



CBI  
Ministry of Foreign Affairs

# **CBI Scenario Planning:**

## **Scarcity of Spices - Chillies**

*Future expectations on supply and demand:  
a case study on the global market for chillies*

## 1. Introduction

The growing sense of scarcity is perhaps the single most important issue in the spice sector at the moment. In the past decade, prices levels have increased significantly and the sourcing challenge of buyers has increased. Together with many other changes in the supply chain the future looks more uncertain than it has done in the past. Therefore, to what extent scarcity is expected to be an issue for chillies will be explored in this study. Different scenarios will provide insights into what the future might hold and which are the related opportunities and threats for exporters from developing countries.

Scarcity is on the agenda of the entire food sector and stakeholders are taking actions to ensure future supply. It is clear that all agricultural markets will be directly or indirectly affected by the effects of an increasingly tight balance between supply and demand. All product markets however have a different dynamic and some will be more affected than others. In this document the main question is to what extent scarcity will affect the chilli market in the coming decade (i.e. 2014-2024). Related to this, the influence of the future balance between supply and demand on exporters in developing countries will be discerned.

To gain an insight into the different possibilities we will formulate various possible scenarios. This will be preceded by a statistical analysis of the current supply and demand situation. This will be followed by the identification of driving trends and developments of supply and demand. For this purpose we look at the determinants for supply and demand as formulated by the macro-economic [supply and demand model of price determination](#). These determinants will provide direction to what variables are important when looking at supply and demand.

In the next section preliminary conclusions and critical uncertainties related to the main research question are summarized. The uncertainties will form the basis of the scenarios which are described in the following chapter. The scenarios will address the question what will happen to the balance between supply and demand in the coming decade. This will be followed by a discussion on what the most likely scenario in the coming decade will be. In the final part of this document opportunities and threats for exporters from developing countries related to the most likely scenario are given.

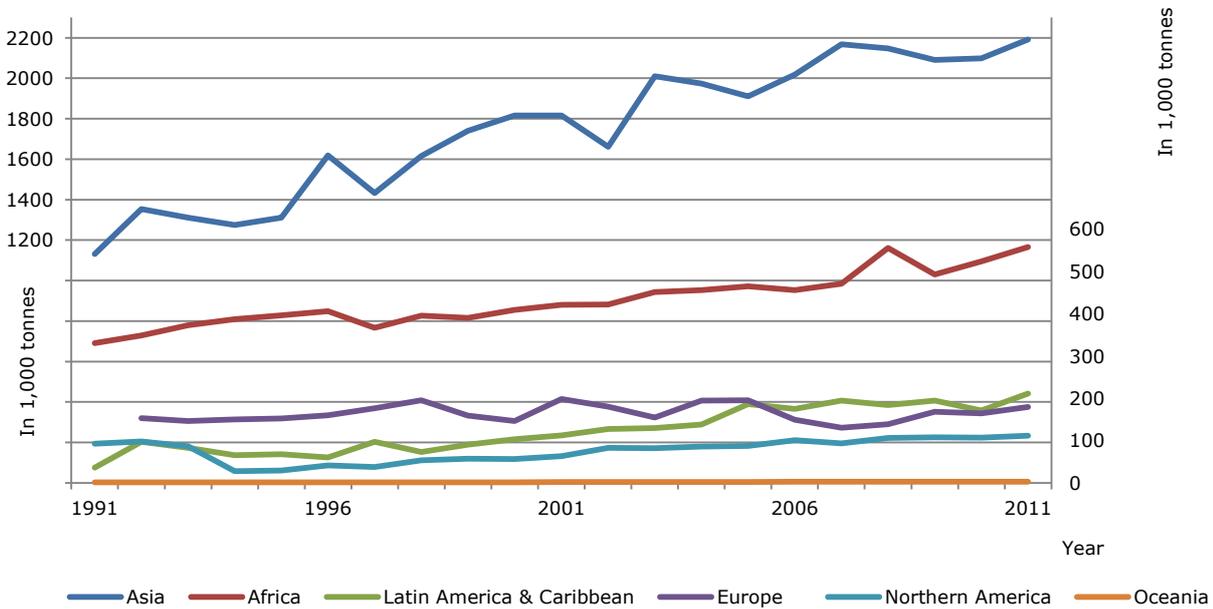
The scenarios we have arrived at in this document are based on secondary research (e.g. articles and market reports) and primary research such as interviews with sector experts. Nevertheless, scenario planning is based on uncertainties. Therefore, findings should be considered carefully.

## 2. Analysis current demand/supply balance

The statistical data in this document are based on Combined Nomenclature (CN) codes. The CN uses Harmonised System (HS) codes to classify products. The HS-code 09042200 used for this analysis is an aggregated product code. Dry chillies, (dry) sweet peppers, allspice and Jamaica peppers, both whole and crushed and ground versions are included. Although chillies are the largest part of this product group, conclusions based on the statistical analysis should be considered carefully.

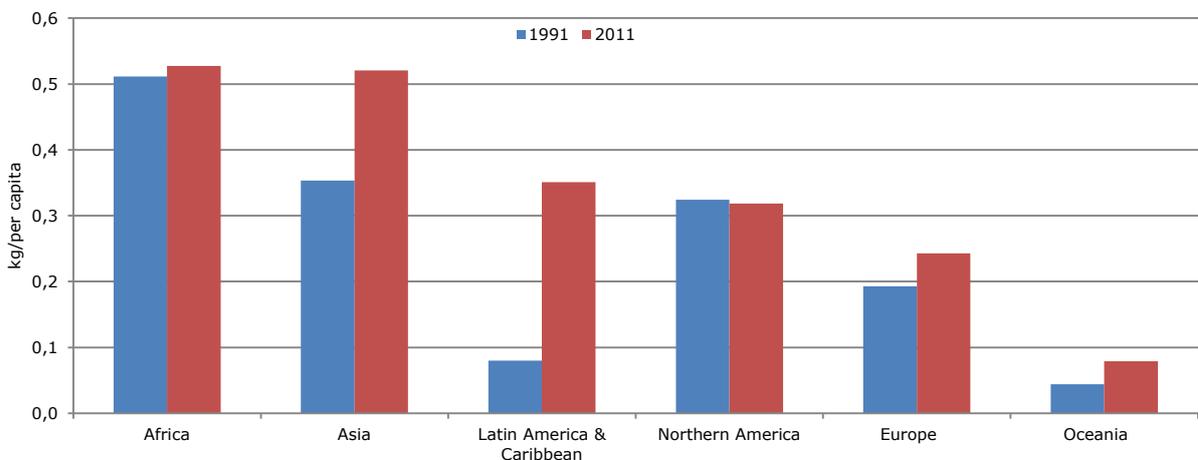
### Development of demand

**Figure 2: Apparent consumption of capsicums in different regions of the world, 1991-2011, in 1,000 tons**



Source: FAOSTAT, 2014

**Figure 3: Development of per capita apparent consumption dry chillies and peppers, 1991-2011**



Source: FAOSTAT, 2014

Apparent consumption<sup>1</sup> (from here on called consumption) of dry chillies and peppers in 2011 amounted to 3.3 million tonnes. Between 1991 and 2011 global consumption increased by 2.5% per year on average (Figure 2). This is partly due

