

**Both ENDS
Cordaid
CREM**

In collaboration with:
**NVS
PHCC
Swiss Contact**

October 2010



Could you pass me the sustainable pepper, please?

**Towards a sustainable spices supply chain
Keys findings and sector recommendations**

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Introduction

“Could you pass me the sustainable pepper, please? “

This is not a question that people are used to hear while sitting at a dining table. Nobody thinks of asking if the dressing of the salad they ordered in a restaurant is environmentally friendly or if the spices that can be found in the marinated chicken bought in a local store originate from a farmer who has received a decent price for his or her produce or is pesticide-free. The majority of spices used in the European food sector are consumed in food applications or blends. Consumers know little about these invisible products although they bring essential flavors and colors to their plates. But although consumers may pay yet little attention to the social, environmental, and economic sustainability of spices, the industry – processors, traders and brands - starting to take these issues seriously, in a context where consumer preferences, demands from the market and policy makers are changing.

Are spices sustainable?

There is no simple answer to this question: European spice companies source globally more than 200 kinds of herbs and spices through a large range of suppliers and intermediaries. As a result, the conditions in which they have been produced (and in some case, the origin) are unknown. This lack of transparency and traceability leaves a lot of questions unanswered: what are the working conditions of farmers, what is the level of pesticide application, what is the impact on the environment?

For international spice companies there is much at stake when it comes to sustainability:

- the **image of their products**: are herbs and spices the natural and healthy products consumers imagine?
- the **security** of their supply: to what extent are farmers willing and able to commit to companies' objectives for more sustainable practices?
- their **corporate image**: how to optimize the practices up the chain for which they may be held responsible and accountable, but on which they have no direct control or influence?
- their **competitiveness**: how to control prices and costs while investing in a more sustainable production?



Demonstrating economic, social and environmental added-values

Besides such challenges, the spices & herbs sector also faces a tremendous opportunity to show its added value in terms of producing, processing and trading products which offer employment and income to millions of people, many of whom are small farmers, in the global South. Products are often grown or harvested in diversified, sometimes biodiversity rich, land use systems and thereby contribute to environmental stability. These questions are also strategic for producing countries: because of the economic importance of spices the sector has the potential to deliver an important contribution to local economic, social and environmental sustainability. Such benefits are easily overlooked and deserve to be highlighted.



Purpose & readers guide

This report is the result of a collaboration between centers of expertise, NGOs and the Dutch Federation for Spice Trading (NVS). It offers an analysis of issues and options to pursue the objective of sustainable spices and herbs and provides a rough road map; a step by step approach to serve this objective.

This report is foremost meant for Dutch and other European companies that face questions concerning sustainability. It is a guide to a better understanding of the challenges and opportunities to realize a sustainable spice sector. It is outlined as follows:



Chapter 1: Supply chain analysis

This chapter reviews the aspects of the spice sector that are key in order to apprehend sustainability issues at the level of the spice production. It describes the supply chain actors and analyses the power distribution, transparency and governance of the chain.



Chapter 2: Drivers and challenges towards sustainability

This chapter highlights the stakes of the farmers and processors in order to identify conditions to an improved sustainability at farm level.



Chapter 3: Roadmap to a sustainable spice sector

This chapter presents the scope of opportunities to improve the economic, social and environmental conditions at the level of the primary production of spices. It reviews various initiatives targeting farmers and stretches recommendations for business and the spice sector as a whole.

For a quick overview

A summary analysis and 'step wise' and 'road map' are presented in diagrams and tables on pages **23, 29, 38-39 and 42-43**.

Methodology

This report is the result of various brainstorm, interviews with Dutch processors and traders, field research, literature review and internet search. The report was compiled by [Both ENDS](#), [Cordaid](#) and [CREM](#) in collaboration with local counterpart organizations [PHCC](#) (India) and [Swiss Contact](#) (Indonesia); with the valuable contributions from [Appropriate Technology India](#) and the [KIT](#) and input and feedback from [Verstegen](#), [Interstate](#), [Euroma](#), [Catz International](#) and [VNK-Herbs](#). The project which led to this report was funded by the Dutch ministry of VROM (Subsidieprogramma voor maatschappelijke organisaties en milieu)

A focus on Indonesian pepper and Indian turmeric

The research has focused on the production of pepper in Indonesia and the production of turmeric in India. The selection of these two spices was based on their economic importance to the NVS and to producing countries. Therefore this study gives an overview of practices, constraints and opportunities for two spices in rather export-oriented food supply-chains. The findings and recommendations provided can not too easily be generalized to other spices cultivated in different farming schemes (cultivation on a marginal scale, collection from the wild), in other countries, or spices produced and processed for non-food use (i.e. for the pharmaceutical or cosmetic sector) or produced for local consumption.

By focusing on two spices, pepper and turmeric, it was possible to get a better understanding of the many practical, technical and institutional aspects of sustainability faced by the sector at large. Bearing in mind the specifics of these two products, it nevertheless also offered a possibility to explore common objectives and concrete options to further sustainability by the sector at large.

Two separate reports as part of this research project (in annex- currently being compiled) describe the findings related to Indian turmeric and Indonesian pepper production more in detail.

Although offering as much quantitative data as could be obtained, the main focus of the study is on the qualitative analysis of the supply chain.



Indonesian pepper and Indian turmeric in a nut shell

Out of the almost 400 products of the herbs and spices category, about 40 to 50 are of global economic and culinary importance. Spices are grown in diverse geographical and climatic conditions. They can be collected from the wild or cultivated in schemes that rank from home gardens to monoculture plantations. Each of them is subsequently marketed, processed and used in a specific manner, either locally or internationally. The spice supply chain is extremely complex. International spice processors need to source numerous products from various origins according to strict products specifications. Indonesian pepper and Indian turmeric set the example in the facts presented here.

Pepper from Indonesia

From 2004-2007 Indonesia was the largest producer of pepper (20%), followed by India (19%), Vietnam (19%), Brazil (18%) and China (6%) worldwide. As of 2008, Vietnam is the world's largest producer and exporter of pepper, producing 34% of the world's pepper. Other major producers include Indonesia (9%), India (19%), Brazil (13%), Malaysia (8%), Sri Lanka (6%), Thailand (4%), and China (6%)%. Pepper production in Indonesia has seen a drastic fall in last couple of years due to bad weather conditions, unfavourable prices and competitions with other crops.

Pepper production significantly contributes to local economies. 99% of pepper in Indonesia is produced by smallholders. Indonesia remains the second largest pepper exporting countries in the world contributing together with Vietnam, Brazil, India, Singapore (re-exports), and Malaysia to 90% of the international trade.



 **Quick fact about sustainability**

Spicing up the flavors of sustainability

- In 96% of cases, application of pesticides is done in an unwise manner, resulting in 18% of farmers experiencing pesticides poisoning.
- One-fifth of pepper farmers sell their pepper prior to harvesting at a fixed price.
- Pepper yields in Indonesia are reported to be half of potential levels.
- Farmers report that while 1kg of pepper could pay for 80kg of rice two decades ago, the same amount only pays for 4 kg of rice at the moment.
- Increased pest attacks deter farmers to replant pepper.

Turmeric from India

India is the largest producer, consumer, and exporter of spices in the world. During 2004-05, India cultivated spices in 2.57 million hectares and produced 3.81 million tones of spices, of which 790.000 tones of turmeric. This represents about 75% of the turmeric world's production. Less than 20% of this is exported annually. The remaining is sold on the domestic market. Other major producers are China, Myanmar, Nigeria, Bangladesh, Pakistan, and Sri Lanka.



 **Quick fact about sustainability**

Spicing up the flavors of sustainability

- The cultivation and local processing of turmeric is reported to be associated with excessive use of (dangerous) chemicals which represent a threat to the environment and to human health.
- Smallholders heavily depend on local collectors, village and district traders for the marketing of their products. There can be up to six intermediaries between farmer and exporter.
- The emergence and epidemics of pests and diseases lead farmers to reduce the cultivation acreage of spices.
- On average post harvest loss is 25 to 30% throughout the entire supply chain. A large share of this loss is being borne by the first tier in the supply chain, which is the farmer.



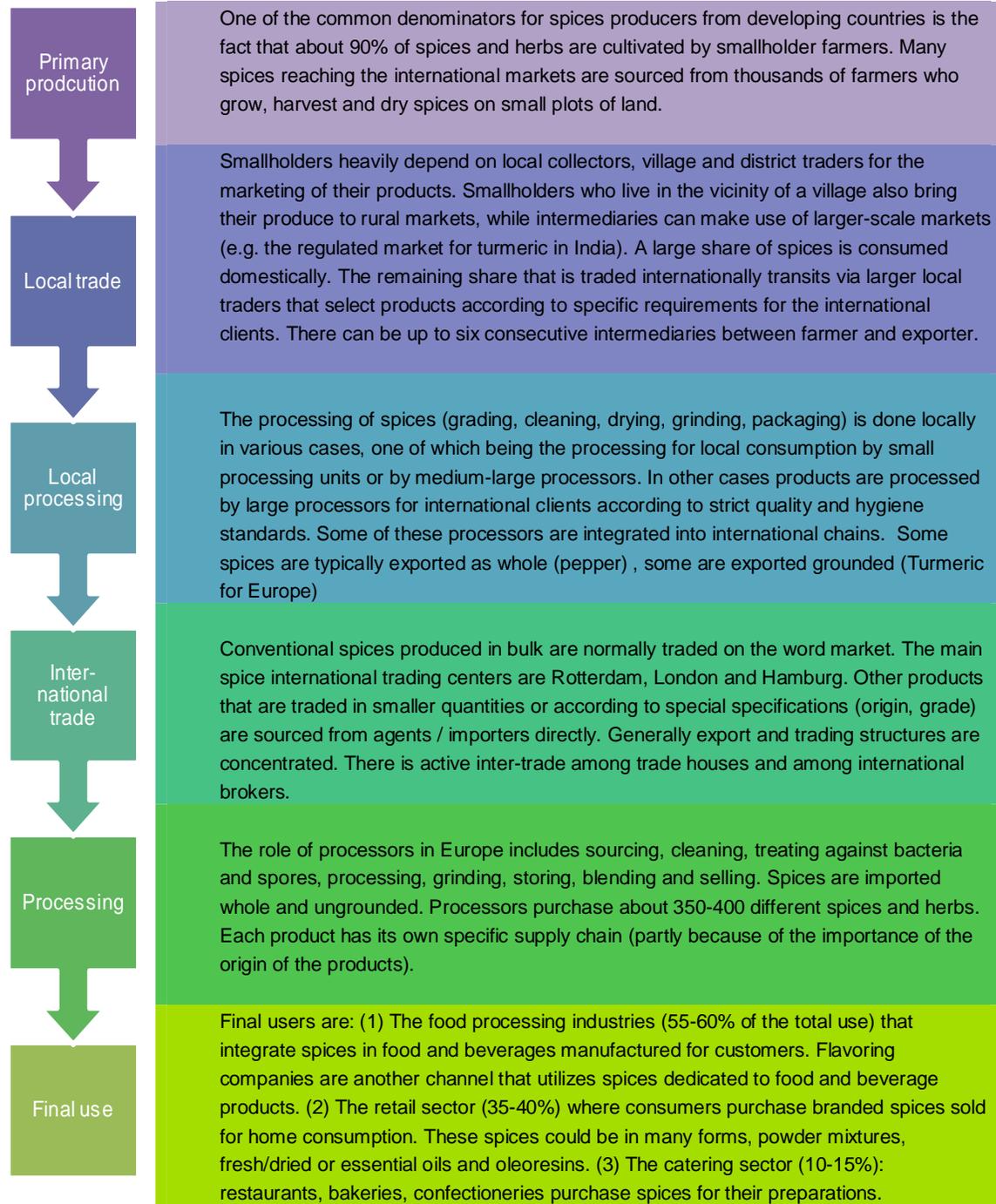
Chapter I - Supply chain analysis

This chapter describes the functioning and actors of the international spice supply chain. It also presents some aspects that are of specific relevance to sustainability. In this respect, the position of smallholders is presented with an insight into the power distribution in the chain. The role of local and international traders and the influence of buyers and consumers are also analyzed. Attention is given to governance within the supply chain, which is represented by the sum of official and unofficial rules that operate in the spice business. It is understood that this analysis might not be representative of the full spectrum of different settings of supply chains for spices. However, it sketches aspects and trends that form a basis to the understanding of drivers and challenges towards sustainability explained in Chapter 2.





Who's who in the chain?





Spicing up the flavors of sustainability

Local practices versus international norms

The complexity of the spice supply chain implies a big disconnect between the expectations of international buyers and the practices in the field. It was reported that the quality and grading norms of the local markets are the ones farmers refer to. They are generally not aware of the requirements of international markets. The local collectors or traders mostly grade products according to primary sensorial aspects (size, color and moisture). So there is no direct incentive for farmers to try and adopt the practices that are prescribed by international buyers. The significant size of domestic or regional markets also contributes to the fact that international norms remain an extremely abstract concept for farmers. When developing criteria for sustainability, this disconnect is important to take into account. The effective implementation of better/ sustainable practices requires an effective communication together with direct incentives for the farmers via the actors of the supply chain.



Power distribution and transparency

The issue of power is complex and still highly debated in the supply chain literature. Power can be defined as directly related to the level of concentration and access to key assets in the hands of a limited number of actors. Key assets can be both physical resources (e.g. capital, land, credit) and intangible resources (market information, knowledge, personal relationships, reputation). Actors who have exclusive access to key assets and resources are more powerful and have the capacity to influence others in the chain.



Spicing up the flavors of sustainability

Influential players in favor of sustainability

The ability to exert an influence in the chain is key in trying to foster shift of practices. The promotion of sustainability throughout the chain requires the involvement of influential players. These players can be: (1) actors whose size (or relative importance for their suppliers) allows them to require the improvement of social or environmental practices. (2) actors with a strategic position in the chain that can operate as a bridge between various tiers. For example, international traders are key-players being involved in mainstreaming sustainability practices. In a similar way, if sustainable practices are to be taken up to the level of the primary production, it is strategic to make use of the influence of farmers' direct intermediaries (local traders or processors).

Lack of industry data makes it difficult to provide a quantitative description concerning the power and influence of the player in the spice supply chain. However some trends can be sketched to give an indication of power distribution in the spice supply chain.



Profile of a spice farmer

Most pepper is grown by smallholders, who, except in Indonesia and Malaysia, cultivate the crop with various other agriculture products, e.g. with coffee for pepper or onions for turmeric. Nevertheless, even if it is grown through intercropping, spices, and most notably pepper, are often considered a vital cash crop. In Indonesia, some 95,000 smallholdings are estimated to be involved in pepper production; there are some 15,000 smallholders in Malaysia and about half a million in India. With the possible exception of Thailand, pepper-growing farmers in India and South-East Asian countries (including Vietnam, the largest producer) are generally small and marginal farmers, who are normally unable to absorb the brunt of unstable pepper prices without major financial consequences. Only in Brazil is pepper predominantly produced on large, specialized pepper plantations.

