opportunities for small producers to participate in the export market or, failing that, to supply fruit exclusively to the domestic market, which is under steady growth.

There is also a lack of cooperation between exporters to consolidate volumes and resolve the problems affecting the sector. The National Association of Exporters of Colombia (ANALDEX) has a section on fruits and vegetables, but only a few companies exporting cape gooseberries are members. The association has run projects with actions grouping different institutional activities. These have resulted in the certification of some 50 cape gooseberry concerns[2]. However, the limited cooperation between exporters and producers has undoubtedly restricted the success of such initiatives.

-Regulations in the countries of destination

As mentioned in the case study, the sector has been the focus of recent institutional efforts to facilitate the application of safety and quality improvement programmes. A good practices manual exists and there have been training events to raise the awareness of producers and other actors to the importance of implementing those programmes. In spite of these efforts, the implementation of good practices has been slow. The use of agrochemicals in cultivation continues as an unresolved bottleneck.

From the perspective of safety standards of the countries of destination, one of the factors that could have a significant impact on competitiveness of the sector is European Union legislation on pesticides, both the harmonization of maximum residue limits (MRLs) and the registration of active ingredients for specific products. One of the difficulties currently facing exporters is the disparity in MRL requirements of different EU countries which suggests that harmonization should in principle have a beneficial impact. On the other hand, the small size of market makes it unlikely that pesticide companies will be registering products specifically for the cape gooseberry, so MRLs could be set at zero tolerance. This would present the enormous challenge of producing excellent quality cape gooseberry with minimum use of chemical products, thus further aggravating the control of pests and diseases which is already problematical given the lack of knowledge of alternative integrated control methods. Such a situation is less likely to arise in export sectors such as pineapple and broccoli that are more substantial in size of market for agrochemical companies and number of countries and stakeholders involved.

8.3.2 Technical, administrative and financial capacities of the broccoli and pineapple sectors and unresolved bottlenecks

In contrast to cape gooseberry, the factors limiting the application of safety and quality improvements in the broccoli and pineapple sectors relate more to the technical, administrative and financial capacities of producers, especially the small and medium producers, than to general structural and technological problems. Again in contrast to cape gooseberry, these sectors have greater interlinkage and higher technology and are far more integrated.

In the case of broccoli, which this is mainly exported frozen, the exporting companies doing the freezing need to comply with the safety and quality requirements of good manufacturing practices. However, an important related component is the safety and quality assurance of raw material from the field, which is why companies have invested time and effort in training their suppliers to meet the necessary standards.

The production and marketing of broccoli is far more concentrated than cape gooseberry, with five

[2] Information provided by Cesar Garcia, Director of Project Policy, Formulation and Implementation, ANALDEX.

exporting companies. These have their own producers (approximately 300 for the five plants) who are contract farmers and receive seedlings from company nurseries (CORPEI, 2006). The large agricultural production units (more than 100 ha) account for 65 percent of total output. The exporting companies have invested heavily in industrial infrastructure and cutting-edge technology, and use purchasing contracts to try to ensure the timely supply of sufficient raw material with the required quality. One of the main incentives for promoting quality and safety improvements through good practices is the ability to supply premium quality produce that meets the standards of importing markets and thus to stand out among the competition.

In the specific case of Huertos Gatazo Zambrano, the possibility for small producers to handle large volumes through their association has facilitated their access to the export market and institutional support services. The sector is more concentrated at purchaser level which facilitates relations between companies and suppliers. The companies prioritize quality aspects with producers given price bonuses for meeting company standards and incurring price penalties for failing to do so. Emphasis in relation to safety is placed on appropriate pesticide management.

Purchasers and producers are organized under the Foundation for the Association of Ecuadorian Fruit and Vegetable Producers (APROFEL) of which the five purchasing companies and some 130 producers are members. The association works on critical technological programmes, for example integrated control methods for *Plasmodiophora brassicae*, a pest that recently appeared in a number of broccoli fields. Technicians from the exporting companies collaborate in trials and studies to develop an integrated crop management model. The project envisages supplying the processing plants and producers with equipment to monitor and locate pests (GPS), meteorological stations and other items needed for better control and monitoring of crops. At the same time, CORPEI is delivering a funding programme to help producers of fresh exports to apply EurepGap.