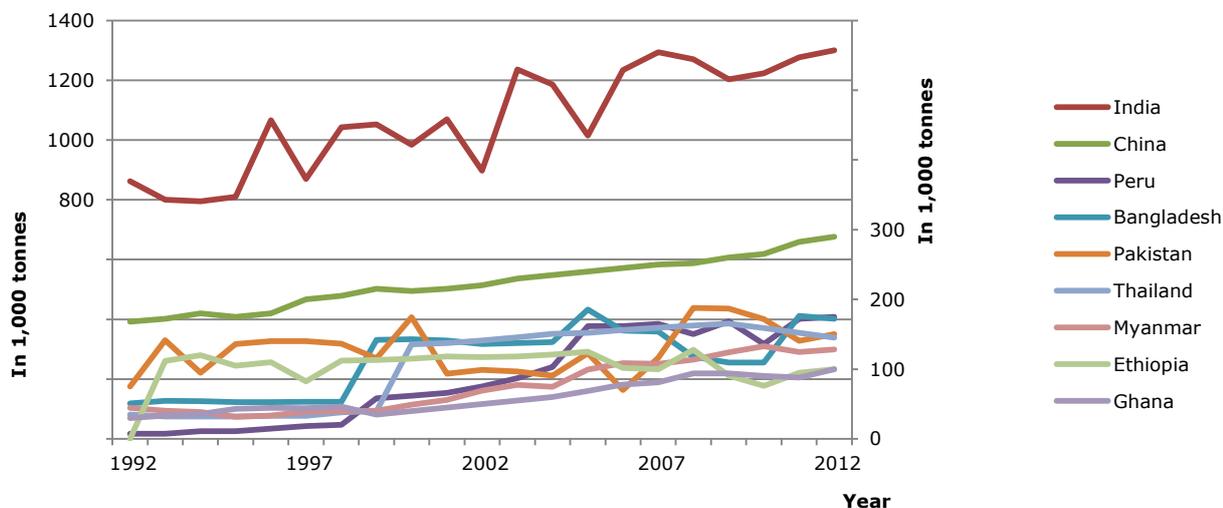
<sup>1</sup> Apparent consumption = Production plus imports minus exports. Due to the limited availability of trade data it is not possible to calculate apparent consumption after 2011.

to growth of the global population (1.3% per year) (Source: FAOSTAT, 2014) and growing demand for agricultural products (+2.2% per year) (Source: OECD, 2013). Due to increased popularity of capsicums, per capita consumption has also increased: from 36 gr/per capita in 1991 to 47 gr/per capita in 2011. Per capita consumption did not only increase in Asia where consumption is traditionally high but also in Latin America and the Caribbean.

Europe and North America account for about 10% of global consumption of dry chillies and peppers (down from 12% in 1991). The other 90% is consumed by mainly developing countries in Asia (67%, India alone accounts for 33%), Africa (17%) and Latin America & Caribbean (6.5%).

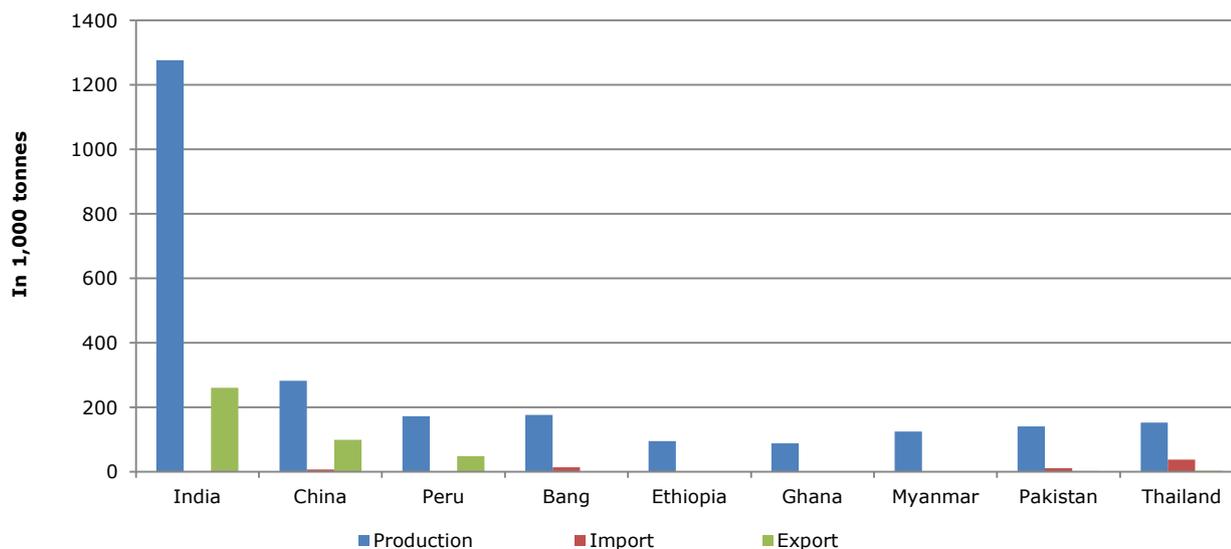
### Development of supply

**Figure 4 Production of dry chillies and peppers by most important producers, 1992-2012**



Source: FAOSTAT, 2014

**Figure 5: Production and trade of dry chillies and peppers by most important producers, 2011**



Source: FAOSTAT, 2014

There are hundreds of different chilli varieties with different colours, sizes and pungency. However there are only a few species of chillies that are traded internationally on a large scale. Common chillies traded internationally are the Guntur Sannam - S4 (India), Tiensin (China), Fukien (China), Aji (Peru) and Bird-eye chillies (Africa). Different chillies have different characteristics but they are often mixed with other chillies to control heat (pungency).

Global production of dry chillies and peppers in 2012 was around 3.2 million tonnes. Between 1992 and 2012 production grew by 2.6% per year on average. India is the largest producer (38%), followed by China (8.7%) and Peru (5.2%). Together they account for about 75% of global exports of dry chillies. Figure 5 shows that only the three largest producers export a significant share of their produce: India (20% of total production and imports is exported), China (34%), and Peru (28%).