Turmeric farmers can be categorized based on their land holdings as follows:

- **marginal farmers:** less than 1 ha landholding, less than 200 kg of spice (fresh tubers). The farmer sells part of his produce, but does not have the substantive volume to sell to the regulated market in the local town, hence sells through local traders.
- **small farmers:** 1 – 2 ha landholding, 200 -500 kg of spice. The farmer grows crops with the objective of sales (on the regulated market) and has the financial strength and volume to tap the regulated market directly or through commission agents.
- **large farmers:** more than 2 ha, more than 500 kg.

Spice production in the hands of smallholders

The primary production is characterized by a large number of smallholders, which are in general price-takers. Their negotiation power is limited by financial pressure or the lack of storage capacity (even properly dried spices can deteriorate if exposed to humidity or contaminants). In this segment of the supply chain horizontal coordination in form of a producer association (for example to share transportation costs or to bundle input purchase) is reported to be rare.

Backward coordination in the form of contract farming agreements exist in an informal manner in India. Contract farming for the cultivation of spices is restricted in India. However, such types of (not legally binding) agreements do exist. It allows large producers to increase the size of land (which is legally limited to 250 ha per exploitation). In Tamil Nadu, two turmeric producers have control over an acreage of about 1000 ha through contract farming type of agreements with small holders.



Smallholders and the supply risk

This predominance of smallholders in spice poses specific challenges to international buyers: because the smallholders are economically vulnerable, farmers follow a short-term rationality which can compromise the quality and quantity of the supply. Local traders and international traders operate as risks mitigators for international buyers as they select the required quality and quantity. However, structural supply risks (for example in case of a decreasing turmeric production acreage parallel to domestic buyers attracting a large share of the volume because of their lower product requirements) may challenge many actors throughout the chain, leading them to jointly seek approaches to support a sustainable production by smallholders.

Concentration of export activities

Export-oriented trading and processing activities in producing countries are fairly concentrated. While a large number of smaller traders cater to the domestic market in India, a limited number of traders, processors, exporters are supplying to the international market. Both European importers and processors increasingly move away from dealing with many small growers, choosing instead to deal with whoever combines high quality, high volume, and consistent products. Direct trade between medium-sized and large producers/exporters in developing countries and grinders/processors in consuming markets is becoming more prevalent. Strict requirements for high and consistent quality and reliable delivery (in time and quantity) represent a significant entry barrier for smaller players.



Integration and concentration down the chain

In recent years, the structure of the trade and processing of spices has shifted towards more integration and concentration, with many companies performing multiple roles within the chain. Many international grinders and processors import their own merchandise from overseas, often without the services of an importer or broker. This is especially important for spices which represent large volumes or which are strategic in their portfolio (spices from a specific origin) while spices representing small volumes are purchased on the international market.

In the US, about two thirds of pepper imports are handled by the grinders themselves. McCormick, the world's largest grinder with a share of 50% of the spice and flavoring industry in the US, buys most of its supplies directly from exporters. It carries out "global sourcing" of spices and herbs by having subsidiary affiliated companies in the countries of origin. It has extended processing and trading operations in most important producing countries and has operations in several EU member countries. In the Netherlands, the market for spices is also concentrated with a few dominant players holding the majority of the market share. Verstegen, Intertaste, Euroma are important importers and exporters at the global level.

International processors increasingly try to develop vertically coordinated supply chains in order to secure a supply from a specific origin or of a specific quality. This requires the setup of longer term relationships with local partners with higher transparency and traceability of the supply chain.

Specialized brokers and importers remain an important channel: they offer very short delivery terms compared to exporters in producing countries due to their infrastructure. They can guarantee regular supplies and quality. In the meantime the role of large international traders and importers remain prominent since they allow international processors to cover significant product and delivery risks.

Influence of spices users

The food-industry, which represents more than 50% in the portfolio of international processors, and retailers, plays a major role in imposing product specifications to the actors upstream in the supply chain. Because of the significant concentration of these final users, the entry level for direct and indirect suppliers is extremely high

Direct sales from foreign exporters to purchasing units of retailers, the catering sector and food processors are very rare, but might increase due to the growing size of their purchasing organizations, especially of retailers. Moreover large retailers tend to deal directly with (European) importers of spices.

Consumption trends

- Increasing consumption of ready-to-use spice mixtures, processed foods and ready to eat dishes.
- Social changes, including food diversification, the desire for new flavors, increasing importance of “ethnic” food.
- Consumer demand for healthier and better-tasting products. Herbs and spices meet this aspiration for natural products with their implied product safety.
- Premium and special/ specialty products: emergence of smaller spice processors catering to a premium market, which includes organic and natural products in the food industry, as well as a ready private-label market. This niche market grew extensively in the 1990s as specialty food retailing expanded and the natural foods and organic segment.



Governance: the rule of trade

Understanding governance

The analysis of governance aims to investigate the rules operating in a supply chain, and the system of coordination, regulation and control in which value is generated along a chain. Requirements may be “official” or “unofficial” and may originate within or outside of the supply chain: harvesting requirements imposed by wholesalers to prevent damage, or enforcement of international standards regarding permissible levels of pesticide residues on imported products, procedures imposed by a multinational firm as a condition of participation by a supplier in its global supply chain. By reviewing the official and unofficial rules that apply to a supply chain, one can gain a better understanding of challenges and opportunities for the implementation of a more sustainable supply chain. (Purcel, et al., 2008)

Rules, standards and commercial requirements for internationally traded spices

The following table represents the most important types of rules that apply to spices, from legal rules to commercial norms, including voluntary standards. Similar types of rules and standards exist for other food products. However, compliance is specifically difficult in the case of spices, not only because of the complexity of the chain, but also because of the importance of the on-farm post-harvest practices for the quality and safety of the final product.



Official rules	
Prohibition of pesticides residues	Prohibition of the use of specific pesticides, active substances in pesticides, persistent organic pollutants (POPs) and set specific maximum residue levels (MRLS) of pesticides that can be found in food. (Directive 79/117/EEC and Regulation 396/2005)
Prohibition of adulteration of spices with specific colorants	The EU prohibits the imports of spices to which illegal colorants have been added.
EU Food traceability requirement	Requirement that all food and feed operators implement special traceability systems. Business responsibility: Identify and document information on products “one step forward and one step back” in the food chain.
Code of Hygienic Practice for Spice and Dried Aromatic Plants of the Codex Alimentarius	Hygienic requirements in the production/harvesting area, in the establishment design and facilities, for personnel hygiene, for hygienic processing requirements and the end-product specifications...
Indian Agmark grade specification	Compulsory quality control and pre-shipment inspection on certain spices. They can be considered as reference by exporters of Indian spices.
Voluntary standards	
HACCP Hygiene requirements	The EU directive on Hygiene and Foodstuff (93/43/EC) prescribes that the HACCP is mandatory to company which process, treat, pack, transport, distribute or trade foodstuff. It also applies to foreign suppliers. Hygiene requirements based on the HACCP system are legally binding for products from outside the EU. Farmers (“primary producers”) are encouraged to implement and certify for the HACCP.
ISO standards for specific spices covering constituents and infestation parameters.	The ISO standards help raise the levels of quality and provide assurance of minimum standards as well as detailing standardized analytical methods. .
ASTA Cleanliness Specifications for Spices, Seeds and Herbs	Cleanliness Specifications on improving the Sampling and Analytical Procedures which can be applied in transactions between buyers and sellers of spices.
ESA European Spice Association Quality Minima Document	Minimum quality standards for imported spices, methods of arbitration and enforcement procedures on the basis of EU legal minimum standards.
General Guidelines for Good Agricultural Practices - Spices	Edited by the International Organisation of Spice Trade Associations (IOSTA)
International Pepper community code of hygienic practice for pepper and other spices	Recommendations on hygiene requirements in the production/harvest area, the design and facilities of spice processing establishments and their hygiene requirements, the hygienic processing requirements and quality standards for pepper.
ETI	Social auditing systems of 1 st tier supplier of EU companies in dev countries.
BSCI	
SEDEX	
Organic certification	Certification of spices, produced according to organic / Fairtrade standards. Fully traceable supply chain.
Fairtrade certification	
Commercial requirements or norms	
Product grading norms	Ex : FAQ grade
Company product specifications	Volume, size, moisture, color, microbial and chemical content, lead-time
Food-industry sustainability requirement	Unilever plans to ask spice suppliers to adopt its 11-point sustainability program (see p19)

Product risks

Throughout the supply chain, ensuring the integrity, hygiene and quality of spice products is complex. Various types of product risk exist:

- **Microbial contamination** (pathogens, yeast and mold). A major quality problem in trading spices (organic and conventional) is mycotoxin contamination. In particular, pepper, nutmeg, paprika and chilies are regularly spot tested for aflatoxin at the port of entry, and often found to be over the permitted maxima. (The EU is very strict compared with the rest of the world, makes it hard to fulfill the contracts for local actors trading with European importers)
- **Chemical contamination** (pesticides, dioxine). Indonesian pepper berries have been rejected on the market before, because the US Food and Drug Administration (FDA) found too high residues of pesticides
- **Adulteration:**
 - Economical adulteration: addition of product improvement substances to increase the commercial value of spices (Sudan Red, corn starch, etc). Contamination of capsicums with Sudan Red and other non-permitted colorants have caused substantial losses following detection.
 - Natural adulteration: extraneous material, allergens, GMO
 - Process adulteration: foreign matter, sulfites from coal fire drying...
 - (Source: Dalina D. 2008)

Rule setting and compliance

Analyzing the regulations and compliance is interesting as an illustration of the power and influence that actors exert in a chain. It also shows the type and level of entry barriers for producers. Most notably in the spice sector, the voluntary standards emerging from sector associations (see p13: ASTA, ESA, IOSTA, IPCNET) are being institutionalized: they serve as official reference to buyers. However, it is interesting to learn from local observers that very few of these sector norms are applied at farm level. In most cases the monitoring of the compliance is done at the trading level, meaning that there is no actual means to monitor compliance at farm level, where many product risks can occur.

Just like in many international chains, the requirements of final users (the food industry and the retail) are key in influencing what voluntary norms should be used by actors up-stream. International processors are requested to adopt the different standards according to their clients' preferences. For example the social auditing system BSCI prevails in the EU while in the UK clients prefer to use its equivalent SEDEX. The adding-on of norms increases the entry barrier level for small suppliers. At the same time, it increases the complexity for European processors to source products.



	EU Pesticide prohibition	EU Adulterant prohibition	EU Food traceability	Indian Agmark grades	Codex alimentarius code of hygienic	HACCP	ISO	ASTA standard and ESA QM	IPC, IOSTA Good agricultural Practices	ETI, BSCI, SEDEX	Organic, Fairtrade certification	Int'l buyers products specifications	Unilevers Quickfire
Primary production													
Local trade													
Local processing													
International trade													
Processing													
Final use													



Area of application of the rules – Indicates who is the chain is **responsible or accountable** for compliance to the rule



Areas of stipulation and (monitoring and / or enforcement) of the rules. Indicates where the rules originate from and which actors in the chain **may take sanctions** in case of non-compliance



Indicates **a traceability requirement** in relation to the rule and / or a **transfer of responsibility** for the implementation of the rule



Chapter II - Drivers and challenges towards sustainability



Spicing up the flavors of sustainability

Preconditions to sustainability: will, ability and capacity

Developing a sustainable spice sector revolves schematically around two poles:

- at the production level: spice farmers should have the will, the capacity and should receive market incentives to invest in sustainable practices.
- at the processing and user level: processors and final users should be able to reach farmers throughout the chain and agree on shared objectives towards sustainability, they should be willing and able to invest in supporting better practices, they should develop and / or be able to benefit from a market system that channels sustainably produced spices commercially.

Such conditions cannot be developed overnight. While Chapter 3 “Roadmap to a sustainable spice sector” presents possible ways to create such conditions, the current chapter highlights various drivers and challenges that are key to understand this process. Most importantly, the position of the two poles mentioned above, i.e the processors (and to a similar extent, the final users) on the one side and the farmers on the other side, are presented. While many diverging interests drive them apart, it appears that a shared understanding for the risks inherent to the spice chain can create a momentum for sustainability.





Processors: what is at stake?

Processors are at a crossroads between two worlds: on the one side, they are pushed by their clients (mainly the food industry and the retail sector) to ensure that spices are produced in a sustainable manner. On the other side, they are confronted by the complexity of a source base that can, due to its complexity and extensiveness, not be fully monitored to ensure sustainability. However, processors and sector associations are aware of the urgency to initiate a discussion and develop sustainability policies and practices.

Drivers for sustainability

From interviews with processors it is clear that many trends and developments are pushing sustainability up on their agenda. One of the most important drivers is the need for more transparency in the chain. As shown in the illustration below, the need for an improved transparency stems from increasingly stringent legal requirements and from recently emerging requests of clients to monitor sustainability practices in the chain, in some cases up to the level of the farmer. Finally transparency is a business case for processors themselves as they wish to increase the efficiency of their supply, possibly via an increased control over their suppliers.

Besides transparency as a driver for sustainability, the figure below also highlights other drivers considered by producers, processors, or buyers. At times different drivers could be on the industry's sustainability agenda, depending on international public debates, but also issues at stake in the supply chain.

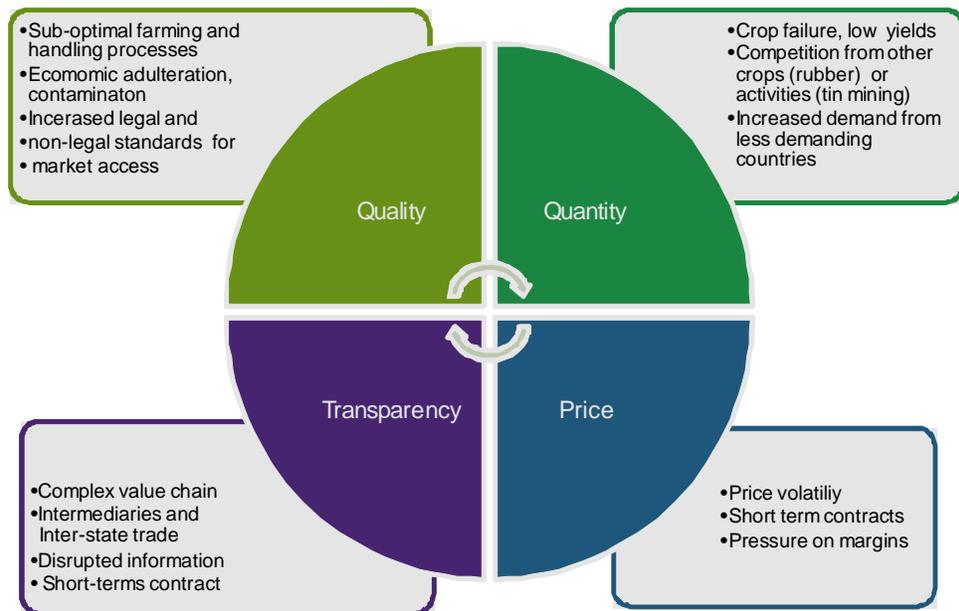


Unilever traceability system

In 2007 Unilever started using a software-based farm auditing system in order to quantify suppliers' progress against an 11-point sustainability program. The standard covers the following issues: soil, nutrients, pest management, energy, biodiversity, waste management, water, social and human capital, animal welfare, supply chain and local economy. The company intends to cover the whole supply base meaning that in turn thousands of farmers will be introduced to this new means of sustainability measurement. This auditing system should be rolled out to Unilever's suppliers of the spices and herbs sector by 2012, implying that European processors should be able to trace their produce back to the field and to monitor farmers' practices. The operationality of such a requirement is a significant challenge for buyers. At the time of writing it is not known how Unilever views the implementation of this system in the spice supply chain.