In the case of the pineapple sector, trade is dominated by a small number of companies, with one alone accounting for 60 percent of national marketing. The integration of activities is a particular feature of this sector. There has been an increase in the number of companies involved in the export trade in recent years because of international prices, with their number rising from 37 in 2001 to 77 in 2005 (PROCOMER, 2005). As in the case of broccoli, coordination through contract is the usual form of fruit supply. The sector has benefited from the technological developments of major producer/exporting companies in Hawaii which have been transferred or adopted to the context of Costa Rica. Technology is thus available for production, although the environmental impacts of monoculture and inappropriate residue management constitute major challenges for sustainability of the sector (Acuña, 2005). The level of technology (in terms of mechanization) is very high for this crop, while coordination among producers is low. *The major challenge facing the industry in terms of safety and quality is to meet the EurepGap requisites in a context of unfavourable prices.*

To conclude, coordination initiatives between suppliers and purchasers exist in the three sectors, with these being more common in the case of broccoli and pineapple. This facilitates communication and the development of strategies to improve safety and quality. However, such cooperation tends to favour producers who can offer a larger volume of product. Although the sectors face challenges in optimizing their production systems, especially in the management and control of pests and diseases, those that have benefited from technological developments and technology transfer from other countries are in a better position to meet the challenge of applying good practices to achieve safety and quality objectives. Their point of departure for change is more advanced.

In the case of cape gooseberry, the sector faces enormous challenges in generating information and solutions to technological problems in the production and post-harvest stages that are fundamental for the achievement of safety and quality improvements.

8.4 Transition of traditional production systems towards good practices to improve product safety and quality

The scale of institutional and private effort needed to promote the implementation of safety and quality improvement programmes in each sector will depend, among other factors, on the gap that exists between current production systems and systems based on good practices to achieve safety and quality objectives.

In this connection, there are common elements among the producer categories of each sector. Small producers operate under traditional production systems with low technology, which is generally reflected in low productivity and low quality of product. The current status of the three sectors identifies the management and control of pests and diseases as a critical issue; there is a need to reduce problems associated with the use of agrochemicals in terms of residues, environmental impact and worker health. The three studies highlight the need to implement integrated pest and disease management programmes, to use and manage agrochemicals appropriately and to apply agrochemicals correctly, using properly calibrated and serviced equipment and providing workers with protective equipment. Other common aspects of the case studies relate to efficiencies in the management of chemical and organic fertilizers and the appropriate application of production practices, such as pruning and weed control. Clearly, the adjustments required from small producers in these aspects are greater than those from the large and medium producers who have a more advanced point of departure in cropping technology.

-Limitations and advantages of safety and quality improvement programmes for small producers

The three sectors have high linkage with small producers. Each sector defines a small producer in terms of investment in sown area. In the case of cape gooseberry, the cost of traditional production per hectare is approximately US$8 400 for a cultivation period of 10-12 months. In the case of broccoli, a producer in the GZ community invests an average of US$1 320.53 per hectare (for three month cycles); and in the case of pineapple, the average production cost is US$9 900 for a period of 360 days until the first cut or harvest. Cape gooseberry and pineapple producers therefore assume a higher investment, with a return on investment over longer periods.

Small producers in the cape gooseberry sector cultivate less than 2 hectares, while medium and large producers cultivate not more than 10 hectares. The possible reason why there are no economies of scale for this crop, in terms of area, is related to the cost of infrastructure to support operations and the labour required for cultivation, together with the production risks (pest and disease). In the case of pineapple, small producers cultivate less than 3 hectares and, in the case of broccoli, small producers cultivate less than 10 hectares. The Huertos GZ producers belong to this category as individuals, but collectively run 60 hectares of cropland which gives them a competitive advantage over individual producers who are not organized. Another relative advantage of small producers in the broccoli and cape gooseberry sectors is that these sectors are labour intensive and therefore generate opportunities for household labour and community work.

Although there is close linkage between the production chains and small producers, total output is mainly from the medium and large producers. In the case of pineapple, the small producers account for 12.9 percent of total sown area, while the large producers with more than 100 hectares account for 76.8 percent. In the case of broccoli, the large producers with more than 100 hectares account for 65 percent of total output. In the case of cape gooseberry, 37 percent of producers are medium or large, with 2 to 10 hectares, and although there are no data on their contribution to total output, this is likely to be high.

The findings of the case studies on the pineapple and cape gooseberry sectors indicate that the application of practices to improve safety and quality and thus meet market requirements has mainly concerned the medium and large producers. For example, in Costa Rica 100 percent of medium and

large producers have certification or are in the process of obtaining it, while only 14 percent of small producers have initiated the process. The large producers are generally in a more competitive market position and have the technical, administrative and economic capacity to make the necessary adjustments to their production systems and product management.