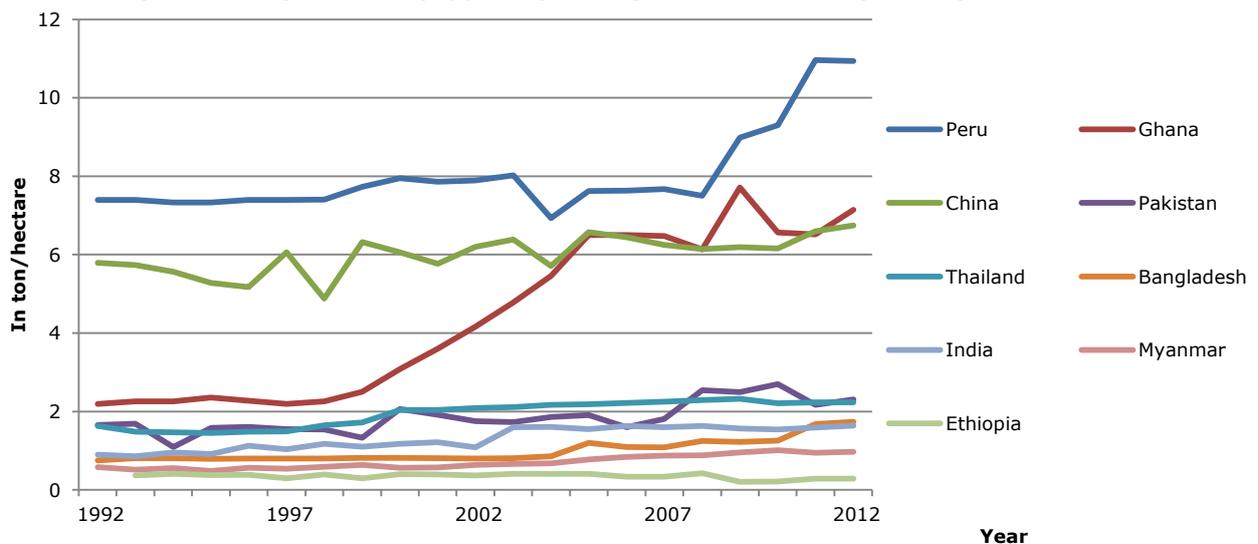
Other countries shown in Figure 5 grow specifically for their domestic market. African countries account for 18% of global production but only account for 3.3% of EU imports and 0.6% of US imports. An important reason is that African bird eye chillies are less demanded in those regions. In addition, problems with supply security from African countries have been reported in the past.

Production can be seen to fluctuate strongly per year. The fact that chillies are rain fed crops in many parts of the world chillies make them depend strongly on weather conditions. Production in China, Peru and Ghana have fluctuated less and has grown steadily over the years. Growth of production in China was mainly due to an increase in the area under cultivation. In Peru it was a combination of a growing area under cultivation and increasing yields. In Ghana growth of production has only been accomplished by increasing yields.

Growth of dry chillies and pepper production between 1992 and 2012 (+2.6% per year) was partially due to the increase in land use which grew by 0.7% per year.

In most of the large producing countries however area under dry chillies and pepper cultivation is stabilising or even decreasing: for example from 21 thousand ha in 2007 to 16 thousand ha in 2012 in Peru.

**Figure 6: Development of dry chilli and pepper capsicum yields of 9 most important producers, 1992-2012**



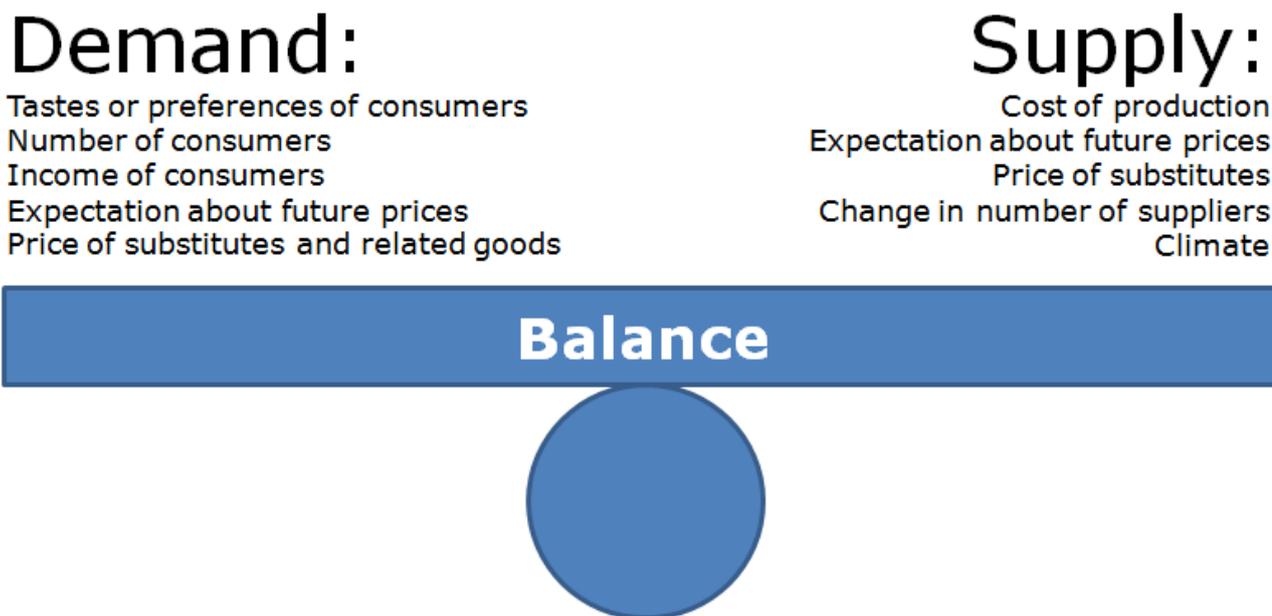
Source: FAOSTAT, 2014

As Figure 6 shows there is a large difference between the three countries with the highest yields and the other producers. Peru has the highest yield (11 ton/ha) which is partly explained by the common application of irrigation. China has relatively high yields (6.7 ton/ha) but they are almost on the same level as 20 years ago. India has significantly lower yields (1.6 ton/ha) which have not grown in the past decade. A distinction has to be made between yields of the larger professional farmers and those of smallholders. In India, yields of professional farmers can be up to 3 ton/ha, while that of smallholders can be as low as 0.2 ton/ha. Yields in Ghana (9<sup>th</sup> largest producer) have developed strongly (from 1.7 ton/ha in 1991 to 7.1 ton/ha in 2012). This growth is partially driven by investments in training by a.o. the [Millennium Challenge Corporation](#), [Ghanaian Millennium Development Authority](#) and the [Ghana Investment Promotion Centre](#). On the other hand yields in Ethiopia (0.3 ton/ha), the 8<sup>th</sup> largest producer in the world, decreased by 50% between 1991 and 2011 making it the lowest yielding producer in the world.