Processors: challenges and risks

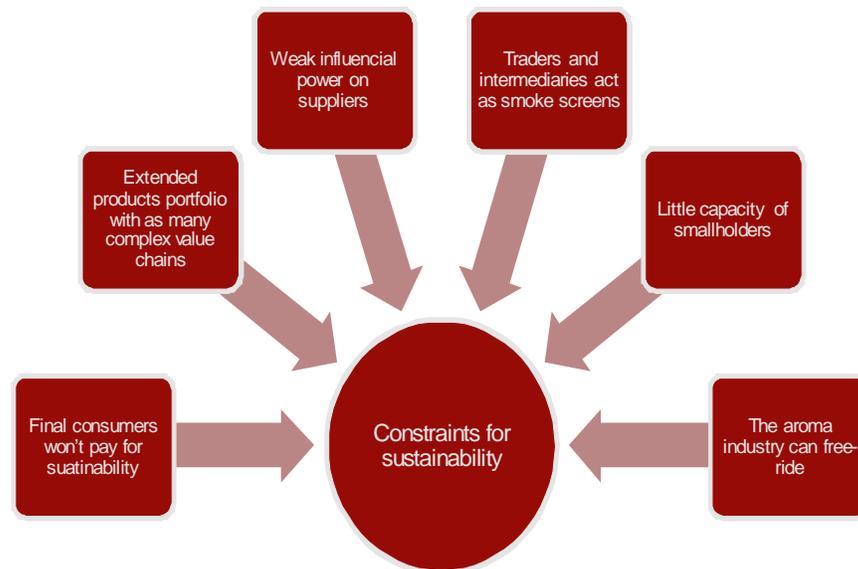
The main challenges and risks for international spice processors cover four main aspects: the product quality (see "product risk" p15), the supply security, the pressure on prices and margins and the limited transparency on direct and indirect suppliers. These elements are important to consider since they highly influence the way sustainability is perceived and tackled in the sector.



Processors: constraints to sustainability

International processors share various concerns about the implementation of sustainability practices up to the primary production. The first element is the weak influential power that they can exert on their suppliers: the European market with stringent regulations and product requirements is not so attractive to producing countries where a huge and less demanding domestic market can be tapped. It is feared that extra standards prescribing more sustainable practices will deter even more local suppliers from catering the European market. This poses an extra constraint on the already existing supply risks. These supply risks emerges from the combination of (1) decreasing cultivation area and crop failure due to the limited capacity and the economic vulnerability of spice farmers, and (2) the competition of more remunerative local or regional markets with less demanding quality levels.

Additionally, the spice industry also competes with the aroma industry which is reported to have lower product entry level. The complexity of the spice supply and the difficulties buyers are facing with regard to transparency in the supply chain makes it difficult for international buyers to trace products back to the farm gate. In such conditions it is also difficult to have a say in the way practices should be improved to achieve more social, economic and environmental sustainability and to reach the farmers to introduce more sustainable practices.



 **Long term relationship with smallholders**

Spicing up the flavors of sustainability

Developing vertical coordination in the chain to build market linkages is one unavoidable condition for up-grading practices at farmers' level: experience shows that suppliers are ready to engage and invest in sustainability (improvement of working conditions, link with producers to develop capacity at farm for example) in the context of longer term relationships and mutual commitment on specific objectives. Thanks to longer term relationships with buyers, farmers' incomes are secured over a longer period which help them investing in new practices.

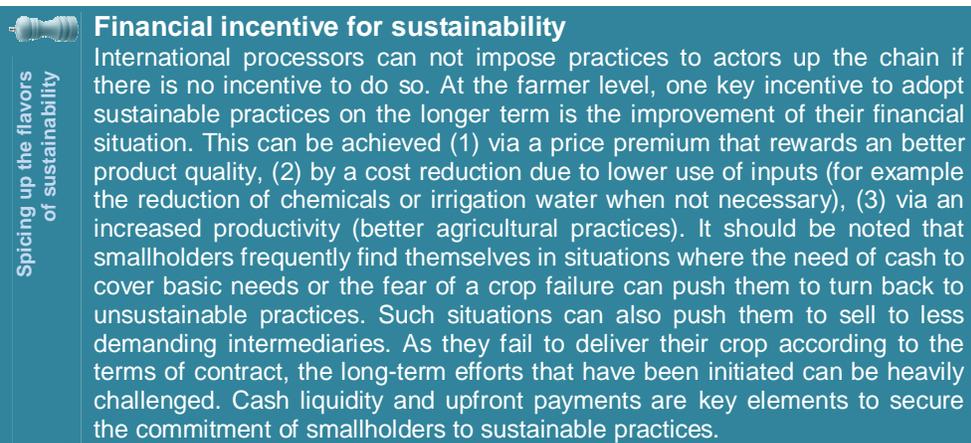
Risks involved with sourcing spices

The following article was written in 1995, but it remains an interesting illustration of a number of risks that can emerge from sourcing spices not only at the level of the producer, but also from local intermediaries.

“ In most developing countries herbs and spices tend to be grown by smallholders. Their high value means that a good financial return may be obtained for people possessing a small plot of land. This has several immediate implications for the purchaser including:

- In many cases smallholders are the poorest farmers so their level of education may be low. As a result they may resist changes if not properly informed.
- Growers are reluctant to reject any substandard material because of its high value. This may result in a grower blending a little poor quality material with good quality crop.
- It is difficult to monitor and control growers who might be tempted to use non-permitted pesticides and herbicides. In addition small scale growers often use fresh animal manure as a fertilizer which may cause heavy contamination with micro-organisms which cause food poisoning.
- As material may come from many small scale producers a high level of raw material inspection is needed, which has a higher cost.
- Farm dried spices and herbs are commonly subject to infestation by insects and rodents due to the poor conditions under which they are stored.
- Most smallholders sell small quantities, often only a few kilograms, to intermediaries or traders. These traders may resort to malpractices such as adulteration with low value materials or adding water to increase weights.
- In the case of spice crops preliminary processing such as washing and drying is carried out by the grower or agent. In many cases the quality of the water used is poor and washing may do more harm than good.
- Traditional drying methods in which the product is spread out in the sun, hopefully on a mat, are a source of contamination by foreign matter.
- In many countries harvest times tend to coincide with rainy weather. Drying may then take several days with occasional wetting by rain if the producer is not quick to cover the crop. This slow drying encourages the growth of micro-organisms.

(P. Fellows, 1995)



Spicing up the flavors of sustainability

Financial incentive for sustainability

International processors can not impose practices to actors up the chain if there is no incentive to do so. At the farmer level, one key incentive to adopt sustainable practices on the longer term is the improvement of their financial situation. This can be achieved (1) via a price premium that rewards an better product quality, (2) by a cost reduction due to lower use of inputs (for example the reduction of chemicals or irrigation water when not necessary), (3) via an increased productivity (better agricultural practices). It should be noted that smallholders frequently find themselves in situations where the need of cash to cover basic needs or the fear of a crop failure can push them to turn back to unsustainable practices. Such situations can also push them to sell to less demanding intermediaries. As they fail to deliver their crop according to the terms of contract, the long-term efforts that have been initiated can be heavily challenged. Cash liquidity and upfront payments are key elements to secure the commitment of smallholders to sustainable practices.

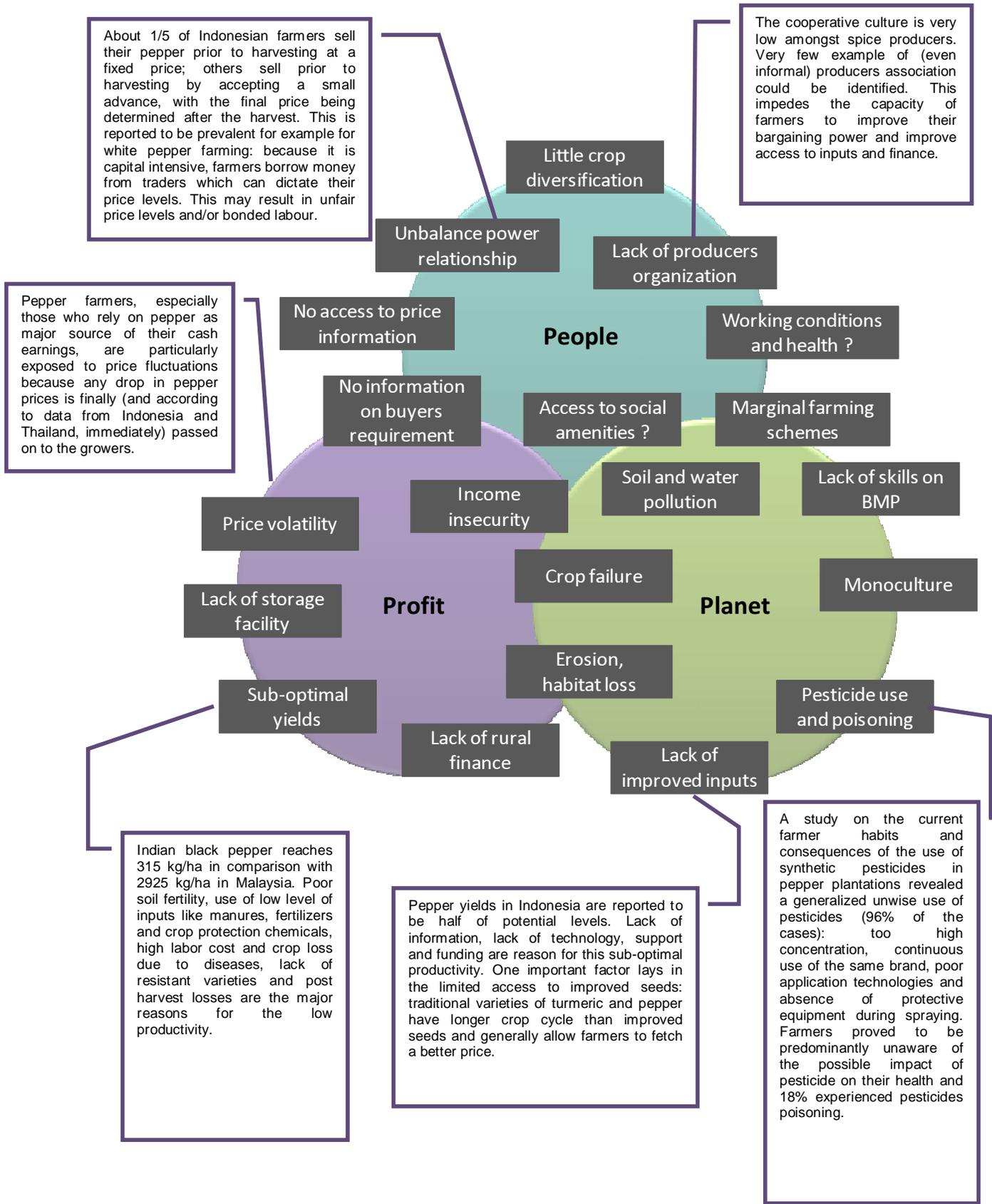


Farmers: What is at stake?

Spice farmers are confronted with the economic, social and environmental conditions that cash crop smallholders generally face in buyer driven supply chains. However, it should be noted that the economic welfare of pepper and turmeric farmers is contrasted. Although 90% of these farmers are smallholders, large differences can be found between farmers located within an export-oriented area and other, marginal farmers, located in zones where subsistence agriculture dominates and where spice production is dedicated to rural markets, if not for the farmers own consumption. Indian spice farmers located close to the districts of Erode or Salem in Tamil Nadu, the main spice trade centers, seem to be less economically vulnerable than farmers located in North and East India.



The following picture presents the most significant economic, environmental and social issues that spice farmers encounter, illustrated by a few specific examples. These issues are explained in more details in the following paragraphs.



Price volatility and short-term deals

The international trade of spice has a strong speculative element. Especially the price of pepper is extremely volatile; it is reported to be one of the most instable amongst all commodities traded internationally. Fluctuations at the level of the international trade have a direct influence on the price spice farmers receive. Farm-gate price is determined by trader or bargain between trader and farmer based on the quality of product and the stock in the market. Price volatility of spices also contributes to the generalization of short term contractual arrangement between European processors and their suppliers.

“ When actual prices move up from the agreed price in the forward contract, default becomes likely. International trade houses reckon that about one-quarter of fixed-price commodity forward contracts need to be renegotiated on account of sellers' unwillingness or inability to deliver. On the other hand, if prices decrease, buyers tend to invoke severe quality penalties or stick rigidly to contract conditions (in practice, very few sellers are able to comply with all conditions of a commodity trade contract), thus effectively forcing down the purchasing price. (Nandakumar, 1995) ”

Price takers

In theory, spices can be stored at farm level when properly dried, allowing framers to sell when prices are favorable. However, very few farmers have storage facilities. Financial pressure is also a major constraint to increasing the negotiation power of spice farmers. In some countries, such as Indonesia and Malaysia, farmers are forced to sell a large part of their crop directly after harvest, irrespective of the prevailing prices. Another large part of pepper is sold even before harvest. Such unbalanced power relationships are reported to be generalized in the case of marginal farmers. As a general rule, the more intermediaries, the lower the farm-gate price is and the lesser access to market information (price, standards). Because of their lack of bargaining power, farmers are price takers. This contributes to their economic vulnerability and leads them to switch to possibly more remunerative crops (for example, it is a well-known fact that the turmeric acreage in India decreases or increases according to price fluctuations of the precedent season).

Access to price information

A comparison of the various pepper producing countries made in 1995 revealed that access to price information enhances farmers' bargaining power. Prices for pepper are available from a number of sources, both within the producing countries and internationally. In Indonesia, export prices for pepper are published and broadcasted by radio. This information is of limited value to farmers, who need data on unprocessed and processed pepper prices. Pepper farmers are also used to consult daily price information through their mobile phone or by referring to local traders. In the main turmeric producing regions in India access to price information is reported to be satisfying. However, it is also reported that farmers may not know how to deal with this price information. For example, farmers are not able to assess whether to dispose the produce immediately or to hold the stock to get a better price in future.