The small producers in the three sectors have common characteristics that restrict implementation of safety and quality improvements. One such characteristic is their low level of education which limits their ability to maintain the documentation and records that are needed for safety and quality assurance programmes and that serve for farm management and planning. Similarly, small producers are generally located in marginal areas or areas far from collection centres, so must pay more for transport and run higher risks of quality loss. They are also technically ill-equipped to deal with pests and diseases and engage in other production practices, and although most have received training programmes in different aspects of good practices, their limited access to credit and investment, their low schooling and the deficiencies in training strategies have impeded the realization of expected changes.

The level of sophistication in safety and quality requirements varies considerably between the sectors. For example, the pineapple producers in the Costa Rica case study have a higher level of education than the small producers of broccoli and cape gooseberry. However, their main constraint is their inability to keep systematic computerized records.

In spite of the difficulties facing small producers, there are also situations in which they would appear to be at an advantage for implementation of safety and quality assurance programmes. For example, small producers of cape gooseberry have a comparative advantage over medium and large producers in that they produce on their own land, which would suggest that they would be more willing to invest in the safety and quality assurance of their product, investing for example in sanitary infrastructure. From the perspective of cost and benefit of making improvements to their production systems and commodity management to achieve safety and quality objectives, small producers should, to all appearances, benefit handsomely from such improvements.

-Are transition costs a barrier to implementation of change by small producers?

The level of sophistication in safety and quality requirements varies considerably between the sectors. In the case of Costa Rica, the very characteristics of the pineapple sector and the involvement of extensive capital resources in pineapple production for export have generated a series of requirements under the EurepGap protocol that call for significant investment (storage facilities, field sanitary facilities, traceability requirements, management of residues and containers, etc.).

In the case of cape gooseberry, although the purchasing/exporting companies require EurepGap certification, the level of sophistication and technical use in this sector is lower, so programmes to raise safety and quality to the standards of European purchasers focus on the implementation of simple documentation and registration systems and investment in basic sanitary infrastructure and infrastructure that is less sophisticated than in the case of pineapple. In the case of broccoli, purchasing companies require that their producers meet requirements that relate essentially to quality, while emphasis in safety targets pesticide residues. The results of cost analysis of actions to improve safety and quality and meet market requirements are presented below.

The results of the cost estimate

Significant differences exist in the approach adopted by the survey teams to analyse the costs of implementing practices to promote safety and quality improvements. This makes it difficult to compare their findings.

In the case of cape gooseberry and pineapple, the cost analysis focuses on the impact of recommended practices on production costs per hectare. In the case of broccoli, the analysis assesses all costs associated with implementation of the proposed intervention, including training costs.

In the case of cape gooseberry, the analysis indicates that producers would have to assume additional costs, mainly relating to administrative activities (keeping records, management of the holding, etc.), the construction of sanitary infrastructure and temporary storage facilities, the payment of technical advisory services, soil and water analysis and the procurement of equipment and tools. Analysis of the impact of these additional costs on total production costs indicates that savings from optimized input use and appropriate crop management practices offset the fixed costs for administrative activities, payment of services, construction of basic infrastructure, etc. There is therefore a reduction in variable costs (from efficiency in input use) and an increase in fixed costs for the construction of infrastructure, required technical assistance, etc. However, in general terms, the overall production cost structure is not significantly affected because of the balance between reduced variable costs and increased fixed costs resulting from the improvements.

In the case of pineapple, the analysis indicates an inverse relationship between cost of programme application and size and technology of holding. Large producers have to assume greater costs for water management, management of residues, workforce safety, etc.. Small producers incur higher costs for harvesting practices, management of soil and growth medium, initiatives to ensure traceability and crop protection.

In contrast to the analysis for cape gooseberry, the analysis for pineapple focused on estimating the costs of practices to be implemented but unfortunately failed to consider the positive impact that such practices might have on total cost structure. From this perspective, the study results suggest that the costs of applying good practices impact more dramatically on the net earnings of small producers (categories I and II), accounting for up to 47 percent of income. The safety components account for a significant proportion of total cost structure for all producer categories, ranging from 36 to 55 percent.

In the case of broccoli, the cost analysis was undertaken from a different perspective and considered the costs of all necessary activities, including training. For the purpose of analysis, all recommendations or good practices were grouped into those aimed at safety and quality and those recommended for environmental sustainability or improved worker welfare (e.g. reforestation of watersheds, building of canteens for workers, etc.). At the same time, the benefits from implementation of good practices were viewed as more gradual, with cost-benefit analysis extending over a horizon of four years. Another aspect to be highlighted is the scope of the analysis, as the recommendations directed towards the community rather than individual broccoli producers. It therefore considers the linkages and interactions that exist between broccoli production and the other agricultural activities of the producers.