### 3. Trends and developments demand and supply

To determine the most important trends and developments, the determinants in figure 7 are used for the analysis of supply and demand.

**Figure 7: Determinants of demand and supply**



#### **Demand for chillies: trends and development**

##### **Growing popularity of spicy food**

Chillies are increasingly used to add taste, pungency and colour to food. Part of this is fuelled by increased popularity of cuisines in which spices are widely used (e.g. Indian, Thai and Mexican cuisine). 80% of the analysts polled by Euromonitor had observed an increase in interest in spicy foods in the USA, around 60% in Europe Middle East & Africa, 45% in Asia Pacific and 40% in Latin America (Source: [Euromonitor](#), 2014). The increased popularity of spicy foods will have a significant influence on the demand for chillies in regions where it is still relatively low (e.g. Northern America, Europe, Oceania) as well as in those where it is already high (Asia and Africa).

##### **Developing countries catching up to strict buyer requirements**

There is a positive correlation between a country's income and the restrictiveness of its import standards on agriculture goods (Source: [World Bank](#), 2013). Therefore, developed countries such as the EU and the US have strict buyer requirements regarding food safety, quality and traceability. As an effect of these stringent requirements, industry sources state that trading prices of chillies bought by the EU and US can be up to 20% higher. This has two reasons: 1) the premium paid to farmers and suppliers for maintaining the land, applying Good Agricultural Practices and Good Manufacturing Practices, better storage; and 2) Stocks are lower, so buyers have fewer opportunities to source and wait for prices to drop.

Buyer requirements in developed countries will not ease up. To the contrary, it is likely that requirements will continue to become stricter as a result of increased detection possibilities and scientific insights. A recent example is the [stricter limit](#) for Ochratoxin A for capsicums (effective from 1 January 2015) set by the EU.

With the strong economic development and growing awareness of food safety, standards will also become stricter in countries such as India and China (Source: [World Bank](#), 2013), which are important consumers of chillies. The Indian Spice Board has already pushed towards further [harmonisation](#) of international food safety standards for spices. This means that producing countries such as India will work more towards complying with stricter limits set by the US and the EU. The difference between buyer requirements in developed and developing countries is expected to become smaller but will remain significant. The share of chillies that comply with stricter buyer requirements will therefore have to increase.

## **Sustainability's growing importance**

The demand for sustainability in spices is developing rapidly, especially in the developed countries in the EU and the Northern America. Buyers are increasingly asking suppliers to comply with sustainability requirements. In addition, the market share for certified sustainable spices including chillies is increasing (refer for CBI's factsheet [Sustainable spices and herbs in the EU](#) for more information). Important sustainability issues for chillies are use of pesticides (especially in India), no child labour, health and safe working conditions and fair pay for farmers. With increased pressure on natural resources, sustainability will become a more important issue in the sector. This does not only apply to developed countries but also to developing countries that are not only involved as producers but increasingly as consumers. Scarcity is strongly related to sustainability in the experience of most players in the supply chain. To what extent the sector is engaged in addressing sustainability therefore depends strongly on the future balance between supply and demand. The level of engagement will also influence how the market for sustainable chillies will develop.

## **Use synthetic substitutes limited by consumer preference**

In the food processing industry dry chillies can be replaced by synthetic capsaicin (i.e. the pungent substance in chillies) such as synthetic nonivamide. Advantages of synthetic capsaicin are that it is generally cheaper (4-5 cheaper than natural capsaicin) and more heat-stable than chillies. In addition, there are no shortages. The use in the food industry is however still limited. A growing share of consumers in developing countries is turning towards healthy and natural food. In most developed countries, fresh meal preparation is more common and there is a large supply of cheap chillies to use. According to industry experts therefore the threat of substitution is low when there is sufficient supply. Only in the case of supply scarcity and a strong price increase will synthetic become a source of competition. The threat of substitution is higher in the low-end of the market or in products in which chillies (i.e. for their pungency) are an important ingredient (e.g. condiments, seasonings, dressings).

## **Slowdown growth global population**

Growth of global population will continue to drive up the demand for chillies. However, until 2022 the growth of world population is expected to slow down to 1% per year – from 1.3% per year between 1992 and 2012. The slowdown in the growth rate will occur in all regions, but the individual rates will be different. Developing countries are expected to continue to experience the fastest population growth, with Africa leading the group with a projected growth of 2.3% per year in 2022.

## **Economic growth remains strong in developing countries**

Economic growth in OECD countries, consisting of mainly developed countries, is expected to average 2.2% per year until 2022 (Source: [OECD](#), 2014). Further economic growth here will only have a limited effect on the per capita food consumption. Growing consumption of chillies in these countries will come mainly from increasing popularity of chillies and growing demand for luxury food products.

Growth of the non-OECD economies (which consist mainly of developing countries) is expected to be around 5% per year (down from 7% per year in the previous decade) in the 2020s. China and India are expected to continue growing at an impressive 7.6% and 6.7% per year (Source: [OECD](#), 2013). Growth in chilli consumption in non-OECD countries will not only come from increased per capita consumption but also come from a growing nutritional demand as a result of economic growth.