Sub-optimal yields levels, crop failure risks and production losses:

According to observers, low production levels are caused by:

- Weather conditions which influence the irrigation levels and the drying process. For example in India, the increasing unpredictability of monsoon rains results in drought.
- Pests and diseases lead farmers to reduce the cultivation acreage of spices.
- Produce loss when the product is not sold on time. On average post harvest loss is 25 to 30% of total production throughout the entire supply chain of agri-products from farm gate to the consumer. Post harvest losses also affect the final price at consumer level.



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A fair price?

Field visits in Indonesia and India revealed that spice farmers located in export-oriented production regions are generally better off than their neighbors producing food crops. It is reported that farmers get a 76-78% of the FOB price. However, this is not an indication that they receive a fair economic benefit for their produce. Objective indicators of the fairness of farm-gate prices can be derived from basic business economics. If the following criteria are not fulfilled, the viability of an activity is at risk, unless one persists due to lack of alternatives (the poverty trap) :

- Farmers should at least break even (cost/ benefit analysis). Unbalanced power relationships between farmers and buyers plus declining international prices of commodities challenge this precondition to economic stability.
- Benefits from produce should pay for a decent livelihood (coverage of basic needs – food and health care, access to social amenities – education, water, sanitation...).
- Benefits should allow farmers to invest in risk-mitigation strategies in order to escape from economic vulnerability on the longer term (re-investment of benefit in strengthening his/her production, crop and activities diversification, capitalization in producer association, access to banking services...).

The scope of this research did not allow to investigate whether turmeric and pepper farmers meet these criteria.

A fair share of revenues?

Another concept generally referred to when addressing the issue of price fairness is the share that farmers receive as part of whole value chain from farmer up to customer. This share is generally extremely marginal in the case of processed products. An indication for the spice sector is as follows: Agents: 2 – 5% --- Importers/processors: 30 – 60% --- Retailers: 50 – 300% (ProFound, 2009). This underlines the unbalanced distribution of benefits. At a macro-level, the 3 indicators mentioned in the paragraph above offers two advantages: (1) a clear correlation with tangible needs of farmers (2) the indicators are easier to use by international buyers that want to ensure that primary products have been bought in a fair way.



Social and economic welfare: a complete picture?

The main social issues that could be traced in the scope of this research concerning turmeric and pepper production are directly connected to the economic issues reported above. The economic vulnerability of smallholders hinders social improvements in rural areas such as access to social amenities (education, health care, sanitation). It is possible that the spectrum of sustainability issues is broader than the evidence found within the scope of this study. Further investigations could help sketching a complete picture of socio-economic conditions associated to the production of pepper and turmeric:

- Working conditions (juvenile workers, occupational safety, benefits, working hours)
- Importance of hired workforce and migratory workers for labor intensive processes (turmeric, white pepper) and working conditions.
- Discrimination, gender issues.
- Job creation (vs. previous or alternative occupations) and effect on communities.
- Access to drinking water, to health care, to educations
- Land ownership and land tenure regimes, land conflicts, impact of resettlement programs.



 **Making spice cultivation attractive**

Because of their limited bargaining power and a low level of association smallholders absorb a large share of the economic ups-and-downs in a buyer driven supply chain. In some sectors, like in cocoa, farmers tend to escape what they consider a last-resort position by switching to crops that are less labor-intensive, less vulnerable to pest or weather conditions and that can generate a more regular revenue, if not a higher income. This trend is extremely difficult to reverse. In a context of increased competition for land, it is not rare to see small farmers being offered land, seedlings and chemical inputs for free by a large multinational to start off a rubber plantation for example. In sectors where the quantity or the quality of the supply is at risk, it is increasingly recognized that international businesses have an interest on the long term to support smallholders developing their organizational capacity to a level where they can develop a viable activity and become stronger business partners.

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Spices and the environment: a vicious circle

Spice production has an impact on the quality of the environment in the same manner that the quality of the environment has an impact on the spice production. In theory this correlation calls for a good environmental care which is not confirmed at the field level because of sub-optimal practices and local circumstances.

Main environmental issues induced by turmeric and pepper cultivation

- **Water pollution due to use of agro-chemicals:** Although fertilizers and protection against pest attack can be essential for smallholders to avoid crop failure, their unwise use present a significant environmental concern. Use of illegal agro-chemicals can also have an important impact on the local environment and most specifically on water quality (further research needed). It should be noted that both Indonesia and India prescribe the use of specific agro-chemicals and subsidize farmers purchase them.
- **Soil fertility, erosion, soil pollution:** because of competition for land between white pepper farming in Bangka and tin mining, white pepper is cultivated in an intensive pattern as a monoculture. This practices lead over the time to fertility loss and increase dependence on fertilizers.
- **Water quantity:** The water demand of turmeric is important the impact of irrigation practices for the production of turmeric (when not rain-fed) should be investigated. Further research needed.
- **Land use and (illegal) logging of forest of high biodiversity value** for the purpose of spice production in more intensive cultivation patterns : The forest land cover in India for example in Tamil Nadu or Kerala (75% of Indian pepper production) has undergone intensive conservation to agriculture to both food and cash crops over the last 30 years. It is also reported that farmers gain cultivation area on forest in Indonesia with effect on biodiversity (impact on forest coverage; species counts). Further research needed.



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Spices in the loop of environmental groups

In 2001, the battle against the pesticide endosulfan was launched in Kerala under the flagship of Green Peace: studies revealed that constant spraying of this pesticide in cashew plantations for 20 years had resulted in a series of abnormalities among village children and death amongst the farmers communities. Endosulfan spraying is now banned in Kerala, while still permitted in the neighboring more liberal states Tamil Nadu. About 60 countries worldwide have banned the use of endosulfan. The Stockholm Convention on Persistent Organic Pollutants, which has imposed a global ban on 20-odd toxic chemicals including DDT, is also considering imposing a ban on endosulfan. India is among the few countries (along with Brazil and China) that have not banned endosulfan, considered as a much cheaper alternative to European pesticides. INDIA is today the world's largest consumer of endosulfan, with nearly 10,000 tones of the pesticide being produced every year. About half of it is consumed domestically and the rest exported.

Currently Indian turmeric growers also use Mancozeb (Dithane-45) to protect the rhizome from fungus. This Fungicide is in the list of [PAN Bad Actor](#) pesticides because its carcinogenic properties and its toxicity for the human reproductive and developmental functions.

The processing of spices as well draws currently the attention of environmental groups. Environmentalists are warning that export-oriented spices processors or dye manufacturers in Kerala and Tamil Nadu use a large amount of chemicals. They are also questioning the existence of appropriate monitoring of the toxicity of water effluent that is discharged in the environment, possibly contributing to the pollution the Bhavani river.

Use of agro-chemicals in black pepper cultivation

Different studies have highlighted the environmental side-effects of pesticide use in South-East Asia. The contamination of the aquatic ecosystem might not only harm the ecological integrity of the water, but also the livelihoods of local people in terms of reduced (drinking) water quality, reduced productivity (e.g. fish killed, , effects on cattle that uses surface water as drinking water. Annually there are about 30000 cases of pesticide poisoning in Indonesia. A study was performed in 2008 on the current farmer habits and consequences of the use of synthetic pesticides in pepper plantations, especially on Bangka Island. It revealed a generalized unwise use of pesticides (96% of the cases): too high concentration, continuous use of the same brand, poor application technologies and absence of protective equipment during spraying. Farmers proved to be predominantly unaware of the possible impacts of pesticide on their health and 18% experienced pesticides poisoning. The environmental risk assessment for the aquatic ecosystem and terrestrial below ground invertebrates using hypothetical scenarios indicated low risks for the terrestrial invertebrates but high risks for aquatic ecosystems. (Wiratno, 2008)

Main environmental issues influencing pepper and turmeric production:

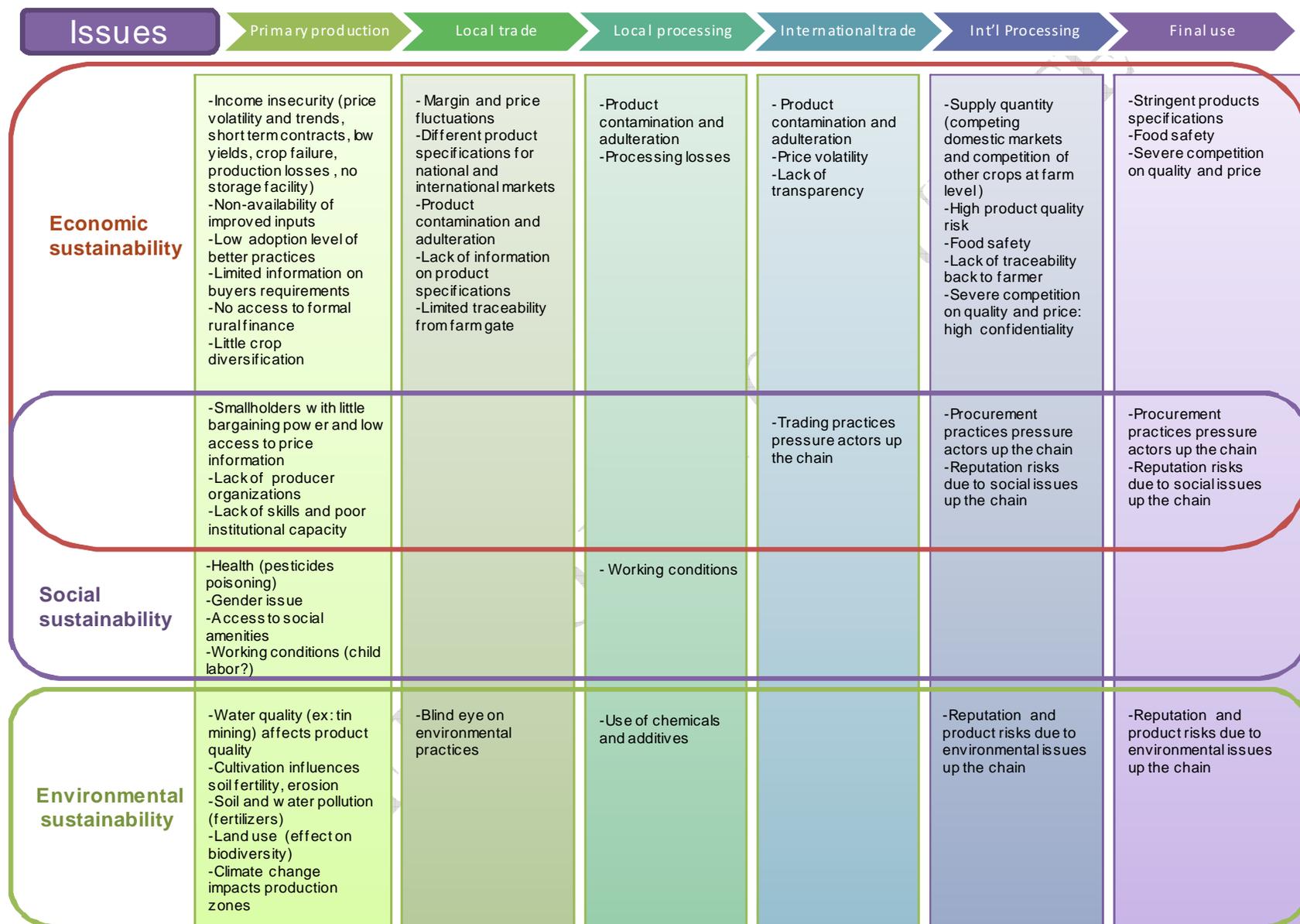
- **The water quality and quantity** is of crucial importance for the on-farm post-harvest handling of spices. Large scale tin mining on Bangka challenges the supply of clean water to soak pepper corns. As a result, rain water is often collected in sinks in the ground with important risk of contaminations

- **Climate change:** production zones are shifting. In Indonesia it is reported that farmers are moving to mountainous areas: the climate in lower production areas is not optimal for pepper production but better fits cocoa production. This transfer of production area has caused land conflict between traditional farmers in mountainous areas and new comers. Further research needed.



Challenges along the chain

The following table summarizes a synthesis of the issues and challenges towards a sustainable production of spices described in this chapter.





Chapter III - Roadmap to a sustainable spice sector

While the first two chapters shed light on the supply chain and its actors, the following section presents opportunities to progressively develop better economic, social and environmental conditions at farm level. In a first step, better practices initiated by government, businesses and NGOs are presented. In a second step, a set of recommendations is provided based on the opportunities identified at different levels of the chain. These recommendations are presented as a roadmap which can help spice stakeholders developing the appropriate conditions for a sustainable spice sector in a step-wise approach.



Better Practices

Some better practices in the spice sector are presented below. These better practices generally do not promote sustainability as an ultimate goal. They can focus on improvements on specific aspect of the spice supply chain with various angles (yields, food safety, cost-efficiency, biodiversity conservation...). The better practices have been segmented according to their initiators (governments, businesses or NGOs) in order to highlight different approaches to promote improvements in the spice supply chain. It is realized that a mix of approaches and initiators is essential to increase sustainability.



Governments initiatives: up-grading the spice sector

The fact that spices are important cash crops for a large number of relatively poor smallholders leads governments to intervene in the spice market in several ways. This intervention is generally motivated by both (1) agricultural development as a key component of the country's economy and its society and (2) promotion of an export-oriented production and processing industry. Their involvement, which mainly aims at improving productivity and fighting pests, covers the following activities:

- **Production and distribution of high-yielding varieties:** shorter crop cycles, more productive, more resistant to pests and diseases.
- **Input supply to small farmers:** local horticultural departments in India provide subsidized seeds, fertilizers and pesticides on credit.
- **Extension services,** including training on Good Agricultural Practices (GAP), Integrated Management Practices (IPM), harvesting and processing techniques.
- **Control of the grading standards and of the local trade:** The regulated markets in India play an important role for the local trading of spices. Spice producing countries all have their national grading systems.
- **Support of value addition at the farm level** (promotion of small processing units for the local market)
- **Up-grading of the processing sector** to meet international demand and standards (development of the processing of spices into oil and oleoresins in India)
- **Promotion of export-oriented production** (to feed a niche market like organic turmeric from India).



Vision 2025 for Indian spices: clean spices, improved productivity and price competitiveness.

During the last three decades, the production of Indian spices has nearly tripled due to area expansion and higher productivity. The value of exports has experienced five-fold increase during the same period. About 6% of this is exported annually. In order to consolidate this position on the international scene, the Indian Institute of Spices Research has established ambitious objectives in two fields:

- **Yield increase:** The Indian government aims at producing spices without increasing the area under the crop. Increasing the productivity per unit area through a spice based farming system, development of variety(s) with high degree of resistance to biotic and abiotic stresses, development of agro technology towards low input management, developing organic and eco-friendly IPM strategies, post harvest technologies with value addition, and popularization of proven technologies through the extension network are the key areas to boost the spice production.