A review of the costs of implementing the priority actions proposed for Huertos GZ clearly indicates that the transition costs do not apply only to the producers. Institutional support from the extension services is also required, for example training is estimated at US$1 124.55. The components impacting most heavily on the cost structure are those that relate to the management of agricultural inputs and associated cropping infrastructure (storage facilities, sanitary facilities and so forth). The first category includes annual analysis of soil and water, equipment to apply pesticides (annual provision) and the construction and annual maintenance of shelving to store agrochemicals. The main infrastructure cost is the construction of latrines and associated furnishings (about US$4 200 per year). The total cost for the first year of activities relating to safety and quality objectives amounts to US$24 499. This is a considerable sum if we consider the economic possibilities of GZ producers; for the first year alone, it represents approximately 31 percent of the resources deployed by the community annually to produce 60 tonnes of broccoli.

To conclude, the costs that producers in the case studies must assume to meet the safety and quality standards of their markets are significant. The answer to the question as to whether or not these act as a barrier to implementation of improvements depends on a number of factors, including:

- The access of small producers to economic resources (lines of credit, support from purchasers, etc.) to carry out the necessary adjustments;

- The public and private institutional infrastructure available to facilitate and support the implementation of programmes;

- The application of a detailed analysis of the benefits and drawbacks of the practices to be implemented, in the context of small producers. An analysis that only considers the drawbacks will most likely view the cost as a barrier to implementation of the necessary improvements.

-Analysis of the benefits of applying safety and quality assurance programmes in the sectors studied

Clearly, the key incentive for applying good practice programmes in the three sectors is compliance with importing market requisites. In other words, the economic benefits of being able to continue supplying a lucrative market are what drive public and private efforts.

Other economic benefits identified in the cape gooseberry and broccoli sectors relate to improvements in productivity (yield/ha) and quality of produce; and a reduction of variable costs. Given that small producers operate under traditional production systems, changes in the production process are clearly reflected in improvements in yields and productivity. These benefits are probably less evident for small producers engaged in production that already requires a degree of technology, such as pineapple, where changes will focus on support infrastructure and other investments to ensure product safety, including documentation of activities and processes of traceability, which have a less direct or obvious impact on production variables.

In the case of cape gooseberry, small producer transition towards production systems that are based on good practices provides a positive cost/benefit ratio because of the increased volume of fruit meeting export quality standards and therefore fetching higher prices.

In the case of pineapple, unfortunately no analysis was conducted on how good practices programmes could impact positively on production variables. Analysis was on the estimated costs of activities, without capturing the benefits of change on production variables and reduced production costs. The producers interviewed considered that the programmes incurred costs but few gains. Producers have little incentive to implement improvements in a context of falling prices.

There are other intangible benefits from good practices programmes that are difficult to define in economic terms. The sustainability of trade and the possibility of producers, especially small producers, participating in that trade would undoubtedly be seriously curtailed without greater human capacity and better environmental stewardship that result from improved farm management; reinforced administrative capacity of actors; change in producer perception of trade; social benefit from improved worker health and welfare, and environmental sustainability of production systems.

In this connection, the case studies highlight the threat of inappropriate production practices on sustainability, especially for cape gooseberry and pineapple. With regard to the former, the capacity of current production areas to maintain steady sustained output has been reduced. In the case of pineapple, monoculture, high use of agrochemicals and agricultural machinery and inappropriate management of cropping residues are causes of increasing concern.

The fostering of clear understanding among actors of the benefits of applying good practices, from an environmental and sustainability perspective, is something that needs to be reinforced in producer training programmes.

Whatever the situation, the opportunities for small producers to participate and/or continue as suppliers of raw materials for export markets will depend on their ability to adjust their production systems to the requirements of the purchasing companies. The favourable prices that exist for cape gooseberry and broccoli are undoubtedly an incentive for the producer to remain in the market. In the case of

pineapple, however, the market is becoming less remunerative because of low prices, so there are fewer incentives for small producers to apply safety and quality improvement programmes.

In this regard, the availability of an alternative market is an added advantage for small producers of cape gooseberry and pineapple. However, in a situation of low prices and stricter safety and quality requisites as in the case of pineapple, the fact that small producers have an alternative market for their product might discourage implementation of safety and quality assurance programmes, as they can target a market that is less lucrative but, at the same time, less exacting.