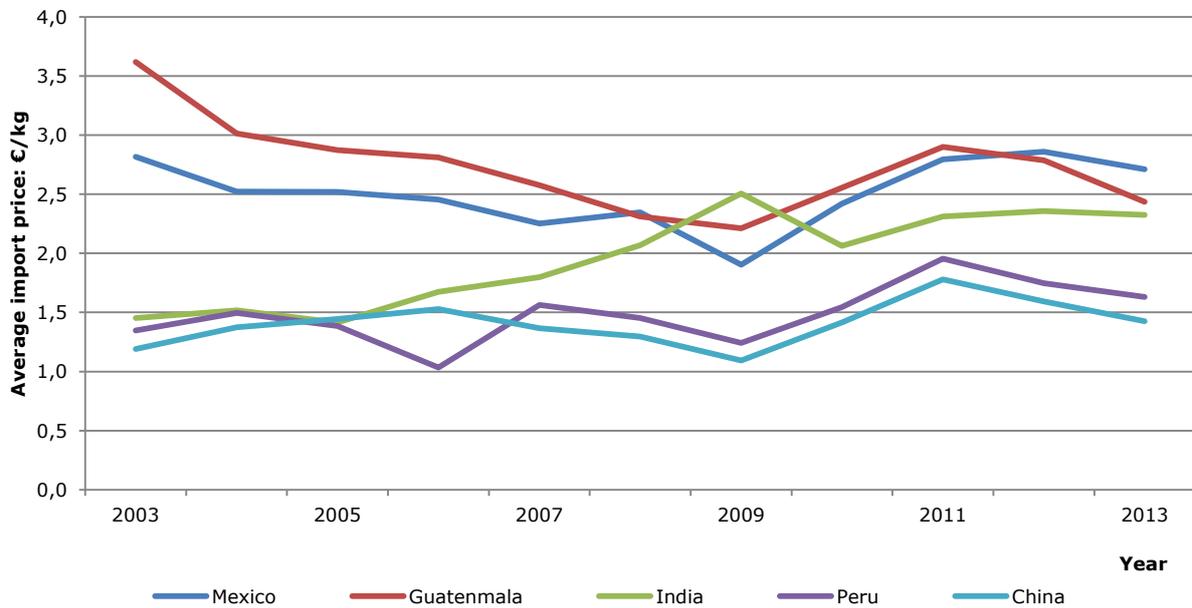
## **Increased trade among developing countries**

As a result of a stronger growth in population and economy than in developed countries, trade between developing countries will develop strongly. This is already noticeable - between 2003 and 2013, exports of dry chillies and peppers by India, China and Peru to developing countries increased by 14%, 5.3% and 29% per annum respectively. Indian (+5.3% p.a.) and Peruvian exports (+8.2%) to developed countries increased significantly less. In the case of China they even decreased (-5.4%) (Source: ITC, 2014).

## **Stable chilli become more volatile**

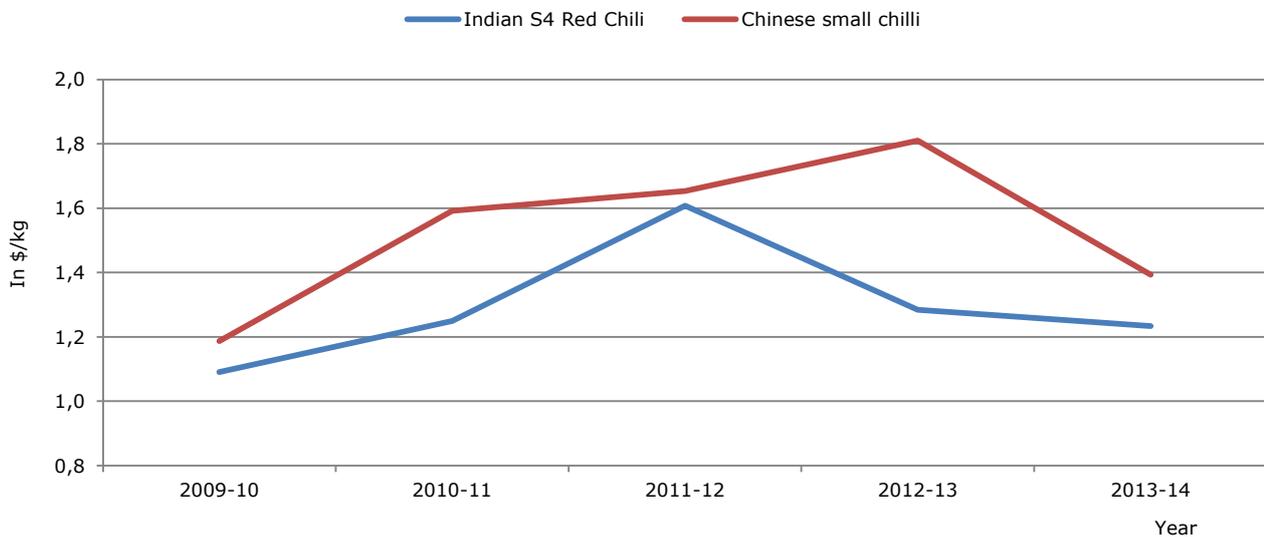
Looking back on the past two decades, supply and demand were relatively balanced. As any agricultural product, chillies show price fluctuations but prices remain relatively stable over time. The average import price of whole chillies by EU28 countries was almost similar in 2013 (€ 1.84 per kg) as in 2003 (€ 1.78 per kg). This also indicates that in the past decade scarcity does not show in EU import prices.

**Figure 8: Average import price of whole chilli of the most important supplier to EU28, 2003-2013**



Source: Eurostat, 2014

**Figure 9: Average price of chillies on the New York spot market, 2009-2014**



Source: Indian Spice Board, 2014

The development of market prices will depend strongly on the future supply and demand balance (see under *Possible scenarios chillies*). However agricultural prices in recent years also show a higher level of volatility due to extreme weather conditions, production shifts to less stable countries, economic shocks and increased linkages between prices of agricultural market and energy prices (Source: [FAO](#), 2012). Prices of chillies are expected to also show a higher degree of volatility regardless of the supply situation.

It is important to note that the demand for chillies is relatively price inelastic. Chillies are a minor but important ingredient that contributes little to the total cost of the food in which it is used. Therefore, end users (consumers and industries) will continue to buy chillies when the price increases. Nevertheless, higher prices can lead to more demand for lower quality products or cheaper varieties. When prices become too high, some buyers will look for alternatives.

## Supply of chillies: trends and developments

### Competitive advantage for low cost countries

By 2030, real Chinese wages would have increased by 300% to an average of \$ 2,052 per month. Indian wages would increase even faster (+370%) but will remain relatively low (\$ 616 per month). Due to a strong increase of wages China will become less important as a low cost production location to favour for countries like India (Source: [PricewaterhouseCoopers](#), 2013). This will benefit countries where wages are lower and/or are expected to increase less or even decrease: Peru (-1%), Thailand (1%) and Bangladesh (+67%) by 2030 (Source: [Trading Economics](#), 2015).

The limited availability of land in China and India is increasing prices of arable land. Additional arable land is more readily available in Latin America, the Caribbean and Sub-Saharan Africa (Source: [OECD](#), 2014). Sub-Saharan African has vast amounts of uncultivated land – close to half of global availability, untapped water resources and large scope for improvements in inputs to increase yields (Source: [Deutsche Bank](#), 2013). As a result it will become more attractive to produce in those regions in the coming decade.