- **10% increase in export of spices:** The biggest handicaps that Indian spices face in the international market are the high cost of the product and high level of microbial including mycotoxin and toxic chemicals contamination in the finished product. Improvement of the post harvest processing and of storage systems, education of farmers and traders in handling/process, focus on quality requirements imposed by ISO 9000. control of the price competitiveness should help securing increased

Good agricultural practices for pepper growers - IPC

The International Pepper Community is an intergovernmental organization of pepper producing countries (Brazil, India, Indonesia, Malaysia, Sri Lanka, Vietnam, Hainan Province (China) and Papua New Guinea) The IPC has established some recommendation on [good agricultural practices](#) to ensure (1) sustainable pepper holdings, low production costs and marketable final products for pepper growers (2) a product of good and consistent quality and reliable quantity to traders and exporters and (3) safe product to consumers. These good practices promote for example the use of live support and the planting of other economic crops (coffee, tea, coconut, arecanut and fruit trees) to diversify the source of income, and an appropriate use of organic and inorganic fertilizers.



Business initiatives: A product improvement approach

Business initiatives are primarily motivated by the will to secure the quantity and quality of the supply. More importantly business actors aim at reducing product safety risks by encouraging the adoption of better agricultural practices and of better post-harvesting and handling practices. Such efforts are carried in the context of a vertically coordinated chain on a small scale, and on a larger scale via sector associations from buyers' countries.



The Clean Spices Program from the ASTA (American Spice Trade Association)

“ As ASTA's members sought cleaner and better raw materials, they realized that the source or producing countries needed to be more aware of the standards and specifications demanded by FDA (the US Food and Drug Administration), ASTA, and the food processors in the U.S. The ASTA embarked on a Clean Spices Program in the 1980s to send members to producing countries to “educate the growers and exporters.” It was felt strongly that if the quality could be improved at the source, then the value of exports would be higher and FDA detention and the need for re cleaning of the product in the U.S. would be minimized. Missions to large producing countries such as Egypt, India, and Turkey saw substantial improvement in their exports. The improvement in quality entering the major markets led to a closer relationship between suppliers and buyers. In most cases, suppliers were able to receive a true and full market value for their products. Additionally, new opportunities were created for investment in source countries for value-added products.

”



External intervention and local ownership

Ownership is a precondition to the adhesion of farmers to the sustainability objectives of international buyers. However, there is a natural gap between 1) the objectives of buyers to develop sustainable practices and (2) farmers that strive to secure basic cash income on a daily basis. The trade-offs farmers are ought to make can be unsustainable: it should not be expected that farmers cut pesticides sprays if they fear a pest invasion or to start cultivating in a system of agro-forestry if this involves increasing the labor input and the ROI is not guaranteed. Build farmers' ownership to sustainable practices is a long term process which can be initiated when farmers have been concretely shown that new practices can improve their working or living conditions and that making different trade-offs can also be beneficial.

General guidelines for good agricultural practices

The International Organisation of Spice Trade Associations (IOSTA) published a [guide](#) that complements the GAP recommendations of the IPC. The guide focuses on the prevention of contaminants to ensure acceptable level from a food safety and legislative perspective. It reviews better practices to limit the occurrence of contaminants which cannot be removed by reconditioning that is carried out throughout the supply chain (i.e. removal of foreign and extraneous matter, improvement of the microbiological status or improvement of the quality: mycotoxins, heavy metals, pesticide, residues, allergens, undeclared colours, whether from the environment or added, processing aids).



Managerial versus operational capacity

Supply chain actors may have limited access to services and other forms of support required for meeting supply chain standards; insufficient support can hamper their possibility to actively participate in higher-value segments of the chain. Access to information on commercial requirements, standards and compliance-related services that may be delivered through government, semi-public initiatives, or through the private systems of supply chain coordination, are key concerns in analyzing upgrading opportunities for poor producers (Purcel, et al., 2008).



NGO-driven initiatives: A pro-poor approach

NGO-driven initiatives are mainly designed taking the producers' perspective as a central point. This bottom-up approach aims at increasing the market value of marginal and small farmers while developing their managerial capacity, strengthening producers' association and bargaining power, and developing the diversification of revenues. One key success factor is their capacity to create and secure the link of smallholders to remunerative domestic or international markets. The farmers operating within these NGO-driven programs are in most cases working in niche markets for international clients, for example under the organic or Fairtrade consumer labels. Other initiatives that do not bear specific labels focus on specific issues: gender, biodiversity, forest preservation.

Organic spice production and certification

The organic spice market is comparatively small at present (a little more than 1% of the total spice demand) but is growing, which can be attributed to the desire to consume natural, safe and healthy products. Organic spices command a 15-20% premium in the international market. Two types of organic producers can be distinguished:

- **(By default) organic small farmers**, having an average of spice area ranging between 0.5-1.5 ha. Most of them produce organic on default within tribal cultivation or backyard home gardens. The inter-planted organic spices (for example pepper and cardamom) are intercropped with coffee, tea or areca nut and their holdings typically range between 3-4 ha. For organic farmers by default, the cost of certification and lack of export market linkage is a major hindrance to obtain the organic label.
- **Larger export-oriented holders**: they dedicate a share of their area to organic agriculture while the majority of their crop is grown under conventional practices for higher yields.



Are all smallholders organic per default?

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of sustainability

According to observers, organic production by default does not exist in export oriented producing regions for high input crops (turmeric or white pepper). Smallholders do use pesticides to secure their yields and income. They cannot afford the lower yield associated to organic practices (on average is 5-10% less than conventional spices). For this reason, it is reported that there is no default organic farmer in Tamil Nadu for turmeric or in Bangka for white pepper.

Organic spices from India

In India, organic spices account for an estimated 11% (in quantity terms) and 3% (in value terms) of the world organic spice export market. Organic spice in India represents a negligible part of the total spice production. India currently produces an estimated 115 tones of organic spices on a certified, cultivated area of 658.4 ha. The main geographical regions cultivating organic spices are Kerala (70%), AP (20%), Karnataka (5%) and Tamil Nadu (5%).

Forestrade organic pepper: traditional organic home gardens in Indonesia

Through various export-oriented projects [Forestrade](#) promotes sustainable production of spices in Indonesia leading to improved socio-economic conditions for communities while at the same time preserving biodiversity both in national parks and in the local agroforestry systems (garden/forest plots). It encourages for example Sumatran pepper farmers to intercrop other spices such as turmeric and galangal with their pepper vines, to increase their incomes as well as promote biodiversity, and also to utilize compost, green manures, and nitrogen-fixing support trees to improve soil fertility. These measures help these communities to sustain their pepper plantations despite severe draughts and economic instability. Other projects include organic production of cinnamon and cloves to encourage local farmers to stop clear-cutting the rainforest. The project focused on land bordering a national forest park, providing a buffer zone for the protection of biodiversity in the rapidly disappearing forested areas. Crops are produced in a modified, traditional "home garden" or "shifting cultivation" situation. Each grower operates one or more traditional gardens (or Ladang) in which a variety of annual plants (such as potato, eggplants and onion), short-lived plants (such as cassava, banana and yam) and longer-lived plants (such as cloves and cinnamon) are produced.



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Participation of women in spice farming

Niche marketing of minor crops such as herbs, spices and essential oils provides enormous potential for generating improved incomes for rural women. The relatively high value and low weight of the products means they are suited for small-scale production and processing operations which can be organized to work around other farming and domestic duties which often traditionally fall on women. Medium-scale processing operations can be established at village level, ensuring maximum retention of the value of the crop in those rural areas. Unfortunately there may be many negative social factors to overcome: for example, farm advisors may recommend diversification into niche crops without recognizing that women's time is not infinitely elastic. An assessment of their existing workload is required to ensure survival is not already filling their day. Also, social factors will determine whether there is any improvement in the financial status of women from participation in the spice trade; frequently, men, regardless of their contribution to the work, control household cash income and in some countries banks may not be able to lend to women. (Douglas, 2005)

Fair trade spice production and certification

Fairtrade introduced [standards](#) for spice and herb production in 2005 to open up new markets to support sufficient income for small farmers. Farmers who produce Fairtrade certified spices and herbs receive a Fairtrade price that covers their costs of sustainable production, as well as a premium to invest in social and economic projects in their communities. Fairtrade certification also addresses the issue of child labor as well as unhealthy and unsafe working conditions on farms. Another example is [Forest Garden Products](#).



Responsible supply chain management

Spot contracts or short-term business relations represent a major hindrance to economic and social sustainability for actors up in the chain: high pressure on time and prices often put direct suppliers and other actors upstream in the chain in a situation that can negatively affect the working conditions (like long working hours). When an international buyer decides to increase the level of its product standards to match its sustainability objectives, it should make sure suppliers can make a smooth transition to new requirements. When it comes to developing a sound sustainability identity, managing the supply chain in a responsible manner is as important as the sustainability grade of the product.

Spicing up the flavors of sustainability

Emerging certification initiatives

A few other initiatives are interesting to look at even if they are, at the moment, not focusing on mainstream spices such as pepper and turmeric. They represent an example of cooperation of various actors along the chain to develop sustainability practices while creating an international market:

• International FairWild Standards for natural ingredients

The [standard](#) promotes appropriate management of wild plant populations used in medicines and cosmetics to ensure they are not over-exploited. Under the new agreement, the FairWild Foundation will help develop an industry labelling system so products harvested using the sustainable criteria can be readily recognised and certified within the herbal products industry. FairWild combines both the social aspects of FairTrade and the ecological aspects of the International Standards for Sustainable Wild Collection of Medicinal and Aromatic Plants (ISSC-MAP).

• The Biotrade initiative

The [BioTrade Initiative](#) was launched by the United Nations Conference on Trade And Development (UNCTAD) in 1997 as a response to the new challenges set by the Convention on Biological Diversity (CBD). The term biotrade refers to those activities of collection/production, transformation, and commercialization of goods and services derived from native biodiversity (genetic resources, species and ecosystems), under criteria of environmental, social and economic sustainability. The BioTrade Facilitation Programmes (BTFPs) enhances the capability of developing countries to produce value-added products and services derived from biodiversity, for both domestic and international markets. The seven BioTrade principles focus on biodiversity conservation, socio-economic sustainability, legal compliance, land tenure and access to natural resources and knowledge.



Defining an approach towards sustainability

The analysis of the spice chain shows that sustainability currently covers two aspects for international spice processors:

- The constant efforts to secure a **sustainable supply**. This can be seen as a result of the commercial risks of companies concerning product quality and quantity. These efforts are formalized in product legislation, norms and codes of good practices. These efforts cover only partially sustainability issues of the production of spices.
- The growing attention to **CSR compliance** concerning socio-economic issues for producers and care for the environment. This attention emerges as a result of the exposure of international buyers, processors and final users to scrutiny of consumers, NGOs and investors. It also illustrates a growing awareness of specific sustainability issues on which companies would like to influence.

There is a growing recognition that these two aspects are interconnected at the level of the primary production: producers are the key element to securing a sustainable supply (food safety, pesticide control, constant quality, growing yields) which can be promoted by an improved socio-economic situation (price security, incentive for improved practices, development of longer term business relationship with buyers involving a better communication and training on required product specification).



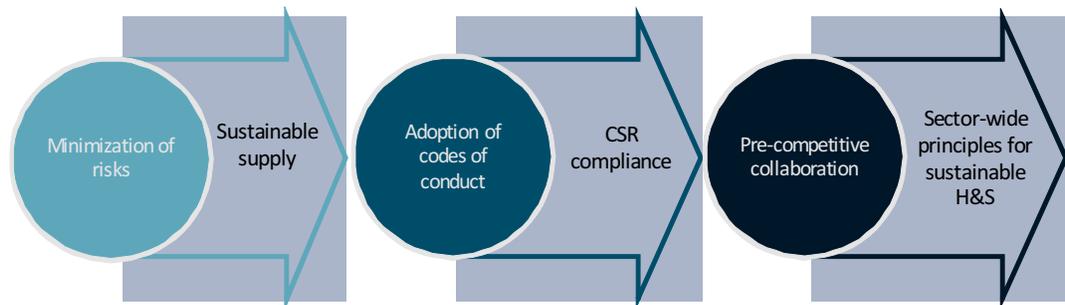
The scope of opportunities

The following table presents the possible scope of actions that can be initiated in response to the sustainability issues identified from the analysis of the supply chain and of the stakes of the processors and farmers.

Opportunities	Primary production	Local trade	Local processing	International trade	Int'l Processing	Final use
Economic sustainability	<ul style="list-style-type: none"> -Incentives for the adoption of GAP and good post-harvest practices -Access to better inputs and planting materials -Longer term contracts/relationships to promote better practices and reward improved quality and quantity -Develop access to formal rural finance -Improve crop diversification 	<ul style="list-style-type: none"> - Longer term contracts to promote better practices and reward improved quality and quantity -Better information on int'l product specifications -Incentive to develop traceability from farm gate -Improved grading and quality control -Incentive to good handling practices 	<ul style="list-style-type: none"> - Longer term contracts to promote better practices and reward improved quality and quantity -Better information on int'l product specifications -Incentive to develop traceability from farm gate -Improved grading and quality control 	<ul style="list-style-type: none"> -Longer term partnership -Incentive to provide more transparency 	<ul style="list-style-type: none"> -Longer term partnership with suppliers & responsible supply chain management -Pre-competitive collaboration at the sector level and with supplying countries 	<ul style="list-style-type: none"> -Pre-competitive collaboration at the sector level
Social sustainability	<ul style="list-style-type: none"> -Develop access to price information & education on its interpretation -Increase and improve (collective) storage capacity -Skills development, organizational capacity building & awareness raising → focus on farm management instead of only crop management education 		<ul style="list-style-type: none"> -Develop backward coordination 	<ul style="list-style-type: none"> -Responsible supply chain management 	<ul style="list-style-type: none"> -Responsible supply chain management -Develop backward coordination -Develop and promote single origin lines of products 	<ul style="list-style-type: none"> -Responsible supply chain management -Develop and promote single origin lines of products
Environmental sustainability	<ul style="list-style-type: none"> -Incentives for the adoption of Good or Better Agricultural Practices -Develop market linkage for pro-biodiversity or organic products 	<ul style="list-style-type: none"> -Incentives for the adoption of Good or Better Agricultural Practices at farm level -Develop market linkage for pro-biodiversity or organic products 	<ul style="list-style-type: none"> - Reduction of chemical use - Implementation of wastewater treatment and waste management systems 		<ul style="list-style-type: none"> -Develop and promote pro-biodiversity or organic products -Incentives for the adoption of Good or Better Agricultural Practices at farm level 	<ul style="list-style-type: none"> -Develop and promote pro-biodiversity or organic products -Incentives for the adoption of Good or Better Agricultural Practices at farm level

Step-wise approach towards sustainability

There is no simple way to implement any of these opportunities. Some can be implemented at a company level, some require a sector-wide cooperation. The maturity of businesses and the maturity of the sector as a whole with regards to sustainability are determining criteria in the way such opportunities are tackled. Typically, businesses evolve from a stage of risk minimization to a stage of internalization of CSR principles into their core operations, to an ultimate stage where competing companies agree on a common set of voluntary principles. The development of such a sector-wide level playing field can simultaneously facilitate the progress of companies towards the promotion a sustainable production of spices in a well-defined framework. Such a framework also represents a strong signal for producers to joint efforts in this direction.