8.5 Implementation of the intervention proposal – support and roles of public and private institutions

FAO's proposed methodology also suggested the preparation of a plan to implement the recommendations, with an identification of the types of public and private institutional support required. The survey teams in Colombia and Ecuador included this aspect in their case studies. Their findings are discussed below.

A solid public and private institutional structure is needed to overcome the constraints and difficulties that small producers face in applying safety and quality improvement programmes, owing to their technical, administrative and financial capacity. The case studies identify clear institutional roles in the generation of an appropriate policy framework, research, advice and training.

In the case of cape gooseberry, the working group formulated a holistic approach to resolve the key problems that affect the sector as a whole and constitute bottlenecks to improved safety and quality. The proposed interventions include regulatory and non-regulatory actions in the pre-production, production, post-harvest and marketing stages. Prominent normative actions include initiatives to improve the quality of planting material by developing a regulatory protocol for the production of nursery seedlings and reviewing regulations for nursery registration; initiatives that are supplemented by non-regulatory actions such as training of nursery operators. Research and technology transfer actions are also suggested to resolve technological problems relating to the management of water resources, nutrition, methods of seedling support (stakes), phytosanitary management and standardization of the drying procedure. Key production support components include boosting the supply of services to conduct laboratory analysis, farm registration, etc. Also included are training components for technology, hygiene and business management. Responsibilities are assigned for each of these activities, in accordance with respective institutional functions and roles (see Annex 3).

In the case of cape gooseberry, safety and quality actions need to be accompanied by programmes to resolve the critical technological problems that affect the sector, i.e. bolstering linkages among actors – between exporters; between producers; and between producers and exporters. Clearly, close coordination between public and private institutions and market operators/exporters is also needed if the proposed initiatives are to be successful.

In the case of broccoli, the intervention proposal formulated by the working group concerns all 111 producers associated with Huertos GZ, so the intervention plan covers actions needed to achieve safety and quality at community level as detailed in Annex 5. The establishment of strategic partnerships between the community and different institutions is suggested for the necessary actions, taking institutional areas of competence into account. Also advocated are partnerships between the community and purchasing companies. The organizational structure of the community will facilitate the implementation of public and private institutional actions.

The intervention proposal for broccoli clearly embraces a series of activities that represent significant investment not only in economic resources but also in time on the part of producers and support institutions. *If the aim is to motivate producers to apply good practices, there will have to be a careful prioritization of the activities that have been identified and that will need to be implemented in the short, medium or*

long term. Although the cost/benefit analysis of implementation of the practices was conducted over a four-year horizon, many of the activities proposed for the development of technical and administrative capacity of small producers relate to the first year. Therefore and although the proposal includes a series of recommendations that are feasible in terms of cost/benefit ratio, their feasibility will need to be examined within the context of producer and institutional realities. For example, the training plan will have to strike a balance between time available to producers for learning and the need to avoid compromising or disrupting their production activities.

In the case of pineapple, no plan was drawn up to facilitate the implementation of good practices programmes by small producers in the study area. Workshops with producers revealed that most institutional actions have been directed towards training them in topic areas such as correct application of chemical products, calibration of equipment, etc. The fact that the training has been oriented towards requirements for certification has prevented the producer from acquiring a broader awareness of the benefits of the programmes. Nor have actions been taken to identify the potential benefits of the programmes, which would highlight their importance in terms of consumer health, efficient use of production resources, environmental protection and so forth.

In conclusion, the analytical approach to promoting safety and quality improvements in the sector should clearly be holistic in perspective. As illustrated in the case studies, the possibilities of producers meeting market safety and quality standards depend on many factors, including technological factors, structure of the sector, interplay between actors, global and national competition, economic benefits and so forth. Public and private institutional activities in the three sectors studied have focused mainly on: i) strengthening the body of "external resources" in terms of generating an appropriate policy framework, support to research, promotion of coordination between actors, etc. and ii) building the technical and administrative capacity of small producers through training and advisory services. However, if small producers are to capture the benefits of implementing practices to improve safety and quality, they must have the financial capacity to conduct the necessary actions and investments. Therefore, public and private interventions that combine the above components with the generation of incentives, through the enhanced financial capacity of producers, will have a greater chance of being successful. Examples of such incentives are subsidies for selected services (e.g. low prices for soil and water analysis); financial support for the payment of certification, the building of infrastructure and the purchase of equipment; the provision of advice and supervision. These aspects represent the major costs associated with implementation of safety programmes and have a significant impact on total production costs, as the case studies illustrated

9. Conclusions

While many countries are actively engaged in developing competitive advantages to consolidate their participation in the global market for fruits and vegetables, increasingly stringent safety and quality assurance requirements of importing markets signify new challenges in making the production and marketing adjustments needed to meet those requirements.