### External pressure on chilli producer prices limited

The recent price increase of [chillies in Indonesia](#) show the significant impact rising oil prices can have. They do not only directly influence prices but also indirectly through price of other inputs (e.g. other inputs such as fertilizers), competition for land with commodities that are used for the production of fuel and increasing correlation between oil and non-oil commodity prices (Source: [OECD](#), 2011). At the moment oil prices are relatively low and are expected to increase by only about 1% per year until 2025 (Source: [World Bank Commodity Forecast Price data](#), October 2014). The slow growth of the oil price will not drive up chilli prices. Chillies are directly competing for land with a large variety of other crops such as cotton, sugarcane, various grains, tobacco, and coffee. The projections until 2024 are that crop prices are expected to drop for one or two more years, before stabilising at levels that remain above the pre-2008 period, but significantly below recent peaks (Source: [OECD](#), 2014). It will therefore generally not become structurally more attractive for farmers to grow other crops than chillies.

### Sector focus on GAP and GMP

Due to the growing price and reduced availability of arable land, the needed growth in production should come mainly from increasing yields. Many developing countries are investing further in their agricultural sectors to focus on increasing yields and improving quality. For example, India is investing significantly in reducing pesticide use through the promotion of quality, yield and Integrated Pest Management (IPM) programmes (example [Spice Board India](#)). Also, foreign buyers such as the Dutch trader [Nedspice](#) are investing in Indian farmers to promote IPM. The example of Ghana shows the importance of application of GAPs and GMP. However even here there is still room for improvement. Ghanaian chilli farmers are reported to produce at 50% of attainable yields because of a.o. lack of irrigation (Source: [Millennium Development Authority](#), 2010).

### Application of irrigation slows down

As studies show ([example 1, 2](#)) further application of (drip) irrigation can have a significant effect on chilli yields and the profitability of farmers. Irrigation allows for growing chillies during the dry season and supplementary irrigation during some months of the wet season. In addition, it allows for intercropping. The growth of arable land equipped for irrigation is expected to slow down: from 2.6% per year between 1991 and 2007 to 0.9% per year until 2030. In China and India this growth is expected to be even slower (+0.6% per year). Irrigation is expected to grow stronger in Sub-Saharan African (+1.6%) and Latin America and the Caribbean (+1.7%) (Source: [FAO](#), 2009). Irrigation is expensive, especially in areas where facilities and infrastructure are not yet in place. Only when the price outlook is positive will further development of irrigation be considered.

### Growing professionalism potential to improve profitability farmers

Chillies are considered an attractive crop for most professional farmers. It is highly flexible as it can be planted in different months of the year. It also provides farmers with an income only few months after planting. In addition, prices are relatively stable and the crop has a short price cycle. This means that prices are corrected rapidly by farmers anticipating future prices. In times of oversupply farmers can decide to grow a different crop. They do not have to flood the market for a long period because they have no alternative. It can be less attractive for resource-deprived smallholders. [Reports](#) about low income of Indian farmers name amongst others high inputs costs (e.g. seeds, pesticides) and low level of knowledge regarding GAP and GMP as reasons. In addition, their limited holding power makes them vulnerable. The strong focus in the sector on better GAP and GMP is expected to increase the level of professionalism in the sector. This should make farmers, especially smallholders, better able to sustain production.

### **Innovation on new varieties**

Higher yielding and disease tolerant varieties are an important part of increasing yields. In India they are experimenting with higher yielding varieties and disease tolerant varieties such as the [Manaswini chilli seed](#) or a [hybrid variety of Byadgi chilli](#). These varieties are still in the introduction phase and it will take time before it is commercially viable to cultivate them. Industry experts think that it will take some time for this to happen. Their impact in the coming decade is therefore expected to be limited.

### **Potential effects climate change limited**

In the coming decade climate change is expected to lead to more extreme weather conditions (e.g. droughts, excessive rainfall). Important producing countries of chillies have a [high risk](#) to be affected by climate change. Changing weather is especially an issue for regions such as Africa where chillies are mainly rain fed or drainage measures are not in place. Weather conditions will likely impact the supply situation temporarily and lead to higher price volatility. Nonetheless, it is not expected to lead to structural supply problems of chillies, at least not in the coming decade. The fact that chillies can be grown in many parts of the world with a (sub-)tropical climate spreads the risk of a shortage considerably. In addition, chillies are a flexible crop that in many regions can be planted during different periods of the year.

## 4. Preliminary conclusions and critical uncertainties

Based on the information we will distinguish between the trends and development that we consider highly likely and those that are still uncertain. These uncertainties will provide the basis for the scenarios discussed in the next chapter.

Looking at demand, it is clear that the consumption of chillies will continue to increase, albeit slower than in previous decades. The most important are the slowdown of global population growth and economic development. The growing popularity of spicy food, and chillies in particular, is expected to partially compensate this. Another development that is highly probable is that consumption will grow especially strong in developing countries, especially in China and India. A side-effect of the strong economic growth in developing countries, is that the gap between buyer requirements in developed and developing countries will close somewhat but remain significant. Sustainability will become a more important theme worldwide.

On the supply side it is clear that the increase in production will need to come mainly from increased productivity. Therefore, in the coming decade further improvements in productivity are expected. This is also likely to lead to a larger share of chillies that complies with the strict buyer requirements in the international market place.

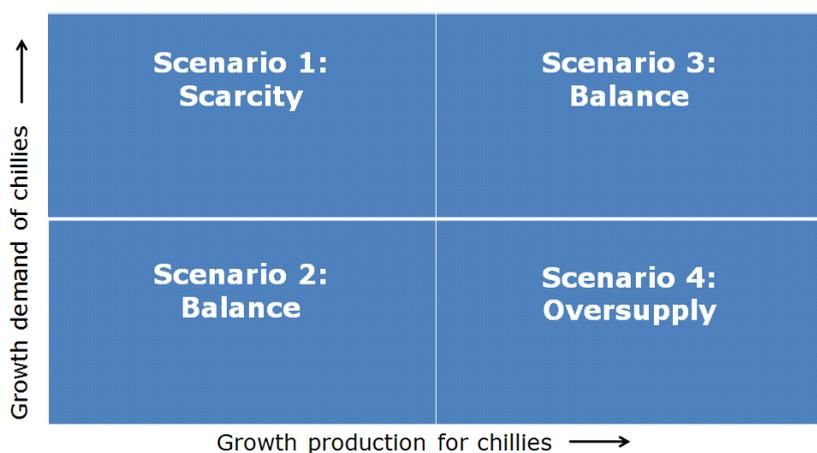
Another trend that is expected to materialize further is that China will become a less important producer and a more important consumer of chillies. It looks like India will become a larger producer but due to growing domestic consumption will relatively exports less. This will lead to changes in trade, enabling smaller countries to fill up the place left by China and India. In addition, trade among developing countries will increase due to their strong development.