Addressing strategic constraints and building necessary conditions

The following illustration presents key conditions to engage in a path towards sustainability at company and at sector level. One condition is to address the issues of the lack of transparency and the lack of traceability that are inherent to the spice sector



It should also be noted that sustainability remains a novel subject for the sector: while other sectors have been confronted with the issues for more than a decade (i.e. the footwear and textile industry or the coffee sector), the spice companies are currently required to adopt standards similar to the ones that more CSR-mature sectors use. The novelty of the sustainability discussion in the sector materializes by a difficulty to enter into pre-competitive collaboration.



Invisible, but yet sustainable

With a limited offer to final consumers, the mitigation of reputation risks does not represent a central business case to international processors. Just as soy or palm oil, spices have no significant visibility to consumers. In the cases of palm oil and soy however the importance of the sustainability impacts caused by the primary production urged companies to jointly address the issue of sustainability. The Round table for Sustainable Palm oil (RSPO – see blow) or the Round Table on Responsible Soy (RTRS) demonstrate their efforts to develop a level playing field for sustainability. The fact that the spice sector represents a multitude of products originating from many production centers somehow blurs the exposure of the sector to sustainability risks. In this sense, individual processors have a limited incentive to invest in sustainability practices. As a result it is essential for companies to engage competitors and final users in the discussion on sustainability. Experience shows that creating synergies and combining efforts at sector level is the most efficient _although time-consuming_ process to achieve results.

Principles for sustainable Palm Oil (RSPO, see <http://www.rspo.org/>)

The RSPO members have developed the following set of principles:

- 1 Commitment to transparency
- 2 Compliance with laws/regulations
- 3 Commitment to long term economic /financial viability
- 4 Use of best practices by growers/millers
- 5 Environmental responsibility /biodiversity
- 6 Responsibility on community/individual involved/affected
- 7 New planting/ renewal/ differentiation
- 8 Commitment to continuous improvements/insights to improve

Such voluntary principles or codes of conduct can be further translated into standards, criteria and indicators. These standards can either be process-oriented (i.e. prescription of tools or system towards a result, for example “a monitoring system for pesticide application should be in place”) or result-oriented (i.e. prescription of results without prescribing the way to reach it, for example: “Pesticide residues at farm gate should be below X level”).

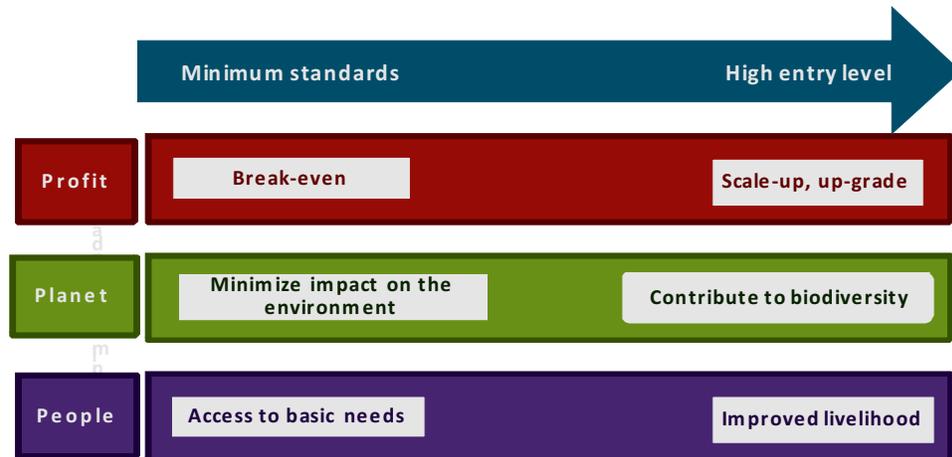
The different grades of sustainability

Both at company or at sector level, different approaches can be used to promote sustainability. Various levels of requirements can be aimed at when it comes to designing voluntary sustainability standards.

(1) The first level is the prescription of minimum standards to avoid worst practices or avoid no-go areas (for example the ban of a supplier engaged in poor working conditions). The codes of practices emitted by sector associations (ASTA, ESA, IPCnet, IOSTA – see p 14 table on voluntary standards) can be an interesting basis to start from. However it should be recognized that social and environmental issues are generally not addressed or essentially under the view point of the product quality. Minimum standards generally associates minimum compulsory requirements (ex: level of pesticide residues) with voluntary criteria that stimulate a continuous improvement (ex: the adoption of IPM practices).

(2) The second level is the prescription of a high entry level for sustainability. By establishing high sustainability requirements, only best practices are rewarded. The organic certification schemes follow this approach: the label is provided to farmers once they have made a full transition to organic practices, if necessary going through a period of “in-conversion to organic” farming.

The illustration below presents minimum and optimal level of sustainability. The use of such a framework is useful to ascertain current economic, social and environment conditions and to identify reachable goals towards sustainability.



Roadmap to a sustainable spice sector

The following roadmap proposes guidance for processors to progressively engage in such a path towards sustainability. In such a process, it is wishful that sector organizations and spice companies engage a discussion on critical issues for the development of a shared approach:

- What sustainability level do we want to achieve? (see above)
- What shall we do to influence the situation? What is in our scope of influence?
- Which key players have to be involved in the sector-wide discussion?
- How to deal with (lack of) transparency and high degree of confidentiality?
- How to deal with price and cost issues?



Recommendations to spice sector organisations

- Map stakeholders including key players, their stakes in sustainability (risks and opportunities) at local and international level, across the supply chain and from various background (businesses, associations, producers, traders, government, NGOs, research institutes)..
- Engage discussion with these actors, create discussion platforms to create a common understanding of the situation, to sketch joint objectives.
- Identify the most urgent issues to tackle (first things first), where visible results can be achieved rapidly and that can help create a momentum and commitment for action amongst spice actors.
- Define how the approach can be generalized to other issues in the supply chain (supply security → improved supply chain efficiency; reputation risks → demonstrate that the sector is promoting sustainability).
- Connect with and learn from networks that promote business-oriented sustainability principles in food chains: Good Agricultural Practices (SAI, Globalgap), or social conditions (BSCI), certification schemes (organic, Fairtrade, Forest Garden Products)
- Identify interesting pilot projects with companies and other (local) partners to increase the understanding of the supply chain and test various approaches to promote sustainable production practices (e.g. starting with companies' current suppliers – notably those which already have a certified supply chain).
- Define objectives and approaches towards sustainability: Does the sector want to develop principles (see above, as example, the RSPO principles)? Should these principles give birth to a sustainability label? Should this label be dedicated to a niche segment or shall it cover mainstream products? 'Piggy-back' on other already proven initiatives.
- Define the necessary means: cost/ benefit analysis, multi-stakeholder process, support of national and local institutions (in up-grading practices, sector transformation, capacity building, R&D, producers organization promotion)
- Accept that one enters a long term processes and start with sure, feasible, steps to create first successes which help create momentum inside and outside the company and the sector at large.
- Weigh costs and gains of engaging in a sustainability trajectory: including the possibility to respond to public pressure & reputational issues, employees' satisfaction, market positioning and customer satisfaction, an opportunity to meet one's own CSR principles.



Roadmap to a sustainable spice business

In parallel to the emergence of a sector-wide discussion, the following table provides a framework for spices companies to develop their own sustainability code of conduct and practices.

Your Corporate strategy	Your Internal processes	Your Suppliers	"Your" spice farmers	Your clients and consumers
1. Analyze your risks and opportunities				
<ul style="list-style-type: none"> - Assess your key risks and opportunities (product quality and quantity, social or environmental issues...) per spice and country of origin - Identify your business case for an increased sustainability. 	<ul style="list-style-type: none"> - Identify the relative importance of different spices in your portfolio and per segment of clients / consumers. - Assess your quality control and procurement policy and the way it promotes / hinders the up-take of sustainability standards. 	<ul style="list-style-type: none"> - Map your supply chain: actors, volumes, strengths of the relationships. - Investigate if your suppliers are aware of sustainability issues regarding spices and if they are willing/able to source sustainable spices. - Assess your level of influence on your suppliers. 	<ul style="list-style-type: none"> - Try to trace your spices back to farm level and assess to what extent your activity potentially contributes to social, economic and environmental issues at farmers level. - Identify indicators specifically relevant to your CSR policy (e.g. chemicals, water use, working conditions?). 	<ul style="list-style-type: none"> - Understand how clients / consumers value your brand and your products (price, quality, image...). - Assess the awareness of your consumers and clients about sustainable spices. - Assess their interest in sustainability and willingness to pay for a sustainability premium.
2. Act within your direct scope of influence				
<ul style="list-style-type: none"> - Be transparent about the sustainability performance of your process and products. - Be accountable: explain your strategy and whenever possible your achievements and plans. 	<ul style="list-style-type: none"> - Involve relevant departments in your reflections and decisions; raise their awareness about sustainable spices. - Ascertain if and how a larger share of sustainable spices could influence your offer of blends and preparations. 	<ul style="list-style-type: none"> - Set minimum sustainability standards for spices and test whether your suppliers are able to follow them. - Strengthen your partnership with suppliers that are willing to cooperate in a switch towards sustainable spices. 	<ul style="list-style-type: none"> - Identify actors promoting the cultivation of sustainable spices (on your side of the chain or in the production regions). - Support initiatives that promote the production of sustainable spices at the farmers level (sponsorship, partnership with NGO, etc.). 	<ul style="list-style-type: none"> - Launch a line of certified sustainable spices, e.g. by means of out-sourcing this to suppliers with relevant expertise. - Test how your clients/ consumers respond to this line and your message. - Evaluate the extra financial and non-financial value of labelling.
3. Strengthen your stakes				
<ul style="list-style-type: none"> - Search allies to support your strategy and increase your influence (other businesses, NGO's, experts). - Participate in debates about sustainable spices and in food products multi-stakeholder initiatives. - Scale up your strategy: enlarge your range of niche products, extend your sustainability standards to more products. 	<ul style="list-style-type: none"> - Assign responsibilities and objectives to quality control agents, buyers and marketers. - Adapt your procurement policy to sourcing sustainable spices (margins, lead time, etc.) 	<ul style="list-style-type: none"> - Try to increase the traceability and transparency of your supply chain using your chain of custody. - Establish partnerships with your current suppliers to source sustainable spices and / or select new suppliers. - Strengthen your standards, ensure that your suppliers can follow them and assist them if needed. - Make a choice for sure, feasible steps to build on successes! 	<ul style="list-style-type: none"> - Become an active partner of farming projects. Provide direct or indirect support for educational programmes focusing on better practices or access to credit. - Commit yourself (possibly through your suppliers) to buy from specific farmer projects. - Agree in advance (ideally before the season starts) on the quality, quantity and price of spices. 	<ul style="list-style-type: none"> - Whenever possible, start diversify the range of (certified) sustainable spices to scale-up your offer. - Use your results to create visibility for B-to-C and B-to-B channels. - Strengthen your profile as a responsible company: educate consumers, share your experience with peers.



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Annex 1 : Turmeric cultivation in India

Turmeric in a snap shot

Turmeric (*curcuma longa* var *domestica*) is member of the ginger family. It is native to India and is also referred to as Indian saffron. It grows best in tropical climates with temperatures from 20 to 35 °C and rainfall of 1500mm - 2000mm. The plant produces the culinary spice known as turmeric and its medicinal extract called curcumin. Turmeric is used as condiment, as flavoring and coloring agent and is the principal ingredient of curry powder. Its use in pharmaceuticals and cosmetics is growing. The textile industry also uses curcumin as a dye.

India: at the center of the turmeric world production

India is the largest producer, consumer and exporter of turmeric in the world. India currently produces about 790,000 tonnes of turmeric annually (75% of world production). Other major producers are China, Myanmar, Nigeria, Bangladesh, Pakistan, and Sri Lanka. Indian Turmeric is considered to be the best in the world. It has a good demand in importing countries because of its high curcumin content. The states of Tamil Nadu and Andhra Pradesh account for 80% of production. It is also produced in Karnataka, Maharashtra, Orissa, Bihar, Meghalaya and Assam. The quality is primarily determined by color after grinding and curcumin content. The best quality is called Rajapuri and comes from the Sangli District of Maharashtra. The second best comes from Salem and is called Gattha. These first two fetch a good price with processors who prefer them because of good color and aroma while used for culinary purposes plus high curcumin content which is demanded by pharmaceutical companies. The third best comes from Messur in Karnataka and is called Godal Patte.

Indian Turmeric represents 60% of the international trade. India exports mainly to the United Arab Emirates, Japan, Iran, Malaysia, the USA, the UK, Bangladesh, Egypt, South Africa, and Sri Lanka. In the EU, importers other than the UK mentioned above include Germany, the Netherlands and France.

Indian turmeric from field to fork

Turmeric is a 10 month crop being sown during arrival of monsoon (June) and being harvested the following March. Turmeric prefers a little shade over direct sunlight so farmers generally intercrop their turmeric plants with fodder crops for their sheep or goats (*Sesbania sesban*). Turmeric is also intercropped with onions. Onions and goats provide the farmers with an additional income during the long duration of 10 month cultivation. Turmeric is a delicate crop and needs to be cultivated and harvested with care to avoid damage to the rhizomes. Cultivation and post-harvest processing of turmeric is labor intensive. The following table; describes the value chain processes from input provision to consumption.

Input provision	Bulbs are generally stored by farmers for seed purpose. Seed rhizome, fertilizers and plant protection chemicals can be provided by large local processors to small farmers in a sort of contract farming arrangement. Local intermediaries / traders can provide inputs (seeds, chemical, cash lending). Fertilizers are subsidized by the Indian government. The regulated market also offers loans to farmers for cultivation against stored crop.
Pre-harvest practices	Turmeric is a water intensive crop and is therefore more favorably cultivated in rain-fed areas: irrigated cultivation present a higher economic risk. Chemical application is necessary for short duration varieties (traditional varieties have longer crop ration cycle than improved varieties).
Harvest	Leaves are cut and the rhizomes are ploughed out of the soil. Harvested rhizomes are washed, roots are removed. The round rhizomes (bulbs) are separated from the fingers and graded separately for sale to different users. Best bulbs are stored for seed purpose. Other bulbs go to the export market, while fingers stay for the domestic market.
Post-harvest practices	Rhizomes are boiled to accelerate the drying process (=curing process). Sun drying takes 10-15 days. Polishing consists in removing the scales and root bits and cleaning fingers. This can be manual or mechanical. Unpolished fingers are only used to make curry powder for the local market. A small quantity of turmeric powder is often added to enhance color of the fingers prior to sending them to market (=Color improvement / adulteration). Emulsions are also used by larger growers. ¹ Color improvement practices can also take place once turmeric is ground.
Local trading and storage	Framers either sell at farm gate (in case of small quantities or if located far from the market) or to the local market. Trade is concluded after a visual check to assess quality and fix the price. The regulated market and many large traders store turmeric in their warehouses for releasing to the market when prices are favorable. Fumigation (methyl bromide or ethylene di-bromide) is a regular practice against insects attack. ²
Local processing	Today the majority of internationally-traded turmeric rhizomes are artificially dried with hot-air drums, tray and continuous tunnel driers. Turmeric can be ground into powder or processed into oil or oleoresins. Small to large processing units grind turmeric for local consumption. Fingers can also be exported without further processing. For export, dealers prepare uniform mixtures of fingers, bulbs or splits with specified amount for curcumin according to future use, according to Indian standards and to the specifications of the importers. The Indian Agmark grade specifications can be used as reference.
International trade	Turmeric is mostly exported as a whole rhizome (fingers, bulbs and splits) and is then processed into powder or oleoresin. However, the EU imports mainly ground turmeric (80%), while whole turmeric is mainly exported to developing countries (middle east and North Africa). Turmeric is often imported in bulk in the EU through German or Dutch traders or processors.
International processing	Turmeric is stored in port of entrance for a more flexible offer and to decrease the price risk. Turmeric undergoes a microbial and quality control. It is cleaned, ground, blend for food applications. The food industry has the largest share of turmeric consumption (more than 80%).