Although safety requirements emerged a few decades ago, for example in the meat and fishery sectors, they are relatively recent in the case of fresh fruits and vegetables and have led to a series of protocols and standards in primary production that have important consequences for production systems and sectoral structures.

Most institutional efforts focus on developing and strengthening the technical and sometimes managerial capacities of public and private actors to facilitate implementation of safety and quality assurance programmes to meet the standards and protocols of governments and/or purchasers in the markets of destination. Such efforts include the provision of advice, training, support in building laboratory infrastructure, and other actions geared towards overcoming identified technical obstacles. With few exceptions, these strategies are accompanied by actions to capture the impact, in terms of benefits and drawbacks, of the recommendations and proposed changes.

A widely held negative perception of safety and quality programmes, which therefore limits their implementation, is the high costs that they incur in return for limited benefits, because in some cases (e.g. investment to improve hygiene) they do not impact directly on prices or production variables and therefore undermine the competitiveness of the sector, especially in the context of small-scale horticulture.

This negative perception is due to the limited understanding that exists in institutions and among sectoral actors of the costs and benefits that are associated with the implementation of safety and quality improvement programmes. FAO's proposed exercise, developed by institutional teams in each country, represents an effort to correct that perception.

Clearly, the adjustments that are required to improve safety and quality, in compliance with the regulations and standards of markets of destination, call for significant producer investment in economic resources and time, as is described in detail in the case studies. Assuming that the producer has access to the economic resources needed to implement those improvements, in most cases he will also need advice and training to help him strengthen and/or develop the technical and administrative capacity to implement the required practices successfully. Small producers are up against significant technical, administrative, but also financial constraints as they seek to implement the safety and quality improvements required by export markets.

However, as the case studies show, there are varying points of departure in the small producer categories. Different levels of support and intervention are therefore required to transpose current systems towards good practices to achieve safety and quality improvements. This consideration is very important for determining the type of intervention and project that is most appropriate for each transition.

From the perspective of strengthening the economic capacity of actors to make the necessary changes, the case studies show that interventions to facilitate access to resources to conduct investment in infrastructure, payment of laboratory analysis and certification services are fundamental for facilitating the transition process.

At the same time, interventions aimed at strengthening and/or generating technical and administrative capacity of actors, and thus helping them meet market standards and requirements, need to consider the level of public and private action that needs to be committed, and the body of resulting benefits. In the case of broccoli, significant differences exist between producer categories in the capacity needed to adjust production systems to safety and quality objectives. The level of institutional effort will be greater for producers in categories II and III.

Clearly, small producers cannot participate in high-value commodity chains at any price. Initiatives

to facilitate their participation in export activities that have very high safety and quality standards will require a clear assessment of the costs and benefits of implementing the necessary changes within the context of producer possibilities. In the case of broccoli, the level of action needed from institutions and producers, to implement a series of practices identified as necessary to achieve safety and quality objectives, is high and therefore not very feasible in the short term. This gives us two cardinal lessons for institutional support to the sectors: the importance of **prioritizing actions** and the perception of transition as a **gradual process** that considers the capacities and possibilities of actors. Hence the need to define objectives that are feasible in the short, medium or the long term. Although the proposed plan is comprehensive and ideal from the perspective of achieving objectives of safety, quality, environmental protection and worker health, if it is to be feasible, its implementation has to match the economic and technical realities and possibilities of the producers and support institutions.

Benefits from applying programmes to improve safety and quality in primary production relate to the provision of public goods such as protection of consumer health and safeguarding of the environment, in addition to those resulting from the modernization of production systems and efficiencies in use of production resources which translate into higher yields, better quality of fruit for export, reduction in variable costs from efficiencies in crop protection systems, fertilization, etc., as illustrated in the case studies.

Along the same lines as costs, the scale of benefits from applying safety and quality programmes will largely depend on producer point of departure in terms of technology and technical and administrative skills. In the case of small producers using little technology, adjustments in their production systems to achieve safety and quality objectives will be more easily reflected in improved yield and quality of product and therefore income, as illustrated in the case of cape gooseberry and broccoli.

For producers employing technologically more advanced systems, the benefits from applying programmes to improve safety will probably have less direct consequences on yield and quality, but by their very nature, those programmes will produce intangible benefits associated with improved farm management, environmental benefits, greater worker productivity and so forth. Actions to identify and quantify such benefits are clearly needed if actors are to be motivated to apply those programmes.