This leads to the following uncertainties to be addressed in the scenarios:

1. How fast will demand for chillies keep growing?
2. Is production able to keep up with the growth in consumption and how will growth in production be achieved?
3. What will happen to the prices of chillies?
4. What will happen to cooperation in the supply chain?
5. What are the opportunities in the premium markets?
6. What are the opportunities for small suppliers and those from small producing countries?

### Possible scenarios chillies

Figure10: Different scenarios for balance between supply and demand



#### Scenario 1: Scarcity

In this scenario demand for chillies grows strong but despite investments in the sector, productivity cannot be sufficiently increased to meet growing global demand. As a result, the price of chillies will show a structural price increase. This will be partially due to suppliers with increased resources, thus holding power, being better able to control the market, wait for better market prices and drive prices up. The tight balance between supply and demand and low stock levels means that there will be strong price volatility.

It is a seller's market where suppliers compete less on price and more on the ability to provide supply continuity. There is a strong cooperation in the sector between different actors to increase productivity and efficiency. The level of professionalism amongst farmers and processors will increase significantly. In this scenario all possibilities to increase productivity are explored including innovation and the development of new production areas. Investment in the application

of irrigation is financially justified. The high prices will also attract new suppliers and investment in countries or regions (such as Africa, Latin America) that show high potential will also attract investments leading to faster development.

Buyers that usually prefer to deal with several large suppliers are now forced to deal with a larger number of small suppliers from different parts of the world. This provides better opportunities for smaller suppliers as well as smaller producing countries. As a result the number of commercially traded varieties of chillies will increase leading to a more diversified market place. The market acceptance for pest-resistant and high yielding varieties will also accelerate.

The rising price levels will make it more interesting to sell to buyers with moderate buyer food safety requirements. Buyers that have strict standards will have to continue to pay a significant premium for compliant chillies. In this scenario sustainability will be strongly related to scarcity. The sector will be engaged and will invest heavily in training and farming practices to help increase yields and improve the livelihoods of farmers. The large involvement of industry players will help accelerate the integration of sustainable practices in the mainstream market. Investing in sustainability is therefore crucial.

Exporters in developing countries have excellent possibilities to work together with players further down the supply chain. Their position can also be threatened by these, actors, whether domestic or foreign, sourcing directly from farmers or setting up their own facilities in origin. It is therefore important for exporters to consolidate their position by strengthening their network, investing and cooperating.

Although the demand for dry chillies is to a large degree inelastic to price changes, food processors faced with scarcity will be more willing to consider (partially) switching to synthetic substitutes. This is especially true in the low-end of the market where price is an issue or for food processors of products in which chillies are an important ingredient (e.g. condiments, seasonings, dressings). Another option is that a larger share of the market will have to make do with chillies of a lesser quality (e.g. aesthetic characteristics).

## **Scenario 2: Balanced slow growth and demand**

The slowing down of global population growth and reducing demand for food products, will also influence the demand for chillies. The increase in popularity of chillies will partially compensate this but overall growth will slow down to between 1.1% and 1.5% per year. Production will have to grow at a similar rate - as opposed to 2.6% per year in the previous decade.

Prices for chillies are relatively stable. Scarcity of oversupply will exist but will be temporary and not structural. Any imbalance between supply and demand will be corrected swiftly by suppliers either attracted by higher prices or turned off by low prices. This stable situation provides a solid basis for exporters and other sector actors to invest in their business. This will have a positive impact on the share of farmers able to comply with strict food safety standards in developed countries will increase. The premium for chillies that comply with those standards will therefore likely go down (less than 20%).

In this scenario there is a fair amount of cooperation between exporters and farmers to increase productivity. Improvements in yields will come mainly from improvements through training farmers on GAP and GMP and the increased application of irrigation.

Specialised buyers will continue to invest in the sector to bring prices down and improve quality. Some will move towards origin in order to have more control over their supply providing opportunities for cooperation. Buyers with a broader product assortment will focus on the spices where scarcity is an imminent threat.

With China and India exporting fewer chillies, opportunities for suppliers from other (potential) chilli exporting countries increase. This would increase opportunities for countries like Peru and Ghana that already have a professional chilli growing industry.

However, the need for further development will at that moment still be limited. Therefore, less developed growing countries will see less development and continue selling mainly to local or regional markets.

Due to their large concentration, buyers continue to have significant influence to control prices and impose buyer requirements. At the same time a growing share of suppliers are improving their position due to the increased availability of (price) information of chillies and increased investment in productivity and quality.

Sustainability will be seen as an important issue. Focus will be more on avoiding negative impacts and on quality (e.g. less pesticides use) and only to a certain extent on increasing yields. The immediate necessity for further improvement is not there but will be on the horizon looking further ahead. It will take longer for sustainable practices to be integrated the mainstream than in the scarcity scenario situation. However, addressing sustainability is still the way forward, especially when selling in the international market place.

### **Scenario 3: Balanced strong growth and demand**

In this scenario demand will grow by 1.5% to 2% per year. The difference between this scenario and the other 'balanced scenario' is that the popularity of chillies will grow even stronger leading to a higher demand.

This scenario holds the middle between the Scarcity Scenario and first Balanced Scenario. Compared to the latter it will be harder to meet demand and the threat of scarcity is bigger. Investment in productivity will therefore be higher on the agenda of the sector. This will lead to more investments, buyers moving to source and focus on sustainability. It also provides increased opportunities for smaller suppliers and those from countries that currently only export a small share of chillies.

### **Scenario 4: Oversupply**

Despite a growing consumption, supply structurally exceeds supply. This could be imaginable in a situation where measures to increase productivity are very successful and/or consumption growth is moderate. This is really a buyer's market in which buyers are able to dictate prices and impose their requirements. Farmers will continue cultivation for various reasons: for example smallholders can have financial or contractual obligations towards seed companies or traders. Farmers with higher level of professionalism can be willing to continue if low prices are compensated by higher yields.

Due to a low level of investment it will be hard to sustain the level of development of the previous decade. In addition, cooperation in the supply chain will stall. Poor prospects will make access to finance difficult. The resource-deprived farmers will have limited opportunities to further develop. In addition, international buyers that generally prefer sourcing from a limited number of suppliers and countries, will make it harder for suppliers from smaller producing countries to find their way to the international market place.