¹ The growers sometimes use a wet process where the turmeric powder for coloring is mixed with a little castor oil and mixture is poured into the fingers or bulbs that are rotating inside the cylinder with wire mesh cage. Some large growers are using an emulsion of the oil with alum and sodium bisulfite plus some hydrochloric acid that gives a fine texture to the turmeric

² The US EPA specified higher residue limits for bromine from the practice as the daily intake of spice is very low but the Indian Plant and Food Act prescribes lower limits as there is regular use of the spice by all Indians.

Local trading channels for turmeric in India

The local trading system for Turmeric in India can be divided into two main channels: (1) the trading channel for the turmeric that is consumed locally (60% of the production) and that mainly makes use of the regulated markets and (2) the export oriented trade channels.

The state of Uttarakhand (North East India) is a typical illustration of the trade channels dedicated to local consumption: The region is characterized by small to marginal scale farmers some living in secluded areas (see p10 in the main report). Farmers generally sell to a local collector. Turmeric then transits through village traders, then through a district trader before being sold on the regulated market.

Rural and regulated markets for turmeric in India

India has primarily two types of markets for agricultural produce.

→ Rural markets (“haats”)

Periodic markets or rural haats are one of the major rural market systems. Farmers who have limited access to transportation or cannot bear the cost of transportation to carry their produce to the major agri-markets and in addition do not have quality or volume to sell in the wholesale markets, sell in these rural markets. Lack of infrastructure, low consistency in quality of the produce, fragmented volume of produce etc makes these haat markets not very attractive for wholesale buyers. The farmers mostly sell their produce at an un-remunerative price. In addition, one can find vegetable vendors carrying around the agri-produce in small hamlets, mostly in hilly regions. These vendors procure the produce from small and marginal farmers.

→ Regulated markets (“mandi”)

Wholesale regulated markets are exchange points for gathering agri-produce from different sources and change hands from producers to large retailers or traders for onward transportation. The volume of transactions handled through these markets is large and hence require not only a sophisticated physical infra-structure but also require regulation to protect both producers and consumers. Most of these wholesale markets are covered under the Agricultural Produce Marketing committee Acts and are also called regulated market or Mandi. The objective of mandis is to regulate the trade practices, increase market efficiencies through reduction of market charges, elimination of intermediaries and to protect the interest of the producer and seller. In theory, processing industries cannot buy directly from farmers, except through mandis. No person or agency can carry wholesale marketing activity in the area, without license issued by the market committee. License holder traders are locally called pucca adtiya.

Three types of traders operate around the mandi:

(1) Local traders, also called thekedar operate outside the mandi. They collect produce from the radius of 4-10 villages and sell it to retailers, processors or Pucca adtiya of the mandi. Local traders buy material through cash payment or credit of 15 days to 1 month from the farmers and make 5-10% profits margin on total sell value.

(2) A pucca adtiya collects products directly from the farmers of 30 to 40 villages. He assesses quality of the product by visual experience (size, shape, color, spots, texture etc). Price of product is being fixed by the adtiya in consultation with the farmer. Cash payment is done to the farmer as and when the product is being sold by the adtiya. Adtiya charges commission 5% from farmer and 5% from buyer of the whole amount. More so he also provides agriculture inputs like seed, fertilizer, pesticides and also cash advance during sowing season to his loyal farmers to maintain his supply. A pucca adtiya has a strong network with traders inside and outside the state who usually come to him for the purchase of the product. Pucca adtiya keep in touch with wholesale traders through phone for information on the recent prices of commodity in other areas. Pucca adtiya also have contacts with local traders who provide them produce if they get big orders from other wholesale traders.

(3) The wholesale traders do generally not operate through the regulated market which is less flexible than direct sales (longer delays, packaging of lower quality). It is reported that in the main producing states (Tamil Nadu and Andhra Pradesh) 70% of the traders are private (not linked to the regulated market). They channel 75% of the volume of turmeric meaning that only a smaller share of the turmeric transit through the regulated market (however most of small to large producers sell at least a share of their production through the regulated market so that they can benefit from supported price in case of price crash). Wholesale traders exert a large control of process of sales and purchase. They still retain a position of prominence in the value chain given their ability to store, retain and then access to outside markets. In addition to accessing the storage capacity within the mandi, these traders also maintain their own storage facilities outside the mandi. The rates offered by these license holder traders are the highest in the value chain but come with a component of credit, which is under normal circumstance cleared within a month's time. They have contacts with adtiya of various mandis and thus they keep track of prices of other mandis with adtiya. When the prices in a certain mandi's are low, traders come from distant areas to source turmeric. Erode Regulated Market in Tamil Nadu is one of the biggest markets for turmeric in India.

Price construction

Farmers can market the turmeric immediately after harvest or store it for selling at better price. On the markets, turmeric is sold by direct auction. Turmeric farmers frequently are often confused whether to dispose the produce immediately or to hold the stock to get better price in the future. To help them in taking a better selling decision the Domestic and Export Market Intelligence Cell of Tamil Nadu provides analysis on prices in Erode Regulated Market. Information on prices trends help farmers to anticipate turmeric price movements and arbitrate whether to hold stocks or sell immediately in order to maximize their revenues. However turmeric farmers that are located far from the main trading markets make little use of price information and are in general price-takers.

An unstable production level

India contributes to 60 per cent of the world turmeric trade. As a result, the Indian production and price levels are directly felt on international markets. However the level of the Indian production significantly fluctuates due to unstable yields (on average 4 tonnes/ha) and the variable cultivation acreage. According to the price of the previous season, farmers decide if they replant turmeric or switch to another cash crop for the following season. Farmers may also opt for alternatives because of a shortage of skilled labor.

In Andhra Pradesh (the first turmeric state in India in terms of acreage and production, but the third in terms of yield) the area sown under turmeric decreased by 20 percent between 2009 and 2010. This resulted in lower production compared to the previous year. Even though better prices prevailed in the last year, the delayed monsoon, increased cost of cultivation, labor and water problems deterred farmers from replanting turmeric. They switched to other short duration crops like maize and soybeans.

Observers report other factors that explain the conversion of farmers to other crops:

- the limited access to improved seeds: traditional varieties of turmeric have longer crop cycle than improved seed which generally allows farmers to get a better price. For example, in Uttarakhand, most of the farmers do not have access to the government horticulture department so they do not get seed during sowing time.
- the weather conditions both influence the cultivation phase (irrigation levels) and impact the drying process. Moreover, the increasing unpredictability of monsoon in India results in drought.
- the emergence and epidemics of pests and diseases.

The crop coverage area and production of selected spices in India is presented in the following table. Quite interestingly, of all the spices cultivated in India, turmeric is the only one with a declining acreage, compensated however by an increasing yield over the study period.

Area (ha), Production (tonnes), Productivity (tonnes/ha) of spices in India

Crop	2000 - 01			2004-05		
	Area	Production	Productivity	Area	Production	Productivity
Black Pepper	213,870	63,670	0.30	257020	79640	0.31
Cardamom	66,000	9,100	0.14	95480	16600	0.17
Cinnamon	700	1,660	2.37	760	1660	2.19
Clove	1,880	980	0.52	2430	1810	0.75
Ginger	86,200	288,000	3.34	100270	397990	3.97
Nutmeg	7,520	1,920	0.25	10010	2530	0.25
Turmeric	191,700	714,300	3.72	161230	716840	4.45

Sustainability issues

The chapter on the sustainability of spices (p22) should be referred to for a general overview of sustainability issues. This paragraph only highlights a few points that are specific to turmeric production in India.

Small versus larger holders: Although 90% of Indian turmeric farmers are smallholders (see p10- profile of a spice farmer), it is reported that the area of Erode (one of the main spice trade center for turmeric) is dominated by large holders of about 12 ha. They make up for up to 40% of turmeric growers. The remaining 60% growers are small holders having 2-4 ha, of which about 1 ha is dedicated to turmeric (see also p22 for a profile of turmeric farmers in other production areas).

Price fluctuation: Price fluctuation is an important feature of the spice trade. As mentioned above, turmeric prices can greatly vary from one season to another. This provides little incentive to farmer to plan and possibly to invest in better practices.

Insecurity of incomes: incomes from turmeric cultivation depend on unpredictable factors like pest and diseases attack, the access to improve varieties and fertilizers, weather conditions.

Gender issue: Most of the cultivation operations are performed by women (planting rhizomes, weeding, fertilizing, harvesting and farm-level processing). While the processing of turmeric in electric powered processing units can be considered less old-fashioned compared to the traditional methods that involve women labor, it was reported that processing units affect women adversely due to reduced water availability (diversion of water sources that are normally used for households consumption) Young women from Tamil Nadu are reported to prefer working in textile manufacturing units of Tiruppur or Coimbatore since they can get better wages than when working on a turmeric farm or in a turmeric processing unit.

Water demand of turmeric cultivation: turmeric is a thirsty crop. In areas where this crop is not rain-fed, the effect of turmeric cultivation on the water levels should be studied.

Chemicals use: controversial chemicals are used for cultivation and processing of turmeric (see p27). The potential impacts on some of these chemicals on human health, water bodies and soil require further research.

Deforestation: in export oriented areas, turmeric contributes, together with other crops, to the conversion of natural areas to biodiversity-poor agricultural areas (see p27).

Relevant government policies

Spices board India, Indian Ministry of Commerce and Industry: offers a complete overview of turmeric production and related governmental programs

<http://www.indianspices.com/>

Indian Institute of Spices Research: offers an extensive information base on cultivation practices and research on turmeric.

<http://www.spices.res.in/overview/index.php>



Annex 2 : Pepper cultivation in Indonesia

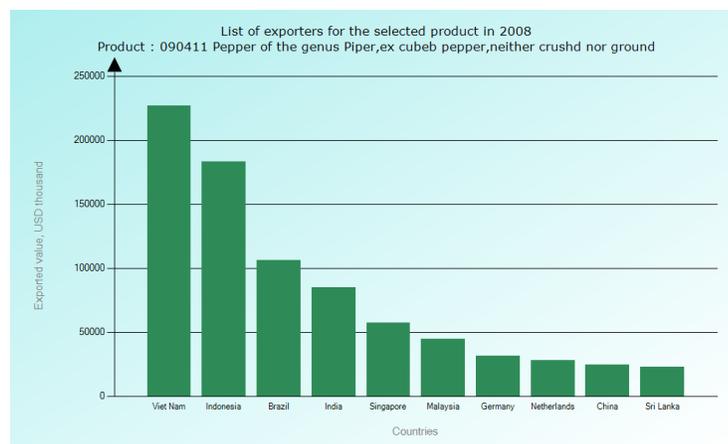
Pepper in a snap shot:

Pepper (*Piper nigrum*) is a flowering vine in the Piperaceae family. It is a perennial and climbing plant. The crop grows easily in warm and humid climates between 0 and 600 meters above sea level with temperatures from 22 to 30 °C. The pepper plant provides three kinds of peppercorns: black pepper, white pepper and green pepper. Black pepper is obtained by simply drying the fruit and white pepper is obtained by fermenting ripened fruits in order to peel and dry them. Pepper is used as a spice and seasoning in the food industry and in the pharmaceutical and perfume industry

Black pepper (*Piper nigrum* L.), known as the “King” of spices”, is by monetary value, the most widely traded spice in the world, accounting for 33 percent of all spice trade (2002). It is predicted that the global demand for pepper will increase from 230,000 in 2010 to about 280,000 tonnes by the year 2020, possibly further increasing to 360,000 tonnes by 2050. Whole grain non-ground black pepper accounts for 90 percent of the traded pepper on the global market.

Production and trade data

From 2004-2007 Indonesia was the largest producer of pepper (20%), followed by India (19%), Vietnam (19%), Brazil (18%) and China (6%). Global pepper production peaked in 2003 with over 355,000 tonnes but has fallen to just over 271,000 tonnes by 2008 due to a series of issues including poor crop management, exhausted vines, disease and weather. As of 2008, Vietnam is the world's largest producer of pepper (34%). Other major producers include India (19%), Brazil (13%), Indonesia (9%), Malaysia (8%), Sri Lanka (6%), Thailand (4%), and China (6%). Vietnam also dominates the export market, using almost none of its production domestically. However, its 2007 crop fell by nearly 10% from the previous year to about 90,000 tonnes. Similar crop yields occurred in 2007 across the other pepper producing nations.



Source: Intracent data base

Main exporting countries	Percentages of total				
	2004	2005	2006	2007	2008
Vietnam	35%	36%	31%	30%	25%
Brazil	14%	11%	13%	13%	12%
Indonesia	13%	14%	13%	15%	20%
India	5%	6%	9%	11%	9%
Malaysia	6%	6%	6%	5%	5%

Source: Intracent data base

With 27% of total EU imports of spices and herbs, pepper is the largest imported product group. With a share of almost 31%, Germany is by far the largest importer of pepper.

Pepper cultivation in Indonesia

Pepper is an important commodity of Indonesia, which has been cultivated within the country since the 6th century. In Indonesia the pepper production in 2008 was around 25,000 tonnes. Due to erratic rain in producing centers the crops in Indonesia have been affected. Production in Indonesia has seen a drastic fall in the last couple of years from around 65,000 tonnes in 2003 to about 25,000 tonnes in 2007. This declining trend can also be seen in current production. Indonesia exports most of its black and white pepper. Indonesian contribution in world pepper export tends to decrease with the highest export in 2000 for 63.938 tonnes or 37% of world export (29.682 tonnes of black pepper from Lampung and 34.256 tonnes of white pepper from Bangka Belitung).