Given this situation, the challenge for cooperation agencies and public and private bodies at local, national and international level is to generate **appropriate support mechanisms and incentives** that will enable small producers to capture the benefits from adjusting their production systems to achieve the safety and quality objectives required by the market. However, the factors limiting the application of the necessary adjustments are multiple and vary according to sector and type of actor, as illustrated in the case studies. The proposed solutions include a series of disciplines and roles. Perhaps the most important challenge for organizations providing support to individual sectors is to achieve the synergy needed to identify and apply solutions that correspond to the critical problems that have been identified. This can be done by defining the point of departure and determining the gap that needs to be bridged regarding the capacities of institutions and of the sector (producers, exporters, etc.) to effect the necessary changes; changes whose benefits exceed the costs and resources that need to be committed for their implementation.

-Appropriate support mechanisms to overcome the identified bottlenecks

The case studies emphasize **training** as a fundamental strategy to create and strengthen actor capacity to implement safety and quality improvement programmes. However, if they are to be effective, training programmes need to be viewed as an ongoing process and based on local, regional and/or national realities. These realities are obviously different in many regards but similar in others, as is illustrated in the case studies.

There is a risk of overburdening producers with training that is geared towards all the recommendations to achieve safety and quality objectives but that fails to consider the competitive and organizational context of the sectors and the possibilities of the actors. The challenge is to orient training towards

identified needs while not significantly compromising the time that producers have to carry out their production activities.

At the same time, the opportunities for small producers to participate in highly competitive and concentrated commodity chains is determined by their ability to achieve economies of scale that will permit a regular supply of produce with the necessary quantity and quality. Initiatives to strengthen coordination between small producers and to promote interlinkages between small producers and markets[1] provide a point of departure for the more effective delivery of public and private international efforts to support the implementation of safety and quality programmes (including initiatives carried out by purchasers in the form of provision of seeds, technical assistance, etc.).

Also fundamental to any proposed intervention to achieve safety and quality improvements is consideration of the administrative and financial capacity of producers to carry out the intended changes. In the case of cape gooseberry, the transition from traditional production to systems based on good practices does not apparently generate significant additional costs. The technical, administrative and managerial capacity of producers to carry out the required changes in an orderly and gradual manner is undoubtedly a key factor for successful transition. In the case of Huertos GZ, the proposed intervention covers a large number of areas requiring improvement; the prioritization of proposed activities in the light of producer capacity and market requirements is essential to ensure sustainable results.

There is unquestionably a need to promote actor awareness of market requirements and prevailing safety and quality standards. However, training based on recommendations as to what needs to be done to meet those standards restricts producer possibilities. A training approach that is geared towards understanding the factors of risk that are linked to product safety and quality is essential for long-term results. In this regard, the focus or emphasis of training should be broadened to cover not only the recommendations that need to be applied *(what needs to be done)*, but also the determination with producers and exporters of cost-effective methods of implementing those recommendations *(how to do it and how much it will cost)*.

In this connection, the case studies clearly illustrate the implications that the general recommendations in the codes of practice and standards have on the producer decision-making process. For example, the general recommendation to apply integrated pest and disease management to reduce chemical contamination hazards is premised on a thorough scientific understanding of the crop pest and disease cycle, of economic damage thresholds and of levels of damage, which makes it possible to develop effective prevention and control methods. Without such understanding the producers will have to base their decisions on trial and error.

At the same time, if training is to serve as an instrument to develop capacity in the area of safety and quality of primary production, efforts will need to be directed towards strategies that will reduce training costs, given the mobility of labour hired for harvesting and other cultivation activities. The specialized training of rural workers is one possibility. Such initiatives have been carried out in Mexico and Colombia[2], with workers certified in specific skills in accordance with national standards. For example, a trained worker with proven ability and know-how in harvesting a specific crop receives a certificate attesting to that competence. Such a process serves to differentiate the workforce and optimizes the effectiveness of training.

Finally, training programmes that are not accompanied by integrated solutions to the technical, managerial and financial problems of a sector and its producers will undoubtedly have a limited impact.

[1] An example is the law implemented in Rio de Janeiro in 2003 whereby producers and purchasers entering into written contracts have the right to a 10 percent discount on property tax (UNCTAD 2007).

[2] In Mexico, the Association for the Assurance of Vocational Quality and Competence (ACERTAR) is charged with certifying work competence; in Colombia, the National Agricultural Service sets vocational proficiency standards.