The sector will focus on the most pressing sustainability issues are addressed (e.g. no child labour, pesticide use). Other issues such as the low income of farmers and negative impacts on the environments (e.g. loss of biodiversity) will be driven more by NGOs and governmental organisations and conscious consumers. Suppliers that want to set up sustainable projects will have turn to those NGOs and governmental organisations. Due to the limited engagement of the sector, the integration of sustainability in the mainstream market will be slow. Sustainability chillies will be mainly sold in niche markets. Nonetheless, this can provide interesting opportunities for suppliers. In any high volume and low price market, it is important for SMEs to differentiate themselves and add value. The premium market for chillies that comply with the strict buyer requirements in international markets is also an interesting segment of the market.

## 5. Conclusion

Based on the research done we think *Scenario 2: Balanced slow growth and demand* is the most likely scenario. Most industry experts interviewed for the purpose of this study commented that they expect scarcity to be an issue for several spices but not chillies.

First, we think a growth rate of 1.1-1.5% per year is realistic. Chillies are already an essential part of diets in Asia and Africa which together account for about 90% of global consumption. Growth in consumption of chillies here will mainly be under the influence of economic development and population growth which are to be strong but will slow down compared to the previous decade. The growing popularity of chillies in other regions (e.g. EU, US, Latin America) will likely partially compensate but not enough to sustain the high growth rates of demand in previous years.

Production is expected to be able to keep up. The fact that producing countries, governmental organisations, NGOs, market players and other international donors (e.g. USAID, World Bank) are investing significantly in the sector is a sign that improvements are coming. As shown by Ghana much can be won by applying better GAP and GMP. This also applies to increased application of irrigation as seen in the example of Peru. Furthermore, the increased transfer of knowledge, growing cooperation and the further development of higher yielding chilli varieties will lead to higher yields. It will also provide a higher incentive for farmers to continue production.

Therefore, if the need is there it seems possible to sufficiently raise the level of productivity to meet future demand.

### Opportunities and challenges

The opportunities and threats for exporters in developing countries will depend strongly on the expected changes in the coming decade. Below is an overview of the most important opportunities and threats.

#### Local and south-south trade

The growing demand in India and China will mean that they will export less and import more in the coming decade. This provides opportunities for suppliers that can fill the gap left by the reducing Indian or Chinese exports. In addition, in India and China the growing middle and high class will want to buy high quality chillies with specific taste and pungency. For example, African bird eye chillies can be exported to be used in Indian curries. At the moment, most countries source a large share from giants such as India, China and Spain (mainly a trading country). Smaller supplying countries can however find increased market openings.

#### Tip:

- Use [ITC's Trademap](#) to determine which countries are increasing their imports and how trade with your country is developing.
- Look for information on developments in growing developing countries such as India and China. The [Indian Spice Board](#) has a lot of valuable market and price information on their website.

#### Monitor buyer requirements closely

Buyer requirements, also those in your country or region, will get stricter or monitored more closely. The recent implementation of OTA legislation by the EU shows that specific countries can be affected strongly by changing requirements. As the formation of OTA is strongly dependent on climatic conditions, the year-round tropical climate in Peru means they will also be strongly affected by the new EU OTA legislation.

#### Tip:

- The guidelines by the [European Spice Association](#) (ESA), [American Spice Trade Association](#) (ASTA) and the [New Zealand government](#) (specific chilli requirements) are examples of the requirements you will need to follow when exporting these regions. The [Indian Spice Board](#) (see under quality) gives more information about the requirements in India.
- Educate growers in term of efficiency and agronomics to improve your supply continuity. Refer to the guidelines on [Good Agricultural Practices for spices](#) (IOSTA) and [Good Manufacturing Practices for spices](#) (IPC) for more information. Furthermore, consider investing in artificial drying and climate controlled storage and transportation.
- Invest in stability. Please keep in mind that securing supply is the most important for your buyer, especially in developed countries.

## Growing international cooperation

There will be more cooperation in the sector. This is partially based on the need to increase productivity. Also, Western food companies interested in serving a growing international market will want to look for suitable partners. For example, [McCormick](#) acquired Wuhan Asia-Pacific Condiments. A growing south-to-south trade will also lead to more cooperation between developing countries. [Everest Spices](#) (India) recently established a spice manufacturing plant in Zanzibar, Africa. For SMEs in developing countries mergers or acquisitions are generally not an option. Opportunities can however open up by working together with these larger local parties.

### Tip:

- Be less opportunistic and more strategic about the market you target and the partners you work with. If you are looking to export to international markets do not just send your products and hope for the best. Take your time to understand the market you are targeting and try to get an idea whether you can compete on quality and price and are able to meet the other requirements in the market.

## Stay connected

The price of chillies fluctuates strongly per harvesting season and increased price volatility is expected. This means that you will have to stay on top of things. Timely monitoring price developments, production figures and worldwide estimates and trade developments can be of vital importance.

### Tip:

- Keep updated on prices. [Spices Board India](#) publishes weekly and monthly price of pepper (Indian as well as international prices) for free. [Public Ledger](#) publishes monthly price analyses but this is a paid service.
- Look for crop reports online or visit conferences where these are shared. They will provide you with valuable information regarding your competitive position in coming months. Champagne Foods publishes various crop reports on chillies ([here](#) and [here](#)).
- Read to report [Price Volatility in Food and Agricultural Markets](#) to learn more about the topic.

## Think long-term and work together

By 2050 the world's population is expected to have reached about 9 billion people and the demand for food to have increased by between 70% and 100%. Despite a relative balance between supply and demand is expected, the threat of scarcity is glooming when no improvements are made. If you want to stay in business you will have to go along with new developments, invest in your suppliers and consider investing in long-term sustainable solutions.

### Tip:

- Governmental and non-governmental organisations in developed countries often have programmes and subsidies available for investments in agricultural sectors. Therefore, look for possible partners to take issues up with the help of these funds. Look for more information on websites such as the [Sustainable Spice Initiative](#), [Netherlands Enterprise Agency](#), [German Ministry for Economic Cooperation and Development](#) and [Cordaid](#).
- Learn from success stories from around the world such as [India](#), [Pakistan](#), [Ghana](#) and [Colombia](#). Vital in achieving success is investing in farming practices, networks, irrigation and/or artificial drying. There are several studies ([example 1](#), [2](#)) written about the profitability of the application of irrigation in chilly farming. Drip irrigation is the more sustainable option as it saves water resources and reduces soil degradation. Drip fertigation can be especially profitable in [low fertility soil](#).
- Investing in farmers is not only profitable for large companies. As this [economic analysis](#) of chilli production in Nigeria shows, return on investment in inputs (e.g. manures, fertilizer, irrigation, plant protection and irrigation) can be higher in medium and small size farmers group than large farmer's group.
- Paying fair prices to smallholders (that are strongly affected by price volatility) can also be an important factor in success. As this study [shows](#) applying organic farming practices can be profitable in terms of due to higher yields and market price.



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