The most important growing areas for pepper are Lampung producing Lampung black pepper, and Bangka producing Munthok white pepper. The total production from these two province accounts for 70-80% of the total pepper production in Indonesia; the other 20-30% comes from West Kalimantan, East Kalimantan, South Sulawesi and West Java. Nowadays, pepper is economically one of the most important commodities in these areas also because, being a labor intensive crop, it provides jobs for the local population. 95% of the plantations are cultivated by smallholder farmers. In 2006, almost 99% of 199.222 Ha of pepper were cultivated by 332.739 small farming households. With an average of 5 members per household, it is estimated that the pepper sector provides income to 1.6 million people in rural areas.

Small land ownership, scattered field location, lack of capital, lack of knowledge and skill in developing pepper business are the main characteristics of pepper production Indonesia. The main constraints farmers face are: 1. Low productivity and quality; 2. High loss of production due to pest and disease attacks; 3. Lack of knowledge in pepper cultivation especially in pest and disease management; 4. Lack of knowledge of food safety and quality; 5. Fluctuation in price. Besides these constraints, black pepper farming in Lampung competes with other commodities such as coffee, cocoa and palm oil whereas in Bangka Belitung pepper farming competes with community "tin" mining, palm oil and rubber.

Local trading channels for pepper in Indonesia

Smallholders normally sell their produce to village traders, who sell on local markets to larger traders, who bulk their purchase for sale to wholesale merchants, which are themselves usually exporters' agents. In case of scarcity, traders come and collect the pepper at farm gate. Large Indonesian pepper exporters are also large exporters of coffee and other commodities, so they benefit from a portfolio of non-correlated risks. They actively use the Robusta (coffee) and cocoa futures contract in London through brokers in Singapore. All these reduce their dependency on pepper and thus increase their capacity to take risks in pepper trade.

Back pepper from Lampung

Lampung used to be the largest supplier of black pepper to the world market. In the last 3 years the production of pepper in Lampung has dropped to the level averaging 25,000 tonnes against the high production of 33,000 tonnes in 2003. In 2008 pepper output from Lampung (21,575 tonnes) was estimated to represent 50% of its normal production capacity. The decline in the output of pepper from Lampung is mainly due to unfavorable weather conditions, disease infestations and a decline in acreage planted. Productivity normally ranges between 300 and 1000 kg /ha. Because plantations are ageing (pepper vines produce for about 20 years), black pepper is being replaced by cocoa, palm oil or rubber in Lampung. As a sum, the reputation of pepper as a high value crop is being eroded because of decreasing and volatile prices and crop failure (pest attacks and unfavorable weather conditions).

Production practices for black pepper in Lampung

Although black and white peppers originate from the same species, the two cultivation contexts are different. Black pepper is cultivated in areas with fertile soils. It is usually cultivated in agro-forestry systems, whereby the vines are supported on the trunks or stems of young or small living trees (life support), while not negatively impacting the trees or competing with them. The use of life support such as *Glycinea maculata* reduces stress of pepper during the dry season, regulates air humidity, and improves soil fertility. Farmers generally use the leaves of live support as goat feed. Farmers in Lampung only use manure and compost. After pruning, tree leaves are used as mulch, adding nutrients to the soil when decomposing. As such, chemical fertilizers are not necessary, making the cultivation of black pepper not capital intensive. Traditionally, black pepper is intercropped with coffee trees, wood (singan), rambuttan, upland rice or food crops. This type of pepper garden allows generating revenues during the first three unproductive years. When the vines become productive, the different harvesting seasons of pepper and coffee allow spreading income over the year. Black pepper accounts on average for about 60% of the pepper farmers' income.

White pepper from Bangka

In Indonesia, white pepper is traditionally grown in Bangka- Belitung. There are numerous pepper plantations, which were especially prosperous during the late 1980s. The price of pepper and tin have both dropped dramatically since the 80s, thus seriously affecting the Bangka economy. In 2001, the production of white pepper in Bangka Belitung islands amounted to 34.000 tonnes for an area of 64.570 ha and a productivity of 1,1 tonnes/ha. It decreased to about 18.000 tonnes in 2006 (cultivated area: 41.800 ha, productivity: 0,89 tonnes/ha). The decline in the pepper production was caused by a low productivity (disease attack) and a reduction of pepper cultivated area (switch to tin mining and/or to palm oil). In 2001, about 40% of Bangka households were engaged in white pepper production.

Production practices for white pepper on Bangka



Types of pepper cultivation with “concrete pole” and “wooden pole”.

White pepper of Bangka still fetches a good price because of the heritage of the island and its reputation on the international market. However, because of the importance of tin mining, land scarcity and soil fertility are now a significant threat to the production of white pepper. Farmers have to practice an intensive type of cultivation on a limited cultivated area. This involves planting pepper vines on concrete or wooden poles on full sun plantations and using considerable amounts of pesticides and fertilizers. White pepper is considered a capital-intensive crop. In Bangka Belitung islands, the majority of farmers (98.4%) usually grow pepper by using concrete or wooden poles enabling the pepper tree to climb while only a 1.6% intercrop pepper with other crops. Farmers in Bangka experience difficulties in obtaining pest or disease resistant seedlings. They usually use their own planting material as seedlings. Research has been done to promote agricultural diversification of white pepper cultivations, mainly with the introduction of life poles. However, implementation has not yet been done on a large scale. A few examples of agro-forestry cultivation of white pepper exist by Chinese communities in the west of Kalimantan.

Sustainability issues

The chapter on Spice sustainability should be referred to for a general overview of sustainability issues. This paragraph only highlights a few points that are specific to pepper production in Indonesia.

Water quality: Large scale tin mining on Bangka challenges the supply of clean water to soak pepper corns. As a result, rain water is often collected in sinks in the ground, implying risk of contaminations. The Indonesian government works on developing water treatment units for pepper farmers, but such units have not yet been supplied at farm level.

Climate change: Production zones are shifting. In Indonesia it is reported that farmers are moving to mountainous areas since the climate in lower production areas is not optimal for pepper production but better fits cocoa production. This transfer of production area has caused land conflicts between traditional farmers in mountainous areas and new comers. Further research needed on this topic is however required.

Use of Chemicals: Indonesia prescribes the use of specific agro-chemicals and subsidizes farmers to purchase them. The Department of Agriculture of Indonesia provides the synthetic pesticides recommended by the Indonesian government for black pepper. Most of the pesticides used are insecticides, namely pyrethroids (Pyr) or organophosphates (OP) or carbamates (Carb), and two herbicides i.e. Paraquat and glyphosate. Although fertilizers and pesticides can be essential for smallholders to avoid crop failure, their unwise use presents a significant environmental concern.

Use of agro-chemicals in black pepper cultivation:

Different studies have highlighted the environmental side-effects of pesticide use in South-East Asia. The contamination of the aquatic ecosystem might not only harm the ecological integrity of the water, but also the livelihoods of local people in terms of reduced (drinking) water quality, reduced productivity (e.g. fish kills, effects on cattle that uses surface water as drinking water).

There are annually about 30000 cases of pesticide poisoning in Indonesia. A study was performed in 2008 on the current farmer habits and consequences of the use of synthetic pesticides in pepper plantations, especially on Bangka Island. It revealed a generalized unwise use of pesticides (96% of the cases): too high concentration, continuous use of the same brand, poor application technologies and absence of protective equipment during spraying. Farmers proved to be predominantly unaware of the possible impact of pesticides on their health and 18% experienced pesticides poisoning. The environmental risk assessment for the aquatic ecosystem and terrestrial below ground invertebrates using hypothetical scenarios indicated low risks for the terrestrial invertebrates but high risks for aquatic ecosystems. (Wiratno, 2008)

Land use: It is reported that farmers gain cultivation area on forest in Indonesia, which negatively affects biodiversity. Also the logging of trees to serve as poles for pepper vines might lead to forest clearing. Further research is needed.

Soil fertility, erosion, soil pollution: Because of competition for land between white pepper farming in Bangka and tin mining, white pepper is cultivated in a monoculture. This practice leads to fertility loss and increased dependence on fertilizers.

Tin mining and white pepper in Bangka

Tin mining, which began in the 18th and 19th centuries, is a major industry on Bangka Island together with traditional activities such as pepper farming and fishing and, currently, trading. Illegal economic activities such as smuggling of tin have been long embedded in the history people of Bangka. Smuggling activities are not only a response to trade monopoly (by the Dutch VOC and later by the Indonesian government after the independence) and resistance to state power, but also as a strategy of common people to survive especially during political and economic crises. In the 1960s the price of basic necessities soared and the price of tin abroad was high; the pepper farmers felt victim to pepper pest and the pepper price fell drastically. As a result, smuggling of tin became rampant at the onset of the 1970s. During the 1970s, when Indonesian economic development was gloomy, almost all people of Bangka were involved in tin smuggling to meet their daily needs. Smuggling of tin in the late of 1970s and in the beginning of 1980s—when state control was quite strong—was correlated with the decline of other local economic sectors such as the price of pepper and rubber.

The deregulation of the tin trade in 1999 was followed by an unprecedented interest of local government, businessmen and local inhabitants for tin mining. Two years later, the local Regent authorized export of tin sand in the objective of increasing locally-generated revenue from tin business, because local revenues from pepper export were declining together with the decrease of its price. This new regime encourages the rise of “informal mining” at a time of declining pepper prices (the price of pepper fell from Rp 90,000 per kilogram during 1998 to Rp 30,000 in 2001 and then Rp 19,000 in April 2005). Many residents switched from pepper farming to tin mining with the promise of immediate cash availability upon collection of the tin sand (unlike cultivating pepper plants which required a lot of patience). The new mining regime of the Regent has made an extraordinary contribution to locally generated revenue: In 2006, tin production by the illegal miners reached Rp 310 billion monthly, while the population of Bangka and Belitung only amounted to 1.3 million.

However, informal mining practices gave birth to a short-term oriented exploitative economy with no concern for the working and living conditions of the miners or the environment of Bangka. Simultaneously, it gave rise to numerous conflicts, between the public and the government, and within and between the mining and non-mining communities. On land, the informal miners encroach on protected forests on the slopes of mountains, residential areas, plantations, near public facilities such as roads, bridges, and public water processing plants, and right next to local residents' rice fields, leaving more than 6000 open pits in 2006. The encroachment of informal mining into prohibited areas has had a tremendous impact on the residents of Bangka. Village residents complain that clean water from the rivers has become scarce. The rivers can no longer be used to soak pepper and the water can no longer be used for daily needs. Forests are disappearing, because even the pepper farmers have converted their pepper plantations into “tin plantations.” As of 2002, the regional and central government have initiated different measures to regulate or control informal mining and its smuggling to neighboring countries, to jugulate its impact on the environment and to recuperate the revenue losses from these informal activities. These measures have not yet been able to diminish the economic attractiveness of informal mining in comparison to other economic activities such as pepper farming.

In 2008 the governor took measures to try to curb the practice of community mining and to restore the agricultural sector. However, this measure had little effect on practices since it conflicts with the national measures that allows or tolerates community mining.

Adapted from Swiss Contact, 2010 and Erman, 2008)

Price volatility: The price of pepper is extremely volatile; it is one of the most instable prices amongst all commodities traded internationally. Pepper producers, especially those who rely on pepper for a major part of their cash earnings, are particularly exposed to price fluctuations. Volatile short-term price fluctuations make it difficult for farmers to plan and invest in more sustainable practices.

Bargaining power: In Indonesia, it is reported that about one-fifth of pepper farmers sell their pepper at a fixed price prior to harvesting; others sell their pepper prior to harvesting by accepting a small advance, with the final price being determined after the harvest. This is reported to be prevalent for white pepper farming: because it is capital intensive, farmers borrow money from traders which can dictate their price levels. As a result, traders often operate as finance-providers or input providers. In the case of ageing plantations for white pepper, it is reported that farmers would easily opt for tin mining unless they could receive some capital or secure the co-investment of a trader in a new plantation. Farmers need a lot of money in three years before harvesting time to prepare the land and to buy good seedling, wood/concrete poles and fertilizer.

Sub-optimal yield levels, Crop failure risks and production losses:

Pepper yields in Indonesia are reported to be half of potential levels. (e.g.: black pepper in Lampung yields 500kg/ha, and in Bangka 890kg/ha, in other countries white pepper yields are 900 - 1,000 kg/ha; Sri Lanka: 1,350 - 2,500 kg/ha; Brazil: 600 – 4,000 kg/ha). Pest and disease attacks, poor quality of seedlings and lack of technology, support and funding are reasons for this sub-optimal productivity.

Relevant government policies

In order to improve competitiveness in a global market, the Indonesian government facilitates smallholders applying to international standards such as ISO 9001 (year 2000), ISO 14000, HACCP and SPS. The Indonesian Agriculture Department under the Plantation Directorate has a program on pepper up to 2010, aiming at improving productivity and quality, developing upstream added value, farmer empowerment, institutional strengthening and capital facilitation.

The Association of Indonesian Pepper Exporters (AIPE) is established to bridge exporters and the government. It aims at providing support for improving cultivation and management practices of pepper growing and at improving the position of exporters. AIPE also cared for the extension of the area under pepper cultivation, for the improvement of pepper quality and the improvement of the processing and shipment of pepper. Nowadays, AIPE is not so active anymore and mainly records export transactions.



Annexes 3 : Global trade of organic spices

Table 63: World consumption of organic spices in MT (2001-02)

Country	Pepper	Ginger	Turmeric	Cardamom	Chilli	Cloves	Nutmeg	Vanilla	Other	Total
France	35	25	20	7	6	7	10	1	5	116
Germany	150	50	30	30	18	25	18	5	5	331
Netherlands	15	12	10	7	5	5	5	-	-	59
UK	50	25	35	12	10	10	12	1	5	160
USA	10	5	-	5	12	5	10	2	6	55
Japan	15	50	-	-	-	5	5	0.5	15	90.5
Other	10	12	5	7	10	5	7	-	7	63
Total	285	179	100	68	61	62	67	9.5	43	874.5
Value (US \$)	882161	276331	169500	795600	113497	499906	88440	228000	38700	3092134

Source: EXIM bank report 2003

Table 64: World supply of organic spices in MT (2001-02)

Country	Pepper	Ginger	Turmeric	Cardamom	Chilli	Cloves	Nutmeg	Vanilla	Other	Total
Guatemala	-	10	20	35	8	-	-			73
Honduras	-	5	-	7	5	-	-			17
India	60	20	2	5	7	7	3		10	114
Indonesia	50	10	10	-	-	12	-		7	89
Malawi	-	3	-	-	-	-	-			11
Madagascar	50	1	5	-	-	-	-			77
Pakistan	-	-	20	-	5	7	5	9		25.5
Sri-Lanka	140	50	12	3	-	-		0.5		257
Tanzania	13	45	7	3	7	8	39		5	93
Vietnam	-	10	16	-	-	18	-		13	39
Others	-	25	10	20	23	10	20		30	138
Total	313	179	102	73	63	62	67	9.5	65	933.5
Value (US \$)	968829	276331	172890	854100	117218	499906	88440	228000	58500	3264214