Towards a constructive small producer perception of safety and quality programmes

The increased demand for safety and quality assurances for fresh fruit and vegetable imports has raised growing concern over its impact on the competitiveness of exporting countries and the possibilities of small farmer involvement. The debate has focused on the costs and obstacles of increasingly stringent safety and quality requirements with little emphasis placed on analysing the benefits of such initiatives in the public domain, such as consumer protection in the countries of destination or the home country.

The approach adopted in the case study on pineapple clearly illustrates this perspective. The application of safety and quality assurance programmes clearly affects the cost structure, but the analysis would fall short without efforts to capture benefits in terms of improved quality, efficiency of use of production resources and sustainability of production systems. This is where real opportunities lie for generating incentives for export and domestic market producers to implement safety and quality improvements.

The case studies show how difficult it is to understand impacts in terms of costs and benefits. Analysis is compounded by differences in production systems and points of departure. However, analysis of such aspects provides key elements for raising small producer understanding of the implications of implementing the programmes and for defining areas of support and identifying incentives.

There is no doubt that small producers face enormous changes and challenges in applying safety and quality assurance programmes, but this is also the group in which the benefits are most apparent. Given that their point of departure is less advanced, gradual improvements introduced into their production systems will translate more easily into higher quality and yield. The application of practices relating to safety, mainly the prevention of microbiological contamination, through programmes focusing on the cleaning of equipment and tools, field hygiene and the building of infrastructure, have less direct impacts on production variables. Cooperation from purchasing/exporting companies in these areas is essential. Interventions such as the provision of clean transport and packing services by pineapple and broccoli purchasing companies help alleviate some of the constraints in making improvements. Similarly, financial support for temporary storage infrastructure, sanitary services and other aspects are incentives for producers to implement practices that have less direct economic benefits.

There is also a need to anticipate rather than react to change in order to channel the benefits of programme implementation. The best time for companies to envisage change is when everything seems to be functioning well; the case of pineapple is a clear example. High international prices have motivated a large number of producers to enter this sector in recent years, and the producers who have gradually implemented change will be better prepared to deal with the challenge of EurepGap certification in a context of less favourable prices.

Marked differences exist among small producers in terms of ability to apply safety and quality improvement programmes. Institutional efforts could thus have a stronger impact if they focused on identifying and resolving the specific constraints of producer categories, focusing first on boosting the opportunities of those small producers who are in a better position to carry the necessary changes forward.

Generation of incentives in domestic markets

While, pressure to satisfy export market demands has encouraged implementation of safety and quality programmes in the horticultural sector, progress has been much slower for the domestic market which is less demanding in terms of safety and quality.

There are three key actors in the promotion of initiatives for food safety and quality: the consumer, the purchaser (reacting to consumer demand) and the government seeking to protect consumer health and ensure sustainable food production.

In developing countries, progress in safety and quality for consumers has not been sufficient to drive safety requirements; there is no market impetus promoting significant change.

From a standards perspective, interventions to promote such programmes have generally been voluntary. Other non-normative initiatives undertaken by developing country governments, as in the case of cape gooseberry, have focused on defining a global framework for implementation of good practices in production systems, embracing policy actions, reworking institutional roles and providing incentives for implementation through the financing of projects.

Although such initiatives are necessary, their impact will be determined by their ability to generate demand for safe and quality products on domestic markets. Coordination is needed with supermarkets, agroindustry and the institutional market to promote price, contract procurement and other incentives that will motivate producers to implement good practices.

At the same time, consumer awareness and coordination between support institutions and the private sector are needed to promote change in safety and quality for domestic markets.

The institutional impact of safety and quality developments

Increasing demands for safety and quality have spurred significant changes in sectoral structure, almost always leading to greater coordination between suppliers and purchasers. However, coordination and integration are needed not only in the industry. Coordination and integration of actions among support institutions and international cooperation agencies are also fundamental if integrated solutions are to be found with the desired impact. Safety and quality standards, codes of practice and protocols cover many disciplines and constitute a huge challenge for producers, exporters and support institutions as they seek to adjust to the new conditions.

The impact of safety and quality developments extends to local, national and international cooperation and support agencies. The new scenario calls for a reorganization of institutional efforts in the definition, planning and implementation of coordinated activities, within and between organizations, that will integrate roles, capacities and experiences. The aim is to define the strategies and actions that are required to achieve the necessary synergy to provide comprehensive support to commodity chains and countries as they strive to implement safety and quality improvements.